RUSSIAN RIVER ESTUARY MANAGEMENT PROJECT

Draft Environmental Impact Report

Prepared for
Sonoma County Water Agency

December 2010

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ACRONYMS, ABBREVIATIONS AND GLOSSARY

Acronyms and Abbreviations

AB	Assembly Bill
ABAG	Association of Bay Area Governments
ADFW	average dry weather flow
ADI	Area of Direct Impact
af	acre-feet
AFY	acre-feet per year
ALS	advanced life support
amsl	above mean sea level
APE	Areas of Potential Effect
ASA	Area of Sensitivity Assessment
Basin Plan	North Coast Water Quality Control Plan
BA	Biological Assessment
BAAQMD	Bay Area Air Quality Management District
BEP	Business Emergency Plan
bgs	below ground surface
BLS	basic life support
BMPs	Best Management Practices
BOD	biochemical oxygen demand
CA FID	California Facility Inventory Database
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Cal EPA	California Environmental Protection Agency
CAL FIRE	California Department of Forestry and Fire Protection
CalARP	California Accidental Release Prevention Program
California Register	California Register of Historical Resources
Caltrans	California Department of Transportation

CARB	California Air Resources Board
CBC	California Building Code
CC	California Coast
CCC	California Coastal Commission
CCR	California Code of Regulations
CDF	California Department of Forestry
CDFG	California Department of Fish and Game
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CH_4	methane
CHMIRS	California Hazardous Material Incident Report System
CHSC	California Health and Safety Code
CIP	Capital Improvements Program
CMP	Congestion Management Program
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
CSC	California Species of Special Concern
CTR	California Toxics Rule
CTS	California tiger salamander
CUPA	Certified Unified Program Agency
CUWCC	California Urban Water Conservation Council
CWA	Clean Water Act
cy	cubic yards

CZMA	Coastal Zone Management Act
dB	decibel
dBA	A-weighted decibels
dbh	diameter at breast height
DEIR	Draft Environmental Impact Report
DO	dissolved oxygen
DTSC	California Department of Toxic Substances Control
DWR	Department of Water Resources
EDR	Environmental Data Resources
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EMI	Emissions Inventory Data
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
EPA	Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Environmental Science Associates
FCWCD	Flood Control and Water Conservation District
FEMA	United States Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FESA	Federal Endangered Species Act
FINDS	Facility Index System
FMMP	Farmland Mapping and Monitoring Program
FMA	Flood Mitigation Assistance
FMP	Fisheries Management Plan
FPD	Fire Protection Department
FPP	Farmland Protection Program
FPPA	Farmland Protection Policy Act
FRHZ	Fault Rupture Hazard Zone
ft	feet
FTA	Federal Transit Administration
g	gravity
GHG	Greenhouse Gases
HCP	Habitat Conservation Plan

HHW	higher high water
HMBP	Hazardous Materials Business Plan
Hz	hertz
IBC	International Building Code
ICBO	International Conference of Building Officials
ICC	International Code Council
IHA	Incidental Harassment Authorization
IPCC	Intergovernmental Panel on Climate Change
IRWMP	Integrated Regional Water Management Plan
km	kilometers
KOP	Key Observation Point
kV	kilovolt
kwH	kilowatt hours
LAFCO	Local Agency Formation Commission
LCP	Local Coast Plan
L_{dn}	day-night average noise level
L_{eq}	equivalent sound level
L_{eq}	energy-equivalent noise level
LESA	Land Evaluation and Site Assessment
lf	linear feet
L_{max}	The instantaneous maximum noise level
L_{max}	maximum noise level
LOS	Level of Service
LUST	leaking underground storage tank
M	Richter magnitude
M&I	municipal and industrial
MBTA	Migratory Bird Treaty Act
mg	milligrams
mg/L	milligrams per liter
mgd	million gallons per day
MHHW	mean higher high water
MLLW	mean lower low water
MLPA	Marine Life Protection Act
MMPA	Marine Mammal Protection Act

MMI	Modified Mercalli Intensity
MP	milepost
MPAs	Marine Protected Areas
mph	miles per hour
MPN	most probable number
MRZ	Mineral Resources Zone
MSDS	Material Safety Data Sheet
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSL	mean sea level
Mw	Moment magnitude
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
National Register	National Register of Historic Places
NBBR	Nesting Breeding Birds and Raptors
NGVD	National Geodetic Vertical Datum of 1929
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOP	Notice of Preparation
NO_x	Nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NPPA	Native Plant Protection Act
NRCS	National Resource Conservation Service
NWIC	Northwest Information of the California Historical Resources Information System
O_3	ozone
OEHHA	Office of Environmental Health Hazard Assessment
OES	California Office of Emergency Services
OHP	California Office of Historic Preservation
OHW	Ordinary high water
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Act

PFMC	Pacific Fishery Management Council
PG&E	Pacific Gas & Electric Company
PGA	Peak ground acceleration
Plan	Sonoma Coast State Park General Plan and EIR
PM 10	Particulate matter $\leq$ 10 microns
PM 2.5	Particulate matter $\leq$ 2.5 microns
PM	particulate matter
POD	Pelagic Organism Decline
ppm	parts per million
ppt	parts per thousand
PPV	peak particle velocity
PRC	Public Resources Code
PSHA	probabilistic seismic hazard assessment
PVP	Potter Valley Project
PWA	Philip Williams & Associates, Ltd.
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RH Plan	Regional Haze Plan
RMP	Risk Management Plan
RMS	root mean square
RPA	Reasonable and Prudent Alternatives
RPM	Reasonable and Prudent Measures
ROG	Reactive organic gases
RRCSCBP	Russian River Coho Salmon Captive Broodstock Program
RRCSD	Russian River County Sanitation District
RRCWD	Russian River County Water District
RRU	Russian River Utility
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SCAPOSP	Sonoma County Agriculture Preservation and Open Space District
SCTA	Sonoma County Transportation Agency
SCWA	Sonoma County Water Agency
SCWMA	Sonoma County Waste Management Agency

SDC	Seismic Design Category
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SLIC	Spills, Leaks, Investigation, and Cleanup
SMARA	Surface Mining and Reclamation Act
SMP	Stream Management Plan
SMR	state marine reserve
SO_2	sulphur dioxide
SOI	Sphere of Influence
SOP	Standard Operating Procedures
SR	State Route
SSWD	Sweetwater Springs Water District
SVFRA	Sonoma Valley Fire and Rescue Authority
SWEEPS	Statewide Environmental Evaluation and Planning System
SWF/LF	Solid Waste Facilities/Landfill Sites
SWMP	Stormwater Management Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	California State Water Resources Control Board
SWRCY	Recycling Facilities in California Database
T&E	Threatened and Endangered
TAC	toxic air contaminants
TDS	total dissolved solids
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
UBC	Uniform Building Code
UC	University of California
UGB	Urban Growth Boundary
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

UST	underground storage tank
UV	ultraviolet light
VdB	Decibel notation
Water Agency	Sonoma County Water Agency
WDS	Waste Discharge System
WMI	Waste Management Incorporated
WMUDS/SWAT	Waste Management Unit Database System
WQCP	Water Quality Control Plans
WQOs	water quality objectives
$\mu g/m^3$	micrograms per cubic meter
µS/cm	microsiemens per centimeter

Glossary of Terms

100-year flood	A flood which has a one percent chance of being equaled or exceeded in magnitude in any given year. Contrary to popular belief, it is not a flood occurring once every 100 years.
acre-foot (AF)	The volume of water that would cover 1 acre to a depth of 1 foot. Equal to 1,233.5 cubic meters (43,560 cubic feet).
active fault	Defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 10,000 years).
anadromous fish	Fish that spend a part of their lifecycle in the sea and return to freshwater streams to spawn.
beneficial uses	Those uses of water as defined in the State of California Water Code (Chapter 10, Part 2, Division 2), including but not limited to, agricultural, domestic, municipal, industrial, power generation, fish and wildlife, recreation, and mining.
Biological Opinion	Document issued under the authority of the Federal Endangered Species Act stating the findings of the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service as to whether a federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction of adverse modification of critical habitat.
California Environmental Quality Act (CEQA)	Act requiring California public agency decision-makers to document and consider the environmental impacts of their actions. Also requires an agency to identify ways to avoid or reduce environmental damage and to implement those measures where feasible. Provides means to encourage public participation in the decision-making process.

channel	Natural or artificial watercourse, with a defined bed and banks to confine and conduct continuously or periodically flowing water.
CNEL	Community Noise Equivalent Level adds a 5-dBA "penalty" for the evening between 7:00 p.m. and 10:00 p.m. in addition to a 10-dBA penalty between 10:00 p.m. and 7:00 a.m. See also "decibel (dB)", below.
cooperating agency	Any federal agency other than the lead agency that has jurisdiction by law or special expertise with respect to the environmental impacts expected to result from a proposed project.
criteria air pollutants	Pollutants that are the primary focus of regulatory agencies as indicators of ambient air quality, which include ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead. These are the most prevalent air pollutants known to be harmful to human health, and extensive documentation on health-effects criteria is available for them.
critical habitat	An area designated as critical habitat listed in 50 CFR Parts 17 or 226 (50 CFR Section 402.02); specific geographic areas, whether occupied by special-status species or not, that are determined to be essential for the conservation and management of the special-status species, and that have been formally described in the Federal Register.
cultural resource	An aspect of a cultural system that is valued by or significantly representative of a culture or that contains significant information about a culture. Properties such as landscapes or districts, sites, buildings, structures, objects, or cultural practices that are usually more than 50 years old and possess architectural, historic, scientific, or other technical value.
cumulative impact	For NEPA purposes, defined in Council of Environmental Quality (CEQ) regulations as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Under CEQA, defined as the change in the environment that results from the incremental impact of the project when added to other, closely related past, present, and reasonably foreseeable probable future projects.
decibel (dB)	A unitless measure of sound on a logarithmic scale that indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals. An A-weighted dB (dBA) is an overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear. A measurement that includes the low frequency component is denoted by dBL.
dewater	To remove water.

DNL	The 24-hour day and night A-weighted noise exposure level, which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.
endangered species	Any species or subspecies of bird, mammal, fish, amphibian, reptile, or plant that is in serious danger of becoming extinct throughout all or a significant portion of its range. Official federal designations of endangered species are made by the USFWS or NMFS and published in the Federal Register. Species are listed under the California Endangered Species Act by the California Department of Fish and Game.
Endangered Species Act (ESA)	The federal or state acts administered by the USFWS/NMFS and California Department of Fish and Game, respectively, to list and protect animal and plant species that are listed as threatened or endangered, are formally recognized candidates for listing, or are declining to a point where they may be listed.
Environmental Impact Report (EIR)	A detailed statement (i.e., report) prepared under the California Environmental Quality Act by a state or local agency describing and analyzing the significant environmental effects of a project and discussing ways to mitigate or avoid the effects.
erosion	The gradual wearing away of land by water, wind, and general weather conditions; the diminishing of property by the elements. With regard to levees specifically: loss of levee material as a result of the effects of channel flows, tidal action, boat wakes, and wind-generated waves.
Essential fish habitat (EFH)	Defined in the Magnuson-Stevens Fishery Conservation and Management Act as waters or substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.
expansive soils	Soils that shrink and swell as a result of moisture changes.
fault	A planar rock fracture which shows evidence of relative movement. Large faults within the Earth's curst are the result of differential or shear motion.
fault rupture	Displacement at the earth's surface resulting from fault movement associated with an earthquake.
federal P&Gs	Principles and Guidelines for federal water studies, published as "Federal Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" by the U.S. Water Resources Council, 1983.

Fisheries Management Plan (FMP)	Required under the Magnuson-Stevens Fishery Conservation and Management Act to address long-term viability of fisheries, allow overfished stocks to recover; and to conserve and manage fishery resources.
floodplain	Any land area susceptible to inundation by floodwaters from any source.
flow	The volume of water passing a given point per unit of time.
groundwater	Any water naturally stored underground in aquifers, or that flows though and saturates soil and rock, supplying springs and wells.
habitat	The specific area or environment in which a particular type of animal or plant lives.
HAZNET	A California Department of Toxic Substances Control database that records annual hazardous waste shipments, as required by RCRA. All businesses that use and dispose of hazardous materials are entered into the database.
HIST UST	Contains a list of registered historical USTs
Important Farmland	Farmland categories mapped by the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP). Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance are often described together under the term “Important Farmland.”
infiltration	Process by which water on the ground surface enters into, or percolates through the soil
L50	The noise level that is equaled or exceeded 50 percent of the specified time period. The L50 represents the median sound level.
L90	The noise level that is equaled or exceeded 90 percent of the specified time period. The L90 is sometimes used to represent the background sound level.
Leq	The equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The Leq is the constant sound level that would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).
levee	An embankment raised to restrict a river to a defined channel.
liquefaction	The process in which soil loses cohesion when subject to seismic activity (i.e., shaking).
Lmax	The instantaneous maximum noise level for a specified period of time.

Microconstituents	Microconstituents is a term currently used to describe a variety of natural and manmade substances, including pharmaceuticals, household cleaning products, personal care products, plastics, packaging, and other products of a developed society.
modeling	Computer simulations of natural and man-made water systems used to provide a forecast of outcomes for a variety of parameters, such as water quality, flow rates, and reservoir levels, under an assumed set of conditions.
non-attainment	The Clean Air Act (1990) defines this as a locality where pollution levels persistently exceed national ambient air quality standards, or which contributes to ambient air quality in a nearby area that fails to meet standards.
Notice of Availability (NOA)	The notice issued by a local, state, or federal agency to publicly announce that a draft environmental impact report is available for review, pursuant to the California Environmental Quality Act.
Notice of Preparation (NOP)	The notice issued by a state or local agency to publicly announce its intention to prepare an environmental impact report, pursuant to the California Environmental Quality Act.
Proposed Project	Russian River Estuary Management Project
reservoir	An artificially impounded body of water.
responsible agency	As per the CEQA Guidelines, a public agency other than the lead agency that has discretionary approval over a project.
riparian area	The land adjacent to a natural watercourse such as a river or stream. When sufficient to overhang the bank or fall into the water, riparian areas support vegetation that provides important wildlife and fish habitat.
salinity	The amount of dissolved salts in a given volume of water.
seawater intrusion	The intrusion and mixing of saline or brackish water into a body of freshwater.
sedimentation	The phenomenon of sediment or other fine particulates entering a water body, or being disturbed from the bottom of a water body such that they move downstream and settle on the substrate in other aquatic areas.
seiche	A wave on the surface of a lake or landlocked bay caused by atmospheric or seismic disturbances.
seismicity	The frequency, intensity, and distribution of earthquake activity in a given area.
siltation	Sediment influx either from erosion or sediment carried into a water body by inflowing rivers and tributaries.

special-status species	Federal and state classifications for plant and animal species that are listed as threatened or endangered, are formally recognized candidates for listing, or are declining to a point where they may be listed.
stage	Water surface elevation; the elevation above mean sea level (msl) datum (typically measured in feet msl).
stormwater	Untreated surface runoff into a body of water during periods of precipitation.
Stormwater Pollution Prevention Plan (SWPPP)	Required to be developed and implemented when an entity is obtaining a General Permit under the National Pollutant Discharge Elimination System (NPDES). The SWPPP has two major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of stormwater discharges, and (2) to describe and ensure the implementation of best management practices to reduce or eliminate sediment and other pollutants in stormwater as well as non-stormwater discharges.
take	Defined in the Federal Endangered Species Act as "…harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" on special-status species covered under the Act.
terrestrial species	Types of species of animals and plants that live on or grow from the land.
threatened species	Legal status afforded to plant or animals species that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range, as determined by the U.S. Fish and Wildlife Service or National Marine Fisheries Service for federal species and by the California Department of Fish and Game for state species.
tidal flow	Water movements caused by tidal forces (i.e. gravitational); used to describe the movement of water in Delta channels caused by tidal level variations propagating from San Francisco Bay.
total organic carbon (TOC)	A measure of organic matter content in water, which plays a significant role in aquatic ecosystems and has direct implications to drinking water treatment, including the potential for formation of disinfection byproducts.
turbidity	A measure of the cloudiness of water caused by the presence of suspended matter. Turbidity in natural waters may be composed of organic and/or inorganic constituents, and has direct implications to drinking water treatment.
viewshed	An area of land, water, and other environmental elements that is visible from a fixed vantage point. Viewshed is typically evaluated both from a roadway and conversely of a roadway as viewed from the adjacent area.

waters of the U.S.	As defined in the Clean Water Act Section 404, waters of the U.S. applies only to surface waters, rivers, lakes, estuaries, coastal waters, and wetlands. Not all surface waters are legally waters of the U.S. Generally, waters of the U.S. include interstate waters and tributaries, intrastate waters and tributaries used in interstate and/or foreign commerce, territorial seas at the cyclical high-tide mark, and wetlands adjacent to the above.
watershed	A region or area that ultimately drains to a particular watercourse or body of water.
wetland	A zone that is periodically or continuously submerged or has high soil moisture, has aquatic and/or riparian vegetation components, and is maintained by water supplies significantly in excess of those otherwise available through local precipitation.
Williamson Act	The California Land Conservation Act of 1965, commonly known as the Williamson Act, enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use for 10 years. In return, landowners receive property tax assessments that are based on farming and open space uses as opposed to full market value.

EXECUTIVE SUMMARY

ES.1 Introduction

The Sonoma County Water Agency (Water Agency), as Lead Agency, has prepared this Draft Environmental Impact Report (EIR) for the proposed Russian River Estuary Management Project (Estuary Management Project or proposed project) to provide the public and responsible and trustee agencies reviewing the Estuary Management Project an analysis of the potential effects, both beneficial and adverse, on the environment.[1] This project is intended to fulfill federal mandates to implement adaptive management of the Russian River Estuary (Estuary) to enhance fisheries habitat while minimizing flood risk. Implementation of the Estuary Management Project would involve management of the Estuary as a summer lagoon (during a lagoon management period May 15 to October 15), and continuation of artificial breaching practices during the remainder of the year (described in detail below). This Draft EIR considers the following alternatives to the project: No Project, Habitat Restoration, Temporary Outlet Standpipe, Reduced Project, Jetty Modification, and Alternative Flood Management Measures.

ES.1.1 Project Background

The Russian River watershed encompasses 1,485 square miles of Sonoma and Mendocino Counties. The project area, illustrated in **Figure ES-1**, is located at the Russian River Estuary (Estuary)[2], approximately 60 miles northwest of San Francisco Bay, near the town of Jenner, Sonoma County, California. The focus of Estuary management activities is the barrier beach that forms at the mouth of the Russian River where it discharges to the Pacific Ocean.[3] The mouth of the Russian River Estuary is located at Goat Rock State Beach, which is owned by California State Department of Parks and Recreation (State Parks). The Estuary extends from the mouth of the Russian River upstream approximately seven miles to the Duncans Mills area beyond the confluence with Austin Creek (Estuary Study Area. Within this area, the Water Agency has developed high resolution water quality, vegetation, biological resources, and bathymetric information which will be used to examine impacts within the Estuary. This is referred to as the

[1] The Draft EIR was prepared in accordance with the provisions of the California Environmental Quality Act (CEQA) of 1970, codified as California Public Resources Code Sections 21000 et. seq., the State *CEQA Guidelines* in the Code of Regulations, Title 14, Division 6, Chapter 3, and the Water Agency's Procedures for the Implementation of CEQA.

[2] Estuary is defined as a partly enclosed coastal body of water with a river flowing into it, and open connection to the ocean (tidally influence). The term "Estuary", in the context of this document, refers to the geographic location of the project, recognizing that the proposed project involves creation of a 'lagoon", which is defined as a freshwater or brackish body of water separated from the ocean by a barrier beach.

[3] Activities will physically occur in the lower Estuary; however some impacts may extend upstream, and are discussed in the resource sections in Chapter 4.0 as applicable.

SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

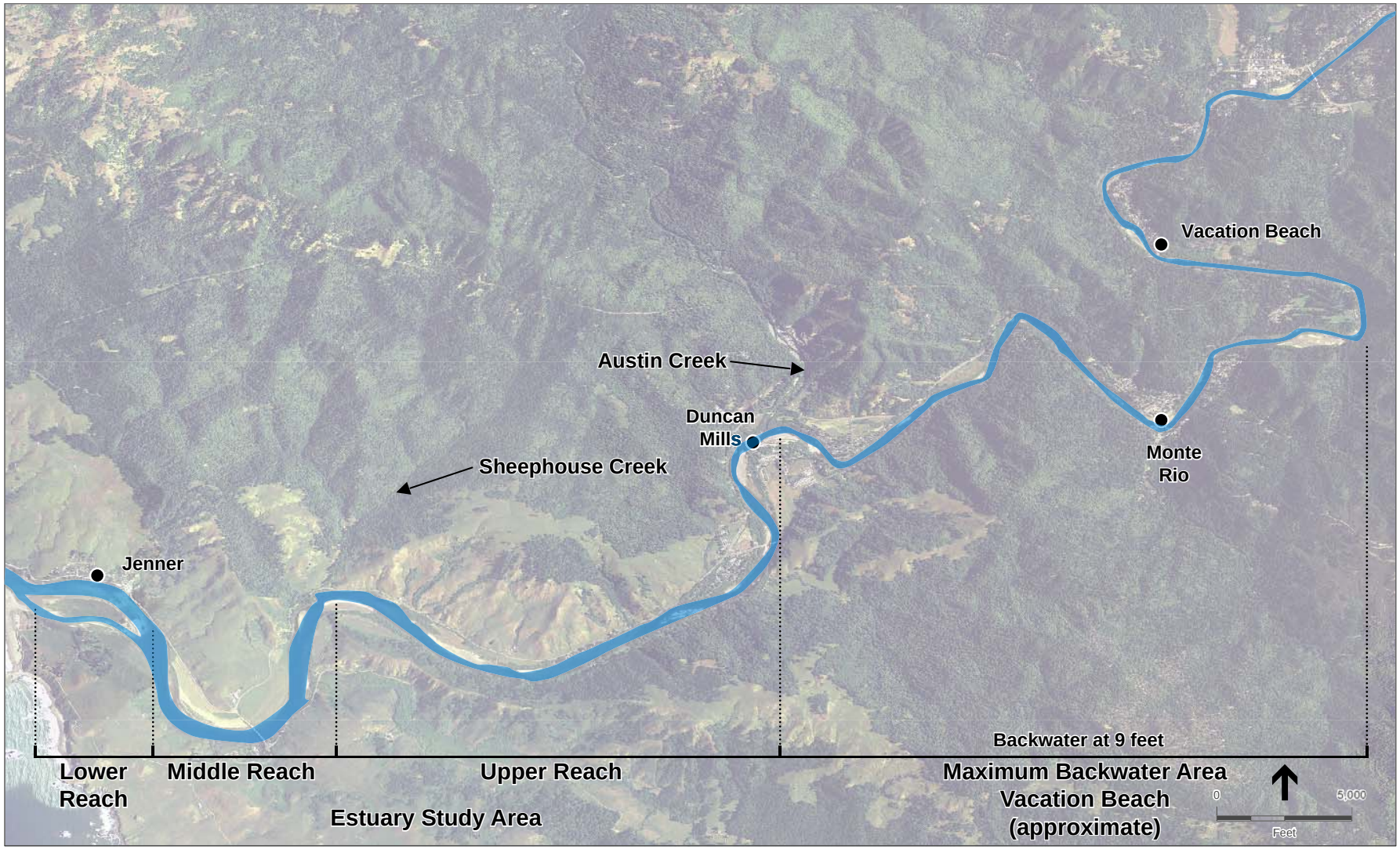
Figure ES-1
Regional Location

Estuary Study Area and is characterized by three primary reaches: lower, middle and upper reach. (**Figure ES-2**). It is estimated that under certain closed conditions, backwatering may extend upstream as far as Vacation Beach. As such, for certain issue areas, this "maximum backwater area" extending from the mouth of the Russian River to Vacation Beach will be discussed.

The Estuary is open to the ocean tides for much of the year. At certain times, the natural formation of a barrier beach[4] across the mouth of the Russian River cuts off the tidal connection between the ocean and the Russian River and creates a lagoon.[5] The Estuary may close at any time of the year, although the closures occur most often during April to June and again in September to November. Closures result in increasing water levels in the Estuary behind the barrier beach and an increase in the risk of flooding of low-lying properties (SCWA, 2009). Natural breaching of the barrier beach occurs when Estuary water levels exceed the capability of the barrier beach to impound this water, causing localized failure of the barrier beach and creating a tidal channel that reconnects the Russian River to the Pacific Ocean. Historically, private citizens breached the barrier beach, enabling the river to flow into the ocean, in an effort to avoid flooding. In the 1960s, the Sonoma County Public Works Department accepted responsibility for breaching, using heavy equipment. After a county reorganization in the mid-1990s, the Water Agency began to perform activities related to breaching the barrier beach. Currently, the Water Agency artificially breaches the barrier beach when the water surface level in the Estuary is between 4.5 and 7.0 feet, as determined by the gauge at the Jenner Visitor's Center, in accordance with the *Russian River Estuary Study 1992–1993* (Heckel, 1994). Breaching occurred every year between 1996 and 2009, except 2006.[6]

In 2008, the National Marine Fisheries Service (NMFS) issued the *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation District in the Russian River Watershed* (Russian River Biological Opinion). [7] The Russian River Biological Opinion is a culmination of more than a decade of consultation between the Water Agency, the U.S. Army Corps of Engineers (USACE), and NMFS regarding the impact of the Water Agency's and USACE's water supply and flood control activities on three fish species listed under the federal Endangered Species Act: Central California Coast steelhead, Central California Coast coho salmon, and California Coastal Chinook salmon. The California Department of Fish and Game (CDFG) issued a consistency determination on November 9, 2009, finding that the Russian River Biological Opinion was consistent with the requirements of the California Endangered Species Act (CESA) and adopted the measures identified in the Russian River Biological Opinion.

4 For the purposes of this project, the term barrier beach is used to describe closed sandbar conditions, consistent with National Marine Fisheries Service (NMFS) terminology.
5 A lagoon is formed when a barrier beach restricts tidal exchange in the Estuary.
6 A detailed description of artificial breaching activities is provided in **Chapter 2.0, Project Description**.
7 The Russian River Biological Opinion may be accessed online at www.sonomacountywater.org and may be reviewed at the Water Agency's office located at 404 Aviation Boulevard, Santa Rosa, CA.



SOURCE: SCWA, 2010; ESA 2010

Russian River Estuary Management Project . 207734.01

Figure ES-2

Estuary Study Area and Maximum Backwater Area

The Russian River Biological Opinion concluded that the continued operations of Coyote Valley Dam and Warm Springs Dam by the USACE and the Water Agency in a manner similar to recent historic practices, together with the Water Agency's stream channel maintenance activities and Estuary management, are likely to jeopardize and adversely modify critical habitat for endangered coho salmon and threatened steelhead. The Russian River Biological Opinion found that artificially elevated inflows to the Russian River Estuary during the low flow season (May through October) and historic artificial breaching practices have significant, adverse effects on the Russian River's estuarine rearing habitat for juvenile salmonids, particularly steelhead. The historic method of artificial breaching, which is done in response to rising water levels behind the barrier beach, creates a tidal marine environment with shallow depths and high salinity. The Russian River Biological Opinion concludes that the combination of high inflows and breaching practices impact rearing habitat because they interfere with natural processes that would otherwise cause a freshwater lagoon to form behind the barrier beach. According to NMFS, fresh or brackish water lagoons at the mouths of many streams in central and southern California often provide depths and water quality that are highly favorable to the survival of rearing salmon and steelhead.[8]

The Russian River Biological Opinion requires the Water Agency to collaborate with NMFS and CDFG and to modify Estuary management in order to reduce marine influence (high salinity and tidal inflow) and promote a higher water level in the Estuary (formation of a fresh or brackish water lagoon) from May 15 to October 15 (referred to hereafter as the "lagoon management period"). Conditions in a fresh or brackish water lagoon are thought by NMFS to enhance the quality of rearing habitat for juvenile salmonids. The Russian River Biological Opinion prescribes a program of potential, incremental steps to accomplish these conditions, including adaptive management of a lagoon outlet channel on the barrier beach during the lagoon management period. The Water Agency would continue the historical practice of artificially breaching the barrier beach to minimize flooding outside of the lagoon management period.

ES.1.2 Project Objectives, Purpose, and Need

This EIR has been developed to provide the public and responsible and trustee agencies reviewing the Estuary Management Project an analysis of the potential effects, both beneficial and adverse, on the local and regional environment associated with implementation and operation of the Estuary Management Project. In order to comply with the requirements of the Russian River Biological Opinion, the Water Agency will adaptively manage the Estuary with the primary objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard. Rearing habitat may be enhanced by reducing tidal influence on the Russian River Estuary during the lagoon management period to increase freshwater habitat available for rearing salmon and steelhead. Adaptive management requires: 1) monitoring of biological productivity, water quality, and physical processes in the Estuary in response to the changes in management actions that control water surface elevations in the

8 National Marine Fisheries Service. Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation District in the Russian River Watershed. p. 243. September 2008.

estuary-lagoon system; and 2) refinement of management actions to achieve desired water levels to support biological productivity, while simultaneously providing flood management for properties adjacent to the Estuary. In addition to the primary objectives, the Estuary Management Project is intended to assist the Water Agency in its efforts to provide for the health and safety of visitors and employees of the State Beach and Water Agency staff during management activities; and to implement, operate, and maintain management techniques in a technically and economically feasible manner.

ES.1.3 Summary of Public Involvement Activities

In accordance with CEQA Guidelines Section15082, the Water Agency circulated a Notice of Preparation (NOP) to local, state, and federal agencies, and to other interested parties on May 7, 2010. The NOP was circulated for a 45-day public review period, which ended on June 21, 2010, to solicit both written and verbal comments on the EIR's scope and provide information on the public scoping meeting. Additionally, the NOP presented the background, purpose, description, and location of the proposed project, potential issues to be addressed in the EIR, and contact information for additional information regarding the project. The NOP was directly mailed to 400 parties, and a postcard notification of the NOP's availability was sent to 1,200 parties.

During the scoping period, the Water Agency held two scoping meetings to discuss the project and to solicit public input as to the scope and content of this EIR. Public legal notices and display advertisements were placed in five local newspapers informing the general public of the availability of the NOP and the times and locations of scheduled scoping meetings. The purpose of the scoping meetings was to present the proposed project to the public through use of display maps and handouts describing project components and potential environmental impacts. Attendees were provided an opportunity to voice comments or concerns regarding potential effects of the proposed project. **Appendix 1** of this Draft EIR contains a copy of the NOP and the Scoping Report, which provides a summary of all verbal and written comments received, and copies of the written comments.

A total of 33 comment submittals (letters, emails, comment cards) were received. Collectively, a total of 38 individual verbal comments were received and noted below. Written comments were received from federal agencies, including NMFS; state agencies, including CDFG, California Department of Parks and Recreation, and California Native American Heritage Commission; public organizations, including SealWatch, Russian Riverkeeper, Save the Waves Coalition, Sonoma Coast Surfrider Foundation, Russian River Watershed Protection Committee, Northern California River Watch, Trout Unlimited; and members of the public. The comments included questions regarding the project description and CEQA process, as well as CEQA technical issues, including potential effects on water quality, biological and fisheries resources, hydrology, cultural resources, climate change, and recreational resources.

ES.2 Proposed Project

ES.2.1 Continued Artificial Breaching

The Water Agency will continue the historical practice of artificially breaching the barrier beach outside the lagoon management period (May 15 through October 15), as allowed in the Russian River Biological Opinion and described in the *Russian River Estuary Study 1992–1993*, seeking to minimize potential flooding of low-lying properties along the Russian River.[9] Artificial breaching outside of the lagoon management period typically consists of the following actions:

1. 24 hours prior to breaching, the Water Agency contacts State Parks lifeguards and posts signs and barriers to minimize potential hazards to beach visitors.

2. A bulldozer or similar equipment is offloaded at the parking lot at Goat Rock State Beach and driven onto the beach via an existing access point. This access point and barrier beach driving route are currently used by lifeguarding trucks and other State Park vehicles.

3. A "pilot channel" is cut at a depth that allows flows from the lagoon to scour sand into the ocean. The size of the pilot channel varies, depending on the height of the barrier beach, the level of the tide, and the surface level of water in the estuary. A typical channel is approximately 100 feet long, 25 feet wide, and 6 feet deep. The amount of sand that is moved ranges from less than 100 cubic yards to approximately 1,000 cubic yards. The sand is placed onto the beach adjacent to the pilot channel. The orientation of the pilot channel is generally perpendicular to the ocean, the shortest distance from the River across the barrier beach.

4. After the pilot channel is dug, the last upstream portion of the barrier beach is removed, allowing lagoon water to flow into the ocean.

5. Flows in the pilot channel scour sand, deepening and widening the channel to create a full tidal connection between the Estuary and the ocean. Within a day after breaching, the tidal channel's width often exceeds 100 feet in width (PWA, 2010). Channel widening washes the excavated sand into the ocean.

6. The channel is monitored and equipment is driven back to the existing access point and loaded for transport. Signage and barriers are removed, and the channel is periodically monitored by Water Agency staff.

[9] NMFS requires estuary management from May 15 through October 15; the Water Agency would continue current artificial breaching practices outside this period. NMFS' includes continued artificial breaching in their Russian River Biological Opinion, Part III, Description of the Proposed Action, Subpart B.2, Estuary Management (page 20), which provides for the Water Agency to periodically excavate a pilot channel across the lowest point of the sand bar at the mouth of the Russian River when the estuary elevation rises to a point where low lying properties are threatened with flooding. The breaching actions will likely take place 4 to 11 times per year for the next fifteen years" (NMFS, 2008; page 20).

ES.2.2 Lagoon Adaptive Management

To comply with conditions stipulated in the Russian River Biological Opinion, the Water Agency will pursue an alternative approach for management of water levels in the Estuary, and will adaptively manage a lagoon outlet channel[10] to achieve an average daily water surface elevation of at least 7 feet during the lagoon management period from May 15 to October 15.[11]

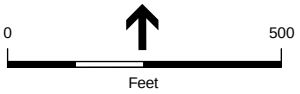
The Estuary is a dynamic system subject to riverine and tidal influence such that lagoon formation is dependent on variables including riverine freshwater inflow, ocean wave conditions, beach sediment, and geologic structure of the river. During the lagoon management period, following natural formation of the barrier beach and the freshwater lagoon, the Water Agency would create an outlet channel at an elevation that would allow for overflow from the lagoon, thereby maintaining a more steady water surface elevation within the lagoon that would minimize property inundation. Physical establishment of the outlet channel during the lagoon management period would be similar in terms of equipment and duration as artificial breaching. Once established, it is anticipated that the outlet channel will allow for longer duration of freshwater lagoon conditions during summer months and improve rearing habitat for juvenile salmonids.

In the event that the outlet channel erodes the barrier beach to re-establish a tidal inlet, the Wa ter Agency would resume adaptive management of the outlet channel's width, slope, and alignment, in consultation with the NMFS and CDFG after ocean wave action naturally reforms the barrier beach and closes the tidal inlet. This "maintenance" of the outlet channel would provide for the continuation of the lagoon conditions that have been established. As such, project implementation would increase the duration of freshwater lagoon conditions from the typical 5 to 14 day duration currently experienced, to an estimated 1 month to 5 month duration. A lagoon lasting for longer duration would be consistent with freshwater lagoons observed in some other coastal river systems.

The channel would be located within the area that it has been observed to naturally occur, between the jetty and approximately 1,500 feet to the northwest (**Figure ES-3**). Channel length would vary based upon location, but a hydraulic gradient would be established to provide for overflow while minimizing channel erosion. The outlet channel would not be excavated as deeply, narrowly, or with as steep a gradient as the pilot channels currently implemented by the Water Agency, which are designed to allow flow velocities to erode a wider and deeper channel that downcuts into the barrier beach and reopens the Estuary to tidal action. The dimensions and location of the outlet channel would be dependent on beach formation topography and forecasted river flow and ocean conditions at the time of outlet channel creation. The Estuary may close at any time of the year, although the closures occur most often between spring and late fall. This is a

[10] No new engineered structures or mechanical devices, temporary or permanent, will be a part of the outlet channel implementation.

[11] NMFS considered the possibility that artificial breaching may be required during the lagoon management period to minimize flooding risk and included allowances for such activities in the Incidental Take Statement: "We estimate that the Agency will need to artificially breach the lagoon using methods that do not create a perched lagoon twice per year between May 15 and October 15 during the first three years covered by this opinion, and once per year between May 15 and October 15 during years 4-15 covered by this opinion" (NMFS, 2008; page 302).



SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure ES-3
Estuary Management Area

period of generally lower instream flows and increased creation of barrier beach conditions due to wave activity. Review of flow data for the 115 closure events occurring between 1996 and 2009 indicated a median flow at the USGS Guerneville Gauge for these events is 250 cubic feet per second (cfs), with a minimum flow of 71 cfs and a maximum flow of 1,120 cfs. Therefore, closure events due to barrier beach formation have occurred over a wide range of flow conditions. During the lagoon management period, the outlet channel would be expected to perform over a range of flow conditions that could be experienced between May 15 and October 15. The outlet channel dimensions are estimated to be approximately 30-feet wide and 100 –feet long, based on a wide and short channel planform alignment that would minimize scour potential. The dimensions of an outlet channel created along either alignment are constrained by the acceptable excavation volumes per the Water Agency's regulatory permits. The outlet channel is estimated to be 0.5 to 2.0 feet deep (PWA, 2010).

Various channel locations within the area shown in **Figure ES-3** and configurations may be pursued in an effort to adapt to other project variables. However, the configuration described above is within the range of likely outlet channel dimensions. Consideration of other project variables include bed slope and bed elevation, as well as an alignment that will maximize site features, including use of areas that experience reduced wave energy to increase suitability and success of the outlet channel.

ES.3 Environmental Impacts and Mitigation Measures

ES.3.1 Impact Assessment Methodology

The analysis of environmental impacts is based upon the environmental setting applicable to each resource/issue and the manner in which the implementation, operation, and maintenance of the Estuary Management Project or alternatives would affect the environmental setting and related resource conditions. In accordance with CEQA requirements and guidelines, the impact assessment methodology also considers the following three topics: (1) the regulatory setting, and whether the Estuary Management Project would be consistent with adopted federal, State and Local regulations and guidelines, (2) growth-inducing impacts, and (3) cumulative impacts. Regulatory compliance issues are discussed in each resource/issue area section. The EIR document is organized according to the following technical issue area categories, which are listed in the order in which they appear in **Chapter 4.0**:

1. Geology and Soils
2. Hydrology and Flooding
3. Water Quality
4. Biological Resources
5. Fisheries
6. Land Use and Agriculture
7. Recreation
8. Cultural Resources
9. Noise
10. Air Quality
11. Transportation and Traffic
12. Hazards and Hazardous Materials
13. Public Services and Utilities and Public Safety
14. Aesthetics

The Draft EIR addresses environmental issues that could result in potentially significant environmental effects from project implementation. Significance criteria have been developed for each environmental issue analyzed in this Draft EIR and are defined at the beginning of each impact analysis section. In order to provide for a comprehensive and systematic evaluation of potential environmental consequences to the resource/issue areas, the environmental impact assessments for the Estuary Management Project are based upon a classification system, categorized as follows:

1. Significant and unavoidable;
2. Potentially significant, but can be mitigated to a less-than-significant level;
3. Less than significant (mitigation is not required under CEQA, but may be recommended);
4. No impact; or
5. Beneficial.

ES.3.2 Mitigation Measures

Where applicable, the EIR describes feasible measures that could minimize significant adverse impacts (CEQA Guidelines Section 15226.4). Within each issue area, mitigation measures are recommended where environmental effects could be substantially minimized. The mitigation measures recommended are identified in the impact assessment sections of the EIR.

ES.3.3 Findings

An overview of environmental impacts by resource area is provided below based on the detailed impact finding and mitigation measures for the Proposed Project provided in **Chapter 4.0 Environmental Impacts and Mitigation Measures**. **Table ES-1**, at the end of this Executive Summary, provides a more detailed summary of all the environmental impacts and mitigation measures identified for the Estuary Management Project.

Less than Significant and Less than Significant with Mitigation

For the Estuary Management Project, based on technical review and evaluation against the environmental and regulatory setting, the impacts to the following environmental resources were determined to be less than significant or less than significant with mitigation.

1. Geology, Soils, Seismicity
2. Land Use and Agriculture
3. Noise
4. Air Quality
5. Transportation and Traffic
6. Hazards and Hazardous Materials
7. Public Utilities and Services and Public Safety
8. Aesthetics

Beneficial

As summarized in **Table ES-1**, environmental impacts would be beneficial in the following areas:

1. Habitat Availability. Maintenance of water surface elevations of 7 to 9 feet would increase the storage volume in the Estuary by approximately 2,771 acre feet (7 feet) and up to 4,565 acre feet (9 feet), thereby increasing potential habitat availability for juvenile salmonids.

Significant and Unavoidable

As summarized in Table **ES-1**, environmental impacts would be significant and unavoidable, even with implementation of feasible mitigation measures, in the following areas:

2. Private Property Inundation. Maintenance of water surface elevations of 7 to 9 feet would inundate the shoreline portions of properties adjacent to the Estuary for a longer duration, depending upon outlet channel performance. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

3. Risk of Inundation Due to Tsunami. In the very unlikely event of a tsunami of sufficient magnitude, the project may result in increased risk of structural damage or loss for properties just outside of the areas that would currently be inundated by tsunami-related flooding. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

4. Water Quality. Project implementation could seasonally increase nutrient and pathogen levels as a result of changes in residence time. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

5. Groundwater Quality. Project implementation could result in secondary effects to groundwater quality due to increased duration of saline groundwater conditions over the saline conditions that are currently experienced. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

6. Inundation of Estuary Haulout Locations. Increased water levels would seasonally inundate pinniped haul out locations, reducing the potential haul out area within the Estuary. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

7. Elimination or modification or recreational resources. Implementation of the proposed project would reduce the occurrence of tidal channel conditions during summer months, thereby reducing the occurrence of resulting sandbar conditions desirable for surfing. Additionally, inundation would seasonally reduce recreational beach area within the Estuary. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

ES.4 Alternatives

This Draft EIR describes and evaluates a reasonable range of alternatives to the Estuary Management Project, in accordance with CEQA Guidelines Section 15126(a). Alternatives to the Estuary Management Project were presented in the Russian River Biological Opinion, as part of the adaptive management program, and identified through the public scoping process. Particular emphasis was placed on developing feasible alternatives which would reduce impacts to water quality, biological resources, and recreational resources.

In total, the alternatives screening process has culminated in the identification and screening of approximately 10 potential alternatives for the Estuary Management Project. These alternatives range from no management in the estuary, to increased artificial breaching, and from passive versus active management techniques, as well as structural alternatives.

The detailed results of the alternatives screening analysis are contained in Chapter 6 of the EIR. Provided below are summary descriptions of the alternatives which meet the basic project objectives, lessen significant impacts, and are feasible, and were therefore carried forward for further analysis. Section 6.2.2, Alternatives Identified but Not Considered Further, provides information related to other alternatives considered and the rational for elimination from further consideration.

ES.4.1 No Project Alternative

The No Project Alternative assumes that the lagoon outlet channel portion of the proposed project would not be implemented, and would include two scenarios: 1) consideration of existing conditions without the project; and 2) consideration of "reasonably foreseeable" future conditions without the proposed project.

Under the No Project Alternative, the Water Agency would continue artificial breaching activities during the lagoon management period, consistent with current practices. In considering existing conditions under a "no project scenario", this would result in periodic breaching of the barrier beach when it becomes established. It is not possible to ascertain how many artificial breaching events would be required each year, but there have been an average of six artificial breaching events annually over the last 14 years, however, of the years during which artificial breaching was implemented, the maximum number of breaching events was 15 artificial breach attempts in 2009, and a minimum of one artificial breaches in 2004. It is anticipated that the number of breaching events would continue to be consistent with historical variation, depending upon hydrologic year type and Pacific Ocean wave patterns. This alternative assumes that the Water Agency could acquire the necessary permits for breaching activities. In considering a "reasonably foreseeable future conditions" scenario, the same scenario would apply; the Water Agency would continue artificial breaching activities during the lagoon management period, consistent with current practices. This scenario also assumes that the agencies with legal jurisdiction will continue to issue/extend necessary permits for the Water Agency to continue to carry out breaching activities. Although not legally required to manage water surface elevations within the Estuary to protect private property, the Water Agency has provided these services since the 1990s, and it is reasonable to assume that the Water Agency would continue to do so and would continue to obtain and operate under necessary permits, assuming the Water Agency has adequate staff and financial resources.

Implementation of the No Project Alternative would avoid significant and unavoidable impacts related to increased water levels in the Estuary for a longer duration. These include potential water quality impacts associated with prolonged closure of the barrier beach, as tidal mixing would continue to occur. Additional impacts that would be avoided include inundation of properties, increased risk of flooding in the event of a tsunami, changes in the distribution of both natural vegetation communities, effects to harbor seal haulout, and modification of recreation opportunities, including both surfing opportunities and recreational haul-out opportunities in the Estuary. It is uncertain if the No Project Alternative would reduce or avoid secondary effects to groundwater impact, or if existing conditions would persist. However, implementation of the

No Project Alternative would result in the continuation of current conditions within the Estuary, which have been found to be detrimental to federally listed salmonids, and could result in the Water Agency being out of compliance with the Russian River Biological Opinion. Implementation of the No Project Alternative would not provide habitat opportunity for rearing juvenile salmonids associated with the provision freshwater lagoon conditions, including the provision of up to 4,416 acre feet of storage within the maximum backwater area (9 feet) for a longer duration during the lagoon management period. As such, implementation of the No Project Alternative would not meet project objectives related to the enhancement of salmonid habitat within the Estuary. Therefore, based on the inability to achieve the project objectives, the No Project Alternative is not considered environmentally superior.

ES.4.2 Habitat Restoration Alternative

In California coastal lagoons, productive juvenile steelhead rearing habitat is available in freshwater and brackish water quality conditions. Under current management, when the Estuary channel is tidal, freshwater habitat is primarily available in the upper Estuary (from Sheephouse Creek to Austin Creek) and at confluences with tributaries (Jenner Creek, Willow Creek, Sheephouse Creek, Freezeout Creek, and Austin Creek), with brackish water quality in the middle Estuary (from Bridgehaven to Sheephouse Creek). In addition, a productive invertebrate prey community is necessary to provide a food base for rearing juvenile steelhead. Improving habitat diversity and structure complexity in locations of optimal water quality that currently exist in the Estuary could improve rearing conditions for juvenile steelhead, thereby achieving the Russian River Biological Opinion mandate to improve freshwater habitat for juvenile steelhead. Under a Habitat Restoration Alternative, the Water Agency would identify areas in the Russian River or other tributaries that, if restored, could provide salmonid rearing habitat. Under this alternative, it is assumed that the Water Agency would continue to artificially breach the barrier beach when water levels approach 4.5 to seven feet to provide flood management, consistent with existing practices. This alternative would provide rearing habitat for salmonids using alternate techniques, but of equivalent quality and quantity of habitat. This type of habitat restoration is common in other coastal lagoons. The Water Agency would identify potential areas, such as sloughs and backwater areas along the upper Estuary, Willow or Austin Creeks in which the strategies, including vegetation restoration, installation of instream structural cover (i.e. woody features), and backwater slough enhancement, could be implemented. This alternative would partially meet the basic project objectives and would meet legal and technical feasibility criteria. However this alternative would not achieve the NMFS' directives to establish a lagoon.

The Habitat Restoration Alternative would benefit fisheries and fish habitat by increasing suitable areas and providing vegetative cover and rearing areas. Implementation of the Habitat Restoration Alternative would avoid significant and unavoidable impacts related to increased water levels in the Estuary for a longer duration. These include potential water quality impacts[12] associated with prolonged closure of the barrier beach, as tidal mixing would continue to occur. Additional impacts that would be avoided include increased risk of inundation of properties, increased risk of flooding in the event of a tsunami, changes in the distribution of both natural vegetation

[12] It is uncertain if this alternative could reduce the groundwater impact or if existing conditions would persist.

communities, modification of recreation opportunities, including both surfing opportunities and recreational haul-out opportunities in the Estuary. It is uncertain if the Habitat Restoration Alternative would reduce or avoid secondary effects to groundwater impact, or if existing conditions would persist. The Habitat Restoration Alternative would not increase the frequency of equipment use beyond current practices.

Implementation of the Habitat Restoration Alternative would not provide habitat opportunity for rearing juvenile salmonids associated with the provision freshwater lagoon conditions, including the provision of up to 4,416 acre feet of storage within the maximum backwater area (9 feet) for a longer duration during the lagoon management period. As such, implementation of the No Project Alternative would not meet project objectives related to the enhancement of salmonid habitat within the Estuary. Therefore, based on the inability to achieve the project objectives, the Habitat Restoration Alternative, in and of itself, is not considered environmentally superior.

ES.4.3 Temporary Outlet Standpipe

An Outlet Standpipe alternative would involve a temporary structure that would be installed during the lagoon management period to allow for outflow from the Russian River to maintain a perched lagoon. The standpipe would be designed to operate to achieve a water level of seven to nine feet in the lagoon. The standpipe would be a passive system, installed as an inclined, closed pipe, tilted a few degrees to the horizontal to transfer Russian River outflow to the ocean via gravity. The standpipe would need to be surge protected and inclined to a degree to prevent backflow of ocean water into the Estuary. The temporary outlet standpipe could be anchored to the jetty or installed in a northwest orientation across the barrier beach and attached to the rip rap along the cliffs to the northwest of the beach management area. This structure would require periodic maintenance throughout the lagoon management period to correct for damage from tidal action and sediment accumulation in the standpipe. This temporary structure would be removed at the end of the lagoon management period. However, substantial engineering, environmental, permitting, and other constraints would be associated with development and implementation of an alternative that included installation of a temporary standpipe within the barrier beach at Jenner to convey outflow from the Estuary and to ensure performance that would maintain protection of private property from flooding.

The Temporary Outlet Standpipe would not avoid significant and unavoidable effects associated with increased water levels in the Estuary for a longer duration. These include potential water quality impacts associated with prolonged closure of the barrier beach, increased risk of inundation of properties, increased risk of flooding in the event of a tsunami, modification of recreation opportunities, including both surfing opportunities and recreational haul-out opportunities in the Estuary. It is uncertain if the Temporary Outlet Standpipe would reduce or avoid the secondary effects to groundwater impact, or if existing conditions would persist.

Implementation of the Temporary Standpipe Alternative could potentially meet the project objectives. However, because implementation of the temporary outlet standpipe has substantial technical uncertainties, would increase aesthetics and public safety impacts, and would not avoid

impacts associated with increased water levels for a longer duration within the Estuary, it is not considered the environmentally superior alternative.

ES.4.4 Reduced Project Alternative

A “reduced project” alternative is a commonly analyzed type of project alternative that is intended to achieve project objectives while simultaneously avoiding or incrementally reducing the severity of significant impacts associated with a proposed project. A Reduced Project Alternative would involve all of the elements of the proposed Estuary Management Project, including artificial breaching outside of a lagoon management period, and creation of an outlet channel following a natural closure to support freshwater conditions during the lagoon management period. However it represents an incremental decrease such that the maximum target water level would be reduced to eight feet maximum (instead of nine feet maximum with a seven foot average elevation). This would be accomplished through management of the outlet channel bed elevation to maintain a lower water level. This would be accomplished through management of the outlet channel bed elevation to maintain a lower water level. This alternative would reduce environmental effects and would meet the basic project objectives and would meet all legal and technical feasibility criteria.

ES.4.5 Jetty Modification Alternative

Jetty construction began in 1929, followed by construction of a seawall in 1939. Over time, the roadway, seawall and railroad have deteriorated significantly. Only portions of these components are visible, with the remainder encased in the sand dunes. Approximately 200 feet of the jetty protrudes from the beach into the ocean. While the landward half of the jetty retains most of its original concrete cap, the seaward half has deteriorated considerably. Removal of the jetty and its base material would require excavation along the jetty alignment and demolition and excavation of the base structure. Although the Water Agency does not own, operate, maintain, or have jurisdiction over the jetty structure, it is mandated in the Russian River Biological Opinion to develop the study plan to analyze the effects of the Russian River Estuary jetty on Estuary water levels and on beach morphology, as well as for evaluating alternatives that modify the jetty to achieve target estuarine water levels. The jetty study plan will establish a conceptual model, workplan, and associated costs for subsequent analysis of the effects of the Russian River Estuary jetty on estuary water levels and on beach morphology, as well as for evaluating alternatives that modify the jetty to achieve target estuarine water levels. Through the study plan, the Water Agency will identify alternative management actions to achieve targeted water surface elevations, such as full or partial jetty removal, jetty notching, or other potential uses of the jetty as a mechanism for water surface elevation control. This element would require coordination with State Parks and USACE. Under the Russian River Biological Opinion, implementation of jetty removal is conditional upon the results of the study. The study plan is anticipated to be developed by 2011. The Russian River Biological Opinion establishes responsibility for removal or modification of the jetty, dependent on the results of the jetty study, with the USACE.

Implementation of the Jetty Modification Alternative in and of itself would not meet project objectives related to the enhancement of salmonid habitat within the Estuary, as it cannot be

demonstrated that modification of the jetty alone would enhance salmonid habitat. Rather, modification of the jetty to improve flow through could represent a sub-alternative that could enhance salmonid habitat in conjunction or combination with the other alternatives identified. Therefore, the Jetty Modification Alternative is not considered environmentally superior. As provided for in the NMFS' Russian River Biological Opinion, the Water Agency will continue to develop and implement a work plan to analyze the potential for jetty modification to result in beneficial effects to salmonid habitat. As required in the Russian River Biological Opinion, NMFS and the Water Agency will re-examine jetty modification, and its ability to enhance conditions for salmonids in the Estuary, if it is determined that implementation of the Estuary Management Project is unsuccessful.

ES.4.6 Alternative Flood Control Measures

As stipulated by NMFS in the Russian River Biological Opinion, if creation of the outlet channel does not reliably achieve the targeted annual and seasonal Estuary water surface elevations prescribed by the Russian River Biological Opinion, the Water Agency may also evaluate the feasibility of actions to avoid or mitigate potential damage to low-lying structures or properties adjacent to the estuary that are currently threatened with flooding and inundation when the barrier beach closes and the estuary water surface elevation rises above 9 feet. Pursuant to conditions in the NMFS' Russian River Biological Opinion, the Water Agency developed and submitted to NMFS a list of structures, properties, or infrastructure that are susceptible to flooding/ inundation as a result of sandbar formation and Estuary closure. Potential alternative flood control actions, including private property owners making physical modification to or raising of their structures to avoid flooding or inundation damage associated with restoration of estuarine functions, would only be pursued, as required in the Russian River Biological Opinion, if the following conditions exist:

1. It must be determined that adaptive management of the outlet channel is not able to reliably achieve the targeted annual and seasonal Estuary water surface elevations by the end of 2013;

2. Estuary monitoring results indicate that freshwater or low salinity brackish (oligohaline) habitats, or temporary closure of the Estuary provides substantial benefit to rearing juvenile steelhead; and

3. Monitoring results indicate that no adverse effects to other populations of Russian River salmonids are occurring from raised lagoon water surface elevations.

Implementation of this alternative would increase water surface elevations within the Estuary, and would rely on natural breaching events to maintain water levels below a defined water level. This would incrementally reduce the storage capacity available within the Estuary. Additionally, without a defined outflow channel, or mechanism to establish one, lands above the defined water level could be affected in the event that natural breaching does not occur in a manner or timeframe that accommodates inflow into the Estuary. The Russian River Biological Opinion attempts to minimize breaching and tidal conditions during the lagoon management period; however natural breaching is anticipated to occur under this scenario. Therefore, implementation of this alternative may not achieve all of the project objectives.

Implementation of this alternative would affect existing and proposed land uses at approximately 120 parcels along the Estuary, and would require the relocation of existing facilities to avoid effects from inundation. Under this alternative, portions of Highway 1 would potentially flood. Furthermore, this alternative would not reduce the effect of seawater intrusion into adjacent groundwater wells. Therefore, this alternative is not considered environmentally superior to the proposed project.

ES.5 Summary Comparison of the Estuary Management Project and Alternatives

ES.5.1 Environmentally Superior Alternative

The Reduced Project Alternative would achieve the dual project objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard. This alternative would have the potential to comply with the objectives of the Russian River Biological Opinion, which specifically requires the Water Agency to modify its Estuary management practices; however, it would not attain the average water surface elevation of 8 feet as identified in the Russian River Biological Opinion. It would reduce the significant impacts associated with increased water levels for a longer duration, including tsunami risk, flood risk to properties and structures, and reduce the extent of vegetation changes and impacts to shoreline beach access. It would not reduce impacts to recreation (surfing), or groundwater. Implementation of the Reduced Project Alternative would reduce significant and unavoidable impacts associated with private property inundation, incrementally reducing the total number of parcels affected within the Estuary Study Area. It is anticipated that water surface elevations of 8 feet would avoid structures such as boat docks. It would also incrementally reduce the area of gravel bar/mudflat inundation within the Estuary Study Area by approximately 5 acres, thereby reducing inundation effects to pinniped haul outs, and recreational beach area. Implementation of the Reduced Alternative would provide an additional total volume of 3,599 acre-feet of storage; this represents a reduction in storage provided by the proposed project by approximately 966 acre-feet. Although the impacts reduced by the Reduced Project Alternative would remain significant and unavoidable, implementation of the Reduced Project Alternative is considered environmentally superior to the Proposed Project, as it would meet the project objectives and would minimize the area of inundation, and the potential significant unavoidable impacts, associated with the proposed project.

Although this alternative may be considered environmentally superior, the Water Agency is directed by the Russian River Biological Opinion to maintain higher water levels envisioned under the Estuary Management Plan. Implementation of this alternative, or use of a different water surface elevation to achieve project objectives and minimize impacts, could be achieved through the mechanism of the Adaptive Management Plan, which provides for modification of Estuary Management in coordination with NMFS and CDFG, based upon monitoring and experience gained through project implementation.

ES.6 Impact Summary Table

Table ES-2, included at the end of this section, summarizes the environmental impacts associated with each of the Estuary Management Project. For impacts determined to be significant, mitigation measures are presented and the impact significance after mitigation is shown.

ES.7 References

Heckel, M., *Russian River Estuary Study, 1992-1993*, Prepared for Sonoma County Department of Planning and California State Coastal Conservancy, 1994.

National Marine Fisheries Service (NMFS), *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation Improvement District in the Russian River Watershed*, September 24, 2008.

Philip Williams and Associates (PWA), *Final Russian River Estuary Outlet Channel Adaptive Management Plan Year 1, 2010*, prepared for Sonoma County Water Agency, June 23, 2010.

Sonoma County Water Agency (SCWA), *Request for Marine Mammal Protection Act Incidental Harassment Authorization, Russian River Estuary Management Activities*, September 2009.

TABLE ES-2
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
GEOLOGY AND SOILS		
4.1.1: Seismicity. In the event of a major earthquake in the region, seismic ground shaking could trigger seismic-related ground or slope failures, including liquefaction, and/or landslides at the beach, outlet channel, and/or along the banks of the lagoon to be formed behind the outlet channel that could expose people or structure to adverse effects.	None Required	LTS
4.1.2: Beach Erosion. The proposed Estuary Management Project could result in conditions that lead to the erosion on the beach at the outlet channel or along the banks of the Estuary formed behind the outlet channel. Changes in water levels could undermine additional bank areas resulting in localized erosion or the loss of topsoil.	None Required	LTS
4.1.3: Unstable Beach Sands, Landslides, Liquefaction: The proposed Estuary Management Project involves moving the beach sands at the outlet channel. These beach sands are considered a geologic unit of soil that is unstable, or that would become unstable as a result of the project activities, and could potentially result in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse.	None Required	LTS
4.1.4: Expansive Soils. The proposed Estuary Management Project could be located on expansive soils, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property.	None Required	LTS
HYDROLOGY AND FLOODING		
4.2.1. Alteration of drainage. The creation and maintenance of the outlet channel would alter the existing drainage pattern within the Estuary, and this could result in increased sedimentation or erosion.	None Required	LTS
4.2.2. Property Inundation. The creation and maintenance of the outlet channel would alter the existing drainage pattern at the Estuary mouth, which could result in increased potential for inundation of parcels adjacent to the Estuary.	4.2.2: Concerning the nine parcels and associated structures (i.e., boat docks or boat ramps on seven of the parcels, and homes or other buildings on the other two parcels) identified above, and presented in more detail in a previous analysis (SCWA, 2010), the Water Agency shall work with the property owners to identify measures that would, if necessary, substantially minimize or avoid any damages to existing structures that would occur as a result of implementing the project (i.e., increased flooding durations at the 7 to 9 foot elevation). The Water Agency shall survey these properties in greater detail to more accurately and precisely determine the elevation of the structures potentially at risk; this information shall be kept on record at the Water Agency and a copy shall be provided to each of the property owners.	SU

NOTE: Grey highlighted cells indicate significant and unavoidable impacts.

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TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
HYDROLOGY AND FLOODING (cont.)		
4.2.3. Tsunami Risk. A portion of the project area is located within a mapped tsunami hazard zone, and therefore could be inundated in the unlikely event of a tsunami. Subsequently, increased water levels in the Estuary could increase the risk to people or structures within this area to loss, injury, or death involving flooding in the event of a tsunami.	No Feasible Measures Available	SU
WATER QUALITY		
4.3.1. Water Quality during channel creation. The action of creating the outlet channel during the lagoon management period could adversely affect the water quality in the Estuary.	None Required	LTS
4.3.2. Water Quality during sandbar breaching. The change in the barrier beach breaching operations during the lagoon management period could adversely affect salinity, temperature and dissolved oxygen levels in the Estuary.	None Required	LTS
4.3.3: Nutrients and Pathogens. The change in the barrier beach breaching operations during the lagoon management period could adversely affect the water quality due to increased nutrient or indicator bacteria levels in the Estuary.	No Mitigation Required or Available	SU
4.3.4: The change in the barrier beach breaching operations during the lagoon management period (i.e., May through October) could change the duration and/or geographic extent of saline conditions in the Estuary. This could extend the period of time groundwater wells experience brackish water intrusion.	No Mitigation Required or Available	SU
BIOLOGICAL RESOURCES		
4.4.1. Short-term impacts to Special-Status Plant and Animal Species. The creation and maintenance of the lagoon outlet channel could adversely affect special-status plant and animal species.	4.4.1a: In addition to implementing measures identified in the Standard Operating Procedures (SOP), a pre-construction biological resources survey shall be conducted to identify special-status plants and butterflies (or larval host species) and nesting birds present within 150 feet of the general location of the outlet channel management area and access route. The pre-construction survey shall: • Be conducted by a qualified biologist no more than 30 days prior to commencement of the lagoon management period (defined as from May 15 to October 15). The biologist shall have familiarity with special-status plants and butterflies (or larval host species) of the area and experience with conducting special-status species and nesting bird surveys.	LSM

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TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
BIOLOGICAL RESOURCES (cont.)		
4.4.1 (cont.)	• If no special-status plants or butterflies (or larval host species), or nesting birds are encountered, no further mitigation would be required for at least 30 days, unless additional measures are required by regulatory permit conditions obtained for the proposed project. • Additional pre-construction surveys, specifically for nesting birds, shall be conducted such that no more than 30 days will have lapsed between the survey and outlet channel creation or maintenance activities. • If a special-status plant or larval host species for special-status butterflies or nesting birds are encountered, the location shall be documented and species-specific avoidance and minimization measures shall be prepared by the qualified biologist in coordination with the Agency and appropriate resource agencies. • The avoidance and minimization measures shall be implemented to prevent the loss of the species or abandonment of active nests, but shall also take the goal of the proposed project (i.e., managing the lagoon water surface elevations high enough to enhance salmon rearing habitat while also minimizing flooding of the low-lying properties) into consideration. 4.4.1b: As part of the safety tailgate meeting specified in the SOP, a worker environmental awareness training shall be included to inform construction personnel of their responsibilities regarding sensitive biological resources that are present within 150 feet of the general location of the outlet channel management area and access route. The training shall comply with the following measures: • The training shall be developed by a qualified biologist familiar with the sensitive biological resources that are known or have the potential to occur in the area. • The training shall be completed by all construction personnel before any work occurs in the outlet channel management area, including construction equipment and vehicle mobilization. If new personnel are added to the proposed project, the Water Agency shall ensure that new personnel received training before they start working. The subsequent training of personnel can include the use of written materials from the initial training rather than in-person training by the biologist. • The training shall provide educational information on the special-status species that are known or have potential to occur in the area, how to identify the species, as well as other sensitive biological resources (e.g., sensitive natural communities, federal and state jurisdictional waters). The training shall also review the required mitigation measures to avoid impacts on the sensitive resources, and penalties for noncompliance with biological mitigation requirements.	

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TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
BIOLOGICAL RESOURCES (cont.)		
4.4.2. Short-term impacts to Sensitive Natural Communities. The creation and maintenance of the lagoon outlet channel could adversely affect sensitive natural communities.	Implement Mitigation Measure 4.4.1b.	LSM
4.4.3. Short-term impacts to Waters and Wetlands. Creation and maintenance of the lagoon outlet channel could adversely affect federal and state jurisdictional waters.	Implement Mitigation Measure 4.4.1b.	LTS
4.4.4. Short-term impacts to Wildlife Movement and Nursery Sites. Creation and maintenance of the lagoon outlet channel could interfere with wildlife movement or impede the use of nursery sites.	Implement Mitigation Measure 4.4.1b.	LTS
4.4.5. Short-term impacts to Local Policies. Creation and maintenance of the lagoon outlet channel would not conflict with any local policies or ordinances protecting biological resources.	None Required	NI
4.4.6. Sensitive Natural Communities. Long-term adaptive management of the Estuary as a lagoon could adversely affect sensitive natural communities.	None Required	LTS
4.4.7. Special-Status Plant and Animal Species. Long-term adaptive management of the Estuary as a lagoon could adversely affect special-status plant and animal species.	None Required	LTS
4.4.8: Protected Marine Mammals. Long-term adaptive management of the Estuary as a lagoon could adversely affect protected marine mammal species.	4.4.8: In compliance with the IHA (NMFS, 2010c), the Agency will conduct seal counts at the Jenner haulout and at nearby coastal and upriver haulout sites in accordance with methods described in the Agency's *Russian River Management Activities Pinniped Monitoring Plan* (Pinniped Monitoring Plan), dated September 9, 2009. If, during implementation of the Pinniped Monitoring Plan (SCWA, 2009), decreases in overall use at the Jenner haul-out are correlated with increases in use at the three closest haul-outs, the Water Agency shall consult with NMFS and CDFG to alter the Estuary Management Plan such that the haul-out site is maintained as a resource. The IHA does not provide for long-term harassment or alteration of habitat conditions that would contribute to abandonment of the Jenner haul out.	SU
4.4.9: Waters and Wetlands. Long-term adaptive management of the Estuary as a lagoon could adversely affect federal and state jurisdictional waters.	None Required	LTS
4.4.10: Wildlife Movement and Nursery Sites. Long-term adaptive management of the Estuary as a lagoon could interfere with wildlife movement or impede the use of nursery sites.	Implement Mitigation Measure 4.4.8	LSM

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TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
BIOLOGICAL RESOURCES (cont.)		
4.4.11: Local Policies and Ordinances: Adaptive management of the lagoon would not conflict with any local policies or ordinances protection biological resources.	None Required	LTS
FISHERIES		
4.5.1: Habitat Availability. Estuary management to promote freshwater lagoon conditions would increase the frequency, duration and volume of freshwater storage within the Estuary during the lagoon management period, thereby increasing potential habitat availability for juvenile salmonids.	None Required	Beneficial
4.5.2: Habitat quality. Management of the Estuary could result in changes in water quality conditions (water temperature, dissolved oxygen, and salinity) becoming stressful for rearing salmonids, special status, and other native fish species inhabiting the Estuary, resulting in reduced quantity and quality of habitat.	None Required	LTS
4.5.3: Essential Fish Habitat. Management of the Russian River Estuary could affect essential fish habitat (EFH) for various federally marine managed species within the Pacific Salmon FMP, the Coastal Pelagics FMP, and the Pacific Groundfish FMP.	None Required	LTS
LAND USE AND AGRICULTURE		
4.6.1: Divide an Existing Community. The proposed project would physically divide or temporarily disrupt an established community.	None Required	LTS
4.6.2: Conflict with Applicable Plans and Policies. The proposed project may conflict with applicable state and/or local land use plan, policy, or regulation of an agency with jurisdiction over the project, including, but not limited to the general plan, specific plan, local coastal plan, or zoning ordinance adopted for the purpose of avoiding of mitigating an environmental effect.	None Required	LTS
4.6.3: Conflict with HCCPs. The proposed project may conflict with applicable habitat conservation plan or document which aims to protect threatened or endangered species and/or their critical habitat.	None Required	BI
4.6.4: Permanent Conversion of Important Farmland. The proposed project could convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.	None Required	NI

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TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
LAND USE AND AGRICULTURE (cont.)		
4.6.5: Conflict with Williamson Act Contracts. The proposed project would conflict with existing zoning for agricultural use or a Williamson Act Contract.	None Required	LTS
4.6.6 Loss or conversion of Forestland. The proposed project would result in loss of designated forest land. The proposed project would temporarily restrict access and beneficial use of recreational sites or facilities.	None Required	LTS
RECREATION		
4.7.1: Disruption of Use of Recreational Facilities. The proposed project would temporarily restrict access and beneficial use of recreational sites or facilities.	No Feasible Measures Available	SU
4.7.2: Eliminate or Modify an Existing Recreational Resource. The proposed project would likely reduce the occurrence of open channel tidal conditions conducive to surfing activities.	No Feasible Measures Available	SU
Impact 4.7.3: Deterioration of Recreational Facilities.	None Required.	LTS
CULTURAL RESOURCES		
4.8.1: Change in the significance of a historical resource or unique archaeological resource. The Estuary Management Project could cause a substantial adverse change in the significance of a historical resource or unique archaeological resource.	4.8.1: The Water Agency will implement the following measure: *Inadvertent Discovery of Historical and Unique Archaeological Resources*. If discovery is made of items of historical or archaeological interest, the contractor shall immediately cease all work activities in the area (within approximately 100 feet) of discovery. Prehistoric archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-period materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse. After cessation of excavation the contractor shall immediately contact the Water Agency, State Parks, and the U.S. Army Corps of Engineers. The contractor shall not resume work until authorization is received from both agencies. • In the event of unanticipated discovery of archaeological materials occurs during construction, the Water Agency shall retain the services of a qualified professional archaeologist to evaluate the significance of the items prior to resuming any activities that could impact the site.	LSM

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TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
CULTURAL RESOURCES (cont.)		
4.8.1 (cont.)	• In the case of an unanticipated archaeological discovery, if it is determined that the find is potentially eligible for listing in the California and/or National Registers, and the site cannot be avoided, the Water Agency shall provide a research design and excavation plan, prepared by a qualified archaeologist, outlining recovery of the resource, analysis, and reporting of the find. The research design and excavation plan shall be approved by the Water Agency, State Parks, and U.S. Army Corps of Engineers. Implementation of the research design and excavation plan shall be conducted prior to work being resumed. Upon project approval, the Water Agency will coordinate with State Parks and U.S. Army Corps of Engineers to develop an action plan that can be implemented in the event that flooding is imminent and breaching must occur immediately.	
4.8.2: Human Remains. The Estuary Management Project could disturb human remains, including those interred outside of formal cemeteries.	4.8.2: The Water Agency will implement the following measures: *Discovery of Human Remains.* If potential human remains are encountered, the Water Agency shall halt work in the vicinity of the find and contact the Sonoma County coroner in accordance with Public Resources Code Section 5097.98 and Health and Safety Code Section 7050.5. The Water Agency will also notify by telephone the U.S. Army Corps of Engineers archaeologist and permit manager. If the coroner determines the remains are Native American, the coroner will contact the Native American Heritage Commission (NAHC). As provided in Public Resources Code Section 5097.98, the NAHC will identify the person or persons believed to be most likely descended from the deceased Native American. The Most Likely Descendent (MLD) makes recommendations for means of treating the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98. Work shall cease in the immediate area until the recommendations of the appropriate MLD are concluded.	LSM
4.8.3: Culturally sensitive plants. The Estuary Management Project could adversely affect the distribution of natural vegetation communities along the Estuary shoreline, such that availability of culturally significant plants is reduced.	None Required	LTS
NOISE		
4.9.1: Ambient Noise Levels. The Estuary Management Project would result in periodic noise levels above existing ambient conditions.	4.9.1: Time of Day Limits and Notice to Residents. The Water Agency shall limit activities at the lagoon outlet channel that involve the use of heavy equipment to between local sunrise to local sunset. The Water Agency shall also provide advanced notification to each residence within 2,000 feet of the lagoon outlet channel site regarding the planned activities at the site. Notification shall be provided at least one week in advance of the planned activities, or as soon as possible based on beach and water level conditions, at the site and shall include the time restriction requirements and contact information of a Water Agency staff person.	LSM

NOTE: Grey highlighted cells indicate significant and unavoidable impacts.

LTS = Less than Significant
LSM = Less than Significant with Mitigation
SU = Significant and Unavoidable
NI = No Impact

TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
NOISE (cont.)		
4.9.2: Ground-borne Vibration. Estuary Management Project activities would generate ground-borne vibration levels.	None Required	LTS
AIR QUALITY		
4.10.1: Criteria Pollutants. The Estuary Management Project would result in periodic emissions of criteria pollutants.	None Required	LTS
4.10.2: Toxic Air Contaminants (TACs). The Estuary Management Project would result in emissions of TACs that could pose a health risk to sensitive receptors located in the project vicinity.	None Required	LTS
4.10.3 Objectionable Odors. The Estuary Management Project could create objectionable odors.	None Required	LTS
4.10.4: Greenhouse Gas Emissions. The Estuary Management Project would result in the generation of GHG emissions.	None Required	LTS
4.10.5: Conflict with Climate Action Plan. The Estuary Management Project could conflict with a plan designed to reduce GHG emissions.	None Required	LTS
TRAFFIC		
4.11.1: Conflict with Transportation Policies. The Estuary Management Project could conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.	None Required	LTS
4.11.2: Emergency Access. The Estuary Management Project could substantially impede access to local streets or adjacent uses, including access for emergency vehicles.	None Required	LTS
4.11.3: Increased Traffic Safety Hazards. The Estuary Management Project could substantially increase traffic safety hazards due to increased traffic volumes.	None Required	LTS
4.11.4: Roadway Wear. The Estuary Management Project could cause substantial damage or wear of roadways by increased movement of heavy vehicles.	None Required	LTS

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TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
TRAFFIC (cont.)		
4.11.5: Parking. The Estuary Management Project could result in inadequate parking capacity.	None Required	LTS
HAZARDS AND HAZARDOUS MATERIALS		
4.12.1: Use of Hazardous Materials. The Estuary Management Project could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	None Required	LTS
4.12.2: Accidental Releases of Hazardous Materials. The Estuary Management Project could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.	4.12-2: To minimize the potential for accidental spills from equipment and to provide for a planned response in the event that an accidental spill does occur, the Water Agency shall implement the following construction best management practices: 1. Prohibit on-site fueling of vehicles and construction equipment; 2. Maintain spill containment and clean up equipment onsite; and, 3. Ensure that construction personnel are trained in proper material handling, cleanup, and disposal procedures.	LSM
4.12.3: Emergency Access. The Estuary Management Project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	None Required	LTS
PUBLIC SERVICES AND UTILITIES AND PUBLIC SAFETY		
4.13.1: Emergency Response Times and Public Facilities. The Estuary Management Project could result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services: fire protection, police protection, schools, parks, other public facilities.	None Required	LTS
4.13.2: Conflict with regulatory requirements. The Estuary Management Project could conflict with wastewater treatment requirements of the applicable Regional Water Quality Control Board.	None Required	LTS

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TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
PUBLIC SERVICES AND UTILITIES AND PUBLIC SAFETY (cont.)		
4.13.3: Public Safety. The Estuary Management Project could substantially affect public safety at the outlet channel location during channel creation.	4.13.1: Following outlet channel creation or artificial breaching, the Water Agency will install semi-permanent signage notifying beach users of channel conditions, potential for safety hazards from beach erosion or hydrologic action, and emergency contact information. Signage should be posted and maintained at key locations, such as the parking lot at Goat Rock State Beach Parking lot, the unofficial beach access trail located on the north side of the beach off Highway 1, and 100 feet on either side of the outlet channel.	LTS
4.13.4: Septic Tanks. The Estuary Management Project could substantially affect the function of septic tanks or other alternative waste water disposal systems.	None Required	LTS
4.13.5: Mosquito Abatement. The Estuary Management Project could increase the frequency and duration of water levels in the Estuary during the lagoon management period, and would inundate vegetated areas adjacent to the existing shoreline. Increased inundation area could increase potential mosquito breeding habitat adjacent to the Estuary.	None Required	LTS
AESTHETICS		
4.14.1: Scenic Vistas. The Project may have a substantial adverse effect on a scenic vista.	None Required	LTS
4.14.2: Visual Character. Implementation of the Estuary Management Project may degrade the existing visual character of the area.	None Required	LTS
4.14.3: Scenic Resources. Implementation of the Estuary Management Project may substantially damage scenic resources, such as scenic highway corridors and scenic landscape units.	None Required	LTS
CUMULATIVE		
5.1: Short-term (Construction-related) Cumulative Impacts. Concurrent construction of the projects within the Russian River Watershed in northern Sonoma County could result in cumulative short-term impacts associated with construction activities.	None Required	LSM
5.2.1: Cumulative Long-term Geologic Impacts (Seismic Events and/or Beach Erosion). Concurrent creation of the outlet channel and continued artificial breaching with other projects proposed in the Russian River Watershed and other habitat enhancement projects could result in cumulative long-term risk of impacts related to groundshaking and surface fault rupture during major earthquakes, or lead to erosion of beach sands or river bank.	None Required	LTS

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TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
CUMULATIVE (cont.)		
5.2.2: Cumulative Long-term Hydrologic Impacts. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, would alter the existing drainage pattern at the Estuary mouth, which could result in increased potential for inundation of parcels adjacent to the Estuary.	No Feasible Measures Available	Cumulatively Significant and Unavoidable
5.2.3: Cumulative Long-term Tsunami Effect. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could increase the risk to people or structures within this area to loss, injury, or death involving flooding in the unlikely event of a tsunami.	No Feasible Measures Available	Cumulatively Significant and Unavoidable
5.2.4: Sea Level Rise. The Estuary Management Project could be affected by an increase in sea level rise.	None Required	LTS
5.2.5: Cumulative Long-term Impacts on Water Resources. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to water quality related to bacteria and nutrient levels.	No Feasible Measures Available	Cumulatively Significant and Unavoidable
5.2. 6: Cumulative Long-term Groundwater Impacts. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could change the duration and/or geographic extent of saline conditions in the Estuary. This could extend the period of time groundwater wells experience brackish water intrusion.	No Feasible Measures Available	Cumulatively Significant and Unavoidable
5.2.7: Cumulative Long-term Impacts on Biological Resources. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to biological resources.	Mitigation Measures in Section 4.4, Biological Resources.	Cumulatively Significant and Unavoidable
5.2.8: Cumulative Long-term Impacts on Fisheries. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to fisheries.	None Required	Cumulatively Beneficial

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TABLE ES-2 (Continued)
SUMMARY OF IMPACT DETERMINATIONS AND MITIGATION MEASURES

Impact	Mitigation Measures	Impact Determination
CUMULATIVE (cont.)		
5.2.9: Cumulative Long-term Impacts on Land Use. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to land use and agricultural resources.	None Required	LTS
5.2.10: Cumulative Impacts to Recreation. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to recreation and recreational facilities.	No Feasible Measures Available	Cumulatively Significant and Unavoidable
5.2.11: Cumulative Long-term Impacts on Cultural and Historic Resources. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to cultural resources.	None Required	LSM
5.2.12: Cumulative Long-term Noise Impacts: Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in a cumulatively considerable net increase in ambient noise.	None Required	LSM
5.2.13: Cumulative Impacts from Greenhouse Gas Emissions. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in a cumulatively considerable net increase in GHG emissions or criteria pollutants for which the region is in non-attainment under applicable standards.	None Required	LTS
5.2.14: Cumulative Long-term Traffic Impacts. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in a cumulatively considerable net increase in traffic congestion or exceedance of applicable road standards.	None Required	LTS
5.2.15: Cumulative Long-term Visual Impacts. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in a cumulatively considerable visual impacts or permanent change is aesthetic characteristics.	None Required	LTS

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CHAPTER 1.0
Introduction

The Sonoma County Water Agency (Water Agency), as Lead Agency, has prepared this Draft Environmental Impact Report (EIR) for the proposed Russian River Estuary Management Project (Estuary Management Project or proposed project), in accordance with the provisions of the California Environmental Quality Act (CEQA) of 1970, codified as California Public Resources Code Sections 21000 et. seq., the State CEQA Guidelines in the Code of Regulations, Title 14, Division 6, Chapter 3, and the Water Agency's Procedures for the Implementation of CEQA. The EIR is a public document for use by the Water Agency, other governmental agencies, and the public in identifying and analyzing the potential effects on the environment and mitigation measures to lessen or eliminate adverse impacts, and examining feasible alternatives to the proposed project.

1.1 Background and Overview of Proposed Project

The Water Agency was created in 1949 by the California Legislature as a special district to provide flood protection and water supply services. The Sonoma County Board of Supervisors acts as the Water Agency's Board of Directors. The Water Agency's powers and duties, as authorized by the California Legislature, include the production and supply of surface water and groundwater for beneficial uses, control of flood waters, generation of electricity, provision of recreational facilities (in connection with the Water Agency's facilities), and the treatment and disposal of wastewater.

The Russian River Estuary (Estuary) is open to the ocean tides for much of the year. At certain times, the natural formation of a barrier beach[1] across the mouth of the Russian River cuts off the tidal connection between the ocean and the Russian River and creates a lagoon.[2] The Estuary may close at any time of the year, although the closures occur most often during the spring, summer, and late fall. Closures result in increasing water levels in the Estuary behind the barrier beach and an increase in the risk of flooding low-lying properties (SCWA, 2009). Natural breaching of the barrier beach occurs when Estuary water levels exceed the capability of the barrier beach to impound this water, causing localized erosion of the barrier beach and creating a tidal channel that reconnects the Russian River to the Pacific Ocean. Historically, private citizens breached the barrier beach, enabling the river to flow into the ocean, in an effort to avoid flooding. In the 1960s, the Sonoma County Public Works Department began carrying out breaching, using heavy

1 For the purposes of this project, the term barrier beach is used to describe closed sandbar conditions, consistent with National Marine Fisheries Service (NMFS) terminology.

2 A lagoon is formed when a barrier beach restricts tidal exchange in the Estuary.

equipment. After a county reorganization in the mid-1990s, the Water Agency began to perform activities related to breaching the barrier beach. Currently, the Water Agency artificially breaches the barrier beach when the water surface level in the Estuary is between 4.5 and 7.0 feet above mean sea level, as determined by the gage at the Jenner Visitor's Center, in accordance with the *Russian River Estuary Study 1992–1993* (Heckel, 1994). Artificial breaching occurred every year between 1996 and 2009, except 2006. A detailed description of artificial breaching activities is provided in **Chapter 2.0, Project Description**.

In September 2008, the National Marine Fisheries Service (NMFS) issued the *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation District in the Russian River Watershed* (Russian River Biological Opinion). [3] The Russian River Biological Opinion is a culmination of more than a decade of consultation between the Water Agency, the U.S. Army Corps of Engineers (USACE), and NMFS regarding the impact of the Water Agency's and USACE's water supply and flood control activities on three fish species listed under the federal Endangered Species Act: Central California Coast steelhead, Central California Coast coho salmon, and California Coastal Chinook salmon. The California Department of Fish and Game (CDFG) issued a consistency determination on November 9, 2009, finding that the Russian River Biological Opinion was consistent with the requirements of the California Endangered Species Act (CESA) and adopted the measures identified in the Russian River Biological Opinion.

The Russian River Biological Opinion concluded that the continued operations of Coyote Valley Dam and Warm Springs Dam by the USACE and the Water Agency in a manner similar to recent historic practices, together with the Water Agency's stream channel maintenance activities and Estuary management, are likely to jeopardize and adversely modify critical habitat for endangered coho salmon and threatened steelhead. The Russian River Biological Opinion found that artificially elevated inflows to the Russian River Estuary during the low flow season (May through October) and historical artificial breaching practices have significant, adverse effects on the Russian River's estuarine rearing habitat for juvenile salmonids, particularly steelhead. The historic method of artificial breaching, which is done in response to rising water levels behind the barrier beach, creates a tidal marine environment with shallow depths and high salinity. The Russian River Biological Opinion concludes that the combination of high inflows and breaching practices impact rearing habitat because they interfere with natural processes that would otherwise cause a freshwater lagoon to form behind the barrier beach. According to NMFS, fresh or brackish water lagoons at the mouths of many streams in central and southern California often provide depths and water quality that are highly favorable to the survival of rearing salmon and steelhead.[4]

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[3] The Russian River Biological Opinion may be accessed online at www.sonomacountywater.org and may be reviewed at the Water Agency's office located at 404 Aviation Boulevard, Santa Rosa, CA.

[4] National Marine Fisheries Service. *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation District in the Russian River Watershed*. p. 243. September 2008.

The Russian River Biological Opinion requires the Water Agency to collaborate with NMFS and the CDFG and to modify Estuary management in order to reduce marine influence (high salinity and tidal inflow) and promote a higher water level in the Estuary (formation of a fresh or brackish water lagoon) from May 15 to October 15 (referred to hereafter as the "lagoon management period"). Conditions in a fresh or brackish water lagoon are thought by NMFS to enhance the quality of rearing habitat for juvenile salmonids. The Russian River Biological Opinion prescribes a program of potential, incremental steps to accomplish these conditions, including adaptive management of a lagoon outlet channel on the barrier beach during the lagoon management period. The Water Agency would continue the historical practice of artificially breaching the barrier beach to minimize flooding outside of the lagoon management period.

1.2 Project Objectives, Purpose, and Need

This EIR has been developed to provide the public and responsible and trustee agencies reviewing the Estuary Management Project an analysis of the potential effects, both beneficial and adverse, on the local and regional environment associated with implementation and operation of the Estuary Management Project. In order to comply with the requirements of the Russian River Biological Opinion, the Water Agency will adaptively manage the Estuary with the primary objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard. Rearing habitat may be enhanced by reducing tidal influence on the Russian River Estuary during the lagoon management period to increase freshwater habitat available for rearing salmon and steelhead. Adaptive management requires: 1) monitoring of biological productivity, water quality, and physical processes in the Estuary in response to the changes in management actions that control water surface elevations in the estuary-lagoon system; and 2) refinement of management actions to achieve desired water levels to support biological productivity, while simultaneously providing flood management for properties adjacent to the Estuary. The Estuary Management Project proposes the elements discussed in **Chapter 2.0, Project Description**.

In addition to the primary objectives, the Estuary Management Project is intended to assist the Water Agency in its efforts to provide for the health and safety of visitors and employees of Goat Rock State Beach, and Water Agency staff, during management activities; and to implement, operate, and maintain management techniques in a technically and economically feasible manner.

1.3 Agency Use of this Document

Section 15124(d) of the CEQA Guidelines requires that an EIR contain a statement briefly describing the intended uses of the EIR. This Draft EIR has been prepared to analyze the potential environmental impacts of proposed management of the Russian River Estuary. This EIR will be used primarily by the Water Agency, as the lead agency, and other Responsible Agencies, to evaluate environmental impacts of the proposed project and make a decision of approval for the proposed project. Prior to a decision, the Water Agency will consider certification of the EIR. Upon completion and certification of this EIR, the Water Agency will use this document to make

written findings and decisions, adopt a Statement of Overriding Considerations, if necessary, and file a Notice of Determination (NOD).

1.4 CEQA Process

This document satisfies the requirements of the CEQA. The primary purpose of an EIR is to identify and publicly disclose environmental impacts that may result from implementation of a project and to identify feasible alternatives, mitigation measures, or revisions to the project that would reduce those impacts, to the degree feasible. CEQA requires a determination of impact significance for each impact discussed in an EIR based on the significance criteria. This document has been prepared as a project-level EIR, as provided for by CEQA Guidelines Section15161.

1.4.1 Notice of Preparation and Public Scoping

In accordance with CEQA Guidelines Section15082, the Water Agency circulated a Notice of Preparation (NOP) to local, state, and federal agencies, and to other interested parties on May 7, 2010. The NOP was mailed to the State Clearinghouse and was available online on the Water Agency website and local libraries. The NOP was circulated for a 45-day public review period, which ended on June 21, 2010,[5] to solicit both written and verbal comments on the EIR's scope and provide information on the public scoping meeting. Additionally, the NOP presented the background, purpose, description, and location of the proposed project, potential issues to be addressed in the EIR, and contact information for additional information regarding the project. The NOP was directly mailed to 400 parties, and a postcard notification of the NOP's availability was sent to 1,200 parties.[6]

During the NOP review period, the Water Agency held two scoping meetings, in May at the Jenner Community Center and the Sonoma County Permit and Resource Management Department in Santa Rosa, to discuss the project and to solicit public input as to the scope and content of this EIR.

Public legal notices and display advertisements were placed in five local newspapers informing the general public of the availability of the NOP and the times and locations of scheduled scoping meetings. The purpose of the scoping meetings was to present the proposed project to the public through use of display maps and handouts describing project components and potential environmental impacts. Attendees were provided an opportunity to voice comments or concerns regarding potential effects of the proposed project. **Appendix 1** of this Draft EIR contains a copy of the NOP and the

[5] The public scoping period generally lasts for 30 days; the Water Agency determined 45 days was appropriate for this project.

[6] The distribution list was developed based on the Water Agency databases of regulatory agencies with jurisdiction, local organizations, business, and interest groups, and property owners based on parcel data. Hard copies of the NOP were mailed directly to federal, state, and local agencies with jurisdiction; members of organizations, business, and interest groups that requested a copy; and property owners with postal zip codes within Jenner, Duncans Mills, Monte Rio, Ville Grande, Rio Nido, Camp Meeker, Forestville, Occidental, and some in the Bodega Bay area. Postcards were mailed to parties that have previously expressed interest in the Russian River Instream Flow and Restoration Program, including other local agencies, other interest groups and organizations, and a subset of Sonoma County residents and property owners (outside of the locations listed above).

Scoping Report, which provides a summary of all verbal and written comments received, and copies of the written comments.

During an additional scoping meeting with regulatory agencies' staff, the Water Agency requested participation from regulatory agencies with jurisdiction over the project area or resources to solicit their comments and input on the scope of the EIR. Invitees included members from NMFS, USACE, CDFG, California Department of Parks and Recreation (State Parks), North Coast Regional Water Quality Control Board, California Coastal Commission, and California State Lands Commission. The meeting was not attended by representatives from the latter two agencies. Written comments received during the scoping meetings and circulation of the NOP are included in **Appendix 1**. A total of 33 comment submittals (letters, emails, comment cards) were received. Collectively, a total of 38 individual verbal comments were received and noted below. Written comments were received from federal agencies, including NMFS; state agencies, including CDFG, State Parks, and California Native American Heritage Commission; public organizations, including SealWatch, Russian Riverkeeper, Save the Waves Coalition, Sonoma Coast Surfrider Foundation, Russian River Watershed Protection Committee, Northern California River Watch, Trout Unlimited; and members of the public. The comments included questions regarding the project description and CEQA process, as well as CEQA technical issues, including potential effects on water quality, biological and fisheries resources, hydrology, cultural resources, climate change, and recreational resources.

1.4.2 Draft EIR

This document constitutes the Draft EIR. The report contains a description of the Estuary Management Project elements, description of the environmental setting and baseline conditions, identification of impacts, and mitigation measures, where feasible, for impacts found to be significant, as well as an analysis of alternatives. This document is intended to provide the Water Agency with the information required to carry out its activities with respect to the proposed project. The Draft EIR addresses environmental issues that could result in potentially significant environmental effects from project implementation. Significance criteria have been developed for each environmental issue analyzed in this Draft EIR and are defined at the beginning of each impact analysis section. Impacts are categorized as follows:

1. Significant and unavoidable;
2. Potentially significant, but can be mitigated to a less-than-significant level;
3. Less than significant (mitigation is not required under CEQA, but may be recommended);
4. No impact; or
5. Beneficial.

CEQA requires that a lead agency shall neither approve nor carry out a project as proposed unless the significant environmental effects have been reduced to an acceptable level, where possible (CEQA Guidelines Section15091 and Section15092). An acceptable level is defined as eliminating, avoiding, or substantially lessening the significant effects. If such a reduction is not possible, a lead agency must adopt mitigation measures and findings for potentially significant

impacts that can be reduced to a less than significant level. For those impacts that remain significant and unavoidable, a lead agency must adopt findings regarding alternatives and a Statement of Overriding Considerations. As defined in CEQA Guidelines Section15093, a Statement of Overriding Considerations balances the benefits of a project against its unavoidable environmental consequences.

Scope of this EIR

The Water Agency identified in the NOP the potential areas of analysis that could be addressed in the EIR. Based on the NOP scoping process, the Water Agency determined that this EIR would address the following technical issue areas, which are listed in the order in which they appear in **Chapter 4.0**:

1. Geology and Soils
2. Hydrology and Flooding
3. Water Quality
4. Biological Resources
5. Fisheries
6. Land Use and Agriculture
7. Recreation
8. Cultural Resources
9. Noise
10. Air Quality
11. Transportation and Traffic
12. Hazards and Hazardous Materials
13. Public Services and Utilities and Public Safety
14. Aesthetics

Organization of the Draft EIR

This Draft EIR has been organized into the following chapters:

ES. **Executive Summary.** This chapter summarizes the contents of the Draft EIR and provides a tabulation of the impacts and mitigation measures for the proposed project and alternatives.

1. **Introduction and Project Background.** This chapter discusses the CEQA process, the purpose of the EIR, and the intended use of the document.

2. **Project Description.** This chapter provides a detailed description of the proposed project.

3. **Project Background and Environmental Setting.** This chapter discusses existing conditions and establishes the environmental baseline for several key issue areas.

4. **Impacts and Mitigation Measures.** This chapter provides a comprehensive analysis and assessment of impacts and mitigation measures for the proposed project. This section is divided into main sections for each environmental issue area (e.g., Air Quality, Biological Resources, etc.) that contain the environmental settings, regulatory framework, significance thresholds, and impacts of the proposed project.

5. **Cumulative Impacts.** This chapter describes the potential impacts of the proposed project when considered together with other related projects in the action area.

6. **Alternatives Analysis.** This chapter presents an overview of the alternatives development process and describes the alternatives to the proposed project that were considered.

7. **Other Topics Required by CEQA.** This chapter describes the potential for the proposed project to induce growth and discusses indirect secondary impacts associated with the

proposed project. This chapter also provides a discussion of significant environmental effects that cannot be avoided and irreversible environmental changes.

8. **Report Preparers.** This chapter identifies authors and consultants involved in preparing this Draft EIR, including persons and organizations consulted.

9. **Appendices.** The appendices contain supporting documents and technical data used in the preparation and documentation of the analysis included in the EIR.

Public Review

This Draft EIR will be available to local, state, and federal agencies and to interested organizations and individuals who may want to review and comment on the report. Notice of this Draft EIR will also be sent directly to every agency, person, or organization that commented on the NOP. Publication of this Draft EIR marks the beginning of a 60-day public review period, during which written comments will be accepted via regular mail, fax, and e-mail at the contact information listed below. During the review period, the Water Agency will hold a public hearing on the Draft EIR. Details regarding the public hearing will be posted on the Water Agency's website, www.sonomacountywater.org, in local newspapers, or by sending inquiries to:

Sonoma County Water Agency
Attention: Jessica Martini-Lamb
404 Aviation Boulevard
Santa Rosa, CA 95403

email: estuaryproject@esassoc.com

1.4.3 Final EIR

Written and oral comments received in response to the Draft EIR will be addressed in a Response to Comments document which, together with the Draft EIR, will constitute the Final EIR. As the CEQA Lead Agency, the Water Agency's Board of Directors will consider certification of the EIR as complete under CEQA (CEQA Guidelines Section15090). Once the EIR has been certified, the Water Agency may proceed to consider project approval. Prior to approving the project, the Water Agency must make written findings with respect to each significant environmental effect identified in the EIR in accordance with Section 15091 of CEQA Guidelines. The Water Agency would be required to adopt Findings of Fact, and for impacts determined to be significant and unavoidable, adopt a Statement of Overriding Considerations.

1.5 References

Heckel, M., *Russian River Estuary Study, 1992-1993*, Prepared for Sonoma County Department of Planning and California State Coastal Conservancy, 1994.

National Marine Fisheries Service (NMFS), *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation Improvement District in the Russian River Watershed*, September 24, 2008.

Philip Williams and Associates (PWA), *Final Russian River Estuary Outlet Channel Adaptive Management Plan 2010*, prepared for Sonoma County Water Agency, June 23, 2010.

Sonoma County Water Agency (SCWA), *Request for Marine Mammal Protection Act Incidental Harassment Authorization, Russian River Estuary Management Activities*, September 2009.

CHAPTER 2.0
Project Description

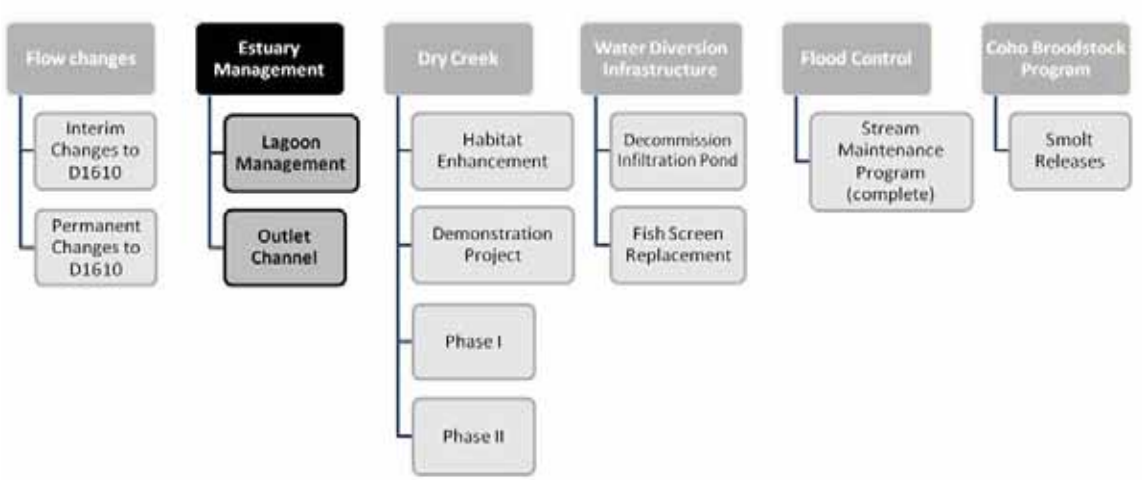
2.1 Introduction

This Draft Environmental Impact Report (EIR) evaluates the potential environmental effects of the Russian River Estuary Management Project (Estuary Management Project or proposed project), proposed by the Sonoma County Water Agency (Water Agency) in response to the mandates in the National Marine Fisheries Service's Russian River Biological Opinion (Russian River Biological Opinion), to provide freshwater habitat for salmonids, particularly juvenile steelhead from May 15 to October 15, and to minimize flood risk to low-lying properties adjacent to the Russian River Estuary (Estuary).

2.1.1 Russian River Instream Flows and Restoration Program (RRIFR Program)

The Russian River Biological Opinion (described in detail in **Chapter 1.0, Introduction**) mandates the Water Agency and United States Army Corps of Engineers (USACE) to implement a series of actions [identified as Reasonable and Prudent Alternatives (RPAs)] to modify existing water supply and flood control activities (**Chart 2-1**). One of these actions is the Estuary Management Project, as presented in this Draft EIR. In concert with habitat enhancement, these actions are intended to minimize impacts to listed salmonid species and enhance their habitats within the Russian River and its tributaries. The Water Agency is charged with the following actions under the Russian River Biological Opinion:

1. Reducing minimum instream flows in the Russian River and Dry Creek
2. Enhancing salmon habitat in Dry Creek and its tributaries
3. Developing a bypass pipeline around Dry Creek if habitat enhancement is unsuccessful
4. Changing Russian River estuary management (i.e. the Estuary Management Project presented in this Draft EIR)
5. Improving water diversion infrastructure at the Agency's Wohler and Mirabel facilities
6. Modifying flood control maintenance activities on the mainstem Russian River and its tributaries
7. Continuing to participate in the Coho Broodstock program



* Environmental review process and permitting for Stream Maintenance Program is complete; project is in implementation phase and is ongoing.

Russian River Estuary Management Plan Project ▪ 207734.01

Chart 2-1
RRIFR Program Elements

The Russian River Biological Opinion is focused on compliance with the federal Endangered Species Act for three listed salmonids; however many of the actions mandated by Russian River Biological Opinion require additional review under CEQA, as well as compliance with state and federal regulations. To implement these actions, the Agency has developed the Russian River Instream Flows and Restoration (RRFIR) Program. This EIR for the Estuary Management Project is one step in evaluating implementation of the mandates of the Russian River Biological Opinion. The Estuary Management Project would involve three primary actions (described in detail below): artificial breaching consistent with current practices and as allowed under the Russian River Biological Opinion, lagoon adaptive management including monitoring and response to physical conditions, and creation of a lagoon outlet channel to control water surface elevation.

2.2 Project Background

2.2.1 Project Area

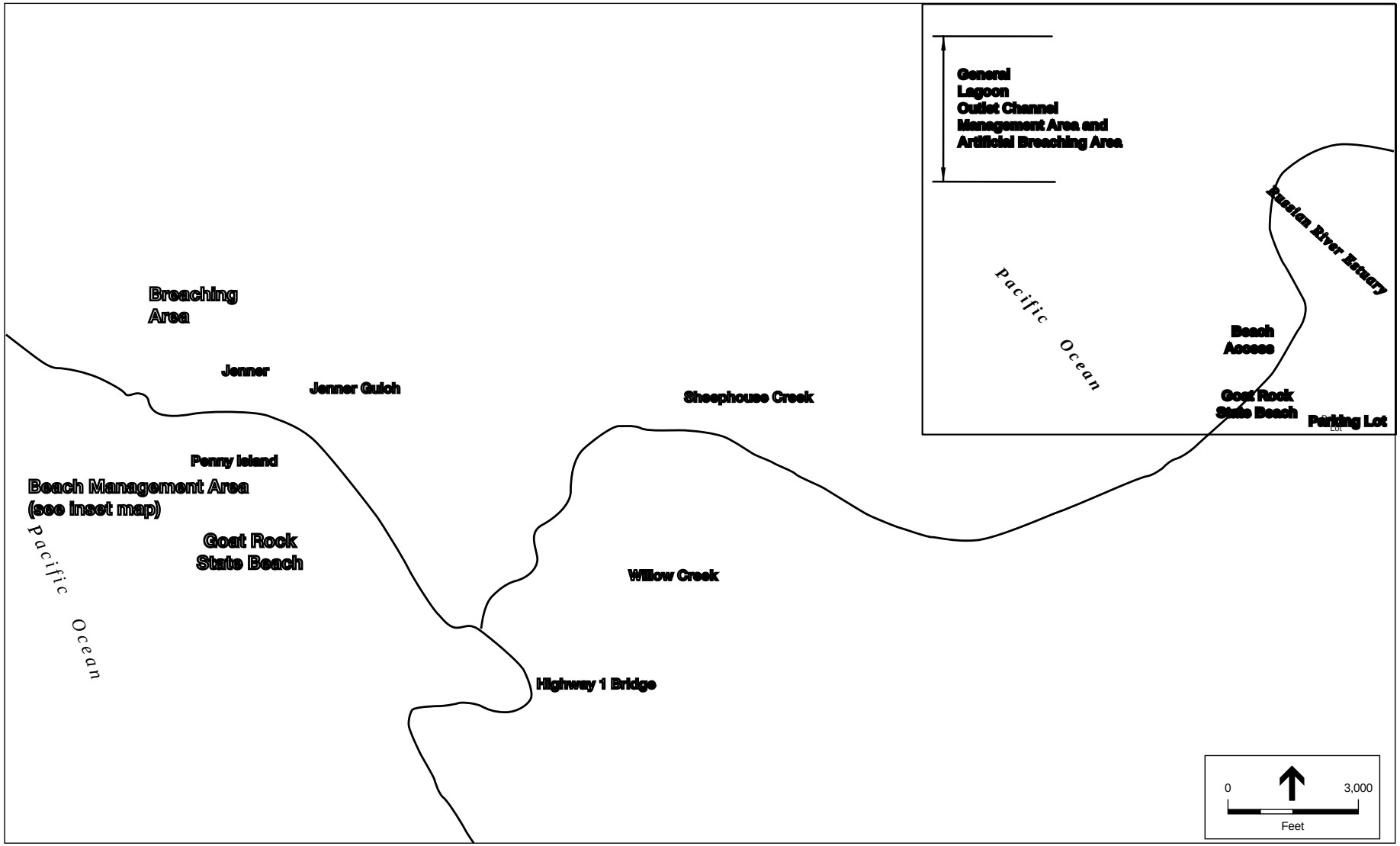
The Russian River watershed encompasses 1,485 square miles of Sonoma and Mendocino Counties. The regional location is presented in **Figure 2-1**. The project area, illustrated in **Figure 2-2**, is located at the Russian River Estuary (Estuary)[1], approximately 60 miles northwest of San Francisco Bay, near the community of Jenner, Sonoma County, California. The focus of Estuary management activities is the barrier beach that forms at the mouth of the Russian River

[1] Estuary is defined as a partly enclosed coastal body of water with a river flowing into it, and open connection to the ocean (tidally influenced). The term "Estuary", in the context of this document, refers to the geographic location of the project, recognizing that the proposed project involves creation of a 'lagoon", which is defined as a freshwater or brackish body of water separated from the ocean by a barrier beach.

SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-1
Regional Location



SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-2
Project Location

where it discharges to the Pacific Ocean.[2] The mouth of the Russian River Estuary is located at Goat Rock State Beach, which is owned by California State Department of Parks and Recreation (State Parks). The Estuary extends from the mouth of the Russian River upstream approximately seven miles to the Duncans Mills area beyond the confluence with Austin Creek. Within this area, the Water Agency has developed high resolution water quality, vegetation, biological resources, and bathymetric information which will be used to examine impacts within the Estuary. This is referred to as the Estuary Study Area, and is characterized by three primary reaches: lower, middle and upper reach (**Figure 2-3**). It is estimated that under certain closed conditions, backwatering may extend upstream as far as Vacation Beach. As such, for certain issue areas, this "maximum backwater area" extending from the mouth of the Russian River to Vacation Beach will be discussed (**Figure 2-3a**).

2.2.2 Historical Estuary Management

The Estuary is open to the ocean tides for much of the year. At certain times, the natural formation of a barrier beach[3] across the mouth of the Russian River cuts off the tidal connection between the ocean and the Russian River and creates a lagoon.[4] The Estuary may close at any time of the year, although the closures occur most often during April to June and again in September to November. Closures result in increasing water levels in the Estuary behind the barrier beach and may increase the risk of flooding of low-lying properties. Natural breaching of the barrier beach occurs when Estuary water levels exceed the capability of the barrier beach to impound this water, causing localized erosion of the barrier beach and creating a tidal channel that reconnects the Russian River to the Pacific Ocean.

The Water Agency artificially breaches the barrier beach when the water surface level in the Estuary is between 4.5 and 7.0 feet (NGVD),[5] as determined by the gage at the Jenner Visitor's Center (Heckel, 1994). Artificial breaching occurred every year between 1996 and 2009, except 2006 (**Table 2-1** and **Figure 2-4a**).[6] Monthly artificial breaching activities varied from year to year; but the majority of the artificial breaching events occurred from April through June and September through November. Of the years that artificial breaching was implemented, the lowest number of artificial breaching events was one event in 2004 and the highest number was 15 attempted breaches (with 13 successful breaches) in 2009 (**Table 2-1** and **Figure 2-4b**).[7] It is not possible to ascertain how many artificial breaching events would be required each year, but there have been an average of six artificial breaching events annually over the last 14 years. Artificial breaching typically consists of the following actions:

[2] Activities will physically occur in the lower Estuary; however some impacts may extend upstream, and are discussed in the resource sections in Chapter 4.0 as applicable.

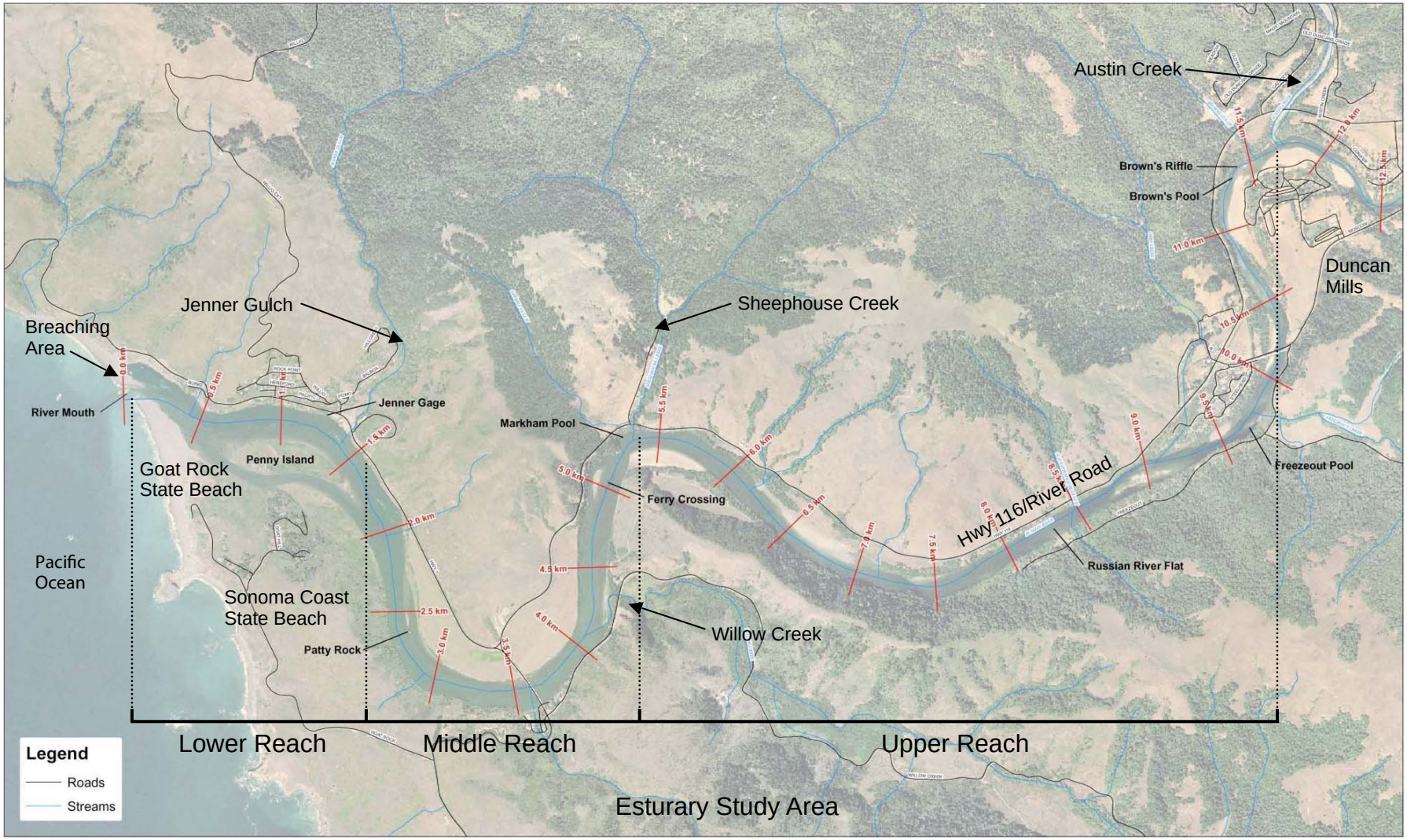
[3] For the purposes of this project, the term barrier beach is used to describe closed sandbar conditions, consistent with NMFS terminology.

[4] A lagoon is formed when a barrier beach restricts tidal exchange in the Estuary.

[5] Throughout the Draft EIR, all specific elevation values presented (in feet) are in reference to the National Geodetic Vertical Datum of 1929 (NGVD 29), unless otherwise noted.

[6] In 2006, only natural breaching events occurred.

[7] This discussion and throughout the document, the focus is on artificial breaches conducted by the Water Agency, not citizen breaches.



SOURCE: SCWA, 2005

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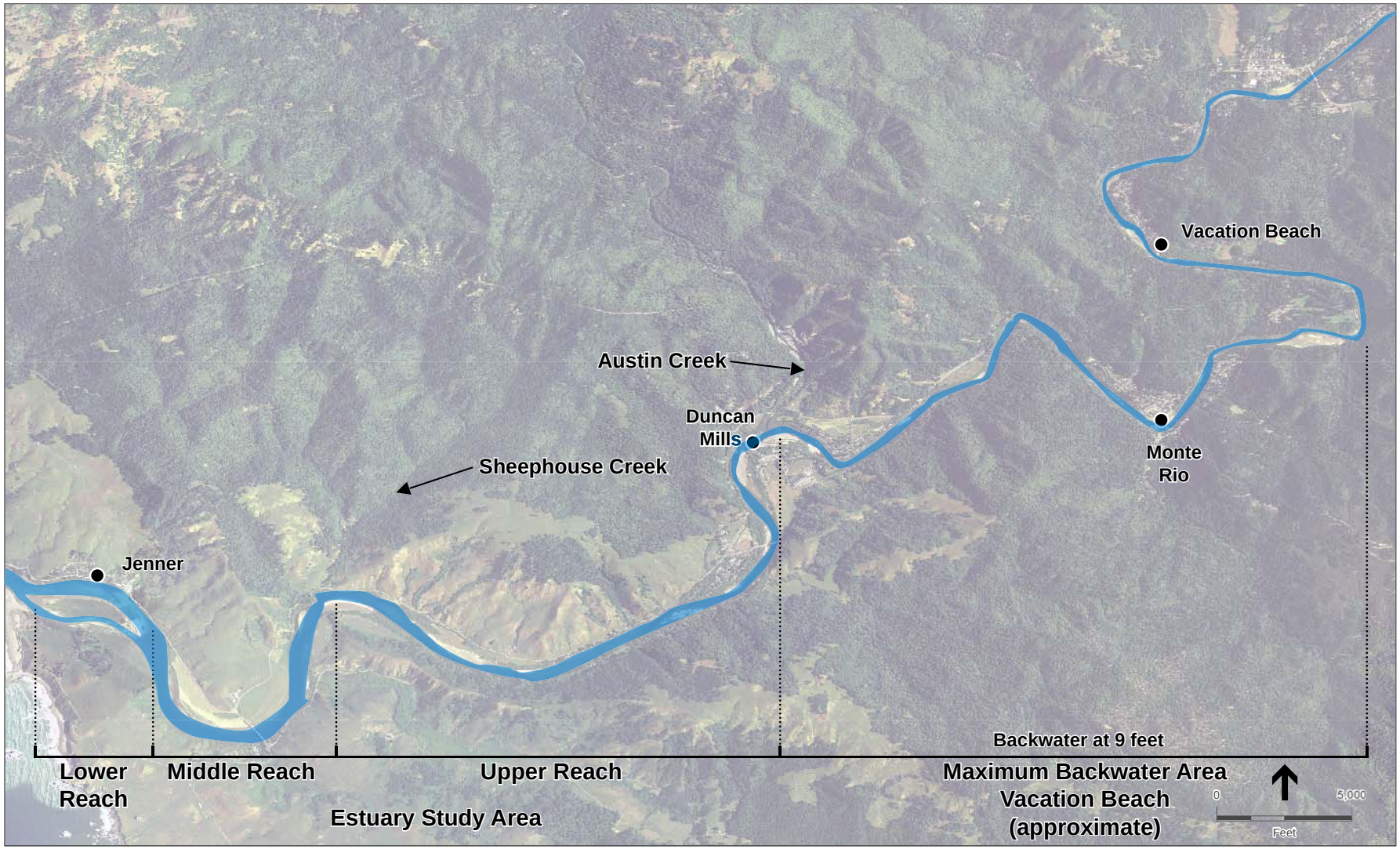
Figure 2-3
Estuary Study Area



SOURCE: SCWA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-3A

Estuary Study Area and Maximum Backwater Area

TABLE 2-1
BREACHING OF THE RUSSIAN RIVER ESTUARY, 1996-2009

Month	Year														Totals by Month
	1996	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
January						1								1, [1]	3
February												2			2
March		1, [1]						[1]							3
April		[1]				2			[1]			3	[1]	[1]	9
May		**1, [1]**			**1**	**3**			**1**				**5**		**12**
June		**2**		**1**	**1**		**1**	**[1]**						**1**	**7**
July	**1**			**1**									**1**		**3**
August	**<2>**	**1**							**[1]**						**4**
September	**1, <1>**	**2**	**4**	**1**	**1**					**1**			**1**	**1**	**13**
October	**1**	**1**	**3**	**2**	**2**	**2**	**[1]**	**2**	**<1>**	**1**	**[1]**	**[1]**	**1**	**4**	**23**
November	[1]	1	1	1, [1]	4	[1]	3	1	<2>	2	[3]	2	1	4	28
December					2		1				[1]	2	1, [1]	4	12
Total	7	12	8	7	11	9	6	5	6	4	5	10	12	17	119
Water Agency Breaches	3	9	8	6	11	8	5	3	1	4	0	9	10	15[1]	92
Breaches During Lagoon Management Period	6	8	7	5	5	5	2	3	3	2	1	1	8	6	62

[1] In 2009, the Water Agency attempted to breach the barrier beach 15 times, however only 13 were successful.
* Type of breach not recorded for 1998. All breaching events in 1998 will be treated as done by the Water Agency.
<#> denotes breaches conducted by private individuals
[#] denotes natural breaches

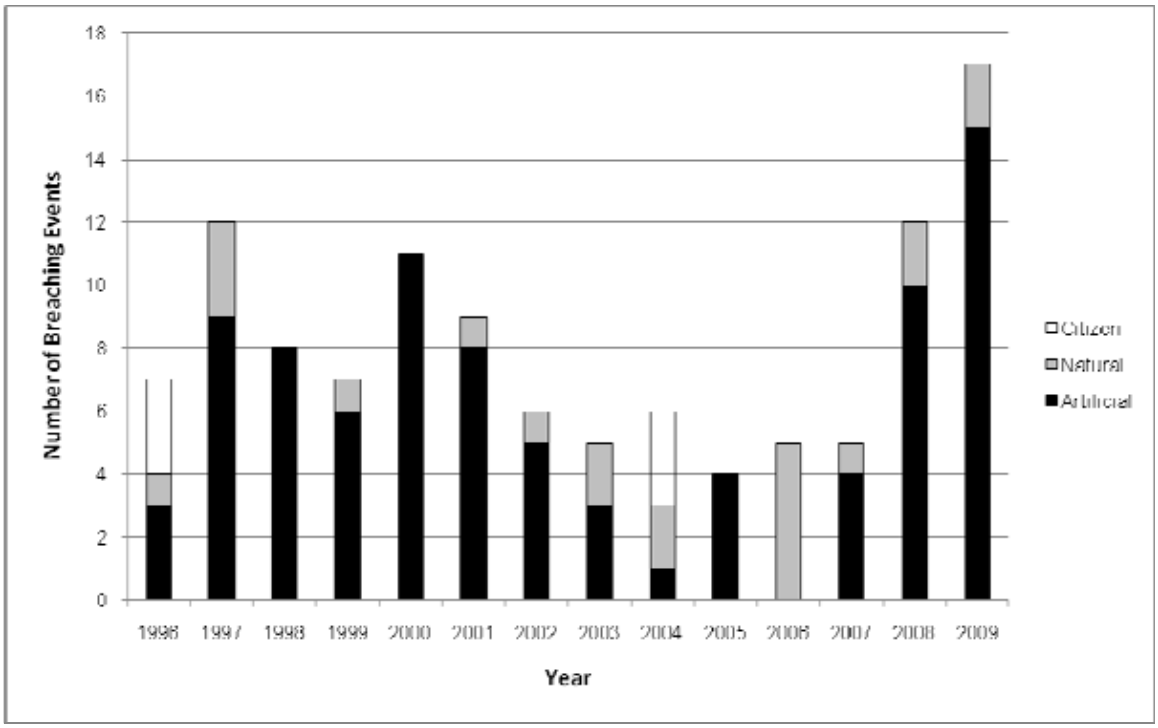
Gray highlighted cells indicate the months within the proposed lagoon management period.

SOURCE: SCWA, 2009.

1. 24 hours prior to breaching, the Water Agency contacts State Parks lifeguards and posts signs and barriers to minimize potential hazards to beach visitors.

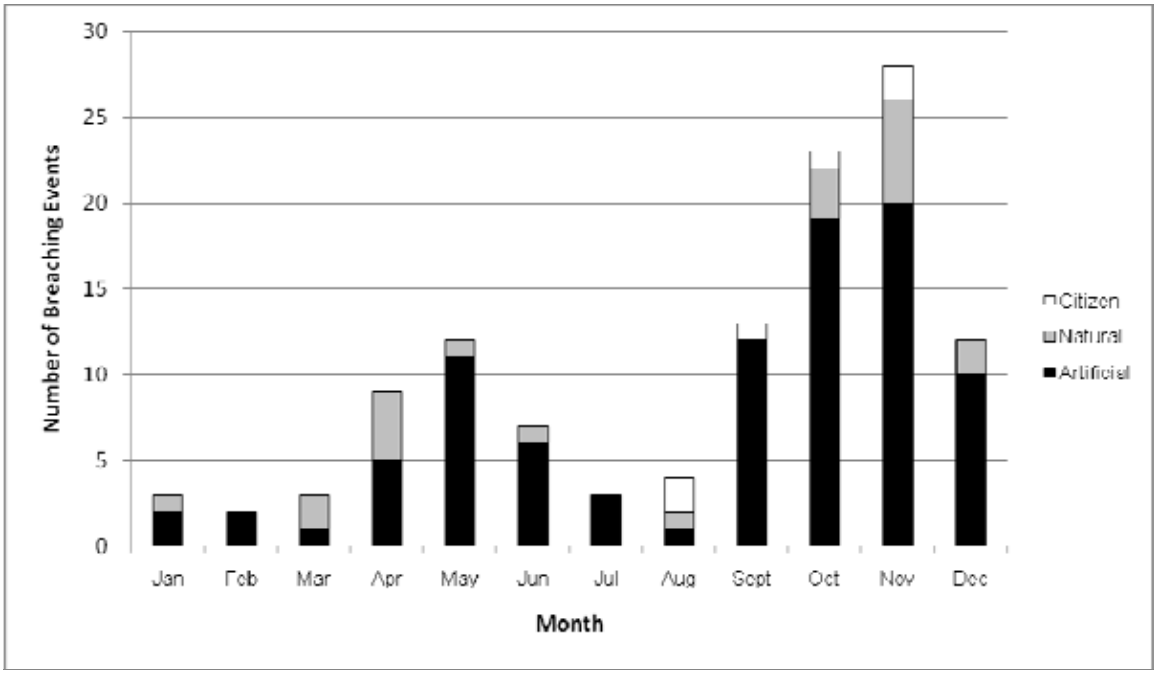
2. A bulldozer or similar equipment is offloaded at the parking lot at Goat Rock State Beach and driven onto the beach via an existing access point. This access point and barrier beach driving route are currently used by lifeguarding trucks and other State Park vehicles.

3. A “pilot channel” is cut at a depth that allows flows from the lagoon to scour sand into the ocean. The size of the pilot channel varies, depending on the height of the barrier beach, the level of the tide, and the surface level of water in the Estuary. A typical channel is approximately 100 feet long, 25 feet wide, and 6 feet deep. The amount of sand that is moved ranges from less than 100 cubic yards to approximately 1,000 cubic yards, depending on the size of the barrier beach at the time of breaching. The sand is placed onto the beach adjacent to the pilot channel. The orientation of the pilot channel is generally perpendicular to the ocean, the shortest distance from the lagoon across the barrier beach.



SOURCE: SCWA, 2009.

Figure 2-4a
Historic Barrier Beach Breaching Events, by Year (1996 – 2009)



SOURCE: SCWA, 2009.

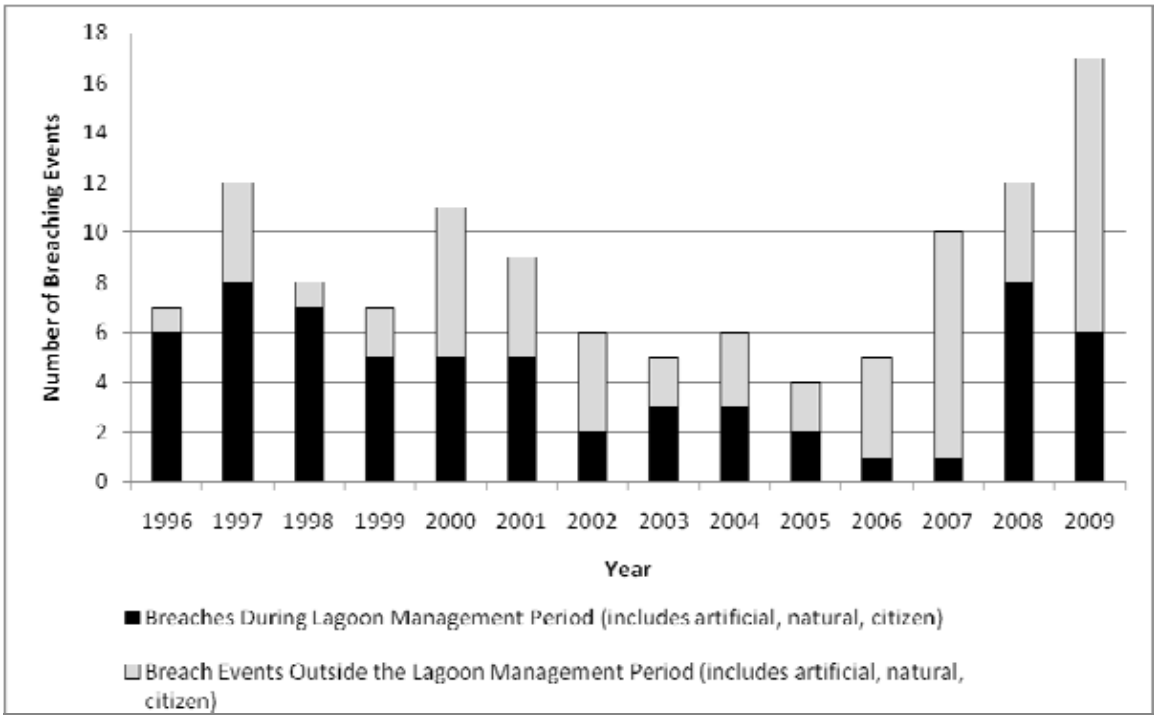
Figure 2-4b
Historic Barrier Beach Breaching Events, by Month (1996 - 2009)

4. After the pilot channel is dug, the last upstream portion of the barrier beach in the channel is removed, allowing lagoon water to flow into the ocean.

5. Flows in the pilot channel scour sand, deepening and widening the channel to create a full tidal connection between the Estuary and the ocean. Within a day after breaching, the tidal channel's width often exceeds 100 feet (PWA, 2010). Channel widening washes the excavated sand from the adjacent beach into the ocean.

6. The channel is monitored and equipment is driven back to the existing access point and loaded for transport. Signage and barriers are removed, and the channel is periodically monitored by Water Agency staff.

Figure 2-4c presents a graphic comparison of the number of breaching events (artificial and natural) that have historically occurred during the proposed lagoon management period, a subset of the total breaching events annually, to demonstrate the frequency of breaching events that generally occur within the lagoon management period. As shown in the figure, the maximum number of breach events during the lagoon management period was eight in 1997 and 2008, while the minimum number was one in 2006.



SOURCE: SCWA, 2009.

Figure 2-4c
Breaching Events During the Lagoon Management Period versus Breaching Events Outside the Lagoon Management Period, by Year (1996 – 2009)

2.3 Proposed Estuary Management

2.3.1 Project Purpose and Objectives

In order to comply with the requirements of the Russian River Biological Opinion, the Water Agency will implement adaptive management of the Estuary with the primary dual objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard. Rearing habitat may be enhanced by reducing tidal influence on the Russian River Estuary from May 15 to October 15 ("lagoon management period") to increase freshwater habitat available for salmon and steelhead. Adaptive management requires: 1) monitoring of biological productivity, water quality, and physical processes in the estuary in response to the changes in management actions that control water surface elevations in the estuary-lagoon system; and 2) refinement of management actions to achieve desired water levels to support biological productivity, while simultaneously providing flood control for properties adjacent to the Estuary.

In addition to the primary objectives, the Estuary Management Project is intended to assist the Water Agency in its efforts to provide for the health and safety of visitors and employees of Goat Rock State Beach, and Water Agency staff, during management activities; and to implement, operate, and maintain management techniques in a technically and economically feasible manner. The Estuary Management Project proposes the elements discussed below.

2.3.2 Continued Artificial Breaching

The Water Agency will continue the historical practice of artificially breaching the barrier beach outside the lagoon management period (May 15 through October 15), as allowed in the Russian River Biological Opinion and described in the *Russian River Estuary Study 1992–1993*, seeking to minimize potential flooding of low-lying properties along the Russian River.[8] Artificial breaching outside of the lagoon management period will be implemented consistent with historical practices, as described above in **Section 2.2.2**.

2.3.3 Lagoon Adaptive Management

To comply with conditions stipulated in the Russian River Biological Opinion, the Water Agency will pursue an alternative approach for management of water levels in the Estuary, and will adaptively manage a lagoon outlet channel[9] to achieve an average daily water surface elevation of

[8] NMFS requires lagoon management from May 15 through October 15; the Water Agency would continue current artificial breaching practices outside this period. NMFS includes continued artificial breaching in the Russian River Biological Opinion, Part III, Description of the Proposed Action, Subpart B.2, Estuary Management (page 20), which provides for the Water Agency to: "periodically excavate a pilot channel across the lowest point of the barrier beach at the mouth of the Russian River when the estuary elevation rises to a point where low-lying properties are threatened with flooding. The breaching actions will likely take place four to 11 times per year for the next fifteen years" (NMFS, 2008; page 20).

[9] No new engineered structures or mechanical devices, temporary or permanent, will be a part of the outlet channel implementation.

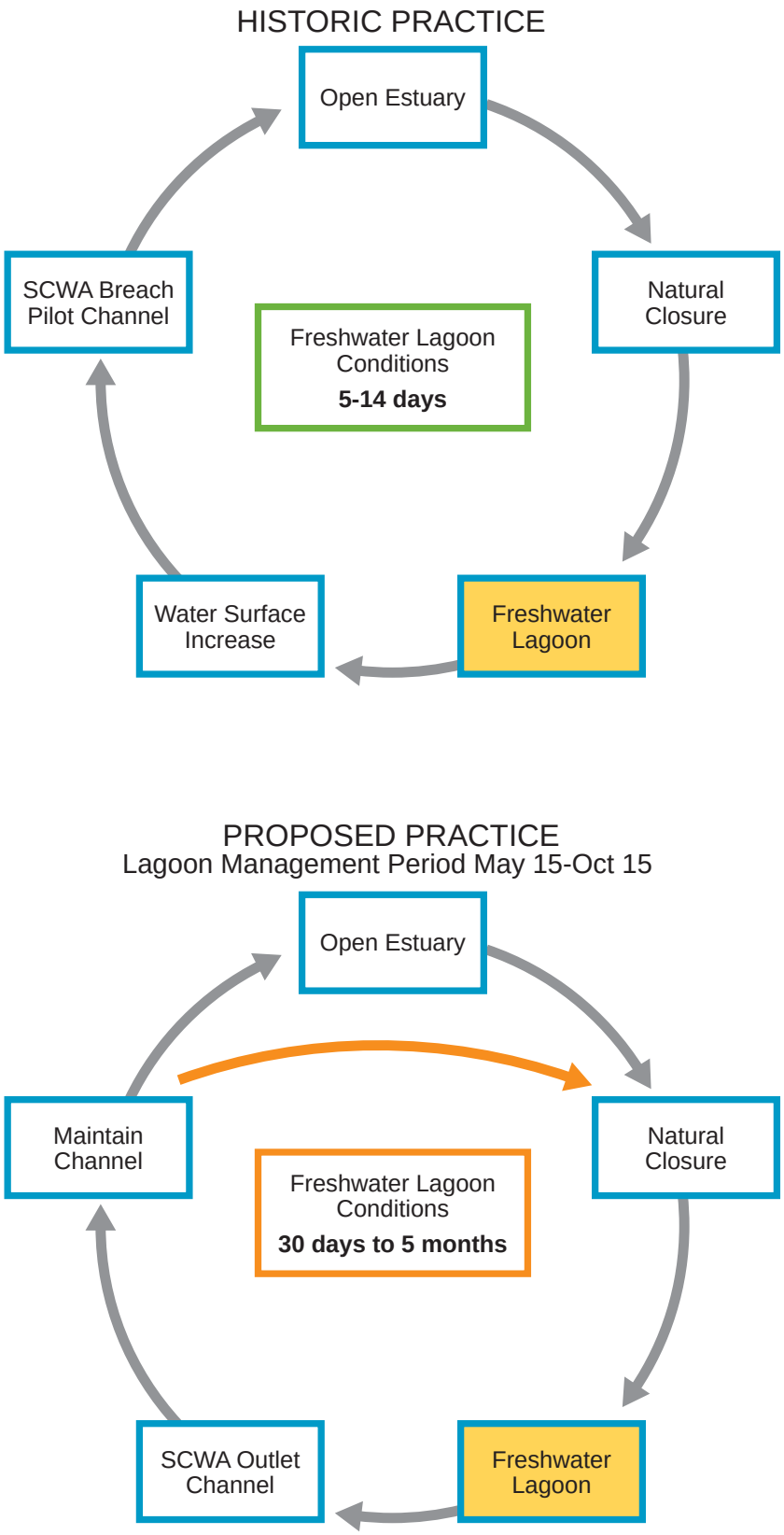
at least 7 feet during the lagoon management period from May 15 to October 15.[10] Adaptive management will be conducted by the Water Agency in consultation with the National Marine Fisheries Service (NMFS) and California Department of Fish and Game (CDFG).

Physical establishment of the outlet channel during the lagoon management period would be similar in terms of equipment and duration as artificial breaching. Project implementation is intended to increase the duration of freshwater lagoon conditions during the lagoon management period (May 15 to October 15) to increase freshwater habitat available for rearing salmon and steelhead. Outlet channel implementation is initiated by ocean wave action naturally forming the barrier beach and closing the tidal inlet. In the event that the outlet channel erodes the barrier beach to re-establish a tidal inlet, the Water Agency would resume adaptive management of the outlet channel's width, slope, and alignment, in consultation with the NMFS and CDFG after ocean wave action naturally reforms the barrier beach and closes the tidal inlet.

Figure 2-5 presents a comparison of the sequences of events under historic artificial breaching versus the proposed Estuary Management Project. Figure 2-5 (top panel) depicts the sequence of events under historic breaching activities, and the resulting duration of freshwater lagoon conditions during summer months. As shown in this graphic, natural formation of the barrier beach results in increased water levels within the lagoon. Breaching the barrier beach minimizes potential property inundation. This current method of breaching establishes a short pilot channel with a steep hydraulic gradient between the estuary and the ocean, encouraging downcutting of the channel and re-establishment of an open, tidal, Estuary. This results in saline conditions within the Estuary, and limits the duration of freshwater lagoon conditions to between five to 14 days.

Figure 2-5 (bottom panel) depicts the sequence of events that would be implemented under the Estuary Management Project. During the lagoon management period, following natural formation of the barrier beach and establishment of a freshwater lagoon, the Water Agency would create an outlet channel at an elevation that would allow for overflow from the lagoon, thereby maintaining water surface elevations within the lagoon that are above the tide range while minimizing property inundation. Once established, it is anticipated that the outlet channel will allow for longer duration of freshwater lagoon conditions during the lagoon management period and improve rearing habitat for juvenile salmonids. In the event that the barrier beach reforms and closes the channel, the Water Agency will consult with NMFS and CDFG to re-establish the channel in the same manner. This "maintenance" of the outlet channel would provide for the continuation of the lagoon conditions that have been established. As such, project implementation would increase the duration of freshwater lagoon conditions from the typical five to 14 day duration currently experienced, to an estimated one- to five- month duration. A lagoon lasting for longer duration would be consistent with freshwater lagoons observed in some other coastal river systems. The Estuary water level management targets (NMFS, 2008) are as follows:

[10] NMFS considered the possibility that artificial breaching may be required during the lagoon management period to minimize flooding risk and included allowances for such activities in the Incidental Take Statement: "We estimate that the Agency will need to artificially breach the lagoon using methods that do not create a perched lagoon twice per year between May 15 and October 15 during the first three years covered by this opinion, and once per year between May 15 and October 15 during years 4-15 covered by this opinion" (NMFS, 2008; page 302).



SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-5
Historic Practice and Lagoon Management Period Sequences

1. Daily minimum water surface elevation of 3.2 feet during 70% of the year.
2. Average daily water surface elevation of at least 7 feet from May 15 to October 15.[11]

Table 2-2 provides a comparison of, including differences between, the pilot channel historically excavated under artificial breaching and the outlet channel that would be created under the Estuary Management Project.

TABLE 2-2
COMPARISON OF PHYSICAL ELEMENTS OF ARTIFICIAL BREACH PILOT CHANNEL VERSUS PROPOSED LAGOON OUTLET CHANNEL

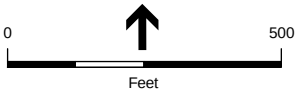
Parameters for Comparison	Pilot Channel (Historic Artificial Breaching)	Outlet Channel (Proposed Lagoon Management)
Channel Shape	"v" cut that River scours out	Wide, shallow flow
Orientation	Perpendicular from River to Ocean across barrier beach	Perpendicular or angled to the northwest across barrier beach
Inflow and Outflow	Tidally influenced	Discharge from river to ocean
Barrier Beach Closure Duration	Short: 5-14 days	Longer: 1 to 5 months
Estuary Water Surface Elevation	4-6 ft	4-9; target 7' ft
Timing	Year-round	May 15 to October 15
Excavation	Up to 1,000 cubic yards	Up to 2,000 cubic yards
Objective(s)	Flood Control	Flood Control and Salmonid Habitat

Outlet Channel Criteria

The Estuary is a dynamic system subject to riverine and tidal influence such that lagoon formation is dependent on riverine freshwater inflow, ocean wave conditions, beach sediment, and geologic structure of the river. Tidal influence contributes to high salinity levels[12] and lower water levels in the Estuary thereby diminishing freshwater steelhead habitat. To create and maintain a shallow outlet channel to manage lagoon water surface elevations between 4- and 9-feet (7-foot target elevation), the Water Agency will create an outlet channel with a bed elevation below the lagoon water surface elevation to allow outflow from the lagoon to pass over the barrier beach, but high enough to minimize the inflow of saline ocean water due to high tides and ocean waves (PWA, 2010).

The channel would be located within the area that it has been observed to naturally occur, between the jetty and approximately 1,500 feet to the northwest (**Figure 2-6**). Only remnants of the historic rock riprap and concrete jetty are now present on the barrier beach. Another

[11] Lagoon may be breached open to ocean tides starting after October 15 if the Estuary is perched or closed.
[12] The Estuary, when reconnected with the tidal system, can have nearly marine salinity of >28 parts per thousand as far upstream as Sheephouse Creek (NMFS, 2008).



SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-6
Estuary Management Area

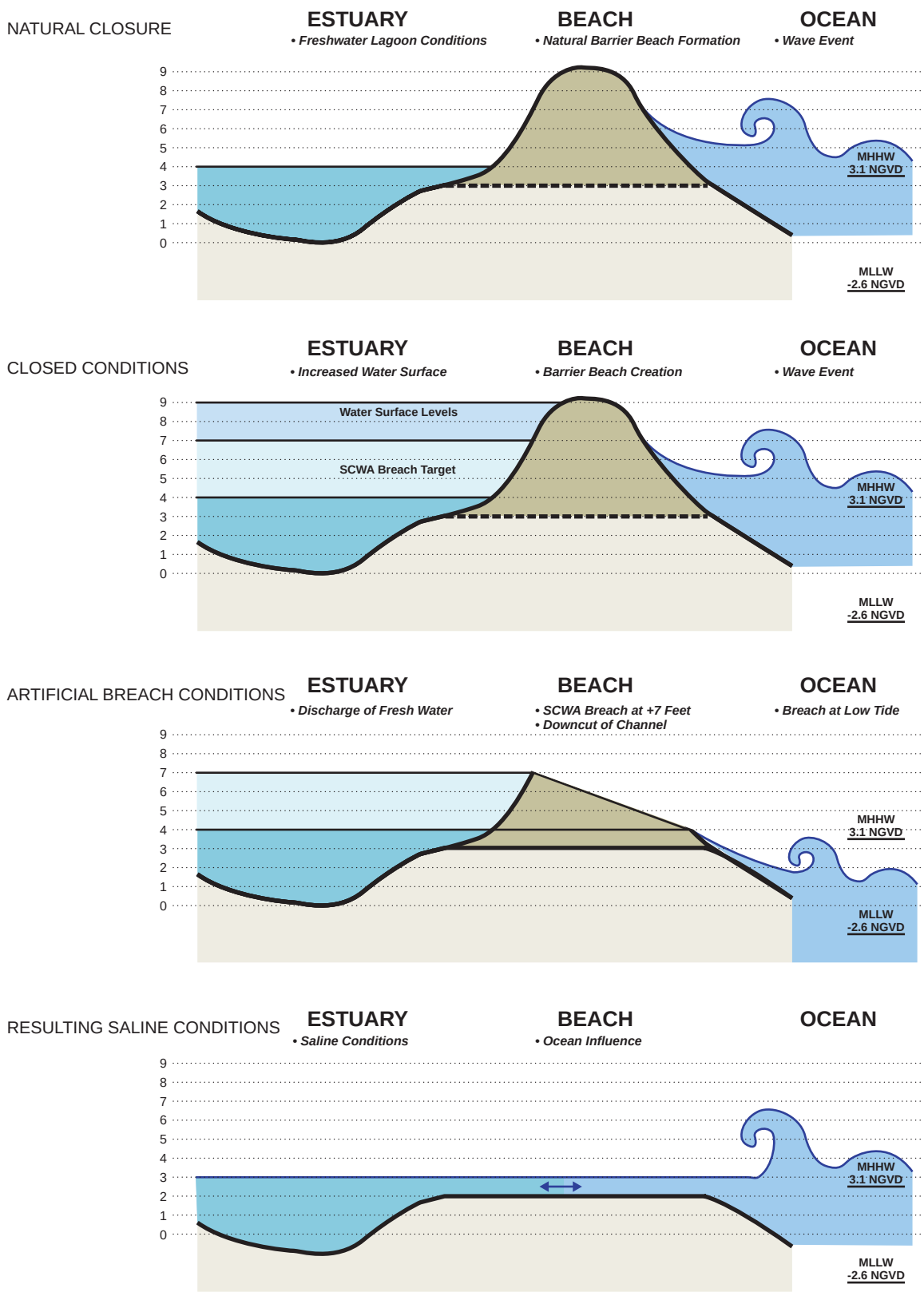
prominent feature in the breaching area is Haystack Rock. The river mouth frequently switches course around this rock. Channel length would vary based upon location, but a hydraulic gradient would be established to provide for overflow while minimizing channel erosion. The outlet channel would not be excavated as deeply, or with as steep a gradient as the pilot channels currently implemented by the Water Agency, which are designed to optimize flow velocities to erode a wider and deeper channel that downcuts into the barrier beach and reopens the Estuary to tidal action.

Figure 2-7 is a schematic representation of the Estuary, beach, and ocean, which demonstrates the sequence of current artificial breaching activities. The Water Agency waits for the barrier beach to form naturally due to wave events (top panel), and monitors lagoon water levels as they rise from 4.5 feet towards 7 feet. As water surfaces approach and exceed 7 feet, the Water Agency excavates a pilot channel between the estuary and the Pacific Ocean. Breaching is performed by creating a deep cut in the closed beach berm approximately 100 feet long by 25 feet wide and 6 feet deep by moving up to approximately 1,000 cubic yards of sand. The alignment of the channel is selected to maximize the success of the breach. Breaching activities are typically conducted on an outgoing tide to maximize the elevation head difference between the estuary water surface and the ocean.

Figure 2-8 presents a schematic representation of the Estuary, beach, and ocean which demonstrates outlet channel creation during the lagoon management period under the proposed project. The Water Agency would wait for the barrier beach to close naturally and monitor the lagoon water levels (top panel). As the water surface rises, the Water Agency would create the outlet channel (middle panel) to maintain a spillway for river water to discharge, while minimizing inflow of saline ocean water (bottom panel).

The dimensions and location of the outlet channel would be dependent on beach formation, topography, forecasted river flow, and ocean conditions at the time of outlet channel creation. The Estuary may close at any time of the year, although the closures occur most often between spring and late fall. This is generally a period of lower instream flows and increased creation of barrier beach conditions due to wave activity. Review of flow data for the 115 closure events occurring between 1996 and 2009 indicated a median flow at the USGS Guerneville Gage at the time of closure is 250 cubic feet per second (cfs), with a minimum flow of 71 cfs and a maximum flow of 1,120 cfs. Therefore, closure events due to barrier beach formation have occurred over a wide range of flow conditions. During the lagoon management period, the outlet channel would be expected to perform over the range of flow conditions that could be experienced between May and October. The outlet channel dimensions are estimated to be approximately 30-feet wide and 100-feet long, based on a wide and short channel alignment that would minimize scour potential. The dimensions of an outlet channel are constrained by the acceptable excavation volumes per the Agency's regulatory permits.[13] The proposed outlet channel flow depths are estimated to be 0.5 to 2.0 feet deep (PWA, 2010).

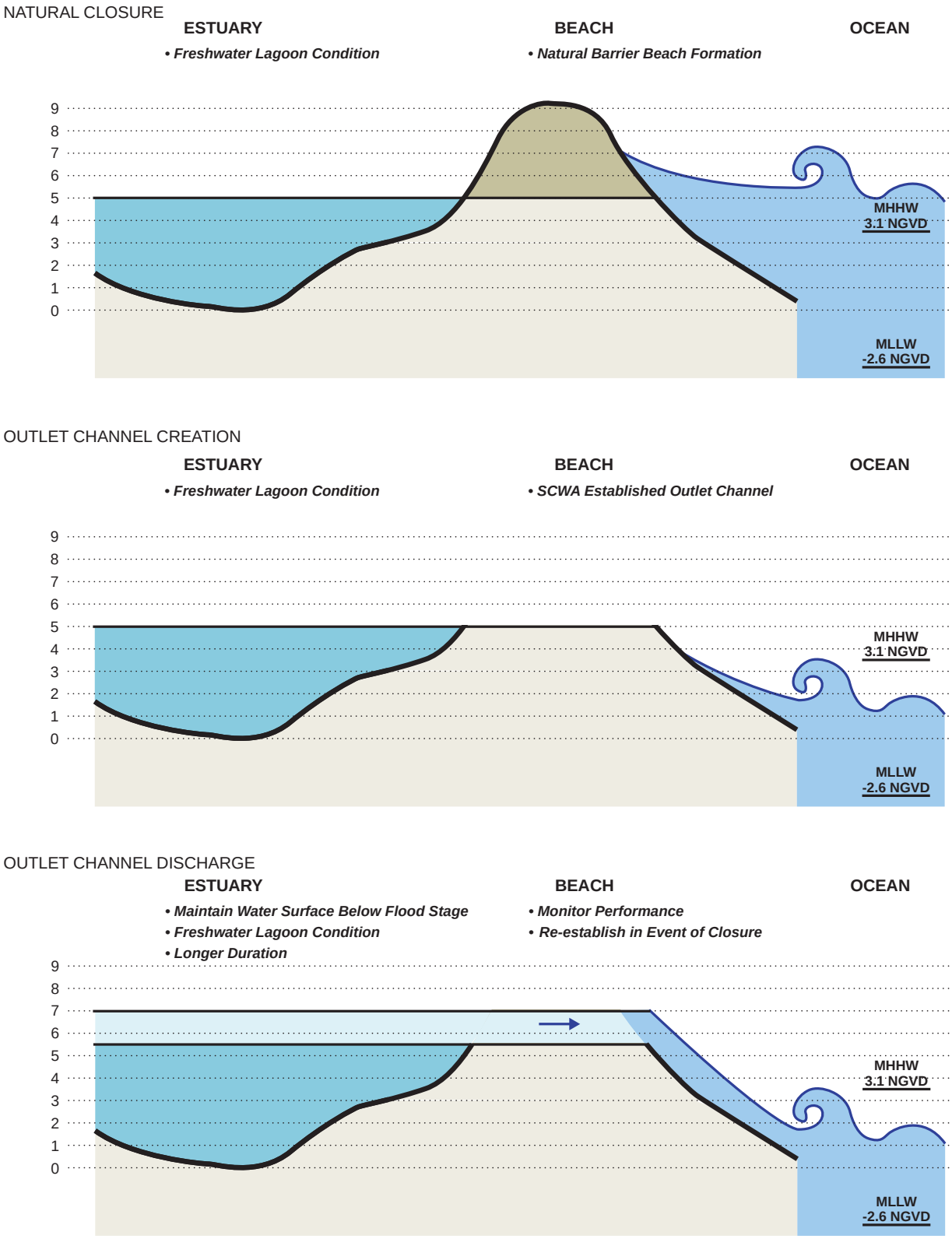
[13] Estimated volume of 2,000 cubic yards.



SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-7
General Outlet Channel Profile:
Historic Artificial Breaching Practices



SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-8

General Lagoon Outlet Channel Profile: Proposed Estuary Management Plan

Various channel locations within the area shown in Figure 2-6 and configurations may be pursued in an effort to adapt to other project variables. However, the configuration described above is within the range of likely outlet channel dimensions. Consideration of other project variables include bed slope and bed elevation, as well as an alignment that will leverage site features that experience reduced wave energy to increase suitability and success of the outlet channel. For example, alignment at the start of the management period may be northward following response to conditions typically observed in the spring and early summer to take advantage of the low berm crest elevation in this direction. **Figure 2-9** shows a photo sequence of outlet channel creation performed by the Water Agency in July 2010 following a natural closure event, as required by the Russian River Biological Opinion. After consultation with NMFS staff, the outlet channel was shaped north of Haystack Rock, and completed on a northwest heading. Alternative channel alignments within the area shown in Figure 2-6 may be implemented to test the relationship of outlet channel location on channel stability.

2.4 Outlet Channel Creation and Maintenance

2.4.1 Outlet Channel Creation

All outlet channel creation activities implemented during the lagoon management period would be consistent with the restrictions to protect pinnipeds (e.g., harbor seals [*Phoca vitulina richardii*]) hauled out on the beach established in the *Russian River Estuary Water Level Management Activities Incidental Harassment Authorization (IHA)* (NFMS, 2009), and other applicable State Parks use permits.[14] The barrier beach would be accessed from the paved parking lot at Goat Rock State Beach, located at the end of Goat Rock Road off of Highway 1 (Figure 2 6). Consistent with current practices, equipment would be off-loaded in the parking lot and driven north onto the beach via an existing access point. This access point and barrier beach driving route are currently used by lifeguarding trucks and other State Park vehicles. Water Agency crews would approach the pinniped haulout on the beach on foot ahead of the heavy equipment to minimize the potential for flushes[15] that could result in a stampede, a particular concern during harbor seal pupping season. Water Agency staff would avoid walking or driving equipment through the seal haulout. Crews on foot would take caution to approach the haulout slowly and to make an effort to be seen from a distance, if possible, rather than appearing suddenly at the top of the barrier beach. Personnel on the beach would include equipment operators, safety team members on the beach (one on each side of the channel observing the equipment operators, and one at the barrier to warn beach visitors away from the activities), and safety team members at the overlook on Highway 1 above the beach. Occasionally, there would be two or more additional people (Water Agency or regulatory agency staff) on the beach to observe the activities. Water Agency staff would be followed by the equipment, which would then be followed by a Water Agency vehicle (typically a small pickup

[14] Copies of the documents: *Russian River Estuary Water Level Management Activities Incidental Harassment Authorization (IHA)* (NFMS, 2009), may be accessed online at www.sonomacountywater.org and may be reviewed at the Water Agency's office at 404 Aviation Boulevard, Santa Rosa, CA.

[15] A "flush" in harbor seals occurs when they are disturbed to the point where they move rapidly off the haul out into the water.

July 1, 2010 Natural Open Channel. Photo from Highway 1 Overlook.

July 7, 2010 Channel Closed by Tidal Action. Photo from Highway 1 Overlook.

July 8, 2010 Created Outlet Channel. Photo from Highway 1 Overlook.

Russian River Estuary Management Project . 207734.01

SOURCE: SCWA, 2010

Figure 2-9

Photos of Russian River Estuary:
Natural Outlet Channel Closed, and
Created Outlet Channel Conditions
July 2010

truck; the vehicle would be parked at the previously posted signs and barriers on the south side of the excavation location). Equipment would be driven slowly on the beach and care would be taken to minimize the number times operators of shut down and started up equipment on the beach.

Creating and maintaining the outlet channel would employ one or two pieces of heavy equipment (e.g. excavator or bulldozer) to move sand on the beach. At the start of the lagoon management period, when configuring the outlet channel for the first time that year, machinery may operate up to two consecutive working days. It is anticipated that maintenance of the outlet channel could be necessary on a weekly basis; therefore, up to 18 maintenance events during the lagoon management period are assumed. Actual maintenance events would be dependent upon natural conditions and outlet channel performance. As technical staff and maintenance crews gain more experience with implementing the outlet channel and observing its response, it may be possible to reduce the frequency of maintenance during the lagoon management period. In consideration of the beach environment, effort would be made to minimize the amount and frequency of mechanical intervention, thereby reducing disturbances to seals and other wildlife, as well as State Park visitors on the beach.

The Water Agency would contact State Parks lifeguards, as well as State Parks District headquarters and the Monte Rio Fire Protection District, 24 hours prior to excavating and maintaining the lagoon outlet channel to minimize potential hazards to beach visitors. Signs and barriers would be posted 750 feet of each side of the lagoon outlet or pilot channel location for 24 hours prior to and after excavation events to warn beach visitors of the hazards of the area and the presence of pinnipeds on the beach. Notifications for the general public would also be posted at the public boat launch adjacent to the Jenner Visitor's Center.

Channel creation and maintenance would likely be initiated at or near low tide so that after several hours of work, the removal of the final portion of the beach berm occurs near high tide.[16] This would minimize the head difference between the Estuary and ocean, reducing the potential for the reconnected channel to scour into a fully tidal inlet. The quantity of sand moved would depend on beach topography. The amount of sand moved would range from less than 100 cubic yards up to approximately 2,000 cubic yards. Sand excavated from the channel would be spread into the adjacent beach to meet existing contours, partially on the north side of the channel. The remaining sand on the south side of the channel would be located within the wave wash zone to promote natural removal by waves to minimize changes to beach topography outside the outlet channel (PWA, 2010).

2.4.2 Outlet Channel Maintenance

Ocean waves may deposit enough sand in the outlet channel over the course of the lagoon management period such that the outlet channel closes. In response, the Water Agency will perform maintenance to re-excavate the outlet channel. Each excavation may be done at increasing elevation (as the beach berm elevation builds) or alignment in response to changing natural conditions.

[16] Depending on the performance of the outlet channel, alternate times in relation to the tide cycles may be implemented.

Ideally, the management strategy for outlet channel configuration and modifications would be an incremental approach that seeks to minimize the risk of uncontrolled breaching, which returns the Estuary to tidal conditions. The precise number of excavations would depend on uncontrollable variables such as seasonal ocean wave conditions (e.g. wave heights and lengths), river inflows, and the success of previous excavations (e.g. the success of selected channel widths and meander patterns) in forming an outlet channel that effectively maintains lagoon water surface elevations. It is predicted that up to two successive outlet channel excavations, at increasingly higher beach elevations, may be necessary, with the result being a "perched" lagoon. Overall, the Water Agency anticipates up to 18 maintenance events, or about one per week over the five month lagoon management period. Maintenance events will be scheduled to comply with restrictions in the IHA and the State Parks use permits. The IHA includes restrictions and limitations on maintenance events during harbor seal pupping season (March 15 through June 30).

Overriding Breaching Conditions

Certain conditions during the lagoon management period, such as water quality degradation[17] or imminent flooding to properties and structures adjacent to the Estuary, could require a change in management, and may result in the Water Agency breaching the barrier beach during the lagoon management period. If Estuary water surface elevations rise above 7 feet (at the Jenner gage) and flooding appears imminent (approaching 9 feet; giving consideration to river inflow, rate of Estuary water surface elevation rise, and ocean conditions), the Water Agency may artificially breach the barrier beach during the lagoon management period to alleviate potential flooding, as discussed in the NMFS' Russian River Biological Opinion. The Water Agency would consult with NMFS, CDFG, and State Parks regarding the potential for flooding as described in the Lagoon Outlet Channel Adaptive Management Plan (PWA, 2010). The Russian River Biological Opinion incidental take statement estimates that the Water Agency may need to artificially breach the barrier beach "twice per year between May 15 and October 15 during the first three years covered by this opinion, and once per year between May 15 and October 15 during years four to 15 covered by this opinion" (NMFS, 2008).

2.4.3 Artificial Breaching

Outside of the Lagoon Management Period of May 15 to October 15, artificial breaching would continue to be implemented by the Water Agency when the Estuary water surface level is between 4.5 and 7 feet as read at the Jenner gage (located at the Jenner Visitor's Center) to prevent imminent flooding. Access, sensitivity to the pinniped haulout, personnel, equipment, and general procedures would be equivalent to those described in **Section 2.2.2**. Historically, the maximum annual number of artificial breaching attempts was 15,[18] during 2009. Under the proposed project, the Water Agency would only conduct artificial breaching from October to May (outside the lagoon management period). However, refer to the contingency provided in the incidental take statement, described above in **Sections 2.3.1** and **2.4.2**. The historical maximum number of artificial breaches during this timeframe was eight in 2008. Therefore, for the purposes of this analysis, it is assumed

[17] Water Quality parameters are defined in the North Coast Regional Water Quality Control Board's Basin Plan and would be further defined in consultation with NMFS and RWQCB.

[18] Only 13 of the 15 breaches attempted were successful in 2009.

that the Agency may be required to conduct artificial breaching up to eight times outside the lagoon management period for flood management purposes. This disruption to beach access is temporary and limited to one to two consecutive work days up to eight times per year, and full access would be restored upon removal of equipment from the beach.

Breaching activities would typically be conducted during outgoing tides to maximize the elevation head difference between the Estuary water surface and the ocean. A cut in the barrier beach would be created at a sufficient depth to allow river flows to begin transporting sand to the ocean. The sand would be placed onto the beach adjacent to the pilot channel. After the pilot channel is established, the last upstream portion of the barrier beach would be removed, allowing river water to flow to the ocean. The size of the pilot channel varies depending on the height of the barrier beach to be breached, the tide level, and the water surface elevation in the Estuary. Excavation volumes are expected to be consistent with previous artificial breaching activities and would not exceed 1,000 cubic yards.[19]

2.5 Implementation Schedule

The Russian River Biological Opinion and the corresponding RRIFR Program include a series of actions to be taken by the Water Agency, in coordination with NMFS and CDFG, to provide benefit to listed salmonids. The Estuary Management Project is one action to be undertaken by the Water Agency to meet the requirements of the Russian River Biological Opinion. The Water Agency will continue to manage the Estuary, irrespective of the other RRIFR Program elements. These modifications to current breaching practices were implemented under existing permits and agreements governing Estuary management activities in Summer 2010; however renewal and/or re-issuance of permits for future management in 2011 is partly contingent upon CEQA documentation. As part of its CEQA analysis, the Water Agency will consider the long-term effects of the NMFS-mandated alteration in how it manages water elevations in the Estuary.

2.6 Project Alternatives to be Considered

This EIR considers the Estuary Management Project, as well as the No Project Alternative and alternative Estuary management strategies. Implementation of alternatives may be necessary to achieve performance criteria through 2023 (over the 15-year Biological Opinion). Subsequent to the results of implementation of the proposed Estuary Management Project, the Water Agency, in consultation with NMFS and CDFG, will monitor and evaluate the outlet channel to determine effectiveness in achieving habitat, water quality, recreational, and flood control objectives. Refinement of activities, as identified in an adaptive management plan, may redirect Water Agency efforts such that target conditions may be achieved. The Russian River Biological Opinion identifies a series of future potential actions that could be considered in the event that management of a lagoon outlet channel is not successful in enhancing rearing habitat for listed salmonids. The EIR will consider these as alternatives to the proposed project.

[19] Volume of excavated sand may be amended by future regulatory permits.

Elements described below comprise alternate management practices that may be determined feasible and necessary to achieve project objectives. Implementation of jetty modification and flood risk management activities is contingent upon review of monitoring results and engineering feasibility. These alternatives, and a comparison of advantages and disadvantages, are described in more detail in **Chapter 6.0, Alternatives Analysis**.

2.6.1 No Project Alternative

The No Project Alternative assumes that the lagoon outlet channel portion of the proposed project would not be implemented, and would include two scenarios: 1) consideration of existing conditions without the proposed project; and 2) consideration of "reasonably foreseeable" future conditions without the proposed project.

Under the No Project Alternative, the Water Agency would continue artificial breaching activities during the lagoon management period, consistent with current practices. In considering existing conditions under a "no project scenario", this would result in periodic breaching of the barrier beach between May 15 and October 15 when it becomes established. It is not possible to ascertain how many artificial breaching events would be required each year, but there have been an average of six artificial breaching events annually over the last 14 years, however, of the years during which artificial breaching was implemented, the maximum number of breaching events was 15 artificial breach attempts in 2009, and a minimum of one artificial breaches in 2004. It is anticipated that the number of breaching events would continue to be consistent with historical variation, depending upon hydrologic year type and Pacific Ocean wave patterns. This alternative assumes that the Water Agency could acquire the necessary permits for breaching activities.[20]

In considering a "reasonably foreseeable future conditions" scenario, the same scenario would apply; the Water Agency would continue artificial breaching activities during the lagoon management period, consistent with current practices. This scenario also assumes that the agencies with legal jurisdiction will continue to issue/extend necessary permits for the Water Agency to continue to carry out breaching activities (see also **Section 2.7** below). Although not legally required to manage water surface elevations within the Estuary to protect private property, the Water Agency has provided these services since the 1990s, and it is reasonable to assume that the Water Agency would continue to do so and would continue to obtain and operate under necessary permits, assuming the Water Agency has adequate staff and financial resources.

2.6.2 Habitat Restoration Alternative

In California coastal lagoons, productive juvenile steelhead rearing habitat is available in freshwater and brackish water quality conditions. Under current management, when the Estuary channel is tidal, freshwater habitat is primarily available in the upper Estuary (from Sheephouse Creek to Austin Creek) and at confluences with tributaries (Jenner Creek, Willow Creek,

[20] The Water Agency currently operates under a set of regulatory permits and a categorical exemption to conduct artificial breaching. These permits will expire in January 2010, and the Water Agency is currently pursuing renewal and/or re-issuance of these permits to include both artificial breaching and the proposed Estuary Management Plan. It is reasonable to assume that the Water Agency will secure these permits related to artificial breaching activities, and is therefore included as an assumption for the No Project Alternative.

Sheephouse Creek, Freezeout Creek, and Austin Creek), with brackish water quality in the middle Estuary (from Bridgehaven to Sheephouse Creek). In addition, a productive invertebrate prey community is necessary to provide a food base for rearing juvenile steelhead. Improving habitat diversity and structure complexity in locations of optimal water quality that currently exist in the Estuary could improve rearing conditions for juvenile steelhead, thereby achieving the Russian River Biological Opinion mandate to improve freshwater habitat for juvenile steelhead. Under a Habitat Restoration Alternative, the Water Agency would identify areas in the Russian River or other tributaries that, if restored, could provide salmonid rearing habitat. Under this alternative, it is assumed that the Water Agency would continue to artificially breach the barrier beach when water levels approach 4.5 to 7 feet to provide flood management, consistent with existing practices. This alternative would provide rearing habitat for salmonids using alternate techniques, but of equivalent quality and quantity of habitat. This type of habitat restoration is common in other coastal lagoons. The Water Agency would identify potential areas, such as sloughs and backwater areas along the upper Estuary, Willow Creek and Austin Creek in which the strategies, including vegetation restoration, installation of instream structural cover (i.e. woody features), and backwater slough enhancement, could be implemented.

2.6.3 Temporary Outlet Standpipe Alternative

A Temporary Outlet Standpipe alternative would involve a temporary structure that would be installed during the lagoon management period to allow for outflow from the Russian River to maintain a perched lagoon. The standpipe would be designed to operate to achieve a water level of 7 to 9 feet in the lagoon. The standpipe would be a passive system, installed as an inclined, closed pipe, tilted a few degrees to the horizontal to transfer Russian River outflow to the ocean via gravity. The standpipe would need to be surge protected and inclined to a degree to prevent backflow of ocean water into the Estuary. The temporary outlet standpipe could be anchored to the jetty or installed in a northwest orientation across the barrier beach and attached to the rip rap along the cliffs to the northwest of the beach management area. This structure would require periodic maintenance throughout the lagoon management period to correct for damage from tidal action and sediment accumulation in the standpipe. This temporary structure would be removed at the end of the lagoon management period. There are public and worker safety concerns associated with implementation and maintenance of this type of structure.

2.6.4 Reduced Project Alternative

A “reduced project” alternative is a commonly analyzed type of project alternative that is intended to achieve project objectives while simultaneously avoiding or incrementally reducing the severity of significant impacts associated with a proposed project. A Reduced Project Alternative would involve all of the elements of the proposed Estuary Management Project, including artificial breaching outside of a lagoon management period, and creation of an outlet channel following a natural closure to support freshwater conditions during the lagoon management period. However it represents an incremental decrease such that the maximum target water level would be reduced to 8 feet maximum (instead of 9 feet maximum with a 7 foot average elevation). This would be accomplished through management of the outlet channel bed elevation to maintain a lower water level.

2.6.5 Jetty Modification Alternative

In accordance with the Russian River Biological Opinion, if creation of the outlet channel does not reliably achieve the targeted annual and seasonal Estuary water surface elevations, the Water Agency is developing a study plan for analyzing the effects and role of the existing jetty at Goat Rock State Beach on beach permeability, seasonal sand storage and transport, seasonal flood risk, and seasonal water surface elevations in the Estuary. Although the Water Agency does not own, operate, maintain, or have jurisdiction over the jetty structure, it is mandated in the Russian River Biological Opinion to develop the study plan to analyze the effects of the Russian River Estuary jetty on Estuary water levels and on beach morphology, as well as for evaluating alternatives that modify the jetty to achieve target estuarine water levels.

Development of the study plan will include the following subtasks:

1. Describe the mechanisms through which the jetty may affect Estuary water levels;

2. Assess the relative importance of these mechanisms on estuarine water levels, using readily available observations and analysis;

3. Outline geotechnical and groundwater investigations needed to determine the subsurface characteristics of the jetty and whether the jetty tends to increase or decrease seepage through the berm;

4. Plan a geomorphic study to better quantify the beach berm geometry in relation to ocean waves and water levels, jetty geometry, and the Estuary's inlet condition. This study is likely to integrate wave observations and runup estimates, observations of beach berm geometry, and sand transport modeling;

5. Describe the opportunities and constraints of modifying the jetty (including permit approvals, costs, and availability of funding mechanisms);

6. Recommend a process for developing and evaluating management alternatives that modify the jetty.

Through the study the Water Agency will identify alternative management actions to achieve targeted water surface elevations, such as full or partial jetty removal, jetty notching, or other potential uses of the jetty as a mechanism for water surface elevation control. This element would require coordination with State Parks and USACE. Under the Russian River Biological Opinion, implementation of jetty removal is conditional upon the results of the study. The study plan is anticipated to be developed by 2011. The Russian River Biological Opinion establishes responsibility for removal or modification of the jetty, dependent on the results of the jetty study, on the USACE.

In 1929, construction of the jetty began with a mound of rubble (Johnson 1959) which later developed into a timber trestle 1,000 feet long, which created a trench that could be filled with stones (Rice 1974; Magoon and Treadwell et al. 2008). A stone quarry on Goat Rock was developed for this purpose along with a road and railroad to transport the material. To build the foundation of the road and railroad, fill material was placed to create the roadbed on top of an

intertidal sandbar that extended from the river mouth towards Goat Rock. In 1930, the original funds for the project ran out and the jetty was abandoned. The rocks in the structure began to settle which exposed the piling to the ocean waves and the jetty was mostly destroyed by 1931 (Johnson 1959). Other companies worked on the jetty from 1931 to 1934, but mostly in the form of maintenance. The timber trestle was replaced for a steel one, but this caused more settling of the structure (Magoon and Treadwell et al. 2008).

A sea wall was built between 1938-1939 in an attempt to catch sand moving along the coast and further protect the jetty from wave action. **Figure 6-2**, a map from 1953, shows the wall running along the coast, the road, and a portion of the railroad. In 1941, the structure was extended and capped with concrete (Johnson 1959). The plan called for a trapezoidal cross-section, with a 12-foot wide top flaring out to an approximately 80-foot wide base (Figure 6-2). By 1948, 4,280 tons of rock from the quarry was added to the structure and capped with concrete (Magoon and Treadwell et al. 2008). However, financial causes again forced the project to be abandoned.

In the 1960s, the idea of capitalizing on the gravel and sand deposits was again considered and so plans for improving the jetty were put into motion once again. Local citizens and scientists in the area began to question the environmental impacts of commercially developing the deposits and so plans for the jetty were never executed.

Jetty Alteration to Improve Subsurface Outflow

NMFS hypothesizes that substantial outflow from the Estuary occurs subsurface through the barrier beach; this hypothesis is supported by a mass balance calculation of inflow from the Russian River and water level changes in the Estuary (Behrens and Largier, 2010). However, little is known about the permeability of the subsurface component of the jetty, and the jetty substructure could either be impeding or enhancing the outflow of water from the lower elevations of the Estuary. Because known historical documentation is limited and the components obscured by sand, additional characterization of the jetty is required. Observations in 2009 (Behrens and Largier, 2010) indicate increased seepage rates through the barrier beach when Estuary water surface elevations are between two and four feet, which may indicate a horizon of increased permeability at different elevations in the jetty structure.

If future monitoring determines that the jetty impedes seepage, alteration of the jetty to improve subsurface outflow could be implemented though directional drilling or exposure and excavation of specific locations along the jetty structure to increase subsurface outflow through the base of the jetty structure along its approximately 1,600 linear feet.

2.6.6 Alternative Flood Control Measures

As stipulated by NMFS in the Russian River Biological Opinion, if creation of the lagoon outlet channel does not reliably achieve the targeted annual and seasonal Estuary water surface elevations prescribed by the Russian River Biological Opinion, the Water Agency may also evaluate the feasibility of actions to avoid or mitigate potential damage to low-lying structures or properties adjacent to the Estuary that are currently threatened with flooding and inundation when

the barrier beach closes and the Estuary water surface elevation rises above 9 feet. Pursuant to conditions in the Russian River Biological Opinion, the Water Agency developed and submitted to NMFS a preliminary list of structures, properties, or infrastructure that are susceptible to flooding and inundation as a result of barrier beach formation and Estuary closure. Potential alternative flood control actions, including private property owners making physical modification to or raising of their structures to avoid flooding or inundation damage associated with restoration of estuarine functions, would only be pursued, as required in the Russian River Biological Opinion, if the following conditions exist:

1. It must be determined that adaptive management of the outlet channel is not able to reliably achieve the targeted annual and seasonal Estuary water surface elevations by the end of 2013;

2. Estuary monitoring results indicate that freshwater or low salinity brackish (oligohaline) habitats, or temporary closure of the Estuary provides substantial benefit to rearing juvenile steelhead; and

3. Monitoring results indicate that no adverse effects to other populations of Russian River salmonids are occurring from raised lagoon water surface elevations.

4. The Water Agency, in coordination with NMFS and other appropriate public and nonprofit agencies, shall, not later than May 1, 2014, attempt to negotiate agreements with property owners to avoid or mitigate potential damages to the structures identified in list to NMFS from flooding, either by elevating the structures or other methods. Such agreements will include identification of funding sources and initial schedule for initiation and completion of avoidance and mitigation work.

5. The Water Agency may, alternatively, pursue other actions that will result in the mitigation or avoidance of flood damage to the structures identified in list to NMFS.

As previously noted in **Chapter 3.0, Project Background and Existing Setting**, water levels within the Estuary exceeded 9 feet on an annual basis, with a high of 11.1 feet experienced during a natural breaching event in November 2001. The average recorded water surface elevation at the time of breaching was 7.1 feet. During closure events, water surface elevations of 7 feet affect the shoreline frontage of 46 parcels along the Russian River. The rising water surface elevations affect primary shoreline and beach areas, and no structures are directly affected. Water surface elevations of 7 to 9 feet affect approximately 78 parcels within the Estuary Study Area (SCWA, 2010).

2.7 Agency Use of this Document

2.7.1 Consideration of Project Approval

As the CEQA Lead Agency, the Water Agency and its's Board of Directors (Sonoma County Board of Supervisors) will use this EIR during consideration of project approval and implementation of the Estuary Management Project. As part of the project approval and in accordance with CEQA, the Board of Director's will make findings regarding identified significant impacts, and if necessary, adopt a Statement of Overriding Considerations regarding these impacts.

2.7.2 Existing Permits and Agreements

The Water Agency currently manages the artificial breaching of the barrier beach in compliance with a number of federal and State permits and agreements. These include authorizations from NMFS, USACE, State Parks, the California State Lands Commission, the California Coastal Commission, CDFG, and North Coast Regional Water Quality Control Board (NCRWQCB). Specifically, these permits and agreements include:

1. NMFS Marine Mammal Protection Act Incidental Harassment Authorization
2. USACE Clean Water Act Section 404 Permit (File No. 221211N)
3. California State Parks temporary use permit
4. State Lands Commission General Lease for Public Agencies (PRC 7918.9)
5. California Coastal Commission Coastal Development Permit (No. 2-01-033)
6. CDFG 1601 Agreement (No. III-1176-96)
7. NCRWQCB Clean Water Act 401 water quality certification

2.7.3 Anticipated Permits, Approvals, and Regulatory or Consultation Requirements

In addition to lead agency use of this EIR, regulatory agencies may rely on this document, in whole, or in part, for the renewal and/or re-issuance of regulatory permits for the proposed project. **Table 2-3** lists potential federal, state, and local permits and approvals, as well as formal regulatory consultations likely to be required for construction and operation of the proposed project. This table is not intended to be exclusive and exhaustive; other permits and approvals may be required.

TABLE 2-3
SUMMARY OF APPLICABLE PERMITS

Agency	Applicable Permit(s)
Federal	
National Marine Fisheries Service	*Endangered Species Act Incidental Take Permit* *Marine Mammal Protection Act*
United States Fish and Wildlife Service	*Endangered Species Act Incidental Take Permit*
United States Army Corps of Engineers	*Clean Water Act Section 404*
State	
California Department of Fish and Game	*Lake/Streambed Alteration Agreement* *California Endangered Species Act Consistency Determination*
California Coastal Commission	*Coastal Development Permit*
California State Parks and Recreation	*Temporary Use Permit*
California State Lands Commission	*Public Agency Lease*
Regional	
North Coast Regional Water Quality Control Board	*Clean Water Act Section 401 Water Quality Certification*

2.8 References

Behrens, D. and J. Largier, *Preliminary Study of Russian River Estuary: Circulation and Water Quality Monitoring -2009 Data Report (in preparation)*, Report to Sonoma County Water Agency. Bodega Marine Laboratory, University of California Davis, February 2010.

Heckel, M., *Russian River Estuary Study, 1992-1993*, Prepared for Sonoma County Department of Planning and California State Coastal Conservancy, 1994.

Johnson, J. W., Basic Oceanographic Data for the California Coast at the Mouth of the Russian River, University of California Water Resources Center Archives at Berkeley,1959.

Magoon, O., D. Treadwell, et al. (2008). Lost Jetty of California's Russian River. *International Conference on Coastal Engineering*. Hamburg, Germany.

National Marine Fisheries Service (NMFS), *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation Improvement District in the Russian River Watershed*, September 24, 2008.

Philip Williams and Associates (PWA), *Final Russian River Estuary Outlet Channel Adaptive Management Plan Year 1, 2010*, prepared for Sonoma County Water Agency, June 23, 2010.

Rice, M. P., The Mouth of the Russian River, Civil Engineering, Berkeley, University of California at Berkeley, Masters of Science: 166, 1974.

Sonoma County Water Agency (SCWA), *Request for Marine Mammal Protection Act Incidental Harassment Authorization, Russian River Estuary Management Activities*, September 2009.

Sonoma County Water Agency (SCWA), Letter to Mr. William Hearn, National Marine Fisheries Service Regarding Russian River Estuary Flood Risk Management Feasibility Study, March 22, 2010.

CHAPTER 3.0
Project Background and Environmental Setting

3.1 Introduction

The following section discusses existing conditions and establishes the environmental baseline for several key issue areas. The California Environmental Quality Act (CEQA) requires that an Environmental Impact Report (EIR) describe the physical environmental conditions in the vicinity of the project, or the environmental setting, which constitutes the baseline conditions by which the Lead Agency determines impact significance (CEQA Guidelines Section 15125). CEQA usually defines baseline as the conditions at the time of publication of the Notice of Preparation (NOP). However, because artificial breaching is a historical practice, and because the physical conditions within the Russian River Estuary (Estuary) are highly variable on a daily, monthly, and annual basis, this chapter provides an overview of Estuary management and the factors that influence its implementation each year. As part of its current Estuary management, the Sonoma County Water Agency (Water Agency) monitors water surface elevations, water quality parameters, and biological resource conditions, and has developed bathymetry mapping within the Estuary Study Area. This information provided below summarizes the best available information regarding the "existing conditions" in the Estuary Study Area. **Chapter 4.0** analyzes how implementation of the Estuary Management Project may change or alter these existing conditions both within the Estuary Study Area, and for certain impacts, within the maximum backwater area. As noted in **Chapter 2.0, Project Description**, the maximum backwater area is defined as extending upstream within the Russian River channel to approximately Vacation Beach. The following discussion is organized as follows to provide an overview of existing conditions within the Estuary:

1. *Estuary Management*. Provides discussion and data regarding the frequency and timing of natural and artificial breaching events since 1996. Discusses relationship of observed and expected Russian River inflow to the Estuary, formation of barrier beach conditions, and subsequent closure events

2. *Estuary Management and Minimum Instream Flows*. Provides a discussion of the relationship between Estuary Management and Decision 1610 (D1610) flows and proposed D1610 changes (Fish Habitat Flows and Water Rights Project).

3. *Estuary Water Surface Elevations*. Provides discussion of water surface elevations (WSEs) experienced in the Estuary during closure events, their frequency of occurrence, and their duration. Maps water surface elevations experienced in the Estuary during closure events.

4. *Estuary Monitoring Programs*. Provides an overview of biological processes, water quality and physical processes monitoring, including pinniped monitoring, implemented by the Water Agency.

5. *Estuary Conditions and National Marine Fisheries Service (NMFS) Russian River Biological Opinion (*Russian River Biological Opinion*)*. Provides a summary of conditions in the Estuary as identified in the Russian River Biological Opinion.

6. *2009 Extended Closure Data Report.* Provides an overview of data gathered for salinity, temperature and dissolved oxygen during an extended closure period of 29 days occurring September 7 through October 5, 2009. Because of the high resolution of the data collected, this information provides insight into Estuary processes under closed lagoon conditions. However, it should be noted that the data presented in this EIR is from a single extended closure, and cannot be interpreted as being representative of all closure conditions, which will vary substantially depending upon hydrologic year type, the seasonal timing of the closure, and closure duration.

3.2 Estuary Management

The Water Agency currently manages Estuary water levels with the primary objective of minimizing flooding of low-lying properties when barrier beach formation occurs. Specifically, when conditions allow (i.e., during safe wave and river flow conditions), the Water Agency mechanically breaches the barrier beach following a natural closure when the water surface level in the Estuary is between 4.5 and 7.0 feet and to avoid Estuary water levels greater than 9 feet, as determined by the gage at the Jenner Visitor's Center, in accordance with the *Russian River Estuary Study 1992–1993* (Heckel, 1994). [1] Water surface elevations above 9 feet could result in flood damage to low-lying structures.

The Estuary may close at any time of the year, although the closures occur most often between spring and late fall. This is a period of generally lower instream flows and increased creation of barrier beach conditions due to wave activity. Following formation of the barrier beach and Estuary closure, natural breaching of the barrier beach occurs when Estuary water levels exceed the capability of the barrier beach to impound this water, causing localized erosion of the barrier beach and creation of a tidal channel that reconnects the Russian River to the Pacific Ocean. This condition depends on the elevation of the barrier beach, and can vary throughout the year. However, under existing conditions and management practices, the barrier beach is more often artificially breached by the Water Agency. In some cases, private citizens take it upon themselves to breach the barrier beach. As a result of the current management regime, the barrier beach is typically closed for no more than five to fourteen days at a time (Entrix, 2004).

The number of breaching events varies from year to year, depending on the amount of inflow to the Estuary, and beach and ocean conditions that determine the frequency of closure of the Russian River barrier beach (SCWA, 2006). The number of events between 1996 and 2009 are

[1] The Water Agency maintains a recording, water level gage upstream of the Estuary mouth, at the Jenner visitor's center. The gage records water surface elevations in 0.5-hour increments. Water levels for 2000-2009 are provided in the *Russian River Estuary Sandbar Breaching 2009 Monitoring Report*, SCWA, 2010.

shown in **Table 2-1** and **Figure 2-4a and b**, **Chapter 2.0, Project Description**. The maximum number of artificial breach events during the lagoon management period was eight, which occurred in 1997 and 2008.

Review of flow data for the 119 closure events occurring between 1996 and 2009 indicated a median flow at the USGS Guerneville Gage at the time of these closure events of 250 cubic feet per second (cfs), with a minimum flow of 71 cfs and a maximum flow of 1,120 cfs. Therefore, closure events due to barrier beach formation have occurred over a wide range of flow conditions. During the lagoon management period, the outlet channel would be expected to perform over the range of flow conditions that could be experienced between May to October.

River flows typically decline rapidly over the five month lagoon management period. Flows in May averaged 767 cfs for the years 1939 to 2009, and averaged 178 cfs in September for the same time period. Because of this decline in river flow during the lagoon management period, the primary factors in barrier beach formation are wave activity and tidal exchange, with river outflow being a secondary factor. Average monthly wave energy changes with the seasons; wave energy is greatest in winter, reduces over spring, and is minimal from July to September. However, late spring storms, early fall storms and Southern Hemisphere storms can occasionally produce waves exceeding 10 feet in the vicinity of the river mouth during the lagoon management period. Swell waves with periods longer than 10 seconds from either the northwest or south are often the cause of closure during the management period. Large wave events are particularly likely to cause closure when they coincide with the reduced tidal exchange that occurs approximately every two weeks during neap tides.

3.3 Estuary Management Plan and Minimum Instream Flows

The Water Agency releases water from Coyote Valley Dam and Warm Springs Dam to meet minimum instream flow requirements and for water supply purposes in accordance with the requirements of Decision 1610 (D1610), adopted on April 17, 1986 by the State Water Resources Control Board (SWRCB). D1610 specifies minimum instream flow requirements for the Russian River and Dry Creek. These minimum flow requirements vary based on hydrologic conditions, which are also defined by D1610. From Dry Creek to the Pacific Ocean, the required minimum flows in the Russian River are 125 cfs during *Normal* conditions, 85 cfs during *Dry* conditions and 35 cfs during *Critical* conditions.

The Russian River Biological Opinion (NMFS, 2008) concluded that the summer minimum instream flows in the upper Russian River and Dry Creek required by D1610 are too high for optimal juvenile salmonid habitat. The Russian River Biological Opinion also concluded that the historical practice of breaching the barrier beach that builds up and frequently closes the mouth of the Russian River during the late spring, summer, and fall may also adversely affect the listed species. Consequently, the Russian River Biological Opinion concludes that reducing D1610 minimum instream flow requirements will enable alternative flow management scenarios that will increase available rearing habitat in Dry Creek and the upper Russian River, and provide a lower,

closer-to-natural inflow to the Estuary between late spring and early fall, thereby enhancing the potential for maintaining a seasonal freshwater lagoon that would likely support increased production of juvenile steelhead and salmon (NMFS, 2008).[2]

The Russian River Biological Opinion acknowledges that implementing permanent changes to the minimum instream flow requirements for the Russian River and Dry Creek will take several years, including the time needed for review under CEQA and compliance with state and federal regulations. Consequently, the Russian River Biological Opinion mandates that the Water Agency file annual petitions with the SWRCB for temporary changes to the D1610 minimum instream flow requirements on the mainstem Russian River, starting in 2010 and for each year thereafter, until the SWRCB has issued an order on the Water Agency's petition for permanent changes to the D1610 minimum in-stream flow requirements. The Water Agency submitted a Petition for Temporary Urgency Change on April 4, 2010, and the SWRCB approved the Temporary Urgency Change on May 24, 2010 for the season between May 1 and October 15, 2010.

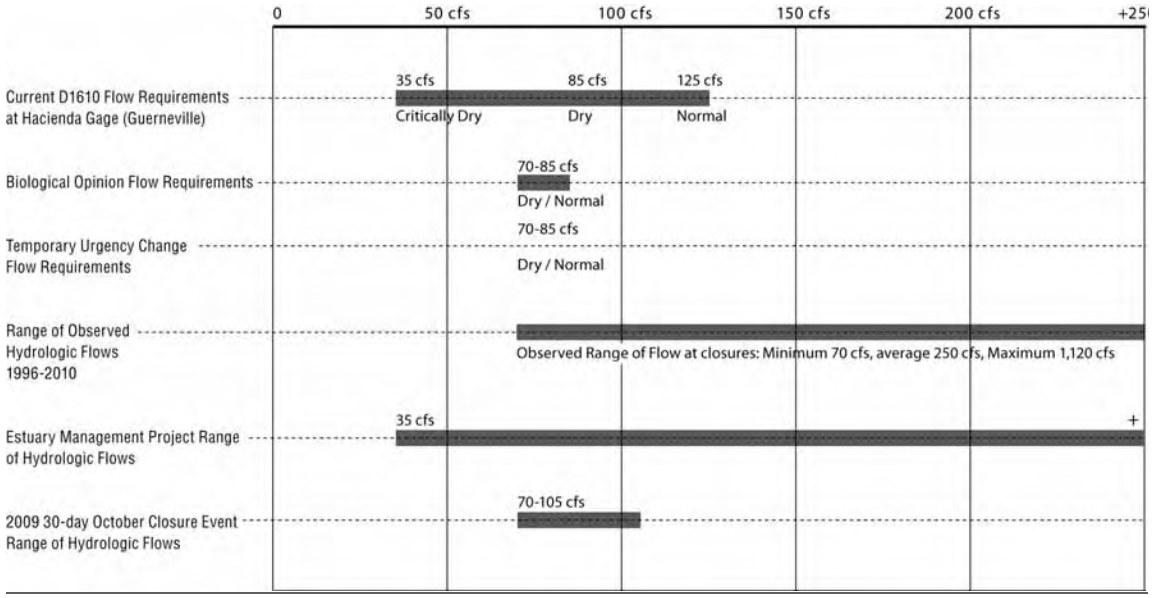
The changes to D1610 minimum instream flow requirements would benefit juvenile steelhead rearing habitat in the upper mainstem Russian River and in the Estuary. The Russian River Biological Opinion requires the Water Agency to request that the minimum instream flow requirements for the mainstem Russian River be temporarily changed each year to the following values:

1. 70 cfs at the U.S. Geological Survey (USGS) Guerneville gage located at Hacienda Bridge, between May 1 and October 15, with the understanding that, because of the need for an operational buffer above this minimum requirement, the Water Agency will typically maintain approximately 85 cfs at this gage; and

2. 125 cfs at the USGS gage located at Healdsburg between May 1 and October 15.

Figure 3-1 summarizes lower Russian River flow requirements from Dry Creek to the Pacific Ocean that would influence flows into the Estuary during the lagoon management period. **Figure 3-1** includes existing D1610 flow requirements, the proposed minimum instream flow changes identified in the Russian River Biological Opinion, the flows identified in the 2010 Petition for Temporary Urgency Change, and the anticipated range of flows that would be expected to occur during the lagoon management period, based upon observed conditions. As previously noted, closure events due to barrier beach formation have occurred over a wide range of flow conditions. During the lagoon management period, the outlet channel would be expected to perform over a range of flow conditions that could be experienced from May to October. As such, the Estuary Management Project is not reliant upon temporary or permanent changes to D1610 for its implementation. Rather, the Estuary Management Project has been developed to adaptively manage the Estuary under any likely range of flow conditions following barrier beach formation under varying hydrologic year types and conditions.

[2] National Marine Fisheries Service. Russian River Biological Opinion, Page 243, September 2008.



Russian River Estuary Management Plan Project ▪ 207734

SOURCE: ESA, 2010

Figure 3-1
Comparison of Lower Russian River Flow Requirements and Anticipated Hydrologic Flow Range for Estuary Management Project

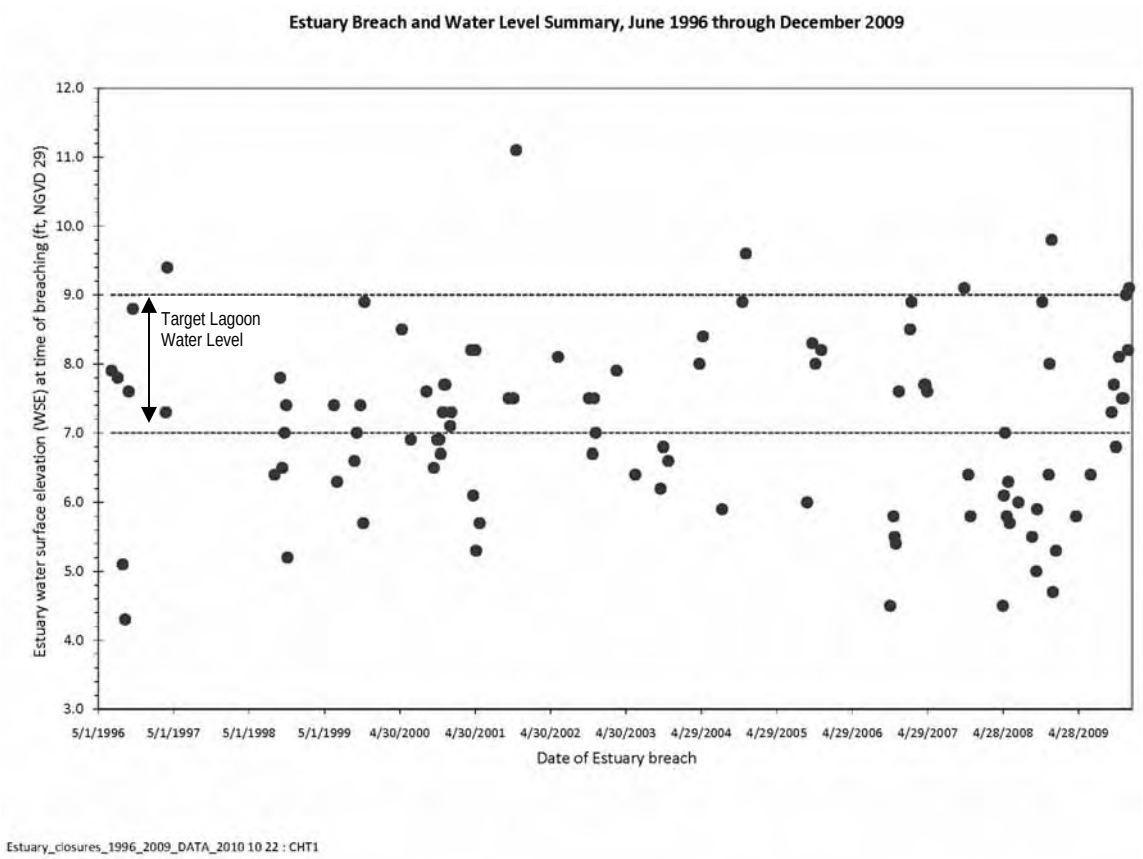
3.4 Estuary Water Surface Elevations

The Water Agency currently manages Estuary water levels with the primary objective of minimizing flooding to surrounding properties. Under the Estuary Management Project, the Water Agency will implement adaptive management of the Estuary with the primary objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard. The following discussion of water surface elevations that have occurred within the Estuary following barrier beach formation, and subsequent artificial breaching by the Water Agency is provided for the years 1996 through 2010. The Water Agency water surface elevation dataset represents the best available information relative to water surface elevations, and their duration, that have been experienced in the Estuary, presented in **Figure 3-4A** through **3-4E** (EDS, 2009). This information represents the existing conditions baseline with respect to water surface elevations in the Estuary.

Natural breaching of the barrier beach occurs when Estuary water levels exceed the capability of the barrier beach to impound this water, causing localized erosion of the barrier beach and creation of a tidal channel that reconnects the Russian River to the Pacific Ocean. This overtopping condition depends on the elevation of the barrier beach, and can vary throughout the year. Artificial breaching has occurred every year from 1996 to 2009, except 2006, when only natural breaching events occurred. The number of artificial breaching events in any given month varied from year to year, but the majority of the artificial breaching events occurred from April through June and September through November. Of the years when the Water Agency completed artificial breaches, the lowest number of artificial breaching events was one event in 2004 and the

highest number was 15 attempted breaches (with 13 successful breaches) in 2009 (**Table 2-1** and **Figure 2-4 of Chapter 2.0**, **Project Description**). It is not possible to ascertain how many artificial breaching events would be required each year, but there have been an average of six artificial breaching events annually over the last 14 years.

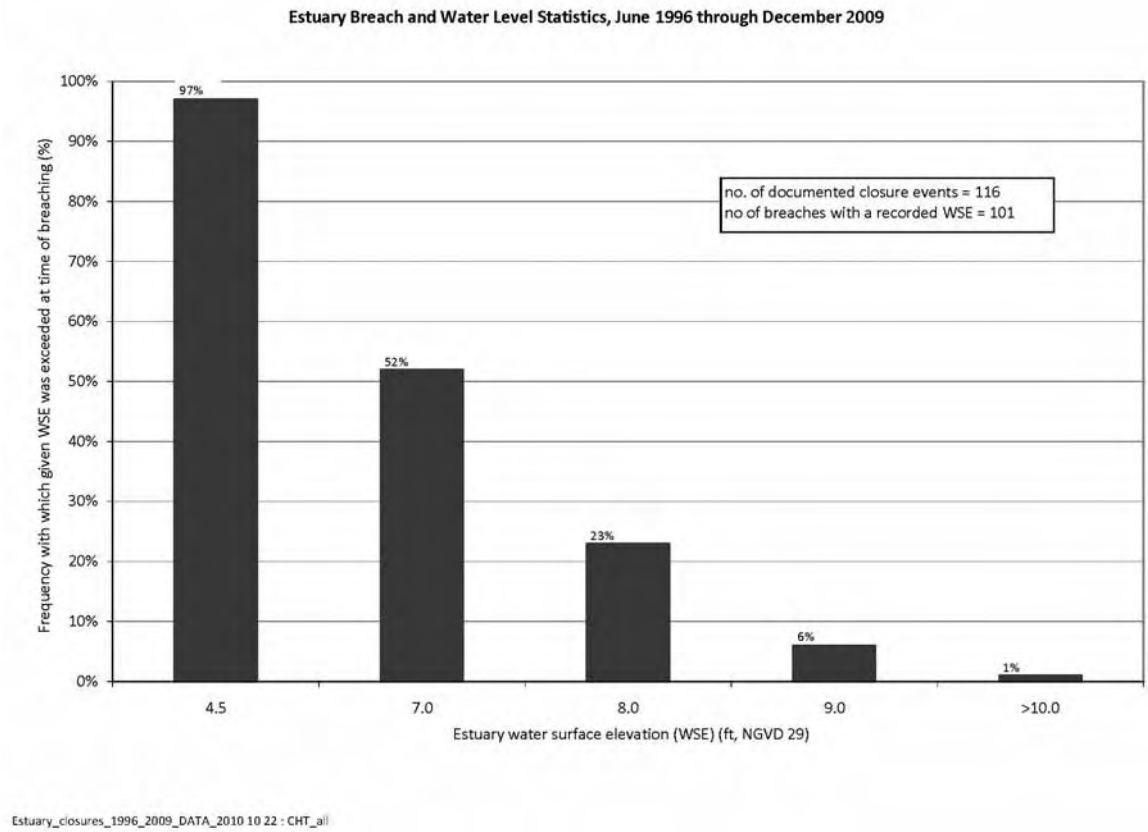
The Water Agency records information pertaining to Estuary closure events, including the date on which the barrier beach was breached (either natural, citizen [if known], or artificial) and the Estuary water surface elevation at the time of breaching. **Figure 3-2** depicts the recorded water surface elevations upon breaching between June 1996 and December 2010. The lowest recorded water surface elevation upon breaching was 4.3 feet (September 8, 1996); the highest water surface elevation was 11.1 feet during a natural breach event on November 13, 2001. As evidenced in **Figure 3-2**, the average (7 feet) and maximum (9 feet) water surface elevations targeted by the Estuary Management Project are within the existing range of water surface elevations associated with the current closure and breaching processes within the Estuary.



Russian River Estuary Management Plan Project ▪ 207734

Figure 3-2
Water Surface Elevations at All Breaching Events
(Water Agency, Citizen and Natural) 1996-2009

Using this same information, **Figure 3-3** shows the frequency with which given Estuary water surface elevations were exceeded at the time of breaching. For example, of the 101 breaching events for which a water surface elevation was subsequently recorded, over half of the events (i.e., 52 percent) had water surface elevations that exceeded 7 feet and were sometimes as high as 8 to 9 feet. The average Estuary water surface elevation at the time of breaching was 7.1 feet. During closure events, water surface elevations of 7 feet affect the shoreline frontage of approximately 46 parcels within the Estuary, primarily through inundation of the shoreline and beach areas; however no structures are directly affected.



Russian River Estuary Management Plan Project ▪ 207734

Figure 3-3
Frequency of Water Surface Elevations at
All Breaching Events (Water Agency, Citizen and Natural) 1996-2009

Water surface elevations of 7 to 9 feet inundate the shoreline frontage of approximately 78 parcels, including 9 structures (boat docks). The approximate area of inundation between the 4.5 to 7-foot contours and the 7 and 9-foot contours in **Figures 3-4A through 3-4E**.

The water surface elevation of the Estuary is generally well below the elevations typically associated with breaching events and potential flooding for most of the year. For example, based upon data from the Water Agency's Jenner gage, the average water surface elevation in the Estuary from May 2000 through December 2009 was approximately 2.2 feet. Over this same

period of time, within the lagoon management period (May 15 – October 15), the average water surface elevation in the Estuary was approximately 1.9 feet. Over 99 percent of the time, the Estuary water surface elevation, as recorded at the Jenner gage, was below 7.7 feet. A typical example of the range and seasonal distribution of Estuary water levels is shown in **Figure 3-5** for the year 2003, which had close to an average number of breaching events. Russian River flow data from the Guerneville gage for 2003 also exhibited a typical range of variability, (i.e., no extreme peaks, and base flow was not unusually high or low).

3.5 Estuary Monitoring Programs

3.5.1 Monitoring Programs

The Water Agency monitors biological resources, water quality, and physical processes in the Estuary. From 1996 to 2000, the Water Agency monitored the effects of artificially breaching the Estuary. The responses of fish, macroinvertebrates, and pinnipeds, as well as changes in water quality, in the Estuary to formation of the barrier beach and subsequent artificial breaching were the primary focus of monitoring during these years. Fisheries, macroinvertebrates, and pinnipeds were monitored before, during, and after artificial breaching events. Water quality vertical profiles (temperature, salinity, conductivity, and dissolved oxygen) were taken at stations in the middle and lower reaches of the Estuary during each biological sampling event. In addition, water quality monitoring stations were established in and near Willow Creek from confluence with the Russian River (SCWA and Merritt Smith Consulting, 2001).

In 2003, the Water Agency began monitoring biological resources and water quality in the Estuary not only to understand how artificial breaching affects resources, but also to better understand Estuary ecology during the spring, summer, and fall months when the Water Agency was most often managing water surface elevations. By this time, coho salmon, Chinook salmon, and steelhead were listed under the federal Endangered Species Act (ESA) and additional information regarding how these species, and more common species, utilized the Estuary was needed. Fisheries, macroinvertebrate, and water quality monitoring changed from breaching-related monitoring to monitoring at regular intervals. Monitoring stations were also expanded from the lower and middle Estuary to include the upper Estuary.

The Russian River Biological Opinion mandates the Water Agency to continue fisheries and water quality monitoring in the Estuary, as well as requires invertebrate sampling to better understand juvenile steelhead prey resources in the Estuary and how these resources may be affected by summer lagoon management.

In 2009, the Water Agency, in collaboration with Stewards of the Coast and Redwoods (Stewards), began a new pinniped monitoring program to collect additional baseline information on the harbor seal haulout at the mouth of the river, as well as to monitor pinniped response to summer lagoon management as part of the Water Agency's application for incidental harassment authorization (IHA) under the Marine Mammal Protection Act (SCWA and Stewards, 2009). The purpose of the monitoring is to detect the response of pinnipeds to Estuary management activities.

No Photo Coverage

1

Jenner

SCWA - Survey
Jenner Gage

Jenner Gulch

Penny Island

Pinniped Haulout
Jenner Logs

Goat Rock
State Beach

0 600
Feet

Elevation above mean sea level

4.5 to 7

7 to 9

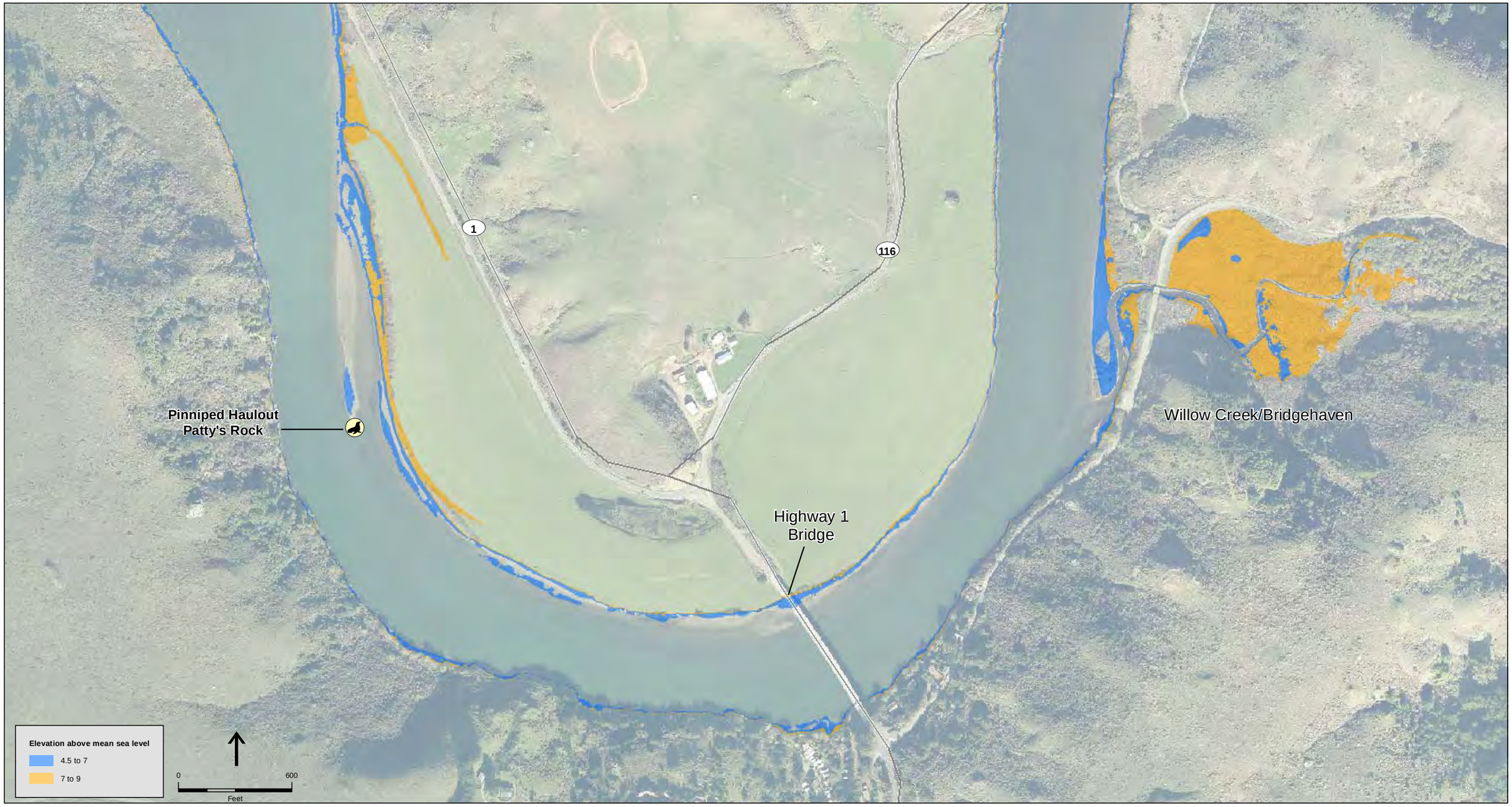
SOURCE: EDS, 2009; SCWA, 2010; (aerial photo, 2008)

Note: Elevations shown for display purposes only;
areas between elevations are shaded to depict
incremental inundation areas relative to 7 and 9 foot elevations.

Russian River Estuary Management Project. 207734.01

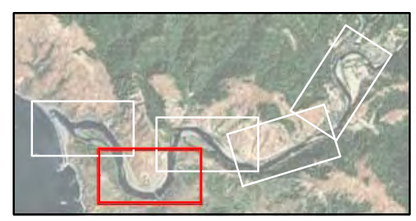
Figure 3-4a

Estuary Study Area: Elevation Contours



SOURCE: EDS, 2009; SCWA, 2010; (aerial photo, 2008)

Note: Elevations shown for display purposes only;
areas between elevations are shaded to depict
incremental inundation areas relative to 7 and 9 foot elevations.



Russian River Estuary Management Project. 207734.01

Figure 3-4b

Estuary Study Area: Elevation Contours

Sheephouse Creek

116

Pinniped Haulout Chalanchawi

0 600
Feet

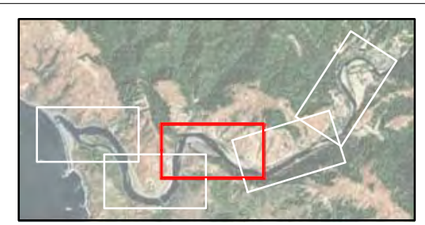
Elevation above mean sea level

4.5 to 7

7 to 9

SOURCE: EDS, 2009; SCWA, 2010; (aerial photo, 2008)

Note: Elevations shown for display purposes only;
areas between elevations are shaded to depict
incremental inundation areas relative to 7 and 9 foot elevations.



Russian River Estuary Management Project. 207734.01

Figure 3-4c

Estuary Study Area: Elevation Contours

Heron Rookery

Osprey Rookery

116

Elevation above mean sea level

4.5 to 7

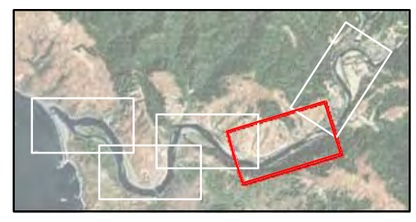
7 to 9

0 600

Feet

SOURCE: EDS, 2009; SCWA, 2010; (aerial photo, 2008)

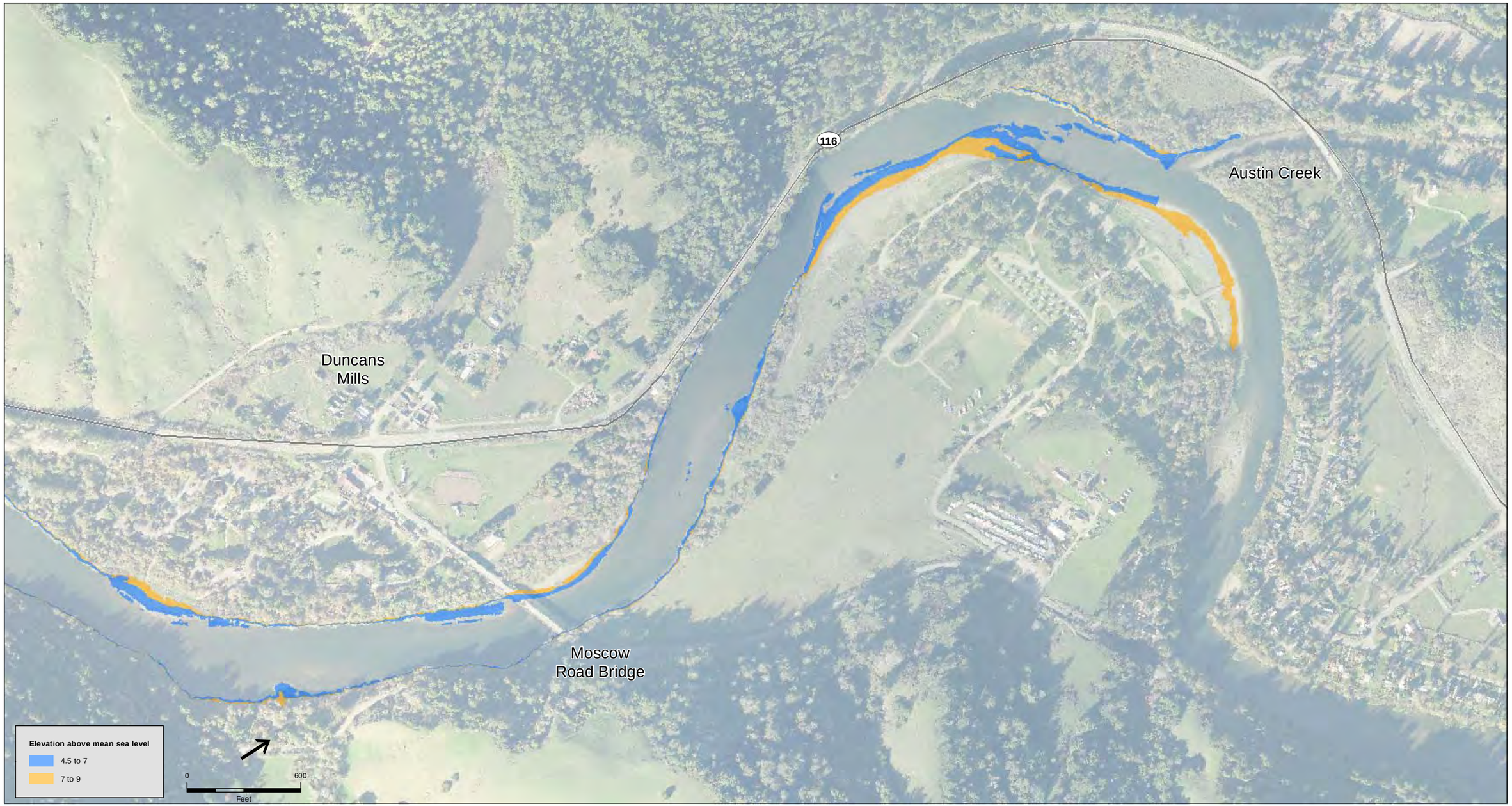
Note: Elevations shown for display purposes only; areas between elevations are shaded to depict incremental inundation areas relative to 7 and 9 foot elevations.



Russian River Estuary Management Project. 207734.01

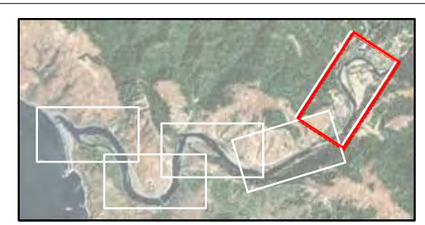
Figure 3-4d

Estuary Study Area: Elevation Contours



SOURCE: EDS, 2009; SCWA, 2010; (aerial photo, 2008)

Note: Elevations shown for display purposes only;
areas between elevations are shaded to depict
incremental inundation areas relative to 7 and 9 foot elevations.



Russian River Estuary Management Project. 207734.01

Figure 3-4e

Estuary Study Area: Elevation Contours

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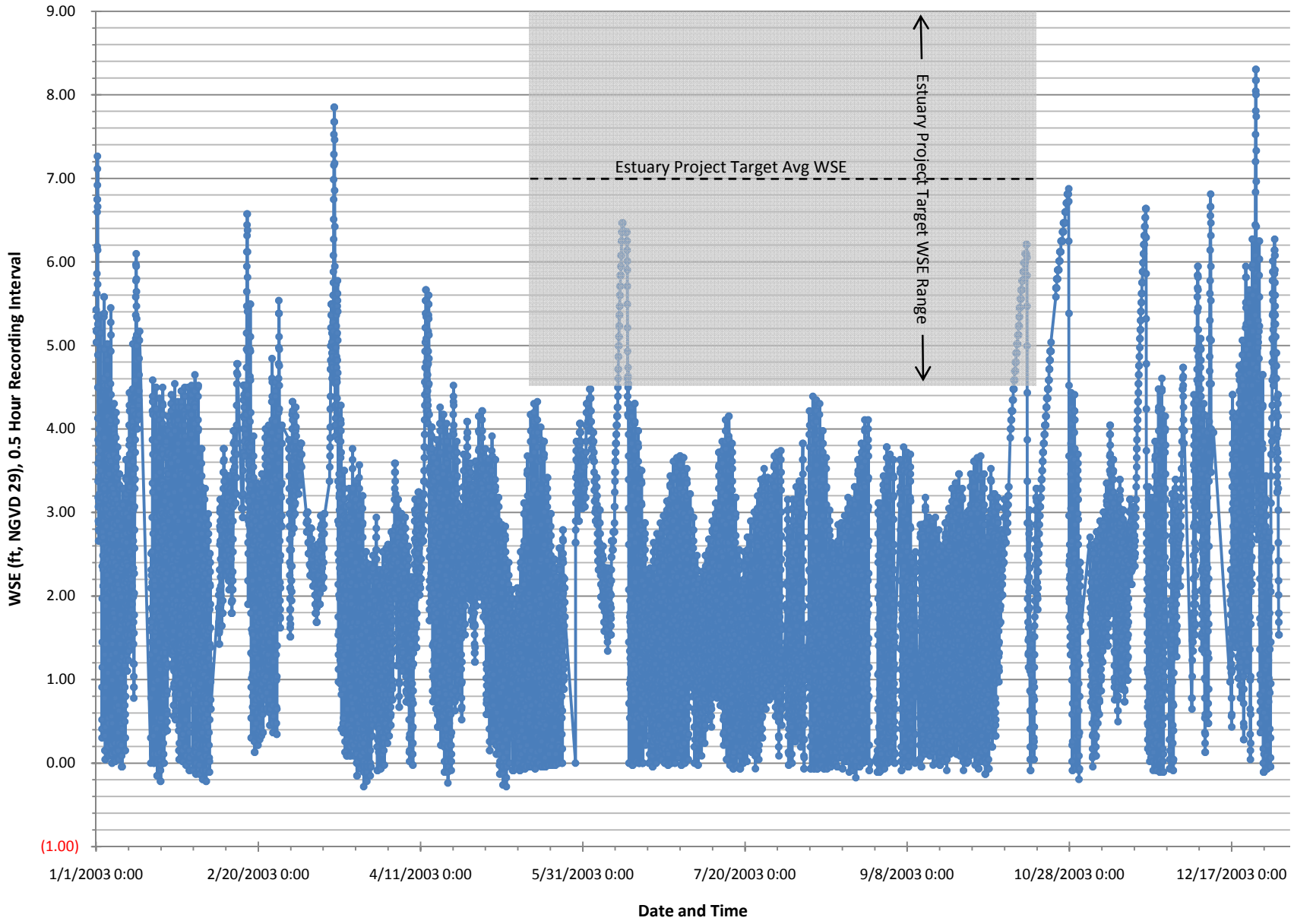


SOURCE: Delaney (2010); ESA

Russian River Estuary Management Project . 207734.01

Figure 3-5

Estuary Water Level at Jenner Gage

Monitoring results would inform the Water Agency about the conditions under which pinnipeds haulout; how the seals respond to creation and maintenance of the lagoon outlet channel and artificial breaching activities; whether the number of seals at the Jenner haulout differ significantly from historic averages after formation of a freshwater lagoon during the lagoon management period; and whether seals displace to nearby haulouts when the river mouth remains closed during the summer. Pinniped monitoring and Russian River haulouts are discussed in detail in **Section 4.4, Biological Resources**.

Also in 2009, the Water Agency began working with University of California, Davis', Bodega Marine Laboratory on a study of physical processes related to circulation, stratification, and mixing in the Estuary. Results of monitoring conducted by Bodega Marine Laboratory during an extended closure event in 2009 are further discussed in **Section 3.7**, below.

In addition to the above sampling programs, the U.S. Geological Survey (USGS) prepared a report in cooperation with the Water Agency to establish baseline water quality data during summer flows in the Russian River. Monitoring sites in the Estuary (Jenner and Willow Creek Marsh) were sampled in summer 2004 for inorganic and organic constituents, nutrients, trace elements, organic carbon, and mercury (Anders et al., 2006). The most recent monitoring in the Estuary conducted by the Water Agency in June through October, 2010, included testing for nutrients such as total organic nitrogen, ammonia, total kjeldahl nitrogen (TKN), nitrates, nitrites, total phosphorus and indicator bacteria. This most recent sampling program is further discussed in **Section 4.3, Water Quality**.

3.6 Estuary Conditions and NMFS' Russian River Biological Opinion

3.6.1 Historic Estuary Conditions and Salmonid Habitat

The Russian River Biological Opinion (2008) evaluated historic estuarine habitat conditions by combining information on current conditions and limited historic information about river flow and bar closures in the Russian River and other California estuaries. Unless otherwise noted the following discussion is summarized from the Russian River Biological Opinion.

Natural California coastal estuaries are typically open to full tidal mixing in the winter and early spring. In late spring, summer, and fall, many of these estuaries are typically converted to freshwater or brackish lagoons. Lagoon formation is a factor of annual precipitation patterns in California, which result in sharp declines in streamflows in coastal rivers during summer months. Declining streamflows and summer beach development[3] typically result in the development of barrier beaches which dam the mouths of many estuaries to produce a lagoon (Smith, 1990).

Freshwater from upstream continues to flow into the newly-formed lagoon and builds up on top of the salt water layer, gradually forcing the salt water layer to seep back into the ocean through

[3] Beach development refers to the sand and gravel build up on the beach cause by changes in ocean swell size and direction.

the barrier beach (NMFS, 2008; Smith, 1990). After barrier beach formation, a variety of other factors, including hydrogeology and the volume of saltwater impounded in the lagoon at the time of closure, freshwater inflow rates, wind action, and wave overwash, dictate the amount of time required for a full conversion of the lagoon habitat from saltwater to freshwater (Swanson, 2001). If inflow is insufficient to displace saltwater impounded at the time of closure there is a higher likelihood that stratification will occur, resulting in an anoxic layer in the lower water column (Smith, 1990; Swanson, 2001). In addition, the conversion time required to convert many lagoons to freshwater can affect the primary and secondary producers in the food chain that require relatively stable hydrologic conditions (Swanson, 2001).

Prior to dams and diversions in the Russian River watershed, the Estuary was likely open to ocean tides for several months between late fall and early spring in nearly all years, and then closed to ocean tides sometime during the late spring through the early fall of most years (NMFS, 2008). This historic pattern of open estuarine conditions followed by Estuary closure to ocean tides through the late spring to early fall period is consistent with other coastal lagoons. This seasonal pattern remains evident today and continues to occur even with summer inflows to the Estuary augmented by releases from upstream dams (NMFS, 2008). In some instances, similar to other coastal lagoons, closure may not have occurred until late summer due to the absence of barrier beach building wave events in the spring (NMFS, 2008; Smith, 1990).

Historically, flows during summer months were low and were unlikely to have breached the barrier beach once formed. In some wetter years, a perched lagoon may have formed, with freshwater outflow over the Estuary's bar (NMFS, 2008). The duration of the perched lagoon through the summer as river flows receded is unknown. It is likely that, historically, the Estuary either converted to freshwater after bar closure, or stratified, with denser salt water remaining at depth (NMFS, 2008; Smith, 1990). The Estuary's condition after bar closure was likely variable across water year types.[4]

Information does not exist on water quality conditions relating to habitat in the Estuary prior to increased summer flows in the Russian River from dam releases. As shown by Smith (1990), natural estuarine systems tend to provide highly productive aquatic habitat during open and fully estuarine conditions as well as during closed and fully converted freshwater conditions. The transition period between those two states, however, tends to be a time of low productivity and result in the loss of some species (e.g., marine species intolerant of freshwater conditions). In the estuary/lagoon systems Smith (1990) studied, it generally took thirty days or more for a freshwater lagoon to form following formation of a barrier beach. Natural estuaries were also observed to remain stratified in some years throughout the summer and fall, with denser salt water on the bottom (Smith, 1990) forming high temperature, low dissolved oxygen salt water lenses. As such, it is important to recognize that even though stratified lagoons are widely understood to present adverse habitat conditions for a variety of species, stratified conditions do at times occur in natural lagoons, and represent one possible physical state among a wide variety of conditions that may be present in highly dynamic ecosystems such as lagoons.

[4] A water year type characterizes the hydrological conditions over the period of one year. There are five common types, normal, very wet, wet, dry, and critically dry, based on relative amounts of surface water inflows.

Whether the Estuary converted to freshwater conditions or remained stratified in some years historically, habitat was likely beneficial for salmonids rearing during the summer months (NMFS, 2008; Smith, 1990; Bond et al., 2008). Smith (1990) and Bond et al. (2008) evaluated closed freshwater lagoons in California and found beneficial salmonid rearing habitat in those lagoons, including abundant food supplies and increased salmonid growth rates over stream-raised fish. The Navarro River Estuary, which is more similar in size and configuration to the Russian River Estuary than the smaller estuary/lagoons studied by Smith (1990), did not convert to freshwater after it closed and became a lagoon in September of 1996 and 1997 (NMFS, 2008). Nevertheless, steelhead productivity remained higher than productivity in other open, salt water tidally-influenced estuaries in California (NMFS, 2008). Steelhead productivity in the Navarro was high due to abundant food and a stable surface freshwater layer (NMFS, 2008).

3.6.2 Current Estuary Management and Fish Habitat

Current Estuary Management

Current Estuary management, including frequency of artificial breaching events, is described in **Sections 3.2** and **3.4** above. During the lagoon management period, the Estuary generally functions as a tidally influenced estuary that experiences periodic transitions between marine and freshwater habitat between May and October of most years when a barrier beach forms. Under the current Estuary management, the barrier beach is generally closed no more than five to 14 days, although it is occasionally closed for longer periods (Entrix, 2004). A prolonged river mouth closure lasting 29 days occurred recently from September 7 through October 5, 2009 (Behrens and Largier, 2010). Based on past breaching records, under current practices, the Estuary has not remained closed for a period longer than 30 days. Conversely, Smith (1990) observed that natural coastal lagoons in California typically take thirty days or more to fully transition from a marine or brackish water habitat to a freshwater habitat. Smith (1990) found that salmonid survival and growth is poor in California coastal lagoons if they undergo long stratified transition periods between barrier beach closure and conversion of the lagoons to freshwater. Artificial summer breaching programs abruptly terminate the transition between marine and freshwater conditions and typically do not allow for a full conversion to productive freshwater habitat. In the case of the current Estuary breaching program, full conversion in the Russian River Estuary is not expected due to hydrogeology (Behrens and Largier, 2010).

Estuary Fish Habitat

Species distribution and abundance within the Estuary is dependent, in part, on water quality conditions, which in turn are dependent on a wide variety of physical conditions such as open or closed river mouth (presence of a barrier beach), freshwater inflow rates, ambient air temperature, wind action, and tidal circulation. These water quality characteristics create a range of habitat conditions that favor different species of fish. Water quality characteristics critical to fish habitat within the Estuary include temperature, dissolved oxygen (DO), and salinity. Depending on the status of the barrier beach (Estuary open to tidal influence or closed), these water quality characteristics can vary across a wide range. Certain fish species share similar habitat requirements and tend to associate together in assemblages (SCWA, 2008). Additionally, based on current breaching practices

between May and October, these water quality characteristics can change rapidly within the project area. The following section summarizes the current trends for critical habitat water quality characteristics in the project area under the current artificial breaching regime based on monitoring data collected by the Water Agency (SCWA 2006, 2010).

Water quality is generally of higher habitat value (lower temperatures and higher DO) in the near-bottom saline layers when the Estuary is open to tidal mixing than when the Estuary has been closed for a short time. When the barrier beach forms, saltwater is trapped in the lagoon. Because saltwater is denser than fresh water, it forms a layer under the freshwater river inflows (stratification), forming a saltwater lens that traps heat (Smith, 1990; Entrix, 2004). Through natural processes, dissolved oxygen (DO) becomes depleted in the bottom saline layer and anoxic conditions can develop. Currently, the Estuary is known to stratify after formation of the barrier beach. When the barrier beach closes, salinity stratification leads to reductions in DO and increases in temperature from solar heating in the lower water column. In the deepest areas cold anoxic saltwater occurs. When the barrier beach is breached, tidal mixing contributes to a renewal of DO and a reduction in temperatures within the Estuary, and especially within the stratified lower water column. This process occurs most rapidly near the mouth of the river following breaching, but can take up to several days at upstream sites. The rate of change of salinity, DO, and temperature within the Estuary is also influenced by the volume of river freshwater inflow to the Estuary, spring and neap tides, and the length of time the barrier beach remains open. This cycle was documented in the Estuary during ongoing monitoring studies conducted by the Water Agency (SCWA, 2006; SCWA, 2010).

Open Estuary Conditions

Salinity

The Estuary exhibits conditions typical of estuarine environments with varying salinity levels. Salinity steadily increases from low levels (0-5 parts per thousand [ppt]) at the freshwater/Estuary interface in the upper reach, to moderate levels in the middle reach (approximately 15 ppt), to the highly saline tidal zone near the ocean (30-35 ppt).

Saline water is denser than freshwater and a salinity “wedge” forms as freshwater outflow passes over the denser tidal inflow. The lower and middle reaches of the Estuary up to Sheephouse Creek are predominantly saline environments with a thin freshwater layer that flows over the denser saltwater. The upper reach of the Estuary transitions to a predominantly freshwater environment, which is periodically underlain by a denser, saltwater layer that migrates upstream as far as the Moscow Road Bridge in Duncans Mills during summer low flow conditions. River flows, tides, and wind action affect the amount of mixing at various longitudinal and vertical positions within the Estuary. However, in most estuaries, including the Russian River Estuary, water stratification is common in deeper sections of the Estuary or when vertical mixing is limited (SCWA, 2006).

Salinities in much of the Estuary are beyond the tolerable range for smaller age classes of non-smolting juvenile steelhead when the Estuary is open during the late spring, summer, and fall (NMFS, 2008). Water quality data indicates that when the Estuary is open to tidal mixing, the most upstream portion of the Estuary from Freezeout Creek to Austin Creek (upper one mile of the

Estuary) is the only portion where predominantly freshwater habitat is maintained throughout the summer. The lower and middle Estuary are predominantly saline environments with a thin freshwater layer that flows over the denser saltwater. Temporary decreases in salinity concentrations have been observed during Estuary closure and following breaching events. The middle Estuary (one to five miles from the mouth) is most subject to fluctuation in salinities throughout the water column due to ocean tides (SCWA, 2006). In the middle Estuary, salinities can range as high as 30 ppt in the saltwater layer, with brackish conditions prevailing at the upper end of the salt wedge, to less than 1 ppt in the freshwater layer on the surface. Salinities near the mouth are similar to ocean salinities (SCWA, 2006; SCWA, 2009).

Dissolved Oxygen

The DO levels in the Estuary fluctuate significantly during the monitoring season, and fluctuations are not necessarily associated with tidal cycles or a diurnal cycle (SCWA, 2006). DO levels in the Estuary also depend upon factors such as the extent of diffusion from surrounding air and water movement including freshwater inflow. DO levels are also a function of nutrients, which can accumulate in standing water during an extended period of time and promote excessive plant and algal growth that utilize the DO. This can reduce DO levels leading to eutrophication and affecting overall ecological health of the Estuary. Estuaries tend to be naturally eutrophic because land-derived nutrients are concentrated where runoff enters the marine environment in a confined channel. [5] A discussion of nutrient levels within the Estuary is presented at the end of this section.

DO concentrations also affect habitat quality and use, physiological stress, and mortality of fish and other aquatic organisms. In general, DO concentrations less than 5 to 6 milligrams per liter (mg/l) are considered to be unsuitable for most fish species, including steelhead (Bell, 1973; Barnhardt, 1986). Salmonids generally require a DO level of at least 8 mg/l for optimal growth and survival, and depending on temperature, the lower lethal limit for salmonids is a DO level of around 3 mg/l. When the Estuary is open, DO typically ranges from approximately 7 to10 mg/l in the surface layers, and varies, on average, from 4 to 9 mg/l in bottom areas of Estuary pools (NMFS, 2008).

Temperature

Water temperature has direct and indirect effects on aquatic ecology. For example, oxygen is more soluble in cold water than hot water (i.e., solubility is a function of water temperature); therefore DO levels may be higher in waters at lower temperatures. Temperature also influences the rate of photosynthesis by algae and aquatic plants. Water bodies such as the Russian River Estuary have naturally fluctuating temperatures due to the dynamic conditions associated with a coastal climate, localized weather patterns, and tidal mixing.

Temperatures recorded during open Estuary conditions typically range from 10° C to 18° C at mid and bottom depths in saline and brackish water. Temperatures are generally warmer in the freshwater layer, which can reach as high as 25° C for short periods, especially in the upper reach of the Estuary, furthest from the natural cooling effects of a marine environment. Temperatures less

[5] *National Estuarine Eutrophication Assessment* by NOAA National Centers for Coastal Ocean Science (NCCOS) and the Integration and Application Network (IAN), 1999.

than 17° C are typically preferred by juvenile steelhead (Sullivan et al., 2000). In general, salmonids in warmer waters require more food and oxygen because their metabolism increases with temperature (Moyle, 2002). The high productivity associated with healthy estuaries provides an abundant food source for many fish species and can allow temperature-sensitive fish, such as juvenile salmonids, to withstand greater water temperatures than the typical optimal range, and can actually result in greater growth rates (Bond et al., 2008).

Closed Estuary Conditions

Salinity

Typically salinity steadily increases from the freshwater/estuary interface in the upper reach with low salinity (0-5 ppt), to a predominantly saline environment with a thin freshwater layer that flows over the denser saltwater in the lower and middle reaches of the Estuary. When the barrier beach is formed at the mouth of the Estuary, water quality conditions can undergo abrupt alteration. Salinity, DO and temperature changes can begin within 24 hours (SCWA 2006, 2010). The freshwater layer begins to thicken at the surface, starting at the mouth and extending upstream. Highly saline conditions are present in the mid and bottom depths of the lower and middle reaches of the Estuary within a few days of barrier beach closure. While surface water becomes fresh, some deeper saline water at the bottom may persist in the lower Estuary, and some may migrate upstream to the middle Estuary due to reduced velocities of river inflows and redistribution of the saltwater wedge.

Furthermore, brackish water has been observed to extend into the lower half of the water column in the upper Estuary during sandbar closure, as far upstream as Freezeout Creek. These increases in salinity concentrations suggest that the salt layer is stratifying and flattening out as the hydraulic forces of freshwater inflow, that serve to counteract tidal inundation, retreat upstream as the Estuary continues to backwater.

Dissolved Oxygen

The DO levels in the Estuary fluctuate significantly during the management period, and fluctuations are not necessarily associated with tidal cycles or a diurnal cycle (SCWA, 2006). DO is affected by salinity and temperature stratification, tidal and wind mixing, abundance of aquatic plants, and presence of decomposing organic matter. DO affects fish growth rates, embryonic development, metabolic activity, and under severe conditions, stress and mortality. Cold water has a higher saturation point than warmer water; therefore cold water is capable of carrying higher levels of oxygen.

When the mouth closes, salinity stratification results in pronounced DO stratification in the closed lagoon. DO fluctuations increase in the mid and upper depths and the bottom depths experience sharp drops in DO concentrations. Data from 1996 to 2000 monitoring indicates stratification, with hypoxic to anoxic conditions in the near-bottom layers of the Estuary within a few days of closure. Supersaturation, hypoxic, and anoxic events were observed, with prolonged hypoxic and anoxic events occurring at the bottom through the duration of Estuary closure. Decreasing DO concentrations were also observed in the middle layers of the water column during barrier beach closures. In deeper pools, DO typically drops to less than 5 mg/l (SCWA 2006; NMFS, 2008).

However, DO levels at the surface in the Estuary did not appear to be negatively impacted by Estuary closure and remained similar to pre-closure conditions, or increased in some instances (SCWA, 2006). DO concentrations near the surface remain similar to those found when the Estuary is open (7 to 10 mg/l). Similar stratified conditions were also observed when the barrier beach was open during neap tides or low river flows, indicating that the deeper portions of the Estuary may not be subject to mixing even during open tidal conditions.

Temperature

Because saltwater trapped in the lagoon is denser than freshwater it forms a layer under the fresh water from river inflows, which creates a saltwater lens that traps heat resulting in increased temperature in the saline and brackish layers below the freshwater layer of the Estuary during barrier beach closure. A three layer system forms with a cooler saline to brackish bottom layer that is below the effects of solar heating, a hot mid-depth layer of saline to brackish water subject to the effects of solar heating, and a relatively warm freshwater layer on the surface. Deeper pools are often stagnant saltwater that are cold and anoxic. Surface waters range between 18-21° C, but can reach temperatures of 25° C for periods. Typically, the mid-depth water column within the saline stratified zone will have higher temperatures than surface waters, with temperatures ranging between 21-24° C (SCWA, 2006, 2010; Behrens and Largier, 2010). This warmer, more saline mid-water column layer is generally consistent with other natural coastal lagoons in California that undergo transition to a freshwater lagoon or remain stratified over the summer months (Smith, 1990). When the barrier beach is breached, tidal mixing contributes to reduced temperatures. This process occurs most quickly near the mouth of the river and lower Estuary, and can take up to several days in the upper Estuary. These higher temperatures can be tolerated by steelhead if food supplies are abundant and the highest temperatures are not constant (NMFS, 2008).

Because the barrier beach is breached soon after closure under current practices, the duration of low DO and high temperature conditions within the lower water column are generally limited to approximately two weeks or less. Data from the monitoring surveys conducted by the Water Agency (2006) show that water quality in near-bottom layers and in deep pools is typically better when the barrier beach is open than when it has been closed for a short period of time (two weeks; Entrix, 2004). Under current practices, summer breaching of the barrier beach draws freshwater through the Estuary and accelerates mixing of stratified layers, which increases DO at depth. However, flows caused by breaching may not be sufficient to mix saline waters located at the bottom of the deepest pools. The deepest pools often remained stratified until an influx of tidal flows or higher winter flows flush the pools or cause mixing of the stratified layers. When the barrier beach re-forms, salinity stratification again leads to a deterioration of water quality in the project area during the one week period monitored following closure (SCWA, 2006; Behrens and Largier, 2010; Entrix, 2004). As described in **Section 4.3, Water Quality**, hypoxia and anoxia can also develop under tidal conditions in deep portions of the Estuary during neap tides and/or low river flows.

The water quality monitoring studies described here have, to date, only monitored water quality during short periods of barrier beach closure (typically two weeks). The Estuary has not been

closed for longer time periods after mouth closure and creation of a freshwater lagoon has not been observed. Additionally, the monitoring conducted by the Water Agency (SCWA, 2005, 2006 and 2010) provides a general assessment of water quality changes in the Estuary, but does not assess the extent of microhabitat within the Estuary that may provide refugia for salmonids and other aquatic species (Entrix, 2004).

Effects to Sensitive Species Habitat

The distribution of fish in the Estuary is, in part, based on a species preference for or tolerance to salinity (SCWA, 2006). The distribution of species in the project area is largely influenced by the salinity gradient in the Estuary that is typically seawater near the mouth of the Russian River and freshwater at the upstream end. The fishery habitat zones relevant to the project area are generally characterized as marine/tidally influenced in the lower Estuary, estuarine/brackish in the middle Estuary, and freshwater in the upper Estuary (**Figure 2-2, Chapter 2.0, Project Description**). The borders between these habitat zones and the fish communities utilizing them are not distinct, and occurrences of overlap are typical. These zones form a gradually shifting continuum in response to changes in water quality characteristics related to instream flows, tidal cycles, barrier beach formation and are influenced by current breaching practices.

Fish monitoring surveys completed in the Estuary (SCWA, 2006; SCWA, 2010) demonstrate a shift in fish species composition during Estuary closures. During open-mouth conditions marine and estuarine fish species are typically found throughout the lower and middle Estuary with freshwater species generally inhabiting the upper Estuary. However, when the mouth closes, marine fish presence shifts towards the lower portion and concentrates around the river mouth where the highest salinities occur. Estuarine fish species, such as starry flounder and bay pipefish, expand their distribution into the upper Estuary. This upward movement of estuarine fish is a function of the upstream migration of the saline wedge resulting from Estuary closure. After the Estuary is re-opened, fewer marine species are typically detected in the Estuary and estuarine species are typically redistributed into the lower and middle Estuary.

In summary, the current practice of artificial breaching when the barrier beach closes the Estuary during the period from late spring to early fall has created a dynamic environment that ranges from near freshwater to marine conditions in the Estuary in the summer. Each time the barrier beach is mechanically breached, much of the freshwater lens in the Estuary that forms following closure of the barrier beach is discharged to the ocean. Near the mouth of the Estuary aquatic conditions (*e.g.*, salinity and temperature) are typical of marine habitat. Under current practices, suitable stable freshwater aquatic habitat (rearing habitat for salmonids) is currently only maintained in the upper reach of the Estuary and possibly near tributary mouths, where freshwater inflow maintains low salinity conditions regardless of tidal action. However, the upper Estuary contains freshwater that is warmer than optimal for rearing salmonids for much of the summer.

3.7 Extended Closure Data Report - 2009

3.7.1 Sampling Program Summary

In 2009, the Water Agency contracted with Bodega Marine Laboratory (University of California, Davis) to provide a view of circulation, stratification, residence and salinity in the Estuary Study Area from July through October 2009. An extended closure period lasting 29 days from September 7 through October 5, 2009, allowed for a study of prolonged closure conditions in the Estuary at high spatial and time resolution, along with two subsequent shorter closures (October 14-17 and October 22-27). This information is reported in *Hydrography of the Russian River Estuary Summer-Fall 2009* (Behrens and Largier, 2010).

Observed closure conditions in 2009 included formation of stratified conditions within the Estuary, as freshwater flows over the top of denser saline water at rates of approximately 70 to 95 cfs. Halocline conditions became established and persisted for the duration of the 29 day closure. Additionally, water balance analysis of the Estuary indicated that depending upon the elevation of the perched lagoon conditions, losses of between 30 and 78 cfs, with an average of 63 cfs, occur through the barrier beach (Largier and Behrens, 2010).

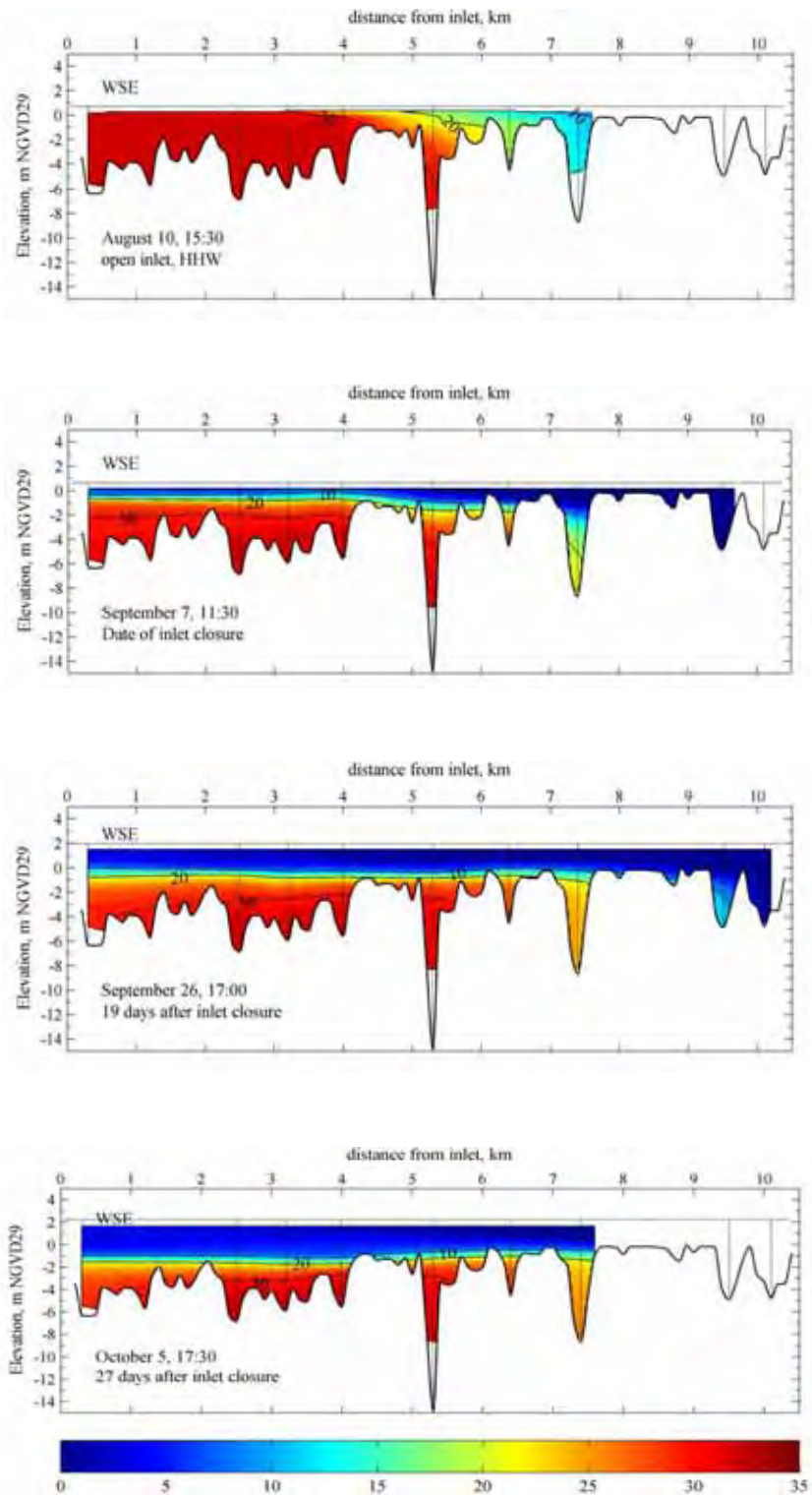
3.7.2 Salinity

Monitoring in 2009 showed a strong longitudinal gradient during open inlet conditions (August 10) prior to the Estuary closure on September 7, with relatively high saline water (>30 practical salinity units [psu])[6] dominating the water column at the mouth and extending approximately 5 kilometers (3.1 miles) up the Estuary (see **Figure 3-6**). Following the closure of the barrier beach on September 7, sharp vertical stratification was already present, with lowest salinity levels (less than 10 psu) at the top and highest (over 30 psu) toward the bottom (see Figure 3-6). For the first several weeks of the closure period, the halocline[7] was approximately three feet higher in the lower three-mile reach of the Estuary than at Sheephouse Creek. By the end of the closure period, the maximum salinity at the mouth was up to 35 psu toward the bottom layers and between 5 and 20 psu in the upper layers. By September 26, the halocline was nearly horizontal within the lower 6 miles, with over six feet of freshwater dominating the top layer of the water column in the lower and middle Estuary (Behrens and Largier, 2010).

When the barrier beach was naturally breached on October 5, the relatively fresh water near the surface was the first to exit the Estuary and the halocline dropped in all the monitoring locations. After one tidal cycle, a longitudinal salinity gradient was formed again, and salinity in the upper water layer extended incrementally farther upstream each day after the closure into the middle

6 Practical Salinity Unit. Used to describe the concentration of dissolved salts in water, the UNESCO Practical Salinity Scale of 1978 (PSS78) defines salinity in terms of a conductivity ratio, so it is dimensionless. Salinity elsewhere in the document is expressed in terms of parts per thousand (ppt), the amount of salt per 1,000 pounds of water. That is, a salinity of 35 ppt meant 35 pounds of salt per 1,000 pounds of water. Open ocean salinity is generally in the range from 32 to 37 ppt. Nonetheless, values of salinity in psu and ppt are nearly equivalent. Behrens and Largier use psu in their report, so the unit is included in this discussion.

7 Vertical salinity gradient in water column.



Russian River Estuary Management Plan Project ▪ 207734

SOURCE: Behrens and Largier, 2010

Figure 3-6
Salinity Profiles (in psu) in Russian River Estuary, 2009 Closure Event

reach of the Estuary. Conversely, salt water was observed to migrate into the upper reach of the Estuary along the bottom of the streambed during barrier beach closure, and then retreat following a breach, with the timing dependent in part on freshwater inflow rates, water surface elevations, and tidal cycles. The salinity patterns during the shorter closures (October 14-17 and October 22-27) were similar to that of the prolonged closure from September 7 to October 5 (Behrens and Largier, 2010).

3.7.3 Dissolved Oxygen

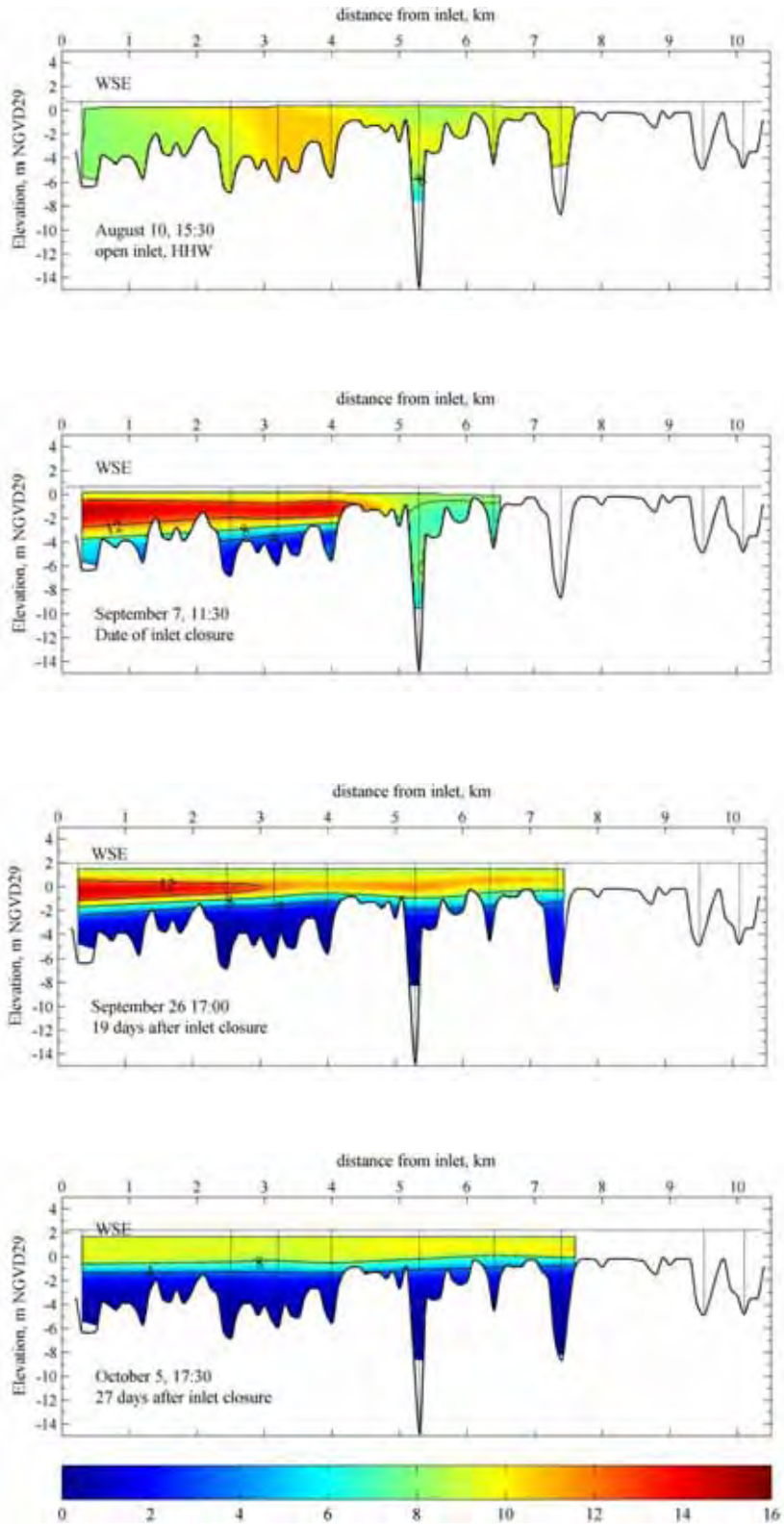
During 2009, DO levels in the Estuary during open and closed river mouth conditions were monitored by Bodega Marine Lab. In mid-August and during an open Estuary condition, DO levels throughout the Estuary were above 8 mg/L, with the exception of low DO levels near the bottom of a deep pool near Sheephouse Creek (**see Figure 3-7, August 10 Panel**). During the period of September 1 through September 7 when the barrier beach was nearly an overflow channel prior to the Estuary closure, DO levels decreased in the deeper parts of the Estuary between 1.2 and 3 miles (1.9 to 5 km) upstream of the barrier beach (**see Figure 3-7, September 7 Panel**). Following closure on September 7, low DO conditions were observed at the mouth, and by September 26, most of the Estuary from the mouth to four miles (6.5 km) upstream (approximately to Heron Rookery) was hypoxic to anoxic below a depth of 9 feet (**see Figure 3.7, September 26 Panel**). However, those conditions also maintained a nearly horizontal, uniform, 9-foot thick layer of high DO water at the surface varying from 8 mg/L near the mouth to above 10 mg/L upstream (**Figure 3.7, September 26 and October 5 panels).** Supersaturation conditions also occurred in the lower three kilometers of the Estuary in the top two meters of water, with DO levels over 14 mg/L.

Following the natural breach event on October 5, there was an incremental restoration of the DO in the Estuary, beginning at the mouth and extending upstream. Within approximately five days, the DO in the Estuary nearly resembled the conditions when the barrier beach had first begun to close on September 1 (Behrens and Largier, 2010).

3.7.4 Temperature

Temperature monitoring in the Estuary during 2009 showed temperature stratification coinciding with the location of the salt wedge. Since the saltwater was significantly colder than the freshwater(Behrens and Largier, 2010). Mean and maximum water temperatures in the Estuary were typically lower at the bottom and mid-depths, which were located primarily in saltwater. Surface temperatures had the greatest degree of fluctuation due to their location at the saltwater-freshwater interface. However, temperatures were also observed to exhibit daily fluctuations (13.5ºC and 15.1ºC [Anders et. al., 2006]) based on the heating and cooling effects of night and day, as well as longer-term seasonal heating and cooling events (SCWA, 2006).

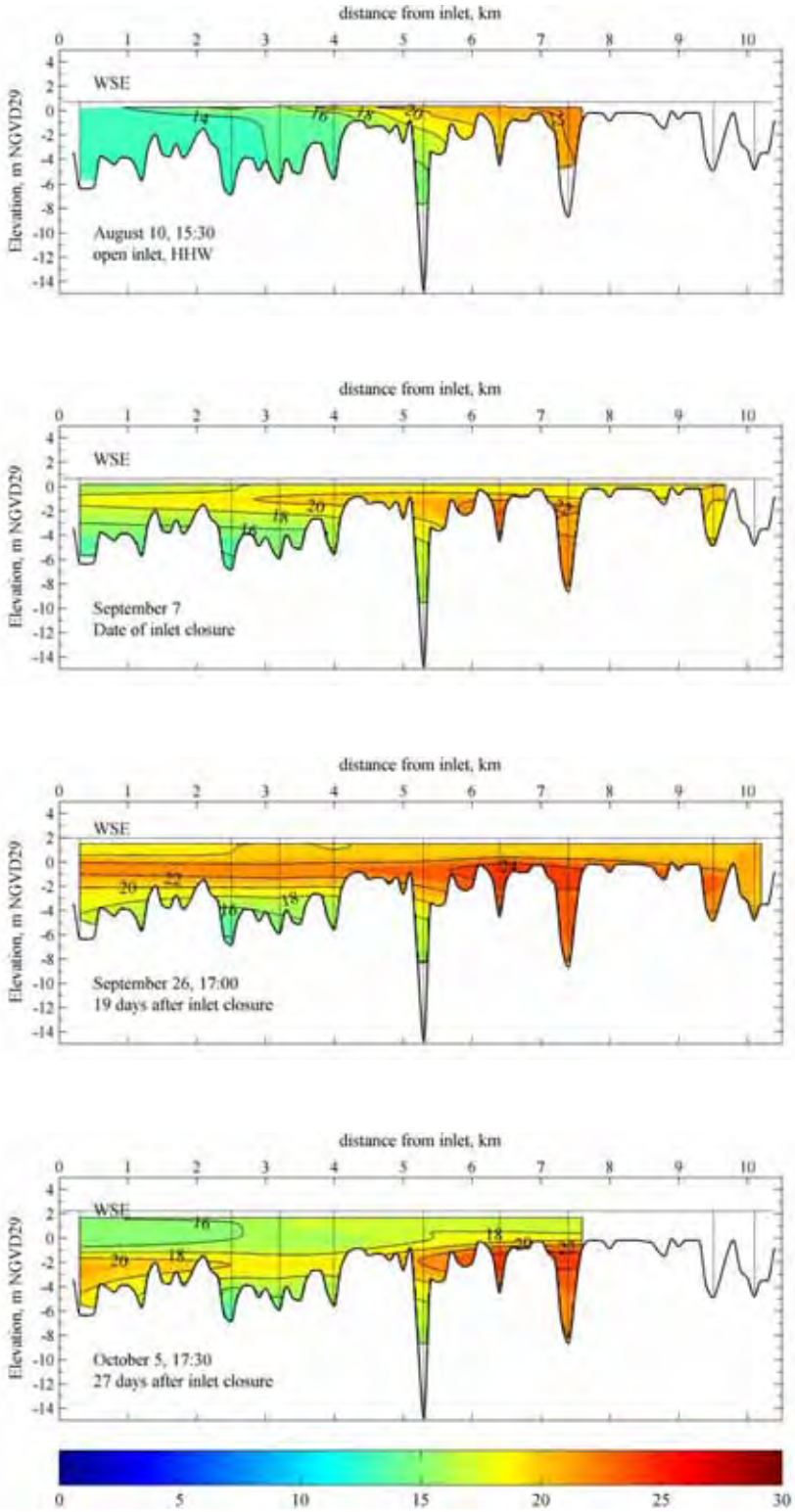
The Estuary showed a strong longitudinal temperature gradient prior to the closure on September 7 **(Figure 3-8, August 10 Panel**). At the onset of the closure on September 7, the Estuary already showed temperature stratification due to the perched conditions of the Estuary mouth (**Figure 3-8, September 7 Panel**). The mean temperature in the Estuary rose considerably with maximum temperature of 22 to 24ºC; however there were low (cooler) temperatures in deep holes that deviate



Russian River Estuary Management Plan Project ▪ 207734

SOURCE: Behrens and Largier, 2010

Figure 3-7
Dissolved Oxygen Profiles (in mg/L) in Russian River Estuary, 2009 Closure Event



Russian River Estuary Management Plan Project ▪ 207734

SOURCE: Behrens and Largier, 2010

Figure 3-8
Temperature Profiles (in ºC) in Russian River Estuary
2009 Closure Event

from the mean. The amount of warm water (16ºC) at the mouth increased sharply primarily in the mid layer of the water column. A vertical gradient was again formed (stratification), which continued through the closure period, and development of a three layer system was observed, with a cooler saline to brackish bottom layer that is below the effects of solar heating, a warmer mid-depth layer of saline to brackish water subject to the effects of solar heating, and a relatively warm freshwater layer on the surface. The peak temperature (>22ºC) was consistently located at the in the middle and upper Estuary in surface waters. Although the peak temperature was lower in other reaches, the same structure formed, with the maximum temperature present near the surface. As shown in Figure 3.8 (October 5 panel), a longitudinal slope in the boundary between high and low temperature water formed with temperature cooler at the river mouth (up to 20ºC) than that near Sheephouse Creek (over 25ºC). Similar to the salinity profile, the warm (and more saline) layer was found to underlie the relatively cooler freshwater layer.

When the river mouth was breached on October 5, the first water to exit the Estuary was the relatively warm (20 to 22 ºC) water in the upper 9 to 12 feet of the water column. In subsequent tidal cycles, the Estuary incrementally became colder, with a strong longitudinal temperature gradient re-forming between the Estuary mouth and Sheephouse Creek. The Estuary closures on October 14 and October 22 did not generate similar temperature structures to that of the prolonged Estuary closure period from September 7 to October 5. The shorter closures resulted in temperature gradients with lower temperatures (12 to 18ºC) than during the extended closures (over 20ºC). However, in both cases, a vertical temperature gradient was formed, with the temperatures of 16-18ºC at the surface.

3.8 References

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CHAPTER 4.0
Environmental Setting, Impacts, and Mitigation Measures

Introduction

This chapter provides background information; establishes the regulatory framework applicable to the project; explains the methodology and approach to impact analysis; discloses environmental impacts associated with the project; and identifies mitigation measures to reduce or avoid impacts, when feasible. The impact analyses define criteria and thresholds for determining level of significance. The level of significance is provided for each impact as applicable under the California Environmental Quality Act (CEQA). In case of any potentially significant impact, mitigation measures are identified that would minimize the impact to less-than-significant level, when feasible.

Sections 4.1 through 4.14 discuss the following resource categories: geology and soils, hydrology and flooding, water quality, biological resources, fisheries, land use and agriculture, recreation, cultural resources, noise, air quality, transportation and traffic, hazards and hazardous materials, public services and utilities and public safety, as well as aesthetics.

CEQA Requirements

In accordance with CEQA Guidelines Section 15125, for the purposes of this analysis, the environmental setting described in **Chapter 3.0, Project Background and Environmental Setting**, constitutes the physical baseline conditions within the Estuary Study Area, and by which the Water Agency determine will whether an impact is significant. Additional setting information is provided in the following subsections. The analysis reviews project impacts relative to "change from existing conditions." The change from existing conditions refers to the ways that the proposed project will alter current or historic management actions, and how those modified practices affect natural resources.

Estuaries are complex, dynamic ecosystems, normally experiencing changes between seasons, between years, and between different places in the same estuary. This condition makes estuaries difficult to study. Moreover, an evaluation of the effects of changes due to Estuary management must bear in mind that, when anticipating future conditions, determination of significance is judged relative to the baseline required by CEQA (i.e. current conditions). Under the current Estuary management practices, water depth and salinity, as well as other water quality

parameters, fluctuate at varying degrees and continuously across a wide range. Therefore, for many of the impacts discussed below, particularly with regards to the lagoon adaptive management element, the effects of the proposed Estuary management practices may not be sufficient to reach a determination of "significant".

As stated in CEQA Guidelines Section 15151, *"an evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among experts. The courts have looked not for perfection, but for adequacy, completeness and a good faith effort at full disclosure."* For the proposed Estuary Management Project, this is particularly relevant for two reasons: 1) as discussed in **Section 3.0, Project Background and Environmental Setting**, the Estuary is a very complex environment subject to changing environmental conditions on daily, seasonal, and yearly timeframes. Therefore, it may not be possible to precisely predict the effects of the proposed Estuary Management Project to the degree typically provided for under CEQA; and 2) the Estuary Management Project proposes implementation of an Adaptive Management Plan that would, by definition, monitor and react to conditions that are observed in the Estuary during the course of its implementation.

Within this context, the Water Agency recognizes that the precise response of the Estuary cannot be predicted with certainty. However, it is anticipated that conditions will remain within the range of those experienced within the Estuary over the past 15 years, although the duration of those conditions will likely be extended. With respect to listed fish species, this increase in duration of freshwater lagoon conditions is the primary objective of the project, and is anticipated to provide benefit to juvenile salmonids, particularly steelhead. This duration may also result in secondary effects related to maintaining higher water surface elevations within the Estuary over a longer period of time during summer months. Several technical issues will require additional monitoring, with subsequent alteration of the Adaptive Management Plan using the best information available. Therefore, in the absence of technical certainty, the EIR identifies potential impacts that could be associated with the implementation of the Estuary Management Project as potentially significant and unavoidable, for the purpose of CEQA.

4.1 Geology and Soils

4.1.1 Introduction

This section describes whether implementation of the Russian River Estuary Management Project (Estuary Management Project or proposed project) would result in potential adverse impacts related to the existing geology, soils, mineral resources, and seismicity. The Setting section describes existing conditions in terms of local topography, geology, soil resources, mineral resources, and seismicity. The Regulatory Framework section describes pertinent state and local laws related to the geologic, mineral resources, and seismic considerations of the project. The Impacts and Mitigation Measures section defines significance criteria used for the impact assessment and presents a discussion of potential project-related impacts. The evaluation and analysis are based, in part, on review of various geologic maps and reports. The primary sources include available resources from the United States Geological Survey (USGS) and the Department of Conservation California Geological Survey (CGS), as well as other sources cited in the References section.

4.1.2 Setting

Topography

The regional topography is typical of the Coast Ranges of Northern California, where long northwest-southeast trending ridges and valleys dominate surface relief. The regional area is located within the Russian River watershed (**Figure 2-1**). The headwaters of the Russian River are located at the northernmost boundary of the watershed, approximately 16 miles north of Ukiah. The Russian River Estuary (Estuary) is located at the downstream end of the Russian River at Jenner and the Pacific Ocean. The mountains of the Coast Range reach peak elevations of 1,000 to 3,000 feet above mean sea level (MSL), with slopes commonly reaching 30 percent.

The Russian River cuts westerly from the Santa Rosa Plain, located approximately 15 miles to the east of Jenner. As the Russian River cuts westerly from the Santa Rosa Plain through the coastal mountain ranges, the elevation of the river gradually declines until it reaches sea level near the river's mouth near Jenner.

The Estuary extends from the mouth of the Russian River upstream approximately seven miles to the Duncans Mills area below the confluence with Austin Creek; this is referred to as the Estuary Study Area (see **Figure 2-3a**). It is estimated that Estuary water levels, when managed as a summer freshwater lagoon under the Estuary Management Project, may extend to Monte Rio, and under certain closed conditions backwater to Vacation Beach, referred to as the maximum backwater area. As such, the project area for the Estuary Management Plan as it relates to geologic and soil conditions will be defined as extending from the mouth of the Russian River to Vacation Beach (Figure 2-3a). The topographic surface elevations of the Russian River range from approximately 0 feet MSL to less than 10 feet MSL at the upper Estuary. Peaks within one mile on the north side of the valley cut by the Russian River are as high as 1,200 feet MSL with slopes up to 30 percent.

Topographic elevations at the breaching area, where the Russian River enters the Pacific Ocean, vary from less than 0 MSL when the beach barrier has been breached to approximately 7 or more feet MSL, the elevation at which the Water Agency typically breaches the barrier beach. Build up of a barrier beach can result in water levels that exceed 7 feet, which necessitates artificial breaching to minimize flooding impacts.

Project Area Geology and Soils

The geology of the Estuary project area (Estuary Study Area and maximum backwater area) can be characterized in terms of bedrock overlain with surficial deposits. Bedrock generally refers to rock, usually solid, that underlies soil or other unconsolidated surficial material that forms the structural core of hilly and mountainous areas. Surficial deposits generally refer to loosely-bound surface materials, such as recent soils and sediment that fill swales and hollows, canyons and ravines, river and stream valleys, and large basins. Further, mapping of surficial deposits often includes areas where topography has been substantially altered by human influence through placement of artificial fills or by other means. The following discussion is organized in terms of bedrock geology and surficial geology, both of which are illustrated in **Figure 4.1-1**.

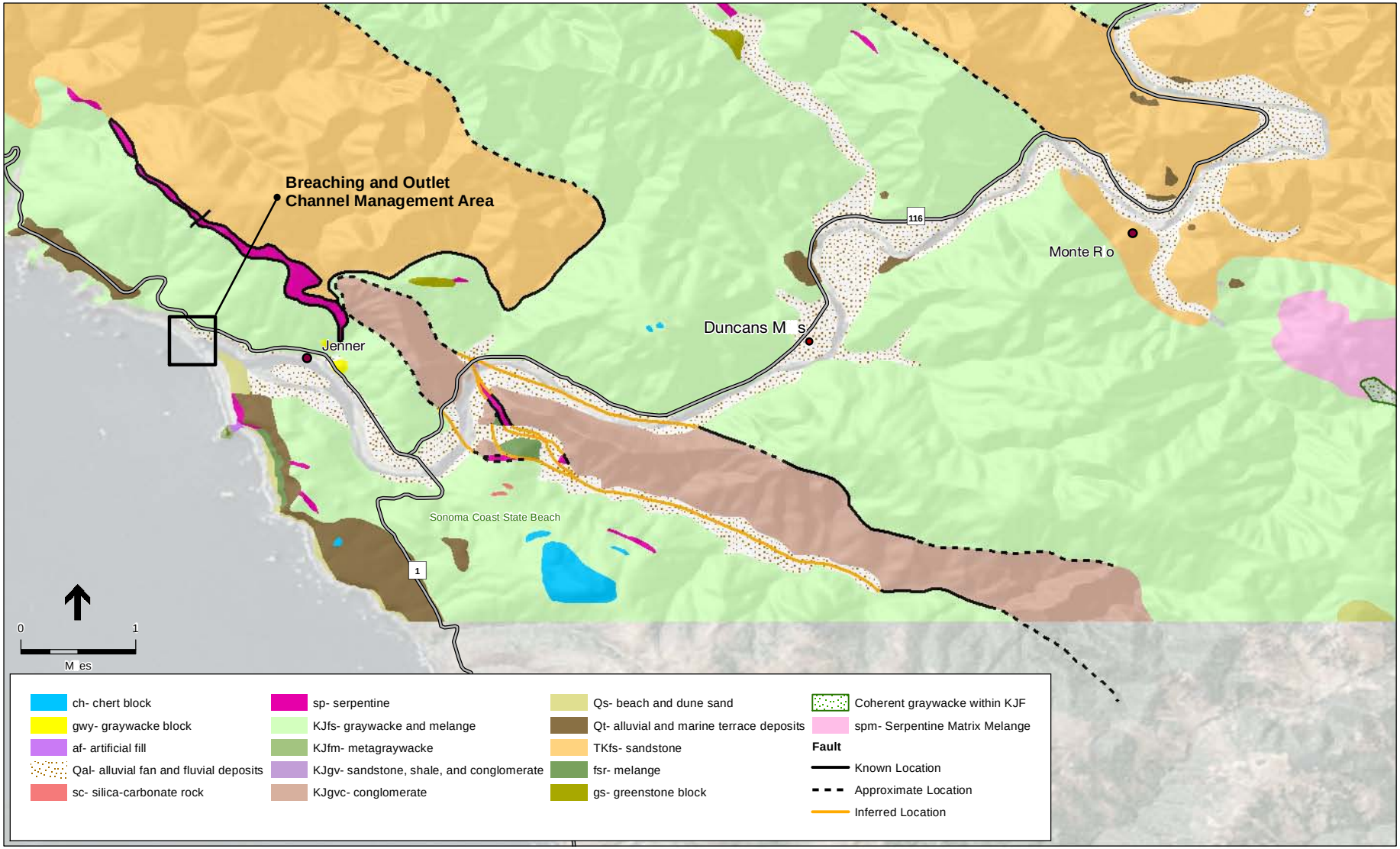
Bedrock Geology

The Estuary is located within the geologically complex region of California referred to as the Coast Range Geomorphic Province. Much of the Coast Range Province is composed of marine sedimentary deposits and volcanic and metamorphic[1] rocks that form northwest trending mountain ridges and valleys, running subparallel to the San Andreas Fault Zone. Bedrock geology in this region consists primarily of the Franciscan Complex and, to a lesser extent, the Great Valley Complex that originated as ancient sea floor sediments. Quaternary (10,000 to 1.8 million years before present) marine terrace deposits are present along portions of the coastal bluffs. Surface deposits in and along the edges of river channels such as the Russian River typically consist of Quaternary alluvial and terrace deposits (Blake, et al., 2002). Each is described below.

Franciscan Complex

The Estuary area is underlain by the Franciscan Complex of Jurassic-Cretaceous age (65 to 200 million years ago). Most of the material consists of sheared mudstone and sandstone, within which are mixed numerous blocks and slabs of greywacke (a variety of sandstone), greenstone (altered volcanic rocks), chert (a variety of quartz), metamorphic rocks, limestone, serpentinite, and other rocks. Although considered a single terrane or unit, the Franciscan Complex is actually the result of the tectonic and/or sedimentary mixing of rocks derived from various locations. Located east of the San Andreas Fault Zone, the units are steeply inclined to the east and are several thousand feet thick.

[1] Metamorphic rocks are those rocks which have formed in the solid state in response to pronounced changes of temperature, pressure, and chemical environment.



SOURCE:USGS Field Studies Map MF- 2402, 2002

Russian River Estuary Management Project. 207734.01

Figure 4.1-1

Bedrock and Superficial Geology

Great Valley Complex

The Great Valley Complex is present as a northwest-southeast block cutting across the Estuary area at Ferry Crossing and Sawmill Gulch. The unit consists mostly of a Jurassic-Cretaceous age (65 to 200 million years ago) conglomerate, with some shale, sandstone, rhyolite, ash-flow tuff, and minor quartzite.

Pleistocene Marine Terrace Deposits

Marine terrace materials were emplaced in the Pleistocene (1.8 million to 10,000 years ago) and consist of crudely bedded, clast supported gravels, cobbles, and boulders in a sandy matrix. The marine terrace deposits are the remnants of an older alluvial system that was lifted above present depositional levels by tectonic uplift. This unit is present along the coastal bluffs and has been eroded away at the mouth of the Russian River.

Surficial Deposits

Quaternary Alluvial Fan and Fluvial Deposits

The youngest geologic units in the project area are the surficial deposits made up of unconsolidated and semi-consolidated alluvial and river (fluvial) sediments. The alluvium consists of unconsolidated stream, channel, levee, flood plain, basin, terrace, and fan deposits ranging in size from boulders to clay. The alluvial material at the beach barrier at the mouth of the Russian River consists of sand, gravel, and silt deposited by the river or washed up by the ocean.

Soils

The description of Estuary area soils is based on a review of soil surveys prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). **Table 4.1-1** identifies the soils present in the Estuary Management Project area, and summarizes some of their key physical and hydrological characteristics.

Landslides

Regional-scale mapping by the California Division of Mines and Geology has mapped the Estuary Management Project area as having numerous landslides (Armstrong, 1980). The natural geology and relatively steep topography of slopes within the project area provides a high susceptibility to landslides. It should be noted that landslides are not mapped at the barrier beach where the project activity will take place.

Geologic Hazards

Slope Failure Hazards

A slope failure is a mass of rock, soil, and debris displaced down a slope under the influence of gravity by sliding, flowing, or falling. Several factors affect the susceptibility of an area to experience slope failure, including slope steepness; the material strength and bulk density of soil or bedrock; the width, orientation and pervasiveness of bedrock fractures or bedding planes; prevailing groundwater conditions; and the type and distribution of vegetation. Those features, among others, are important

TABLE 4.1-1
PROPERTIES OF THE NRCS-MAPPED SOIL UNITS IN THE PROJECT AREA

Map Symbol and Name	Effective Depth (inches)[a]	Available water-holding capacity (inches)[b]	Erosion Hazard[c]	Hydrologic Group[d]	Shrink-Swell Behavior[e]
AdA, Alluvial Land, Sandy	0 to 60	3.2	Low	A	Low
AkC, Arbuckle Gravelly Loam, 5 to 9 percent slopes	0 to 72	8.1	Low	B	Low
AtF, Atwell Clay Loam, 30 to 50 percent slopes	0 to 64	9.8	Moderate	C	Moderate
ChA, Coastal Beaches	0 to 60	2.4	Low	A	Low
CrA, Cortina Very Gravelly Sandy Loam, 0 to 2 percent slopes	0 to 60	4.0	Low	A	Low
CsA, Cortina Very Gravelly Loam, 0 to 2 percent slopes	0 to 60	4.0	Low	A	Low
HkG, Hugo Very Gravelly loam, 50 to 75 percent slopes	0 to 52	5.7	Low	B	Moderate
HlF, Hugo-Atwell Complex, 30 to 50 percent slopes	0 to 44	4.7	Low	B	Moderate
HlG, Hugo-Atwell Complex, 50 to 75 percent slopes	0 to 52	5.7	Low	B	Moderate
HnG, Hugo-Josephine Complex, 50 to 75 percent slopes	0 to 52	5.7	Low	B	Moderate
HsG, Hugo-Hely Complex, 50 to 75 percent slopes	0 to 34	3.4	Moderate	B	Moderate
JoE, Josephine Loam, 9 to 30 percent slopes	0 to 49	7.4	Moderate	B	Moderate
KlF, Kinman Loam, 30 to 50 percent slopes	0 to 58	7.7	Moderate	C	High
KmF, Kinman-Kneeland Loams, 30 to 50 percent slopes	0 to 44	5.0-6.2	Moderate	C	Moderate
KnF, Kneeland Loams, 30 to 50 percent slopes	0 to 26	3.3	Moderate	C	Moderate
LgG, Laughlin Loam, 50 to 75 percent slopes	0 to 26	3.3	Moderate	c	Moderate
McF, Maymen Gravelly Sand Loam, 30 to 50 percent slopes	0 to 22	1.4	Moderate	D	Low
RnA, Riverwash	0 to 60	1.8	Low	D	Low
RrD, Rhonerville Loam 9 to 15 percent slopes	0 to 60	9.6	Moderate	B	High
TeG, Terrace Escarpments	Terrace Escarpments are classified in hydrologic group C and characterized by a concave down slope shape and a convex across-slope shape. They are composed of alluvium parent material. The depth of the material can range from 0 to 60 inches.				

TABLE 4.1-1 (Continued)
PROPERTIES OF THE NRCS-MAPPED SOIL UNITS IN THE PROJECT AREA

Map Symbol and Name	Effective Depth (inches)[a]	Available water-holding capacity (inches)[b]	Erosion Hazard[c]	Hydrologic Group[d]	Shrink-Swell Behavior[e]
TmA, Tidal Marsh	Tidal Marsh area is classified in hydrologic group D and characterized by a saturated and highly vegetated area with poor drainage and frequent flooding. Tidal Marsh is generally composed of organic parent material that ranges in depth from 0 to 60 inches.				
YiA, Yolo Sandy Loam, 0 to 2 percent slopes	0 to 60	9.0	Moderate	B	Low
YmB, Yolo Sandy Loam, Overwash, 0 to 5 percent slopes	0 to 60	9.2	Moderate	B	Low
YoB, Yolo Loam Overwash, 0 to 5 percent slopes	0 to 60	10.6	Moderate to High	B	Low
YuE, Yorkville Clay Loam, 5 to 30 percent slopes	0 to 62	7.9	Moderate	D	High
YuF, Yorkville Clay Loam, 30 to 50 percent slopes	0 to 47	6.9	Moderate	D	High
ZaA, Zamora Silty Clay Loam, 0 to 2 percent slopes	0 to 60	10.0	Moderate to High	B	High

[a] The depth to which a soil is readily penetrated by roots and utilized for moisture and nutrient extraction.
[b] Total available water holding capacity within the effective soil depth.
[c] The relative susceptibility of a land to the prevailing agents of erosion.
[d] Hydrologic soil groups are used for estimating the runoff potential of soils on watersheds at the end of long-duration storms after a prior wetting and opportunity for swelling, and without the protective effect of vegetation. Soils are assigned to groups A through D in order of increasing runoff potential. Soils in group C have a slow infiltration rate when thoroughly wetted, and consist chiefly of soils with a layer that impedes the downward movement of water or soils with a moderately fine to fine texture and a slow infiltration rate.
[e] Shrink-swell behavior is the quality of soil that determines its volume change with change in moisture content. The volume-change behavior of soils is influenced by the amount of moisture change and amount and kind of clay in the soil.

SOURCE: NRCS, 2010a; NRCS, 2010b.

factors that describe the predisposition of a sloped surface to fail, while external processes such as exceptionally heavy rainfall, earthquakes, or human activities (e.g. road cuts, over-steepened slopes, large-scale vegetation removal) may trigger or reactivate a slope failure. The presence of numerous landslides along the steep slopes upstream of the barrier beach area suggests a relatively high potential for slope failures along the steep sides of the river valley.

Erosion/Accelerated Erosion

Erosion is a natural process whereby soil and highly weathered rock materials are worn away and transported to another area, most commonly by water but also by wind. Natural rates of erosion can vary depending on slope, soil type, and vegetative cover (regional erosion rates are also dependant on tectonics and changes in relative sea level). Soils containing high amounts of silt are typically more easily eroded, while coarse-grained (sand and gravel) soils are generally less susceptible to erosion.

Soil erosion can become problematic when human intervention causes rapid soil loss and the development of erosional features (such as incised channels, rills[2] and gullies) that undermine roads, buildings or utilities. Vegetation clearing and earth-moving reduces soil structure and cohesion, resulting in abnormally high rates of erosion, referred to as *accelerated erosion.* Rills, gullies, and excessive sediment transport can eventually damage building foundations and roadways, as well as clog or fill surface drainage facilities (siltation ponds, catchments and culverts).

Mineral Resources

In accordance with the Surface Mining and Reclamation Act (SMARA) of 1975, the State of California has established a mineral land classification system to help identify and protect mineral resources in areas that are subject to urban expansion or other irreversible land uses that would preclude mineral extraction. Protected mineral resources include non-fuels—construction materials, industrial and chemical mineral materials, and metallic and rare minerals—as well as non-fluid mineral fuels. The act directs the state geologist to classify (identify and map) the non-fuel mineral resources of the state to show where economically significant mineral deposits occur and where they are likely to occur based on the best available scientific data. Non-fuel mineral resources include: metals such as gold, silver, iron, and copper; industrial minerals such as boron compounds, rare earth elements, clays, limestone, gypsum, salt, and dimension stone; and construction aggregate, which includes sand, gravel, and crushed stone. The CGS has classified lands within Sonoma County into Mineral Resource Zones (MRZs) (CGS, 2005). MRZs have been designated to indicate the significance of mineral deposits. The MRZ categories are as follows:

> ***MRZ-1*****:** Areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources.
>
> ***MRZ-2a*****:** Areas underlain by mineral deposits where geologic data indicate that significant *measured or indicated* resources are present. Contains known economic mineral resources.
>
> ***MRZ-2b*****:** Areas underlain by mineral deposits where geologic information indicates that significant *inferred* resources are present.
>
> ***MRZ-3a*****:** Areas containing *known* mineral occurrences of undetermined mineral resource significance.
>
> ***MRZ-3b*****:** Areas containing *inferred* mineral occurrences of undetermined mineral resource significance.
>
> ***MRZ-4*****:** Areas of no known mineral occurrences.

The riverbed and floodplain of the Russian River within the Estuary Management Project area is located within Mineral Resource Zone 3a (CGS, 2005). The designation refers to the gravels and sands that had been mined for aggregate in other portions of the Russian River and its floodplain well upstream of the Project area. However, in the portion of the Russian River within the Estuary Management Project area, the presence of the relatively steep sides of the river valley, the depth

[2] Rill is defined as a small channel formed by erosion processes.

of the river water, and the presence of salmon habitat make it highly unlikely that this portion of the Russian River would used for aggregate mining.

Regional Faulting and Seismic Hazards

This section characterizes the region's existing faults, describes historic earthquakes, estimates the likelihood of future earthquakes, and describes probable ground-shaking effects. The primary sources of information for this section are publications prepared by USGS, the CGS, and hazard mapping tools provided by the Association of Bay Area Governments (ABAG).

Earthquake Terminology and Concepts

Earthquake Mechanisms and Fault Activity

Faults are planar features within the earth's crust that have formed to release stresses caused by the dynamic movements of the earth's major tectonic plates. An earthquake on a fault is produced when these stresses overcome the inherent strength of the earth's crust, and the rock ruptures. The rupture causes seismic waves to propagate through the earth's crust, producing the ground-shaking effect known as an earthquake. The rupture also causes variable amounts of slip along the fault, which may or may not be visible at the earth's surface.

Geologists commonly use the age of offset rocks as evidence of fault activity—the younger the displaced rocks, the more recently earthquakes have occurred. To evaluate the likelihood that a fault will produce an earthquake, geologists examine the magnitude and frequency of recorded earthquakes and evidence of past displacement along a fault. An *active* fault is defined by the State of California as a fault that has had surface displacement within Holocene time (last 11,000 years). A *potentially active* fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years) (Hart and Bryant, 1997). *Blind* faults do not show surface evidence of past earthquakes, even if they occurred in the recent past. Faults that are confined to pre-Quaternary rocks (more than 1.6 million years old) are considered inactive and incapable of generating an earthquake.

Earthquake Magnitude

When an earthquake occurs along a fault, a characteristic way to measure its size is to measure the energy released during the event. When an earthquake occurs, a network of seismographs records the amplitude and frequency of the seismic waves it generates. The Richter Magnitude (M) for an earthquake represents the highest amplitude measured by the seismograph at a distance of 100 kilometers from the epicenter. Richter magnitudes vary logarithmically with each whole number step representing a ten-fold increase in the amplitude of the recorded seismic waves. While Richter Magnitude was historically the primary measure of earthquake magnitude, seismologists now use Moment Magnitude as the preferred way to measure earthquakes. The Moment Magnitude scale (Mw) is related to the physical characteristics of a fault, including the rigidity of the rock, the size of fault rupture, and the style of movement or displacement across the fault. Although the formulae of the scales are different, they both contain a similar continuum of magnitude values, except that moment magnitudes can reliably measure larger earthquakes and do so from greater distances.

Peak Ground Acceleration

A common measure of ground motion during an earthquake is the peak ground acceleration (PGA). The PGA for a given component of motion is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as the percentage of the acceleration due to gravity (g), which is approximately 980 centimeters per second squared. In terms of automobile accelerations, one "g" of acceleration is equivalent to the motion of a car traveling 328 feet from rest in 4.5 seconds. For comparison purposes, the maximum peak acceleration value recorded during the Loma Prieta earthquake was in the vicinity of the epicenter, near Santa Cruz, at 0.64g. Unlike measures of magnitude, which provide a single measure of earthquake energy, PGA varies from place to place, and is dependent on the distance from the epicenter and the character of the underlying geology (e.g. hard bedrock, soft sediments or artificial fills).

The Modified Mercalli Intensity Scale

The Modified Mercalli Intensity Scale (**Table 4.1-2**) assigns an intensity value based on the observed effects of ground-shaking produced by an earthquake. Unlike measures of earthquake magnitude and PGA, the Modified Mercalli (MM) intensity scale is qualitative in nature (i.e. it is based on actual observed effects rather than measured values). Similar to PGA, MM intensity values for an earthquake at any one place can vary depending on its magnitude, the distance from its epicenter, the focus its energy, and the type of geologic material. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X could cause moderate to significant structural damage. Because the MM is a measure of ground-shaking effects, intensity values can be related to a range of average PGA values, also shown in Table 4.1-2.

Seismic Context

The Northern California region contains active, potentially active, and inactive faults, and is considered a region of high seismic activity.[3] The major active faults located within 20 miles of the Estuary Management Project area include the San Andreas, Rodgers Creek (Healdsburg-Rodgers Creek-Hayward[4]), and Maacama faults. **Figure 4.1-2** depicts the major active faults, along with two pre-Quaternary faults that are mapped within the project area. Throughout the project area there is a potential of damage from movement along any one of a number of the active faults. The USGS estimates that there is a 63 percent probability of at least one moment magnitude 6.7 or greater earthquake occurring in the San Francisco Bay region over the next 30 years.[5] Within the

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3 An "active" fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 11,000 years). A "potentially active" fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. Inactive faults have experienced no movement in the last 1.6 million years. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive (Hart and Bryant, 1997).

4 The Rodgers Creek fault is considered to be a northern extension of the Hayward fault which has not been mapped beneath San Pablo Bay. The Healdsburg fault may be connected to the Rodgers Creek fault through a "step-over" and is sometimes referred to as the Healdsburg-Rodgers Creek fault. A step-over or fault step occurs where a fault line is interrupted by either a right-lateral or left-lateral shift, creating a gap. The geology of these gaps may include underground linkages between faults.

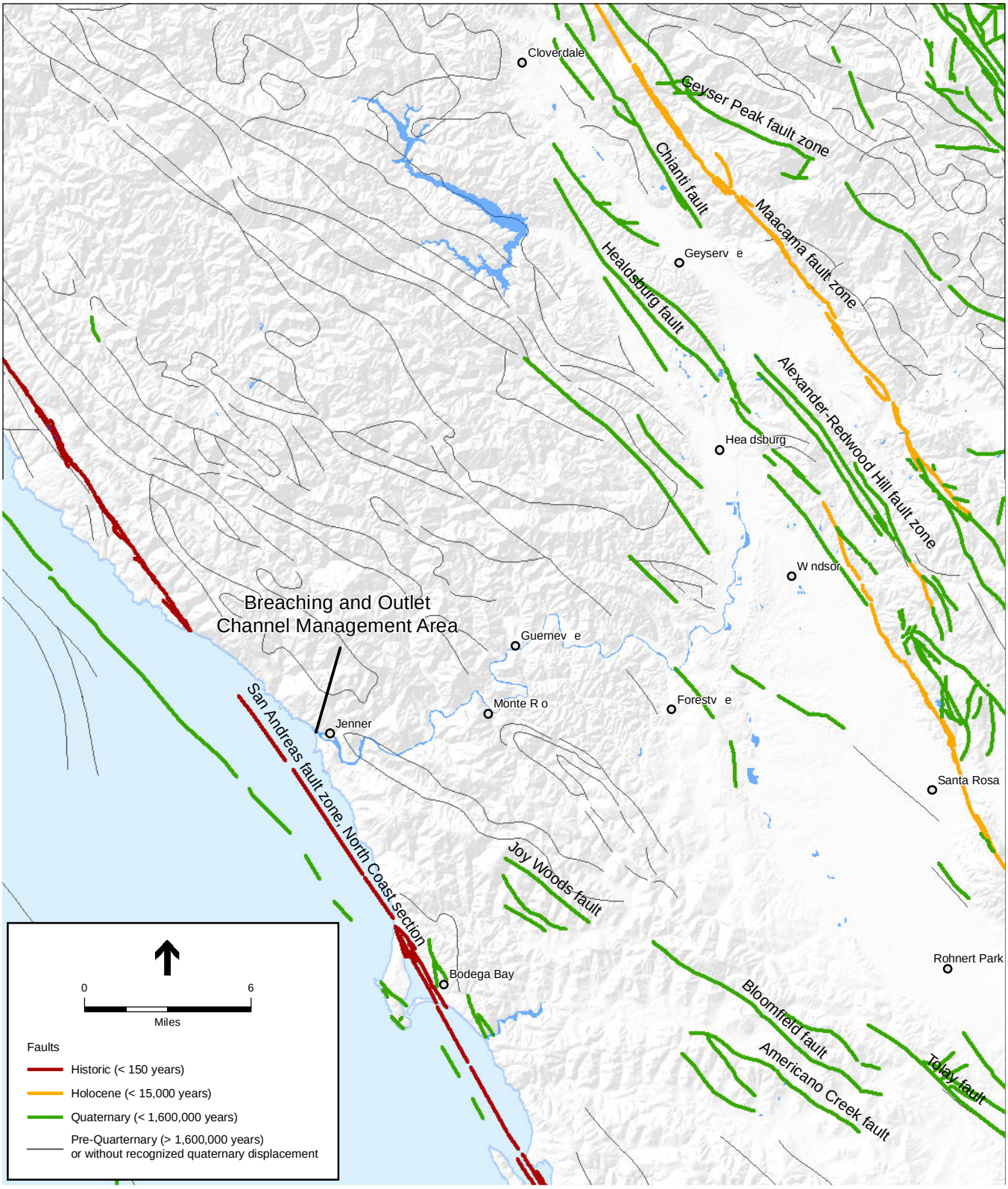
5 Moment magnitude is related to the physical size of a fault rupture and movement across a fault. The Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave. Moment magnitude provides a physically meaningful measure of the size of a faulting event (California Geological Survey (CGS), 2002).

TABLE 4.1-2
MODIFIED MERCALLI INTENSITY SCALE

Intensity Value	Intensity Description	Average Peak Ground Acceleration[a]
I	Not felt except by a very few persons under especially favorable circumstances.	< 0.0017 g
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	0.0017-0.014 g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.	0.0017-0.014 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	0.014–0.039g
V (Light)	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	0.035 – 0.092 g
VI (Moderate)	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	0.092 – 0.18 g
VII (Strong)	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	0.18 – 0.34 g
VIII (Very Strong)	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	0.34 – 0.65 g
IX (Violent)	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	0.65 – 1.24 g
X (Very Violent)	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	> 1.24 g
XI (Very Violent)	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 1.24 g
XII (Very Violent)	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 1.24 g

[a] Value is expressed as a fraction of the acceleration due to gravity (g). Gravity (g) is 9.8 meters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

SOURCE: ABAG, 2003.



SOURCE:USGS and California Geological Survey, 2009

Russian River Estuary Management Project. 207734.01

Figure 4.1-2

Regional Faults

63 percent probability, the San Andreas and Rodgers Creek fault systems are the two most likely to cause such an event (USGS, 2008).

Table 4.1-3 lists these three active faults along with other potentially active fault systems within approximately 20 miles of the Estuary Management Project area, and identifies the dates of their most recent activity and the estimated maximum moment magnitude of a characteristic future event. The distance listed to the various faults represents the shortest distance to the closest boundary of project area. None of the regional active faults are located within the project area, although the San Andreas Fault Zone is located within 1-1/2 miles of the project area. Large historic earthquakes (magnitude 6 and greater) on regional active faults have been responsible for generating significant ground shaking throughout the region including events on the San Andreas fault (1906, 1989), Rodgers Creek fault (1886, 1965), and the Maacama fault (1906).

TABLE 4.1-3
ACTIVE AND POTENTIALLY ACTIVE REGIONAL FAULTS IN THE VICINITY OF THE ESTUARY MANAGEMENT PROJECT AREA

Fault Zone	Location Relative to Action Area	Recency of Faulting[a]	Historical Seismicity[b]	Maximum Moment Magnitude[c]
San Andreas	1-1/2 miles southwest	Historic – Active	M 7.1: 1989 M 8.25: 1906 M 7.0: 1838 Many <M 6	7.3
Rodgers Creek (includes potentially active Healdsburg fault zones)	15 miles northeast	Historic – Active	M 6.7: 1898 M 5.6, 5.7: 1969	7.0
Maacama	20 miles northeast	Holocene – Active	NA	7.1
Bloomfield	12 miles southeast	Potentially Active	NA	NA
Americano Creek	15 miles southeast	Potentially Active	NA	NA

[a] Recency of faulting from Jennings (1994). Historic: displacement during historic time (within last 200 years), including areas of known fault creep; Holocene: evidence of displacement during the last 10,000 years; Quaternary: evidence of displacement during the last 1.6 million years; Pre-Quaternary: no recognized displacement during the last 1.6 million years (but not necessarily inactive).
[b] Richter magnitude (M) and year for recent and/or large events.
[c] Maximum moment magnitude from Peterson *et al.* (1996). This is the maximum earthquake moment magnitude which could occur within the specified fault zone.

NA = Not applicable and/or not available.

SOURCES: Jennings, 1994, Hart and Bryant, 1997, and Peterson *et al,* 1996.

The San Andreas fault is capable of causing significant ground shaking along the entire coast of California. The most recent significant earthquakes on the San Andreas fault include the Loma Prieta earthquake of 1989, measuring magnitude 6.9 (USGS, 2007b) and the San Francisco earthquake of 1906, measuring approximately magnitude 7.8 (USGS, 2007b). The USGS Working Group on California Earthquake Probabilities estimated that there is a 21 percent chance of the San Andreas Fault experiencing an earthquake of magnitude 6.7 or greater during the period between 2002 and 2032 (USGS, 2008, and MMI Engineering, 2008).

The Rodgers Creek fault is considered the northern extension of the Hayward fault and is capable of causing significant ground shaking from Vallejo to north of Healdsburg. The most recent significant earthquake on the Rodgers Creek fault occurred on October 1, 1969. On this date, two earthquakes of magnitude 5.6 and 5.7 occurred in an 83-minute period and caused serious damage to buildings in Santa Rosa. The epicenters were located just northwest of Santa Rosa. The last major earthquake (estimated Richter magnitude 6.7) was generated in 1898 with an epicenter near Mare Island at the north margin of San Pablo Bay. Creep along this fault may be up to 9 millimeters per year (USGS, 2007a). The USGS estimates the probability of a large earthquake (magnitude 6.7 or greater) on the Rodgers Creek fault (when considered together with the Hayward fault) during the period between 2002 and 2032 to be 27 percent (USGS, 2008). The Healdsburg fault is also connected to the Rodgers Creek fault through a step-over and is often referred to as the Healdsburg-Rodgers Creek fault. The 1969 Rodgers Creek earthquakes originated near the southern extent of the Healdsburg fault.

The Maacama fault, like the Rodgers Creek fault, is considered a northern extension of the Hayward fault system, and is separated from the Rodgers Creek fault by a right step-over. It has a creep rate of approximately 7 millimeters per year (USGS, 2007b). Recent seismic activity in the Maacama Fault Zone includes an earthquake measuring magnitude 4.8 centered near Willits in 1977 (Warren, et al., 1985).

Onsite Faults

Two pre-Quaternary faults are mapped passing northwest-southeast through the Estuary Management Project area as shown on Figure 4.1-2. As mapped these two faults appear to line up with the potentially active Bloomfield fault traces to the southeast.

Seismic Hazards

Surface Fault Rupture

Surface fault rupture is typically observed and is expected on or within close proximity to the causative fault trace.[6] The San Andreas and the Rodgers Creek fault zones are the closest active faults to the Estuary Management Project area zoned under the Alquist-Priolo Earthquake Fault Zoning Act. Neither of these faults transect the project area; therefore, none of the project elements are located within an Alquist-Priolo Earthquake Fault Zone. However, the San Andreas fault zone is located 1-1/2 miles west of the project area and, as discussed above, has experienced surface fault rupture during past events. Surface fault rupture would not necessarily be limited to the boundaries of the Alquist-Priolo Fault Zones, although the risk of surface rupture outside these zones would be considered lower than within the zones.

6 Fault rupture is displacement at the earth's surface resulting from fault movement associated with an earthquake.

Seismic Ground Shaking

Strong ground shaking from earthquakes generated by active faults is a hazard to the Estuary Management Project area, as it is likely that an occasional moderate to severe earthquake will cause strong ground shaking within the project vicinity. Ground shaking intensity is related to the size (i.e., magnitude) of an earthquake, the distance from the epicenter to the project's location, and the response of the geologic materials that underlie the site. As a rule, the greater the earthquake magnitude and the closer the fault rupture to the site, the greater the intensity of ground shaking. Violent shaking is generally expected at and near the epicenter of a large earthquake, although studies of recent earthquakes, such as those conducted after the 1992 Landers earthquake, indicate that directional ground motion along a fault can cause strong ground shaking farther away from the epicenter. Seismic hazards due to ground shaking can cause the greatest damage to structures, utilities, and unsecured equipment.

The primary tool that seismologists use to describe ground-shaking hazard is a probabilistic seismic hazard assessment (PSHA). The PSHA for the State of California takes into consideration the range of possible earthquake sources (including such worse-case scenarios as described above) and estimates their characteristic magnitudes to generate a probability map for ground-shaking. The PSHA maps depict values of peak ground acceleration (PGA) that have a 10% probability of being exceeded in 50 years. Use of this probability level allows engineers to design structures to withstand ground motions that have a 90% chance of NOT occurring in the next 50-years, making buildings safer than if they were merely designed for the most probable events. The PSHA indicates that at the Project site, there is a 10 percent chance of exceeding PGA values of approximately 0.62 g over the next 50 years (1 in 475 chance of occurring) (CGS, 2010.) As indicated in Table 4.1-2, these PGAs are typical of a very strong ground shaking. Seismic ground shaking is discussed further in the impacts analysis below.

Liquefaction

Liquefaction is the sudden temporary loss of shear strength in saturated, loose to medium dense, granular sediments subjected to ground shaking. Liquefaction generally occurs when seismically-induced ground shaking causes pore water pressure to increase to a point equal to the overburden pressure. Liquefaction can cause foundation failure of buildings and other facilities due to the reduction of foundation bearing strength. The potential for liquefaction depends on the duration and intensity of earthquake shaking, particle size distribution of the soil, density of the soil, and elevation of the groundwater. Areas at risk due to the effects of liquefaction are typified by a high groundwater table and underlying loose to medium-dense, granular sediments, particularly younger alluvium and artificial fill. This issue is discussed further under the impacts analysis below.

Seismically-induced Landslides

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. Rock slopes exposed to either air or water can undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience shallow soil slides, rapid debris flows, and/or deep-seated rotational slides.

4.1.3 Regulatory Framework

The following section provides a brief summary of the pertinent federal, state, and local regulations.

Federal

Relative to geology and soil resources, no federal regulations were found to apply or be pertinent to this Estuary Management Project, as the project would not result in the construction of permanent structures.

State

Surface Mining and Reclamation Act

The primary State law concerning conservation and development of mineral resources is the California SMARA of 1975, as amended to date. SMARA is found in the California Public Resources Code (PRC), Division 2, Chapter 9, Sections 2710, et seq. SMARA was enacted in 1975 to limit new development in areas with significant mineral deposits. SMARA calls for the state geologist to classify the lands within California based on mineral resource availability. In addition, the California Health and Safety Code requires the covering, filling, or fencing of abandoned shafts, pits and excavations (California Health and Safety Code Sections 24400-03.).

SMARA sets state policy for the reclamation of mined lands. SMARA states that the extraction of minerals is essential to the continued economic well-being of the State and to the needs of society, and that reclamation of mined lands is necessary to prevent or minimize adverse effects on the environment and to protect the public health and safety. The reclamation of mined lands will permit the continued mining of minerals and will provide for the protection and subsequent beneficial use of the mined and reclaimed land. Surface mining takes place in diverse areas where the geologic, topographic, climatic, biological, and social conditions are significantly different, and reclamation operations and the specifications therefore may vary accordingly (California Public Resources Code Section 2711).

The regulations set forth in SMARA are to be used as standards by the lead agencies which can include cities, counties, and regional authorities such as the San Francisco Bay Conservation and Development Commission. The lead agency shall have principal responsibility for approving surface mining operation or reclamation plans which include grading, backfilling, resoiling, revegetation, soil compaction, erosion control, and other reclamation requirements.

Local

Local policies established in the *Sonoma County General Plan 2020* that govern geologic resources in the project area are summarized in Section 4.1 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**.

4.1.4 Environmental Impacts and Mitigation Measures

The following section focuses on potential Estuary Management Project impacts related to geology and soil resources. The evaluation considered project plans, current conditions, and applicable regulations and guidelines.

Significance Criteria

The criteria used to determine the significance of an impact are based on the environmental checklist in Appendix G of the CEQA Guidelines. For this analysis, implementation of the proposed Estuary Management Project would be considered to have a significant impact associated with geology or soil resources if it would:

1. Expose people or structures to potential substantial adverse effects, including risk of loss, injury, or death involving:
   - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
   - Strong seismic ground-shaking;
   - Seismic-related ground failure, including liquefaction;
   - Landslides;
2. Result in substantial soil erosion or the loss of topsoil;
3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Estuary Management Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
4. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, (1994) creating substantial risks to life or property;
5. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water;
6. Result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state;
7. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan;

Some of the above-listed CEQA criteria are not considered relevant to the project based upon the proposed project and data research, and therefore, they will not be evaluated further in this EIR. These issues are:

> *Rupture of a known earthquake fault.* Ground rupture is considered most likely to occur along active faults, which are referenced in Table 4.1-1. As indicated previously, the Estuary Management Project site is *not* located within an Alquist-Priolo Fault Rupture Hazard Zone,

and no mapped active faults are known to pass through the project area. Therefore, the project would not expose persons or structures to risk of ground rupture along a fault line.

Inadequate support for septic tanks. Septic tanks are not proposed as part of the Estuary Management Project. Therefore this issue is not applicable to the project. However, potential for impact to existing septic systems is addressed in **Impact 4.13.4** in **Section 4.13, Public Services, Utilities and Public Safety**.

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to existing artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

Approach to Analysis

The following impact analysis focuses on potential impacts of the proposed Estuary Management Project related to geology and soil resources. The evaluation considered project plans, current conditions at the project site, and applicable regulations and guidelines.

Impact Analysis

Impacts are summarized and categorized as either “no impact,” “less than significant,” “less than significant with mitigation,” or “significant and unavoidable.”

Impact 4.1.1: Seismicity. In the event of a major earthquake in the region, seismic ground shaking could trigger seismic-related ground or slope failures, including liquefaction, and/or landslides at the beach, outlet channel, and/or along the banks of the lagoon to be formed behind the outlet channel that could expose people or structure to adverse effects. (Less than Significant)

The Estuary Management Project area is likely to experience at least one major earthquake (magnitude 6.7 or higher) within the next 30 years, along with other smaller seismic events. The intensity of such an event would depend on the causative fault, the distance to the epicenter, the moment magnitude, and the duration of shaking. As discussed in the Setting, ground shaking in the project area could be considerable given the proximity to the active San Andreas fault and other faults in the region. At the level of expected ground shaking, certain areas of saturated beach sand could liquefy resulting in localized ground failure such as lateral spreads, sand boils, and settlement. Liquefaction-related ground failures could alter the flow path, close, or truncate the proposed outlet flow channel. Ground shaking could also cause localized slope failures upstream along the banks of the lagoon formed behind the outlet channel.

Earthquakes are unavoidable and would occur with or without the project. While the anticipated seismic events could result in strong seismic ground shaking, liquefaction, and/or landslides within the project area, the effects of these potential seismic hazards would not result in additional risk

to the public or adversely affect property. As discussed in **Chapter 2.0, Project Description**, no new structures will be constructed and the barrier beach area will not be occupied by people. Changes to the outlet channel during an earthquake, such as an altered flow path, truncation, and closure would be temporary and would be readjusted by routine maintenance under the Adaptive Management Plan. In addition, the water levels in the lagoon behind the barrier beach at the outlet channel will continue to be maintained within the historical maximums resulting in no new land areas being inundated. Therefore, the proposed project would not result in additional or new exposure of people, structures, or property to seismic hazards, nor does it increase the overall seismic risk. Consequently, this is considered a less-than-significant impact.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.1.2: Beach Erosion. The proposed Estuary Management Project could result in conditions that lead to erosion on the beach at the outlet channel or along the banks of the Estuary formed behind the outlet channel. Changes in water levels within the Estuary Study area and maximum backwater area could undermine additional bank areas resulting in localized erosion or the loss of topsoil. (Less than Significant)

Creation of the outlet channel could result in short-term erosion on the barrier beach. However, the beach is a dynamic system that is already subject to erosive forces from tidal action; therefore the level of erosion on the barrier beach potentially associated with the proposed project would not be considered significant. Within the lagoon management period, consistent with the project goal of reducing tidal influence, the current practice of artificial breaching following closures would theoretically occur less often. However, maintenance of the outlet channel in this fashion may require additional equipment operation on the beach, depending upon performance of the outlet channel. The Water Agency is assuming up to 18 maintenance operations, or approximately once per week during the lagoon management period. This incremental increase in equipment use for maintenance is not anticipated to increase sedimentation or erosion rates within the barrier beach or active surf zone. Project implementation would increase the frequency and duration of higher water surface elevations along the shoreline of the Estuary. Depending upon channel performance, the duration of inundation could be increased to between one and five months.

Changes in water levels in the Estuary behind the barrier beach at the outlet channel could inundate of areas along the shoreline of the Estuary for an increased duration of between one and five months, depending up outlet channel performance. These areas could be subjected to erosion or loss of topsoil associated with wind-induced wave action. This could result in localized erosion along the 7- and 9-foot contours. However, as discussed in **Chapter 2.0, Project Description**, water levels would be maintained within a historical range experienced within the Estuary. Therefore, although the duration of inundation, and subsequent exposure of the shoreline to wave action would be increased, these areas have been episodically subjected to inundation and associated wave action, including water surface elevations of up to 9 feet approximately 52 times since 1996. Therefore, the proposed project is not anticipated to result in substantial erosion along the

shoreline. Additionally, the frequency and duration of the freshwater lagoon (i.e. non-tidal conditions) would not reduce sand and gravel deposition on the beach because the lagoon management period would occur after winter storms, when major transport of coarse sediment (i.e. sand and gravel) occurs; therefore there would be no effect on beach development.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.1.3: Unstable Beach Sands, Landslides, Liquefaction. The proposed Estuary Management Project involves moving the beach sands at the outlet channel. These beach sands are considered a geologic unit of soil that is unstable, or that would become unstable as a result of the project activities, and could potentially result in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse. (Less than Significant)

The sands comprising the beach barrier at the outlet channel are unconsolidated and thus could be subject to loss of stability during lagoon outlet channel creation. Failures of beach sands could include lateral spreading, subsidence, liquefaction, collapse, or other settlement. Such failures could result in a sudden drop in Estuary water levels as the temporarily impounded water quickly drains out to the Pacific Ocean. As discussed above, the alluvial deposits along the river channel are typically unconsolidated. Some soils in areas along the shore along the Estuary behind the outlet channel may be unstable and subject to on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse. Such failures might result in property damage.

The proposed Estuary Management Project does not change the location or composition of the barrier beach material, only the duration and configuration of the barrier beach itself. The adaptive approach to managing the outlet channel would result in a lower energy discharge of river water to the ocean, thus reducing destabilizing forces. The Estuary water levels will continue to be maintained within the range of historical water surface elevations experienced. Therefore, the proposed Estuary Management Project would not result in any new land areas being inundated that might consist of unstable soils. Therefore, potential impacts are considered less than significant.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.1.4: Expansive Soils. The proposed Estuary Management Project could be located on expansive soils, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property. (Less than Significant)

The sands that comprise the barrier beach materials where the outlet channel would be created are not composed of expansive soils. Therefore, there would be no adverse impact associated with expansive soils relative to the creation of the outlet channel under the proposed project. Implementation of the proposed project would increase the frequency and duration of inundation within the Estuary Study Area and maximum backwater area. Potential impacts could occur if

increased water levels inundated areas comprised of expansive soils that are not currently inundated that could result in property damage to foundations or other structures. Expansive soils, by character, expand as they absorb moisture, then shrink when they dry out. The proposed project could result in a longer duration of inundation of some areas; however this prolonged inundation would not exacerbate the shrink/swell amount, and associated risk to physical structures, just the rate and timing of the dry-out.

Based on review of geologic properties of these shoreline areas, no expansive soils (i.e. clay matrix) are expected to occur within the 14-foot contour, and no significant areas of expansive soils are identified. Additionally, there are no structures within the inundation zone that would be at risk or damage due to soil expansion. Furthermore, as discussed in **Chapter 2.0, Project Description**, the water levels in the Estuary will continue to be maintained within the historical range. Therefore, the proposed Estuary Management Project would not result in new land areas being inundated that might respond to soil expansion. Consequently, this issue would result in a less-than-significant impact.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.1.5: Mineral Resources. The proposed Estuary Management Project could result in the loss of availability of a known mineral resource. (Less than Significant)

Within the Estuary Management Project area, the gravels and sands in the Russian River and its floodplain are not currently mined for aggregate. In addition, the presence of the relatively steep sides of the river valley, the depth of the river water, and the presence of salmon habitat make it highly unlikely that this portion of the Russian River would used for aggregate mining. Therefore, the proposed Estuary Management Project would not result in the loss of mineral resources, and consequently, this issue would result in a less-than-significant impact.

Impact Significance: Less than Significant; no mitigation required.

4.1.5 References

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4.2 Hydrology and Flooding

4.2.1 Introduction

This section describes existing hydrologic processes and resources, with a focus on surface water hydrology, geomorphology, and flooding, and assesses potential impacts on these resources as a result of implementing the Russian River Estuary Management Project (Estuary Management Project or proposed project). As previously noted in **Chapter 2.0, Project Description**, the Estuary Study Area comprises the Russian River Estuary (Estuary), which extends approximately seven miles from the mouth of the Russian River upstream to just beyond the confluence of Austin Creek. Under certain closed conditions, the Estuary may backwater to Monte Rio, and as far upstream as Vacation Beach. Although this condition may periodically occur, potential impacts related to hydrology are generally thought to be limited to the seven mile area downstream of Austin Creek. Where appropriate, discussion of hydrology impacts within the Estuary Study Area and the larger maximum backwater area, which extends upstream past Austin Creek approximately to Vacation Beach, is provided (Please refer to **Figure 2-3** in **Section 2.0, Project Description**). Impacts on hydrologic processes and resources are analyzed in accordance with the California Environmental Quality Act (CEQA) significance criteria (CEQA Guidelines, Appendix G). Existing conditions and potential impacts on water quality, including groundwater resources, are addressed in **Section 4.3, Water Quality**. Fisheries resources, including aquatic habitat conditions, are addressed in **Section 4.5, Fisheries**. Geology and geomorphology information is provided in **Section 4.1, Geology and Soils**.

4.2.2 Setting

Regional Setting and Climate

The project area is located in the coastal region of northern California and is characterized by northwest-trending mountain ranges and intervening alluvial valleys. Hills and mountains comprise approximately 85 percent of the Russian River watershed, and valleys make up the remaining 15 percent. The watershed is bordered on the west by the Coast Ranges and on the east by the Mayacamas Mountains, with the Sonoma Mountains lying in the southeastern part of the watershed. The topography of the Russian River watershed greatly influences localized weather patterns (i.e., the distribution and variability of wind, temperature, and precipitation).

The region and project area are characterized by a Mediterranean climate (i.e., cool, wet winters and warm, dry summers). The coastal areas of the Russian River watershed are heavily influenced by the typically foggy, marine weather. Watershed-wide, the mean annual precipitation is 41 inches, with a range of 22 to 80 inches (USACE, 2004). The greatest annual precipitation occurs at high elevations and in the coastal mountains near Cazadero, while the lowest annual precipitation occurs in the southern Santa Rosa plain. Near the Russian River Estuary (i.e., as recorded at Guerneville), the mean annual precipitation is about 50 inches (WRCC, 2010a; WRCC, 2010b). Annually, the vast majority of rainfall and subsequent runoff occurs from November through April during Pacific frontal storms.

Surface Water Hydrology and Drainage

Russian River Watershed

Upstream of its mouth at Jenner, California, the Russian River drains an area of 1,485 square miles (**Figure 4.2-1**) and flows through a series of broad, northwest-trending alluvial valleys separated by narrow bedrock canyons (PWA, 1997). The Russian River flows southward from its headwaters through valleys and past the cities of Ukiah, Cloverdale, and Healdsburg before turning west at Mirabel Park. From Mirabel Park to the Pacific Ocean, low mountains along both banks comprising the Coast Ranges generally confine the river for the remaining 22 miles. There are several significant tributaries to the mainstem of the Russian River, including the East Fork Russian River (north of Ukiah, and regulated by Coyote Valley Dam), Big Sulphur Creek (near Cloverdale), Dry Creek (regulated by Warm Springs Dam), Mark West Creek and the Laguna de Santa Rosa in the southern portion of the watershed (i.e., downstream of the Dry Creek confluence), and Austin and Dutch Bill Creeks in the Monte Rio/Duncans Mills area.

Existing Hydrologic Regime and Controls

In general, the existing hydrology of the lower Russian River is characterized by large, variable peak flows during the wet-season, in response to rainfall events, and anthropogenically sustained base flows during the dry-season on the order of 50 to 200 cubic feet per second (cfs). The U.S. Geological Survey (USGS) operates a gage on the Russian River near Guerneville (USGS Guerneville gage),[1] approximately 21 river miles upstream from the mouth the Estuary. Daily flows recorded at this gage represent an approximation of the daily flow input to the Estuary (from upstream). Since October of 1983 (i.e., since the installation of Warm Springs Dam, see below), the average annual daily flow of the Russian River at the USGS Guerneville gage has been approximately 2,043 cfs (i.e., through water year 2009).[2] During the lagoon management period (i.e., from May 15 through October 15), the average daily flow at this gage has been approximately 263 cfs. The average daily flow of the Russian River for each month, as recorded at the USGS Guerneville gage, is summarized in **Table 4.2-1**. River flows typically decline rapidly over the five month lagoon management period. Flows in May averaged 767 cfs for the years 1939 to 2009, and averaged 178 cfs in September for the same time period.

The hydrologic regime of the Russian River includes man-made structures (e.g., permanent and seasonal dams, small diversions). Principal among these are the two dams that impound the two largest reservoirs in the Russian River watershed: Coyote Valley Dam (Lake Mendocino) and Warm Springs Dam (Lake Sonoma). The water managed at the dams account for approximately 15 percent of the total Russian River watershed and are operated primarily for flood control and water supply purposes. Releases are made from the dams to meet downstream water supply requirements, to meet minimum instream flow requirements as established in the State Water Resources Control Board's Decision 1610 (D1610), and/or to increase available storage capacity. Releases from the dams are controlled by the Water Agency (water supply) and the U.S. Army

1 USGS Gage 11467000, Russian River near Guerneville, California.
2 A water year begins on October 1 of the previous year and ends on September 30 of the designated water year. For example, water year 2004 comprises October 1, 2003, through September 30, 2004.

SOURCE: Sonoma County Water Agency

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Figure 4.2-1

Russian River Watershed

TABLE 4.2-1
RUSSIAN RIVER MONTHLY AVERAGE FLOWS, USGS GUERNEVILLE GAGE (WATER YEARS 1984-2009)

Month or Season	Average Annual Daily Flow (cfs)
January	5,925
February	6,590
March	4,488
April	1,693
May	786
June	332
July	193
August	167
September	169
October	205
November	814
December	3,392
Annual (water year)	2,043

SOURCE: ESA Calculated from data presented in USGS, 2010.

Corps of Engineers (USACE) (flood control). In general, dam operations influence the hydrologic regime by reducing the magnitude of peak flood flows and increasing the magnitude and duration of wet- and dry-season base flows. Historically, summer flows were much lower in the main stem of the Russian River (USACE, 2004).

Existing Geomorphic Characteristics

The existing geomorphic characteristics of the Russian River are a reflection of both historic, natural processes and more recent, human-induced changes and influences. The Russian River of the recent geologic past was likely much more dynamic than the present day river. As a result of recent geologic history and land use practices, previous investigations have concurred that the Russian River of today generally flows in an incised, narrow, single-thread channel that is relatively straight and, to a great degree, confined from lateral movement (SHG, 2008; PWA, 1997; SLA, 1991).

Fluvial processes, as well as human activities, within the entire Russian River watershed greatly influence the morphology of the Estuary, as they control the yield of sediment to the Estuary and, ultimately, the Pacific Ocean. Estimates of the average amount of sediment delivered to the lower Russian River and the Estuary vary. Graca (1976, *as cited by* Goodwin et al., 1993) estimated the total sediment amount (i.e., beach material) discharged at the mouth of the Russian River, including both bed load and suspended load materials, to be approximately 267,000 tons per year.[3] More recently, Simons, Li and Associates, Inc. (SLA) (1991, *as cited by* Goodwin et al., 1993) have

[3] Sediment transport is often separated into two classes based on how grains move: *bed load*, wherein grains move along or near the bed, and *suspended load*, wherein grains are picked up off the bed and move through the water column (generally in wavy paths). Sediment transport can also be organized into two classes by grain source: *bed material load*, which is composed of grains found in the stream bed, and *wash load*, which is composed of the very fine grains found only in small (e.g., less than 1 or 2 percent) amounts in the bed, and which are almost always carried in suspension.

estimated that the bed material load passing through the lower end of the middle reach of the Russian River (i.e., Hacienda Bridge) is approximately 242,000 tons per year. For the period 1981 to 1991, this figure was revised to 110,000 tons per year by Philip Williams & Associates, Ltd. (PWA) (1992, *as cited by* Goodwin et al., 1993). The lower reach of the Russian River is relatively stable compared to upstream areas, with little net change in the annual sediment budget (i.e., the difference between deposition and erosion) (Goodwin et al., 1993; PWA, 1995).

Flooding (Wet Season)

Significant historic floods occurred on the Russian River in Sonoma County in 1955, 1964, 1986, 1995, 1997, and, most recently, in January of 2006. Large portions of the low-lying floodplain adjacent to the river are inundated during high magnitude floods. However, as mentioned previously, the extent of the floodplain within the lower Russian River, including the Estuary, is relatively narrow due to the confined nature of the channel. Floods on small streams usually peak and recede quickly, while floods on the lower Russian River may not peak for two days or more after the start of a storm, and may exceed flood stage for four days or more (County of Sonoma PRMD, 2008). During large flood events the Estuary is typically open to the Pacific Ocean. As discussed in **Chapter 2.0, Project Description**, the Water Agency actively manages water surface elevations in the Estuary during closed conditions. The largest flows recorded by the USGS Guerneville gage were 93,400 cfs in December of 1964, 102,000 cfs in February of 1986, and 93,900 cfs in January of 1995.

The Federal Emergency Management Agency (FEMA) is responsible for mapping areas subject to flooding during a 100-year flood event (i.e., the event with a 1 percent chance of occurring in any given year). According to FEMA (2008a), most of the area of the Estuary below the 7-foot elevation contour occurs within the 100-year flood zone (**Figure 4.2-2** and **Figure 4.2-2a**). The flood zone is relatively narrow and generally follows the flow path of the main channel. Moving upstream from the Estuary mouth, the elevation of the 100-year flood zone (i.e., the base flood elevation) becomes progressively higher than the water surface elevations associated with the periodic formation of the barrier beach during the dry season (e.g., within the proposed lagoon management period). For example, just 1,500 feet upstream of the Estuary mouth, the base flood elevation is approximated at 12.5 feet (NGVD 29) (FEMA, 2008b);[4] near the confluence of Austin Creek, the base flood elevation of the Russian River is approximately 33.1 feet (FEMA, 2008b). At Hacienda it is approximated at 69 feet (NGVD 29) (FEMA, 2008b).

Tsunamis

A tsunami is a series of traveling ocean waves generated by some kind of rare, catastrophic event, including earthquakes, submarine landslides, and volcanic eruptions. Tsunamis can travel over the ocean surface at speeds of 400 to 500 miles per hour or more, and wave heights at the shore can range from inches to in excess of 50 feet (County of Sonoma, 2006; County of Sonoma PRMD, 2008). Factors influencing the size and speed of a tsunami include the source and

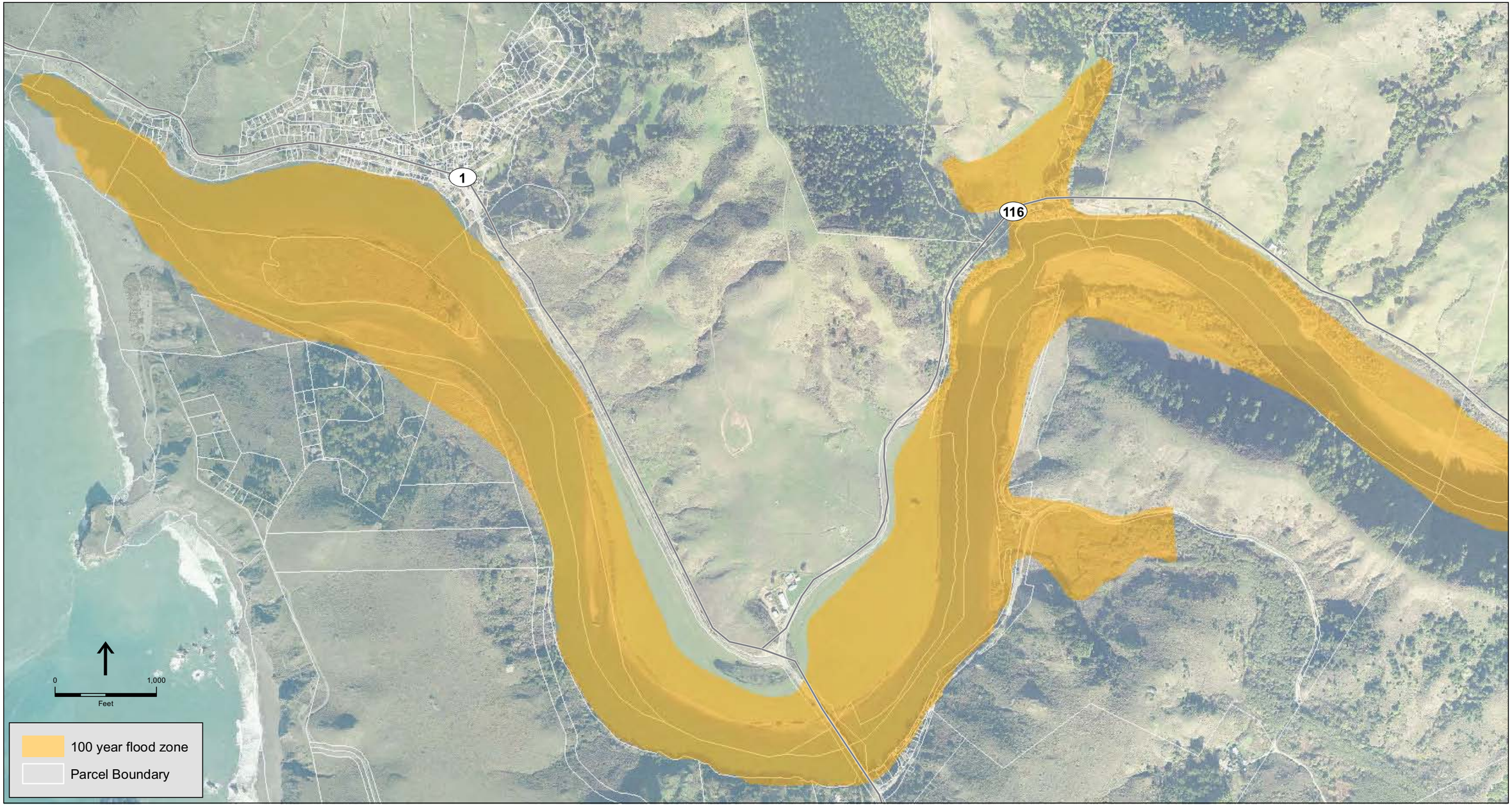
[4] Herein, all specific elevation values presented (in feet) in Section 4.2, Hydrology and Flooding, are in reference to the National Geodetic Vertical Datum of 1929 (NGVD 29), unless otherwise noted.

SOURCE:FEMA, December 2008

Russian River Estuary Management Project. 207734.01

Figure 4.2-2

FEMA Flood Zones - Jenner Gage



SOURCE: SCWA, 2010 (aerial photo, 2008), FEMA, 2008

Russian River Estuary Management Project. 207734.01

Figure 4.2-2a

100 Year FEMA Flood Zone
Jenner Area

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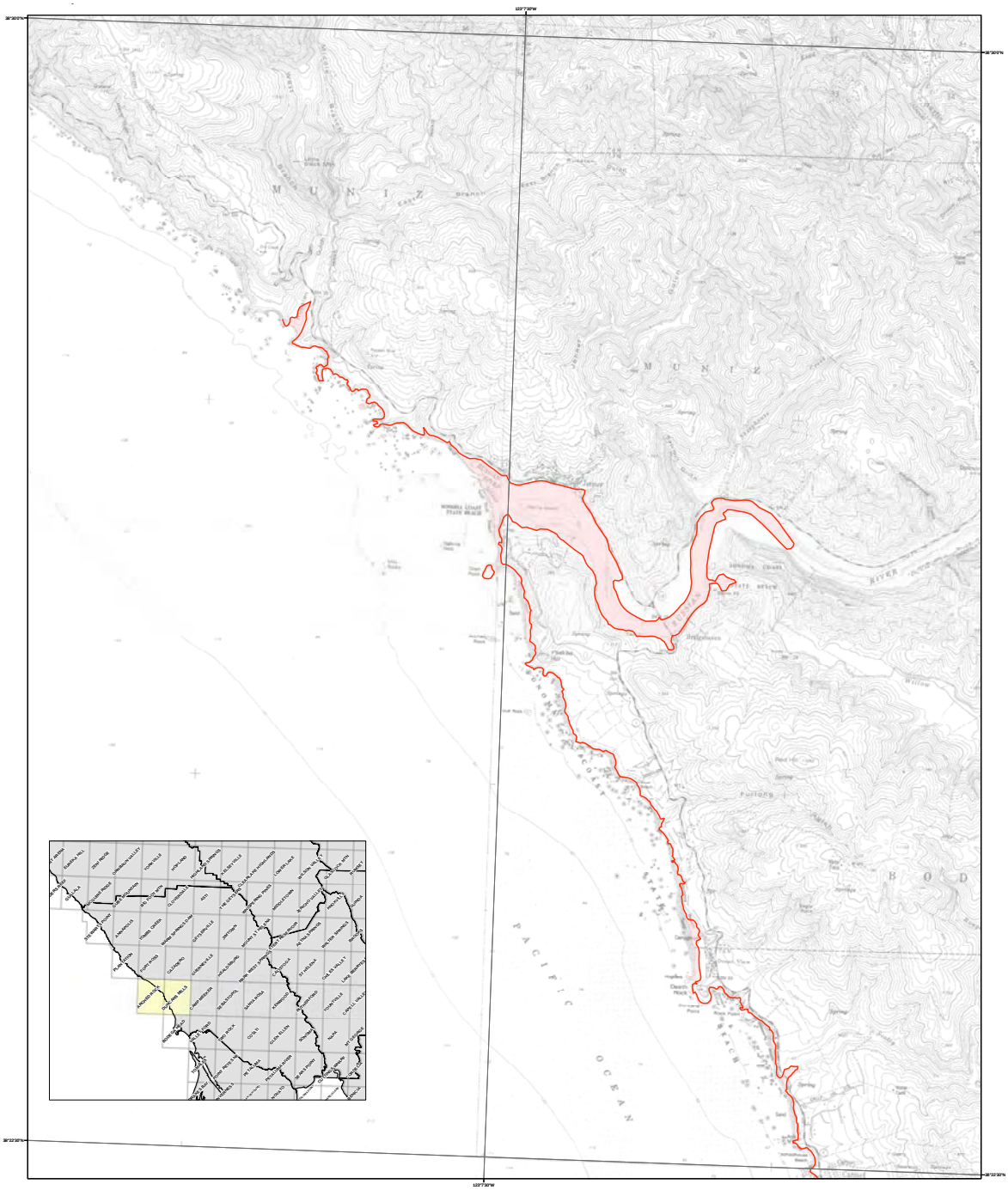
magnitude of the triggering event, as well as off-shore and on-shore topography. There are no historic accounts of tsunamis impacting the Sonoma County coast, however the potential risk remains (County of Sonoma, 2006).

A portion of the Estuary, from the mouth to approximately 3.7 river miles upstream, is within the tsunami inundation zone as mapped by the California Emergency Management Agency (CalEMA) (2009) (**Figure 4.2-3**).[5] Subsequently, in the event of a tsunami, people or structures within this area could be exposed to a significant risk of loss, injury, or death involving flooding. The tsunami inundation zone as mapped by CalEMA is considered a maximum estimate (i.e., based upon the maximum tsunami runup), taking into consideration a number of extreme, yet realistic, tsunami sources. Tsunamis are extremely rare events, yet there is no specific, quantitative probability information associated with the mapped tsunami inundation zone depicted in Figure 4.2-3.

Climate Change and Sea Level Rise

In recent years, the scientific community has generally reached consensus that climate change and sea level rise are likely to occur. California's position on climate change was formalized in Assembly Bill (AB 32), the California Global Warming Solutions Act of 2006, which states that: "Global warming poses a potential threat to the economic well-being, public health, natural resources, and the environment of California." While scientists agree that sea level rise is likely to occur in the future, the rate of sea level rise is uncertain. Several different estimates have been proposed for planning purposes. For example, the CALFED Independent Science Panel used empirical models based on historic sea level rise to estimate a sea level rise ranging from 20 to 55 inches by 2100 (CALFED Independent Science Board, 2007). The San Francisco Bay Conservation and Development Commission (BCDC) is in the process of developing a strategy to address sea level rise in the future (San Francisco BCDC, 2008). This strategy will identify urban areas that should be protected, other areas that would flood, and how to replace some of the tidal areas that would be impacted. This strategy is not yet developed; therefore it is speculative at this point to describe which areas may be impacted. In response to concerns about climate change and sea level rise, the University of Arizona Department of Geosciences conducted research on factors that determine the degree to which a coastal area is susceptible to sea level rise. This analysis assumes a one meter rise in sea level by 2100 as the worst-case-scenario, and identifies potential impacts to the proposed project. A recent study (Largier, 2010) prepared by a joint working group of the Gulf of the Farrallones and Cordell Bank National Marine Sanctuary Advisory Councils identifies and synthesizes potential climate change impacts to habitats and biological communities along the north-central California Coast, over 10 miles south of the project site. Some portions of the project area could be impacted in the future, which could reduce the functionality and effectiveness of the proposed outlet channel and lagoon management strategy. Please refer to **Chapter 5.0, Cumulative Impacts**, for further discussion regarding climate change and resulting potential sea level rise.

[5] While this information was not intended for planning purposes, it nonetheless represents the best statewide tsunami mapping effort to date.



TSUNAMI INUNDATION MAP
FOR EMERGENCY PLANNING

State of California ~ County of Sonoma

ARCHED ROCK QUADRANGLE
DUNCAN MILLS QUADRANGLE

February 15, 2009

SOURCE: CalEMA 2009

Russian River Estuary Management Project . 207734.01

Figure 4.2-3
Tsunami Inundation Map

Russian River Estuary

The project site is comprised of the Estuary, which forms the lowest section of the Russian River. The tidal portion of the Russian River Estuary extends approximately seven miles upstream from the mouth to a point between Duncan's Mills and Austin Creek (see Estuary Study Area, **Figure 2-3a** in **Chapter 2.0, Project Description**). Several Russian River tributaries drain directly to the Estuary, including Dutch Bill Creek, Austin Creek, Freezeout Creek, Sheephouse Creek, Willow Creek, and Jenner Creek. As previously noted in **Chapter 2.0, Project Description**, under certain closed conditions, the Estuary may backwater to Monte Rio, and as far as Vacation Beach (referred to as maximum backwater area).

The Estuary is affected by both coastal and fluvial processes, including general climate and precipitation, nearshore wave action, tides, river discharge and sedimentation (Goodwin et al., 1993). The tidal range at the Estuary mouth is approximately six feet and the tides are diurnal. Mean higher high water (MHHW), as estimated at the Point Reyes buoy, is approximately 3.1 feet and mean lower low water (MLLW) is approximately -2.6 feet (PWA, 2010). At the Estuary mouth, wave action (i.e., wave runup) can increase the water level of the ocean beyond that attributable to just the tides. Sediments in the Estuary are derived from both fluvial (e.g., sands and gravels delivered from upstream) and marine (e.g., sands carried in from the ocean) sources.

The Estuary continues to close throughout the year as a result of a barrier beach forming at the mouth of the Russian River. The barrier beach closes most often in the spring, summer, and fall, when river flows are relatively low and long-period waves transport sand landward, rebuilding the bar that was removed by winter waves and river outflows (SCWA, 2005). The closure of the Estuary temporarily eliminates tidal exchange and initiates pooling of the river flow, which results in a gradual to rapid (i.e., depending on the rate of flow into the Estuary) increase in the elevation of the water within the Estuary.

Estuary Water Level Variations and Management

The Water Agency artificially breaches the barrier beach following a natural closure when the water surface level in the Estuary is between 4.5 and 7.0 feet, as determined by the gage at the Jenner Visitor's Center, in accordance with the *Russian River Estuary Study 1992–1993* (Heckel, 1994). Specifically, when conditions allow (i.e., during safe wave and river flow conditions), the Water Agency ordinarily acts to artificially breach the closed barrier beach to avoid Estuary water levels greater than 9 feet. Water elevations above 9 feet at the Jenner gage could result in flood damage to adjacent properties and/or structures. Following formation of the barrier beach and Estuary closure, natural breaching of the barrier beach occurs when Estuary water levels exceed the capability of the barrier beach to impound this water, causing localized erosion of the barrier beach and creation of a tidal channel that reconnects the Russian River to the Pacific Ocean. This condition depends on the elevation of the barrier beach, and can vary throughout the year. Under existing conditions and management practices, the barrier beach is more often artificially breached by the Water Agency in order to limit or avoid flooding. Under the current management regime, the barrier beach is typically closed for five to 14 days at a time (USACE, 2004). Damages to property have been limited by artificial breaching of the barrier beach.

Since 1996, there have been, on average, six mechanical breaching events per year. Within that timeframe, since June of 1996, the Water Agency has recorded information pertaining to Estuary closure events, including the date on which the barrier beach was breached (by any means, natural or mechanical) and the Estuary water surface elevation at the time of breaching (SCWA, 2010b). Of the 119 documented Estuary closure events between June 1996 and December 2009, an Estuary water surface elevation at the time of breaching was recorded in 101 instances. The lowest recorded water surface elevation upon breaching was 4.3 feet (September 8, 1996); the highest water surface elevation was 11.1 feet, recorded during a natural breach event (November 13, 2001). Of the breaching events for which a water surface elevation was subsequently recorded, over half of the events (i.e., 52 percent) had water surface elevations that exceeded 7 feet (and were sometimes as high as eight, 9, and, in a very few cases, greater than 10 feet).

During a given year, the water surface elevation of the Estuary is well below the elevations typically associated with breaching events and flooding for most of the year. For example, based upon data from the Water Agency's Jenner gage,[6] the average water surface elevation in the lower portion of the Estuary, from May 2000 through December 2009, was approximately 2.2 feet. Over this same timescale, within the lagoon management period, the average water surface elevation in the lower Estuary was approximately 1.9 feet. Over 99 percent of the time, the Estuary water surface elevation, as recorded at the Water Agency's Jenner gage, was below 7.7 feet.

4.2.3 Regulatory Context

The majority of the regulatory information concerning hydrology and flooding is related specifically to water quality. Information pertaining to water quality regulations, including the federal Clean Water Act (CWA) and the State Porter-Cologne Water Quality Control Act (Porter-Cologne), is discussed and summarized in **Section 4.3, Water Quality**. Relevant regulations, orders, plans, and objectives not related exclusively to water quality are summarized below.

Federal

Executive Order 11988

Under Executive Order 11988, FEMA is responsible for management of floodplain areas defined as the lowland and relatively flat areas adjoining inland and coastal waters subject to a one percent or greater chance of flooding in any given year (i.e., the 100-year floodplain). FEMA requires that local governments covered by federal flood insurance pass and enforce a floodplain management ordinance that specifies minimum requirements for any construction within the 100-year floodplain.

6 The Water Agency maintains a recording, water level gage just upstream of the Estuary mouth, at Jenner, on the right bank of the Russian River. The gage records water surface elevations in 0.5-hour increments (some of the earlier data was recorded in 1-hour increments). Data from this gage, for the period 2000-2009, was provided by the Water Agency (SCWA, 2010a).

Local

Local policies established in the *Sonoma County General Plan 2020* that govern hydrologic resources in the project area are summarized in Section 4.2 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**.

4.2.4 Environmental Impacts and Mitigation Measures

This section describes the potential hydrology, flooding, and drainage impacts resulting from the implementation of the proposed project. Potential impacts to water quality, including groundwater resources, are presented in **Section 4.3, Water Quality**, and impacts to fisheries are discussed in **Section 4.5, Fisheries**. Geology and geomorphology information is provided in **Section 4.1, Geology and Soils**.

Significance Criteria

Significance criteria, or thresholds, listed in Appendix G of the CEQA Guidelines are used to determine the significance of potential impacts due to the proposed project. Based on criteria in Appendix G of the CEQA Guidelines, a potential hydrology or flooding impact would be considered significant if the proposed project would result in any of the following:

1. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)

2. Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or sedimentation on- or off-site;

3. Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;

4. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;

5. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;

6. Place within a 100-year flood hazard area structures which would impede or redirect flood flows;

7. Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; or

8. Inundation by seiche, tsunami, or mudflow.

Some of the above-listed CEQA criteria are not considered relevant to the project based upon the proposed project and data research, and therefore, they will not be evaluated further in this EIR. In the case of hydrologic resources:

> *Groundwater supply depletion or interference with recharge*. The Estuary Management Project would not directly deplete groundwater supplies, i.e. it does not include increased pumping to serve land uses enabled by the project, nor does it interfere or eliminate groundwater recharge, i.e. by increasing the amount of impervious surface in a recharge basin. The Estuary Management Project is an adaptive management project that would increase the frequency and duration of higher water levels in the Estuary. Because the proposed project is not anticipated to directly affect groundwater recharge or create a supply in reduction, this impact is not discussed in this section. However, potential for impact to groundwater quality is addressed in **Impact 4.13.4** in **Section 4. 3, Water Quality**.

Approach to Analysis

This impact analysis focuses on foreseeable changes to the baseline (or existing) condition in the context of the significance criteria presented above. It should be noted, not all of the criteria listed in Appendix G of the CEQA Guidelines are directly applicable to the proposed project. The ensuing impact analysis is based upon the potential impact of activities that would occur, during the lagoon management period. As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to artificial breaching outside of the lagoon management period would occur under the Estuary Management Project. The principal project components relevant to the analysis of hydrology and flooding impacts relate to the proposed increase in the water surface elevation within the Estuary and the duration over which that increased elevation would be maintained; these project components are reiterated and summarized below.

As part of the Estuary Management Project described in **Chapter 2.0, Project Description**, following a natural closure of the Russian River mouth and formation of a barrier beach, an outlet channel would be created, managed, and monitored annually within the lagoon management period. The purpose of the outlet channel would be to maintain predominantly freshwater conditions (i.e., a non-tidal state) within the Estuary while minimizing the potential for flooding of low-lying properties. To meet the intended performance criteria, the outlet channel must simultaneously meet two key constraints: 1) convey sufficient discharge from the Estuary to the ocean in order to manage a consistent Estuary water level not to exceed 9 feet mean sea level and that minimizes flooding, and 2) preserve outlet channel function by avoiding closure or breaching.

Within the lagoon management period, the Estuary water level management target would be an average daily water surface elevation of 7 feet. Depending on the conditions at the time of outlet channel establishment (e.g., elevation of the barrier beach, wave and tide conditions, inflow to the

Estuary, etc.), the resulting water surface elevation in the Estuary could range from 4.5 feet up to 9 feet. Under existing conditions, the available data suggest that water surface elevations above 7 feet rarely occur within the Estuary during the lagoon management period. However, the duration over which the target water surface elevations would be maintained would likely increase as a result of implementing the Estuary Management Project.

Impact Analysis

The following impact analysis focuses on potential impacts of the proposed Estuary Management Project related to hydrology. The evaluation considered project plans, current conditions at the project site, and applicable regulations and guidelines. Impacts are summarized and categorized as either "no impact," "less than significant," "less than significant with mitigation," or "significant and unavoidable."

Impacts and Mitigation Measures

Impact 4.2.1: Alteration of drainage. The creation and maintenance of the outlet channel would alter the existing drainage pattern within the Estuary, and this could result in increased sedimentation or erosion. (Less than Significant)

The creation and maintenance of the outlet channel would have the potential to affect the rate of sediment deposition within the entire Estuary, as well as impact erosion processes and general channel stability at the Estuary mouth. As a result of project implementation, the increased base-level within the Estuary (i.e., the water level controlling the velocity of inflow from upstream of the Estuary), over a more prolonged time period, could cause an increase in the rate at which sediment transported by the Russian River mainstem is deposited within the Estuary. Also, the outlet channel itself could change the general conditions at the Estuary mouth, leading to more erosion or less stable conditions locally. Increased maintenance of the outlet channel would also have the potential to increase localized erosion and resulting sedimentation within the surf zone and Estuary mouth.

Deposition within the Estuary

The lagoon management period generally coincides with the dry-season and, subsequently, there is very little sediment input from upstream during this period (compared to the winter months). From water year 1984 through 2009, during the lagoon management period, the mean daily flow in the Russian River at Guerneville (USGS gage) was approximately 263 cfs, which is less than 6 percent of the mean daily flow value outside of the lagoon management period (3,000 cfs). Sediment transport is typically a non-linear function of discharge (e.g., sediment transport is a power function of discharge, with an exponent greater than one). In other words, the rate at which sediment transport increases is proportionately greater than the rate at which discharge increases. Thus, with respect to the annual sediment load, it is expected that less than 6 percent of the annual sediment load would be transported during the lagoon management period. In fact, it is likely that less than one percent of the annual sediment yield at Guerneville is transported during the lagoon management period. In most alluvial rivers draining the north coast of California, the vast

majority of the annual sediment load is carried by a few, large flood events (e.g., by flows that occur less than 5 percent of the time, on a daily average basis).

On average, little-to-no sediment would be transported into the Estuary during the lagoon management period. Consequently, the proposed change in the base-level of the water surface would have little-to-no impact upon the rate of sediment transport through, or deposition within, the Estuary, and the potential impact of the project upon sedimentation would be less than significant.

Stability of the Outlet Channel

As already described (**Chapter 2.0, Project Description**), given the ranges for stable channel geometry previously determined through geomorphic and hydraulic analysis (PWA, 2010), the target outlet channel dimensions would be established so as to minimize the risk of both erosion (natural breaching) and closure. The dimensions of the outlet channel would be dependent upon beach formation conditions. Ultimately, the outlet channel would be designed and constructed such that its discharge capacity is similar to the rate of flow into the Estuary minus losses due to seepage and evaporation. Regarding erosion and outlet channel stability, the impact discussed herein concerns the way in which the channel could fail and the ensuing effect, if any, this would have upon processes at the Estuary mouth.

Failure of the outlet channel would be by one of two natural processes: closure[7] or natural breaching (erosion). Both of these processes are currently active within the Estuary. The processes which lead to outlet channel closure are most likely to originate from elevated ocean water levels and wave heights. Elevated ocean water levels would move the active sediment transport zone into the outlet channel, increasing sediment deposition at elevations above that of the outlet channel's bed (PWA, 2010). If the rate of sediment deposition within the outlet channel exceeds the capacity of the channel to remove or scour sediment, then a barrier beach would build at the mouth of the outlet and it would eventually close. Depending upon the water elevation within the Estuary at the time of closure, and the subsequent inflow rate and rate of water level rise, the Water Agency would attempt to re-establish the outlet channel. Within the lagoon management period, consistent with the project goal of reducing tidal influence, the current practice of artificial breaching following closures would theoretically occur less often. However, maintenance of the outlet channel in this fashion may require additional equipment operation on the beach, depending upon performance of the outlet channel. The Water Agency is assuming up to 18 maintenance operations, or approximately once per week. This incremental increase in equipment use for maintenance is not anticipated to increase sedimentation or erosion rates within the barrier beach or active surf zone.

Natural breaching is likely to result from two processes, high discharge which scours the channel bed or seepage-induced bed mobilization (PWA, 2010). Because the outlet channel is an unconsolidated bed composed of relatively small particles (i.e., approximately 1 millimeter in diameter, on average), it is susceptible to scour by the discharge flowing through the outlet channel. If the rate of scour within or at the mouth of the outlet channel is too great the outlet

[7] All closures would be naturally; not man-made or manipulated.

channel would begin to erode, becoming deeper and wider as the barrier beach is eventually breached and the Estuary again becomes predominantly tidally influenced. These processes can occur simultaneously and work together to create a natural breaching event. Concerning the second potential breaching mechanism, if seepage rates are sufficiently large, the movement of water through the sand can mobilize sand particles where the seepage flow daylights at the ground surface. This process could lead to erosion of the outlet channel and subsequent breaching, similar to that described above for the case of hydraulic scour. When breaching occurs, a large amount of locally-stored sediment (i.e., part of the barrier beach) is usually rapidly excavated and deposited near the landward edge of the surf zone. Within the lagoon management period, consistent with the project goal of reducing tidal influence, this process of breaching and the subsequent sediment movement would theoretically occur less often.

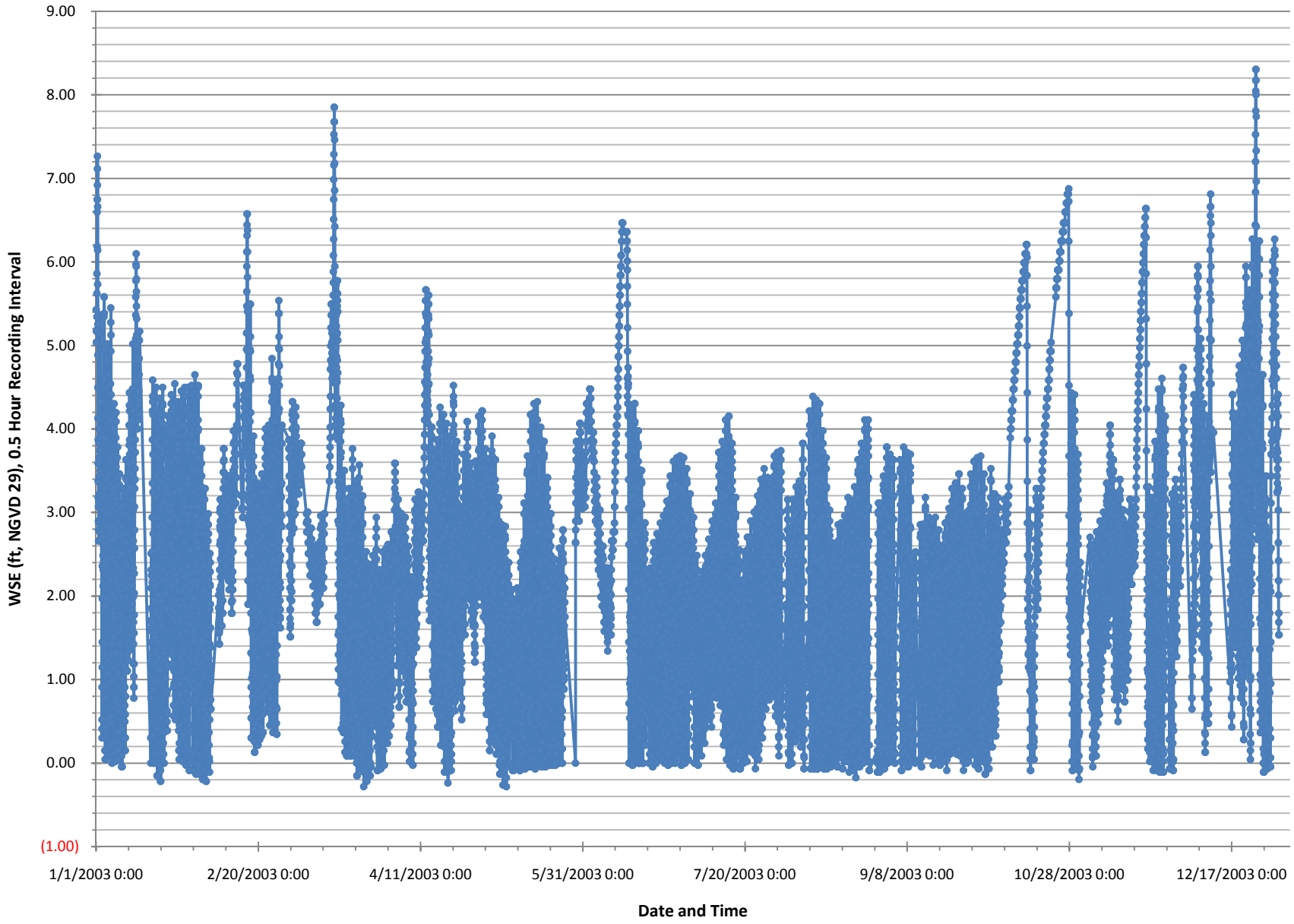
In either case (i.e., closure or breaching), hydraulic and geomorphic conditions at the Estuary mouth upon completion of the given process would be no different as a result of implementing the project. Implementation of the outlet channel would not foster the development of less stable conditions within the Estuary or at the Estuary mouth. Nor would implementation of the outlet channel notably increase the sediment yield to the Estuary or to the ocean. While functioning, it would simply establish an outlet channel at the Estuary mouth, draining the "perched lagoon." Once a closure or breaching event occurs (as previously described), then the processes of wave-induced deposition or hydraulic or seepage erosion end the equilibrium condition and essentially "reset" the Estuary in the same manner as happens under current conditions during a closure or breaching event (natural or artificial). Therefore, the proposed project is likely to decrease localized erosion at the Estuary outlet associated with current artificial breaching activities, with little or no impact expected to the erosion and beach building processes of the adjacent beaches. The potential impact of the project upon the process and frequency of erosion at the mouth would be less than significant.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.2.2: Property Inundation. The creation and maintenance of the outlet channel would alter the existing drainage pattern at the Estuary mouth, which could result in increased potential for inundation of parcels adjacent to the Estuary. (Significant and Unavoidable)

The range of water surface elevations that occur within the Estuary would not change as a result of implementing the project. However, the duration over which the target water surface elevations (e.g., 4.5 feet to 9 feet, with an average of 7 feet) would be maintained would increase, depending upon the performance of the outlet channel. As shown in **Figure 4.2-4**, the duration of target water surface elevations would be increased from less than a few days, on average, to approximately one to five months, on average, within the lagoon management period. Thus, low-lying areas at or below the 9-foot elevation contour, which are currently naturally inundated[8] only

[8] Historically, "inundation" is a naturally occurring condition; existing management is not natural. Allowing the lagoon to form would more closely mimic natural conditions.



SOURCE: SCWA, 2010

Figure 4.2-4
Estuary Water Level at Jenner Gauge (2003)
and Proposed Project Condition

sporadically throughout the year, would remain inundated over much longer durations, on average, during the lagoon management period. As previously discussed in **Chapter 3.0, Project Background and Environmental Setting**, based upon data from the Jenner gage, the average water surface elevation in the lower portion of the Estuary, from May 2000 through December 2009, was approximately 2.2 feet. Over this same period of time, within the lagoon management period, the average water surface elevation in the lower Estuary was approximately 1.9 feet. Over 99 percent of the time, the Estuary water surface elevation, as recorded at the Water Agency's Jenner gage, was below 7.7 feet.

Areas that would be subject to increased durations of inundation include both relatively large, contiguous areas, as well as smaller, more discrete areas immediately adjacent to the active channel margin. The largest relative increase is the area of inundation between the 4.5- and 9-foot contours over the western half of Penny Island, at the mouth of Willow Creek, and over approximately six gravel bars at and upstream of the Willow Creek Environmental Campground (see **Chapter 3.0, Figures 3-4A through 3-4E**). The increase in the duration of inundation at the 7-foot, and, possibly, 9-foot contours in these areas, would not result in a subsequent increase in the potential for damage to existing structures or buildings, as none exist in these areas. Project implementation would not expose people or structures to a significant risk of loss, injury or death related to flooding, the threshold established in Appendix G of the CEQA Guidelines. In this case, and in this context, the increase in the duration of flooding, which currently occurs on an episodic basis, would not be considered a potentially significant impact. However, along more localized areas of the Estuary shoreline, the increase in the duration of flooding between 7 and 9 feet could have a potentially significant impact to property and structures, as further described below.

As described earlier (**Chapter 3.0, Project Background and Environmental Setting**), water surface elevations relative to parcels along the Estuary shoreline were reviewed within the Estuary Study Area, as required by the National Marine Fisheries Service (NMFS) Russian River Biological Opinion. Results of that review indicate that portions of approximately 78 parcels within the Estuary Study Area would be inundated at a water surface elevation of 9 feet. In most cases, the area of inundation would comprise channel margin ("shoreline") and beach areas only, and no structures (e.g., homes, sheds, septic tanks, boat docks, etc.) would be directly affected. However, in a few cases, a preliminary analysis of the Estuary Study Area using aerial photographs, elevation data, and parcel information (SCWA, 2010b) suggests that existing structures, primarily boat docks, would be inundated at a water surface elevation between 7 and 9 feet. The following 9 parcels, identified by Assessor's Parcel Number (APN), are those identified in the aforementioned analysis as containing structures (i.e. buildings and boat docks) that could be inundated at Estuary water surface elevations between 7 and 9 feet: 099-080-008, 099-080-037, 099-120-009 (Visitor Center), 099-140-052, 099-140-055, 099-140-060, 099-140-063, 099-140-065, and 099-140-089. For 7 of the parcels a boat dock or boat ramp could be potentially inundated; for two parcels the structure at risk would be a house or other type of building. The increase in the duration over which these structures would be annually inundated, and for a longer duration, could result in potentially more damage than that which is sustained under existing conditions, as water surfaces are controlled by artificial breaching. Similar impacts

could be associated with increased frequency and duration of higher water surface elevations within the maximum backwater area, extending upstream to approximately Vacation Beach, although a parcel specific analysis was not performed. With respect to these parcels and structures, this would be a potentially significant impact resulting from implementation of the project; **Mitigation Measure 4.2.2** would reduce this impact to the degree feasible relative to structures that may be inundated for a longer duration. However, no mitigation measures are available to reduce or avoid the natural inundation of private parcels to an elevation of up to 9 feet along the Estuary shoreline for longer durations during the lagoon management period. Therefore, these impacts are considered significant and unavoidable.

Mitigation Measure

Mitigation Measure 4.2.2: Concerning the 9 parcels and associated structures (i.e., boat docks or boat ramps on 7 of the parcels, and homes or other buildings on the other two parcels) identified above, and presented in more detail in a previous analysis (SCWA, 2010b), the Water Agency shall coordinate with NMFS and work with the property owners to identify measures that would, if necessary, substantially minimize or avoid any damages to existing structures that would occur as a result of implementing the project (i.e., increased flooding durations at the 7 and 9 foot elevation). As appropriate, the Water Agency shall survey properties within the 9 foot elevation in greater detail to more accurately and precisely determine the elevation of the structures potentially at risk; this information shall be kept on record at the Water Agency and a copy shall be provided to each of the property owners.

Impact Significance after Mitigation: Significant and Unavoidable

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Impact 4.2.3: Tsunami Risk. A portion of the project area is located within a mapped tsunami hazard zone, and therefore could be inundated in the unlikely event of a tsunami. Subsequently, increased water levels in the Estuary could increase the risk to people or structures within this area to loss, injury, or death involving flooding in the event of a tsunami. (Significant and Unavoidable)Implementation of the project during the lagoon management period would increase the frequency and duration of higher water levels in the Estuary, thereby reducing the storage capacity of the Estuary for a more prolonged period of time (i.e., as compared to existing conditions). Therefore, could exacerbate the risk of flooding and loss associated with a tsunami, should one occur. Increased Estuary surface water levels (and, subsequently, decreased storage capacity) may result in somewhat higher inland tsunami elevations in the lower portion of the Estuary, should one occur during the lagoon management period. In essence, portions of the Estuary which may retained a portion of the tsunami's flood volume when Estuary water levels are lower would be filled with water as a result of the project, so the overtopping volume from the tsunami may propagate further landward. The exact extent of this probable effect is uncertain. In fact, there is also considerable uncertainty regarding the existing inundation map and the depicted upper bound of inundation (Figure 4.2-3), and even under existing conditions it remains possible that actual inundation could be greater in a major tsunami event (CalEMA, 2009). When a large seismic event occurs that could trigger a tsunami affecting the coast, the Pacific Tsunami

Warning Center and the West Coast and Alaska Tsunami Warning Centers issue tsunami warnings and watches to potentially affected communities (County of Sonoma, 2006); this would include the community in and around Jenner.

In the event of a tsunami during the lagoon management period, the increased Estuary water levels could result in a higher tsunami-related flood inundation elevation. Currently, within the lagoon management period, the average Estuary water surface elevation as recorded by the Water Agency's Jenner gage is approximately 1.9 feet. According to elevation, area and volume data for the Estuary (Brennan, 2010), the volume at 7 and 9 is approximately 2.4 and 3.1 times greater, respectively, than the volume at 1.9 feet, respectively. As such, the storage capacity of the Estuary would be substantially reduced. However, the dynamics of tsunami effects within the Estuary are not well understood and, consequently, neither is the additional effect of reducing storage capacity. Based on the information available, the potential magnitude of increase in the tsunami inundation elevation of the lower Estuary, as a result of project implementation, is uncertain.

Though tsunamis are extremely rare events, and the specific effect of elevated Estuary water levels upon the tsunami flood risk cannot be reliably quantified at this point, the increase in the duration of target Estuary water levels would, nonetheless, likely increase the overall risk of flooding associated with a tsunami. Since the project would increase the average duration of elevated Estuary water levels from less than a few days, on average, to approximately 1 to 5 months, on average, the probability of a tsunami (of sufficient magnitude to cause damage) occurring concurrently with elevated Estuary water levels would also increase. The amount that this increase in concurrent events would increase the tsunami flood risk probability is not known. It should be noted that increased storage conditions currently occur naturally and episodically, but their duration is limited by artificial breaching practices currently implemented by the Water Agency.

In considering the increased duration of higher water surface elevations, and the increase in risk with respect to people, adequate warning would likely be given in the event of a potential tsunami generating event, this would not necessarily mitigate or alleviate the increased risk of loss as it pertains to existing structures or property (i.e. equipment, cattle, etc.). Given the uncertainty of the magnitude of this potential impact, and lacking more Estuary-specific information concerning tsunami effects, in the unlikely event that a tsunami of sufficient magnitude occurs within the Jenner area during the lagoon management period, the project would result in an increased risk of structural damage or loss for properties just outside of the areas that would currently be inundated by tsunami-related flooding. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

Mitigation Measures

No mitigation measures available.

Impact Significance after Mitigation: Significant and Unavoidable.

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4.3 Water Quality

This section analyzes the potential water quality impacts of the Estuary Management Project in the Russian River Estuary (Estuary). As previously noted in **Chapter 2.0, Project Description,** the Estuary Study Area comprises the Russian River Estuary (Estuary), which extends approximately seven miles from the mouth of the Russian River upstream to Duncans Mills just beyond the confluence of Austin Creek. Under certain closed conditions, the Estuary may backwater to Monte Rio, and as far upstream as Vacation Beach. Although this condition may periodically occur, potential impacts related to water quality are generally thought to be limited to the seven mile area downstream of Austin Creek. Where appropriate, discussion of water quality impacts within the Estuary Study Area and the larger maximum backwater area, which extends upstream past Austin Creek to approximately Vacation Beach, is provided (Please refer to **Figure 2-3** in **Chapter 2.0, Project Description**. Potential impacts relating to flooding and drainage conditions are presented in **Section 4.2, Hydrology and Flooding**. Potential impacts to fisheries and biological resources are discussed in **Section 4.4, Biological Resources,** and **Section 4.5, Fisheries**, respectively.

4.3.1 Setting

Regional Setting

Russian River Watershed

The Russian River drains an area of 1,485 square miles that is approximately 110 miles long and from 12 to 32 miles wide. From its source, about 15 miles north of Ukiah, the river flows southward for 90 miles through Redwood, Ukiah, Hopland, and Alexander Valleys, and through the northwestern part of the Santa Rosa Plain. The river then turns abruptly westward at Mirabel Park and flows for 22 miles through a canyon in the mountains before entering the Pacific Ocean at Jenner.[1]

The Estuary overlies the Lower Russian River Valley Groundwater Basin No. 1-60 (DWR, 2003) located in the Mendocino Range within west-central Sonoma County. The valley begins over two miles east of Mirabel Heights and extends west and southwest for approximately 23 (river) miles until it exits into the Pacific Ocean near Jenner with an average width of about 0.25 miles. The valley is defined by the areal extent of alluvial and river-channel (fluvial) deposits that are bounded predominantly by bedrock of the Franciscan Complex. The deposits consist of unconsolidated and semi-consolidated alluvial and river (fluvial) sediments ranging in size from boulders to clay (Blake et al., 2002) but consist largely of sand and gravel with minor amounts of silt and clay (DWR, 2003). The Franciscan Complex that underlies the lower Russian River Valley is considered predominantly non-water-bearing and therefore, does not yield significant quantities of water to wells (DWR, 2003). With respect to groundwater beneficial uses identified in the North Coast RWQCB Basin Plan, the Estuary portion of the Lower Russian River Basin

[1] The Russian River Interactive Information System, Watershed Background, Hydrology, http://www.russianriverwatershed.net/Content/10065/Hydrology.html

identified Municipal and Domestic Water Supply (MUN) as a "potential" beneficial use, and does not identify Groundwater Recharge (GWR) as a beneficial use.

Surface water quality in the Russian River is influenced primarily by the various inflows or inputs in the river and is a function of the season, the surrounding land use, and the tributaries flowing into the river. During the wet season (November through May) stormwater runoff accounts for most of the flow in the Russian River. Treated wastewater discharges from various cities and communities in the Russian River watershed also account for a small portion of the flows. During the dry season (June through October), most of the flow in the Russian River consists of water released from Lake Mendocino or Lake Sonoma. Implementation of the proposed project would occur during the dry season from May 15 through October 15.

Stream channelization, road construction along stream margins, bank stabilization, and water diversions in tributaries have significantly degraded stream habitats throughout the watershed by simplifying stream channels, isolating them from their floodplains, greatly increasing sedimentation, blocking fish migrations, and reducing or eliminating flow and cover (USACE, 2008). Water quality priorities within the watershed include the need for control of nonpoint source runoff from logging, rural roads, agriculture, and urban areas. As such, sediment, temperature, and nutrients are the items of primary focus for the North Coast Regional Water Quality Control Board (RWQCB; see Section 4.3.2 for details). For a discussion on sediment, please see **Section 4.2, Hydrology and Flooding**.

Consequently, the RWQCB has listed the entire Russian River on the 2006 Clean Water Act (CWA) Section 303(d) List of Water Quality Limited Segments (RWQCB, 2007a) for sedimentation/siltation and temperature impairments. Several hydrologic sub-areas within the Russian River watershed are also listed for impairments including specific conductivity, pH, low dissolved oxygen, nutrients, indicator bacteria, and mercury. The 303(d) impairments identified for the lower section of the Russian River where the project site is located are discussed in **Section 4.3.2**.

Estuary Water Quality

Surface water quality in the Estuary is a function of various sources of inflows into the Russian River (also discussed above under the Regional Setting) and conditions within the Estuary such as tidal influence and stratification of temperature and salinity. As noted in **Chapter 3.0, Project Background and Environmental Setting**, the Water Agency has conducted long-term water quality monitoring, under various sampling programs, within the Russian River Estuary since 1996 to establish baseline information and gain a better understanding of the longitudinal and vertical water quality profile of the Estuary during the ebb and flow of the tide, as well as to track changes that may occur during periods of barrier beach closure and reopening. The data from these sampling reports are used to discuss different parameters that characterize the water quality conditions in the Estuary.

Sampling Program Summary

The Water Agency conducted water quality monitoring from April or May of each year through the spring, summer, and fall (SCWA, 1996; 1997; 1998; 1999; 2005). Current water quality monitoring efforts include data collection at six stations in the Estuary (refer to **Figure 4.3-1**): the Mouth of the Russian River at Goat Rock State Beach (Mouth Station); Patty's Rock upstream from Penny Island (Patty's Rock Station); Bridgehaven just downstream from the Highway 1 bridge (Bridgehaven Station); in the pool downstream of Sheephouse Creek (Sheephouse Creek Station); a pool next to an area known as Heron Rookery approximately halfway between Sheephouse and Freezeout creeks (Heron Rookery Station); and downstream of Freezeout Creek (Freezeout Creek Station).

Multi-parameter, continuously-recording water quality meters (sondes) were deployed during mid-April to mid-May and were retrieved prior to the onset of winter rains. Hourly data was collected on water temperature, dissolved oxygen (DO), salinity, pH, and specific conductance in 2005, 2006, 2007, 2008, and 2009 (SCWA, 2009).

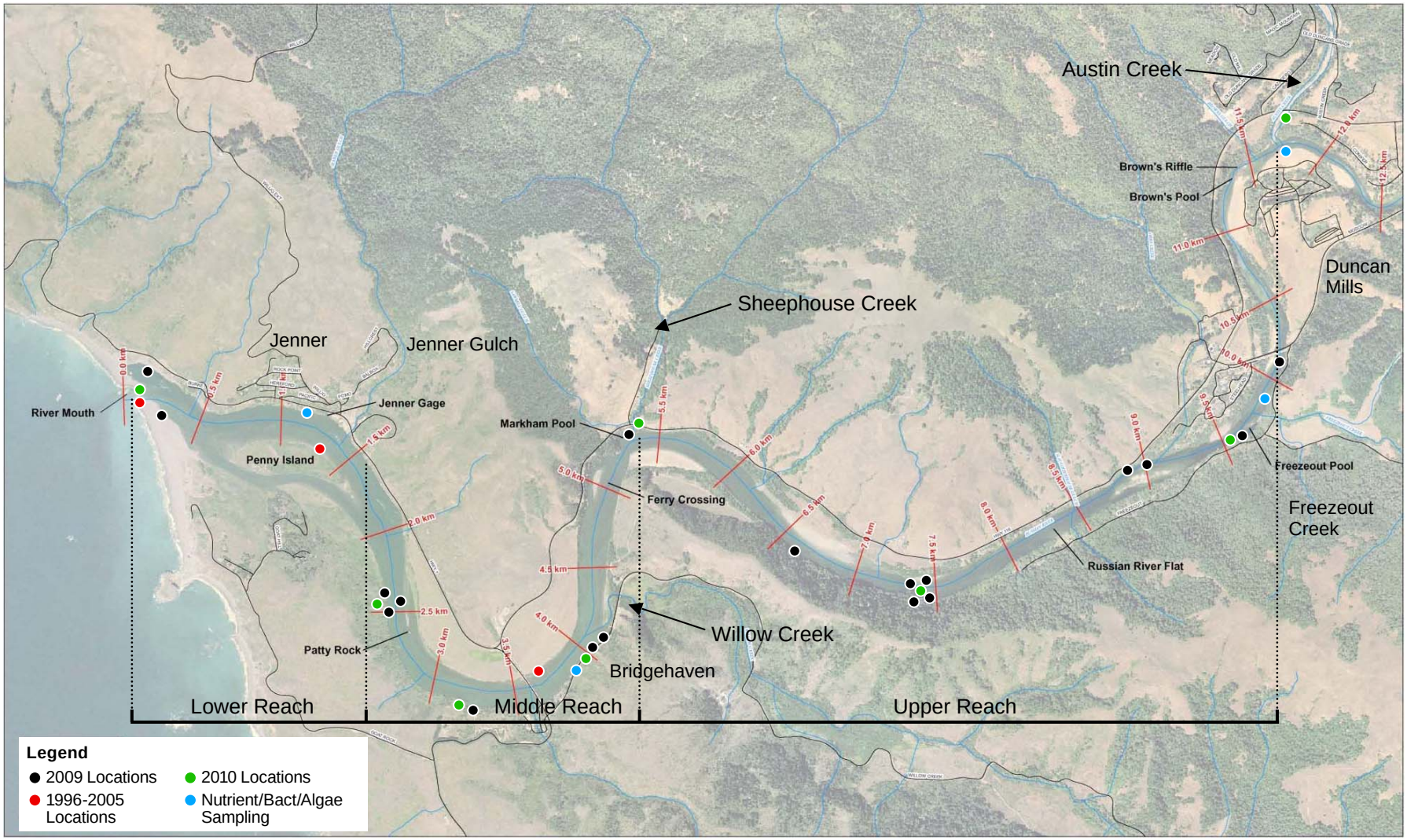
In 2009, the Water Agency contracted with Bodega Marine Laboratory (U.C. Davis) to provide a view of circulation, stratification, residence and salinity in the Russian River Estuary over summer and fall months of 2009. An extended barrier beach closure period lasting 29 days from September 7 through October 5 allowed for a study of prolonged closure conditions in the Estuary at high temporal and spatial resolution, along with two subsequent shorter closures (October 14-17 and October 22-27). This information is reported in *Hydrography of the Russian River Estuary Summer-Fall 2009* (Behrens and Largier, 2010) and a discussion of salinity, dissolved oxygen and temperature data is presented in **Chapter 3.0, Project Background and Environmental Setting, Section 3.7 Extended Closure – 2009 Data Report**.

In addition to the above sampling programs, the U.S. Geological Survey (USGS) prepared a report (Anders et al., 2006) in cooperation with the Water Agency to establish baseline water quality data during summer flows in the Russian River. In the Lower Russian River Basin, the Estuary monitoring sites (Jenner and Willow Creek Marsh) were sampled in summer 2004 for inorganic and organic constituents, nutrients, trace elements, organic carbon, and mercury (Anders et al., 2006).

The Water Agency conducted nutrient and indicator bacteria sampling in the Estuary in 2009 and expanded sampling in 2010 to include areas upstream of the Estuary, including a station at Monte Rio. Sampling conducted by the Water Agency in June through October, 2010, included testing for nutrients such as total organic nitrogen, ammonia, total kjeldahl nitrogen (TKN), nitrates, nitrites, total phosphorus and indicator bacteria. A discussion of these constituents is presented below.

Constituents

In addition to the physical parameters described in **Chapter 3.0, Project Background and Environmental Setting, Section 3.7, Extended Closure – 2009 Data Report** (salinity, DO, and temperature), the concentrations of inorganic and organic constituents, including nutrients,



0 1600
Feet

SOURCE: Behrens and Largier, 2009; SCWA, 2005; ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 4.3-1
Estuary Study Area : Biological and Water Quality Sampling Locations

chlorophyll *a* (an indicator of algal growth and organics tied to the presence of nutrients), and indicator bacteria, help in assessing the overall ecological health of the Estuary in terms of water quality and the protected beneficial uses such as biological habitat and recreation (see also **Table 4.3-1**). For a discussion on sediment, please see **Section 4.2, Hydrology and Flooding**.

High levels of nutrients (i.e., nitrogen and phosphorus) and lower DO from internal nutrient cycling primarily in the reservoirs within the watershed are a concern in the middle section of the Russian River (RWQCB, 2007a). However, the mainstem of the Russian River, including the Estuary, is not listed as impaired for these constituents. Therefore, the background concentrations of these constituents in the Estuary are considered indicators of the current conditions of the Estuary that support the beneficial uses identified in the RWQCB Basin Plan for the Lower Russian River, including aquatic habitat and recreation (see **Table 4.3-1** in **Section 4.3.2** below).

Nutrients

Nutrients such as nitrogen and phosphorus are essential for life processes in aquatic organisms including algal growth. Through a process called photosynthesis, algae utilize solar energy to convert simple inorganic nutrients into complex organic molecules. The organic matter in turn serves as energy source for other organisms (Deas and Orlob, 1999). Increased cellular processes such as photosynthesis and respiration result in greater algal growth and accumulation of organic matter especially in waters that have lower DO levels and high temperatures, which in turn affect the overall health of the water body. The rates of such processes vary with the nature of the water bodies. The Estuary has a typical estuarine environment with varying levels of nutrients from the Russian River mouth to upstream areas.

The most recent monitoring in the Estuary conducted by the Water Agency (June to October, 2010) included testing for nutrients such as total organic nitrogen, ammonia, TKN, nitrates, nitrites, and total phosphorus. Samples were collected from five stations (Jenner, Bridgehaven, Duncans Mills, Casini Ranch, and Monte Rio). The USEPA has established section 304(a) nutrient criteria across 14 major ‘ecoregions’ of the United States. USEPA’s section 304(a) criteria are intended to provide for the protection and propagation of aquatic life and recreation (USEPA, 2002). The Russian River was designated as occurring in Aggregate Ecoregion III. The following discussion of nutrients compares sampling results to these USEPA criteria. However, it is important to note that these criteria are established for freshwater systems, and as such, are only applicable to the freshwater portions of the Estuary. Currently, there are no numeric nutrient criteria established for estuaries.

The USEPA’s desired goal for total nitrogen in Aggregate Ecoregion III is 0.38 milligrams per liter (mg/L) for rivers and streams not discharging into lakes or reservoirs. Calculating total nitrogen values requires the summation of the different components of total nitrogen; organic and ammoniacal nitrogen (together referred to as total kjeldahl nitrogen or TKN), and nitrate and nitrite nitrogen. Total nitrogen concentrations in the upper estuary, including Monte Rio, were predominantly below the USEPA criteria of 0.38 mg/L, with a few exceptions. Concentrations of approximately 0.4 mg/L were recorded at all three upper stations in June when spring flows were still high from an above average rainfall season. Total nitrogen concentrations of 0.83 mg/L were

recorded on single occasions at the Monte Rio and Duncans Mills stations in October at a time when there were several barrier beach closures and breaches occurring. The lower estuary, as represented by the Bridgehaven and Jenner stations, had more frequent exceedances of the USEPA criteria of 0.38 mg/L, including a high value of 0.58 mg/L recorded at the Bridgehaven station and 0.75 mg/L recorded at the Jenner station. However, it is important to note that three of the five exceedances at Jenner occurred during June and July when spring flows were still elevated above normal levels, and another exceedance occurred in October following the breaching of the barrier beach. Elevated levels of total nitrogen were observed to occur during both open and closed conditions in the Estuary.

The USEPA's desired goal for total phosphates as phosphorus in Aggregate Ecoregion III has been established as 21.88 micrograms per liter (µg/L), or approximately 0.022 mg/L, for rivers and streams not discharging into lakes or reservoirs. Total phosphorus concentrations exceeded the USEPA criteria a majority of the time during both open and closed conditions at all stations in the Estuary, including the Monte Rio station. Detectable levels of total phosphorus ranged between 0.021 and 0.077 mg/L during the sampling period of June to October (SCWA, 2010). Total phosphorus concentrations were generally higher in June and July at all stations, when late springs flows were still elevated, and tended to decrease, but remain above USEPA criteria, through the rest of the season into October. There were a couple of exceptions, most notably at the Bridgehaven station, where the 0.077 mg/L value was recorded in October following the breaching of the barrier beach. (SCWA, 2010).

In the process of photosynthesis, *chlorophyll a* - a green pigment in plants -absorbs sunlight and combines carbon dioxide and water to produce sugar and oxygen. Chlorophyll *a* can therefore serve as a measureable parameter of algal growth. Qualitative assessment of primary production on water quality can be based on chlorophyll *a* concentrations. A University of California, Davis report on the Klamath River (1999) assessing potential water quality and quantity regulations for restoration and protection of anadromous fish in the Klamath River includes a discussion of chlorophyll *a* and how it can affect water quality. The report characterizes the effects of chlorophyll *a* in terms of different levels of discoloration (e.g., no discoloration to some, deep, or very deep discoloration). The report indicated that less than 10 µg/L (or 0.01 mg/L) of chlorophyll *a* exhibits no discoloration (Deas and Orlob, 1999). Additionally, the USEPA criteria for chlorophyll *a* in Aggregate Ecoregion III is 1.78 µg/L, or approximately 0.0018 mg/L for rivers and streams not discharging into lakes or reservoirs. Chlorophyll *a* levels in the Estuary were generally lower in the upper estuary, including Monte Rio, and higher in the lower estuary, especially around the Bridgehaven station. Higher concentrations were typically observed early in the season during higher late spring flows and also late in the season during or following barrier beach closure and breaching. Chlorophyll *a* ranged from 0.0001 to 0.0037 mg/L at all stations other than Bridgehaven, with the majority of values below the USEPA criteria. The Bridgehaven station had the most exceedances by far and concentrations ranged from 0.0002 mg/L to 0.0083 mg/L. Higher values at Bridgehaven may be attributable to the location of the station at the mouth of Willow Creek, an area that may provide conditions beneficial to the production of algae, including chlorophyll *a*.

Indicator Bacteria

The following information on the current understanding of human-related bacteriological issues can be found on the North Coast Regional Water Quality Control Board's webpage on Bacteriological Water Quality Sampling.[2]

The RWQCB's Water Quality Control Plan for the North Coast Region (Basin Plan) contains a fecal coliform bacteria freshwater water quality objective for the protection of waters designated with the contact recreation beneficial use (REC-1). Water quality objectives present in the Basin Plan were developed in the 1970s and based on recommendations provided by the California Department of Public Health (CDPH) (formerly California Department of Health Services or DHS) at that time. However, since the 1970s, the U.S. Environmental Protection Agency (USEPA) and the CDPH have recommended standards that differ from the current Basin Plan freshwater bacteria objective.

In 2006, the California Department of Public Health (CDPH) developed the "Draft Guidance for Fresh Water Beaches", which describes bacteria levels that, if exceeded, may require posted warning signs in order to protect public health. The CDPH draft guideline for total coliform is 10,000 most probable number (MPN) per 100 milliliters (ml). The MPN for *Enterococcus* is 61 per 100 ml, and the MPN for *E. coli* is 235 per 100 ml. However, it must be emphasized that these are draft guidelines, not adopted standards, and are therefore both subject to change (if it is determined that the guidelines are not accurate indicators) and are not currently enforceable. In addition, these draft guidelines were established for and are only applicable to fresh water beaches. Currently, there are no numeric guidelines that have been developed for estuarine areas.

Sources of these bacteria include the natural environment (soils and decaying vegetation), stormwater, urban runoff, animal wastes (both wildlife and domestic animals), and human sewage. Analysis for coliform, *Enteroccoccus*, and *E. coli* bacteria are widely used as an indicator test. Coliform is a heading that describes a type of bacteria, which includes *E. coli*. It is found within the intestines of warm-blooded animals, though most water contamination comes from cattle and people. *Enterococcus* is much like coliform bacteria, but is known to have a greater correlation with swimming-associated illnesses and is less likely to die-off in highly saline water. While these bacteria normally occur at low levels in the environment, high levels can indicate contamination (but do not cause illness) and the presence of other harmful pathogens.

Analysis for levels of Total Coliform, *Enterococcus*, and *Escherichia coli* are of primary concern. However, other measurements are taken in the field that can provide an indication of whether conditions of concern exist at the time of sampling including dissolved oxygen content, pH (hydrogen ion activity), conductivity (ionized or dissolved minerals in the water), water temperature, and turbidity (clarity). For example, a lower than normal dissolved oxygen reading can indicate the presence of decaying matter; a higher than normal turbidity could indicate a recent discharge of sediment; or a higher than normal conductivity reading could indicate the presence of a nonpoint source runoff of animal wastes (which are high in ionized salts).

[2] http://www.swrcb.ca.gov/northcoast/water_issues/programs/water_quality_sampling

Sampling events in 2009 and 2010 indicate there is a large variation in indicator bacteria levels observed through the different sections of the Estuary. These variations were observed to occur under both open and closed mouth conditions and may be seasonal as well. In 2009, total coliform counts were observed to be higher during open conditions in mid-summer than during closed conditions, including the 29-day extended closure at the end of the management season. All three stations sampled in 2009 had at least one total coliform value above the draft guidance for freshwater beach posting of 10,000 MPN/100ml during open conditions, with the highest value of 24,196 MPN/100 ml occurring at the Jenner station. *Enterococcus* and *E. coli* counts were generally low, but were observed to occasionally exceed recommended values in both open and closed conditions. It is important to note that the draft guidance for beach postings applies only to freshwater beaches.

However, in 2010, total coliform counts were not significantly elevated during mid-summer open conditions (except at the Bridgehaven Station) and instead were observed to be significantly elevated during closed conditions at the end of the management season and were accompanied by high counts of *Enterococci* and E. coli, as well. These higher counts in 2010 may be attributable to increased inputs of flow into the Estuary at the end of September into early October. Indicator bacteria levels were observed to increase at all stations at the end of September and during the repeated closures in early October.

Local Groundwater Conditions

The approximately two-mile long portion of the groundwater basin underlying the Estuary from the Pacific Ocean upstream to approximately Willow Creek is described as an area with a low or highly variable water yield (Sonoma County, 2010). The area from Willow Creek upstream to the Santa Rosa Plain, east of the project area is described as part of a major groundwater basin (the Lower Russian River Valley Basin). Much of the Russian River, its floodplain, and areas immediately within the river valley are also cited as a groundwater recharge area, indicating that river water is the primary source of groundwater in the local aquifer (Sonoma County, 2010). The immediate portions of the Russian River valley downstream of Willow Creek to the Pacific Ocean could also reasonably be assumed to provide groundwater recharge.

Limited information is available regarding groundwater conditions in the project area. The approximately two-mile portion of the underlying groundwater basin under the Estuary from the Pacific Ocean upstream to approximately Willow Creek is identified as an area with a low or highly variable groundwater yield (SCWA, 2010). Information regarding the exchange between groundwater and surface water of the Russian River within the Estuary Study Area is limited. Based on studies of surface water and groundwater interaction in upstream reaches of the Russian River, it is anticipated that the exchange between surface water and groundwater will vary based, in part, on distance from the river, amount of localized groundwater pumping and seasonal variations in river stage. For example, when the stage of the Russian River is higher than groundwater levels in the alluvial aquifer, surface water from the Russian River recharges groundwater and, conversely, when the stage of the Russian River is lower than groundwater levels in the alluvial aquifer, groundwater will discharge to the Russian River.

Sources available through the California Department of Water Resources and the California Department of Public Health indicate that groundwater production from the Russian River alluvial aquifer is primarily limited to private domestic wells[3] within the Estuary Study Area (DWR, 2003). The nearest municipal supply wells completed within the Russian River alluvial aquifer is located in the vicinity of Monte Rio and serves the Sweetwater Springs Water District. Water supply wells completed within the Russian River alluvial aquifer serving small water systems (e.g., public restaurants and campgrounds) were identified in the vicinity of Duncans Mills. Drinking water for other communities in the area is provided by combinations of surface water from tributaries of the Russian River, and groundwater and spring sources from bedrock areas located outside the alluvial aquifer.

The Water Agency has acquired limited additional information regarding water wells in and near the Estuary, including Duncans Mills, Monte Rio, the Goat Rock area south of Jenner (SCWA, 2010). Review of the available information for wells located in the project area identified 20 known private water supply wells completed within the Russian River alluvial aquifer within the Estuary Study Area. Eight additional wells were identified between Austin Creek and Vacation Beach. It is likely that more wells exist within the project area that that do not have Well Completion Forms on file with the Department of Water Resources (DWR) or the Sonoma County Permit and Resource Management Department. The lithology[4] recorded on the well logs for the 28 identified wells all describe predominantly sands and gravels consistent with the alluvium in and along the margins of the Russian River (see **Figure 4.1-1 in Section 4.1, Geology**).

Anecdotal comments from local residents suggest that water in wells located close to the river in the Estuary area becomes brackish (from salt water intrusion) during certain times of the year and remains that way until the rainy season begins or there are changes in the condition of the Estuary. This would indicate that tidally-influenced ocean water periodically flows upstream, partially mixing with freshwater, and enters the aquifer that supplies the local water wells, resulting in seasonally brackish conditions. Brackish conditions are a mix between freshwater and ocean water conditions. This is consistent with the findings of previous studies that brackish water is found in wells extending from the river mouth up to Duncans Mills (USGS, 1965 and DWR, 2003).

Limited local domestic well water quality data is available in a 1965 United States Geologic Survey (USGS) water supply paper on groundwater along the Russian River and other connected areas (USGS, 1965). One-time water quality tests from the 1950s were compiled from groundwater samples collected from four domestic water supply wells pumping water from alluvium along the margins of the Russian River within the project area. **Table 4.3-1** below summarizes the chloride data, a conservative indicator of salt water intrusion up the Estuary, along with the sample dates and the relative qualitative distance from the river. The wells are listed in order of relative lateral distance (the only description provided) from the river to highlight the decreasing chloride concentrations.

[3] There are limited public water supply systems.
[4] Lithology is defined as the physical character and composition of a bedrock of types of rock comprising a substrate in terms of its geologic structure, color, mineral composition, grain size, formation, etcetera.

TABLE 4.3-1
SUMMARY OF WELL DATA FOR ADJACENT DOMESTIC WELLS

Well Number	Sample Date	Chloride Concentration in Parts per Million	Distance Upstream from River Mouth in Kilometers	Relative Lateral Distance from River Margin
7/11-15P1	12-September-1951	3,580	~8 (along Russian River Flat)	Closest
7/11-17J1	22-July-1954	2,920	~5.3 (near Markham Pool)	Next closest
7/11-20L1	21-August-1954	774	~3.5 (across from Bridgehaven)	Farther
7/11-14E1	12-September-1951	14	~9.9 (Duncans Mills)	Farthest

NOTES:
Well numbering scheme is township/range-section followed by well number
Upstream distance based on Plate 1 in USGS 1548 and Figure 2-3 in the USGS report
Relative lateral distance based on text in USGS 1548; all wells appear to be in or along the river floodplain

The limited 1950s data is consistent with the more recent anecdotal information of brackish water intrusion into domestic wells drawing water from within and near the floodplain as much as five miles upstream from the river mouth. However, unverified anecdotal information suggests it may be as far as 6.2 miles (10 km) upstream. Although no numerically-measured lateral distances from the river to the sampled wells were available, the relative qualitative distances suggest that the brackish water intrusion attenuates with increased lateral distance from the river.

Limited chemical testing data is available for two wells in the Duncans Mills area, collected in 1997 and 2000. The chloride concentrations in samples collected from these two locations ranged from 9 to 11.9 milligrams per liter (equivalent to parts per million). This data further suggests that brackish water conditions attenuate with distance from the ocean and from the margins of the Estuary.

4.3.2 Regulatory Framework

Federal

Clean Water Act

Under the Clean Water Act (CWA) of 1977, the U.S. Environmental Protection Agency (USEPA) seeks to restore and maintain the chemical, physical, and biological integrity on the nation's waters. The CWA authorizes the USEPA to implement water quality regulations. The National Pollutant Discharge Elimination System (NPDES) permit program under Section 402(p) of the CWA controls water pollution by regulating point sources that discharge pollutants into waters of the U.S. California has an approved state NPDES program. The USEPA has delegated authority of issuing NPDES permits to the California State Water Resources Control Board (SWRCB), which has nine regional boards. The North Coast Regional Water Quality Control Board (RWQCB) regulates water quality in the project area.

Total Maximum Daily Load

Section 303(d) of the CWA requires that each state identify water bodies or segments of water bodies that are "impaired" (i.e., do not meet one or more of the water quality standards established by the state). These waters are identified in the Section 303(d) list as waters that are polluted and need further attention to support their beneficial uses. Once the water body or segment is listed, the state is required to establish Total Maximum Daily Load or TMDL for the pollutant, which is causing the conditions of impairment. TMDL is the maximum amount of a pollutant that a water body can receive and still meet water quality standards. Typically, TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The intent of the 303(d) list is to identify water bodies that require future development of a TMDL to maintain water quality. See regional regulatory framework below for water bodies in the project area that are listed for TMDLs.

State

Porter-Cologne Water Quality Act

The Porter-Cologne Water Quality Control Act allows the SWRCB to adopt statewide water quality control plans. The purpose of the plans is to establish water quality objectives for specific water bodies. The act also authorizes the NPDES program under the CWA, which establishes effluent limitations and water quality requirements for discharges to waters of the state. Under the NPDES program, the North Coast RWQCB has established requirements for water quality in the project area. See **Section 4.2, Hydrology and Flooding**, for details.

Regional

North Coast Basin Plan

The North Coast RWQCB prepared the *North Coast Water Quality Control Plan* (Basin Plan) (2007b) that contains descriptions of the legal, technical, and programmatic basis for water quality regulation in the region. The Basin Plan describes beneficial uses of major surface waters and their tributaries. **Table 4.3-2** below lists the beneficial uses for the Austin Creek and Guerneville Hydrologic Subareas that are part of the Lower Russian River where the project site is located.

The North Coast RWQCB is responsible for issuing permits to ensure the protection of beneficial uses. **Table 4.3-3** lists the water quality objectives (WQOs) for freshwater and estuarine bodies that were established to protect these beneficial uses. Freshwater objectives apply to waters that have salinity of equal to or less than 1 part per thousand (ppt) 95 percent of the time, and estuarine objectives apply in brackish to saline water. Additionally, some objectives apply to different target organisms (aquatic life or humans) or different periods of exposure (e.g., 1-hour average or 4-day average for aquatic life and 30-day average for human health). In evaluating existing water quality conditions in the Estuary, the 4-day average criteria for aquatic life (which are lower than the 1-hour average) and 30-day average human health criteria based on consumption of "organisms only" would apply. These criteria are applicable as data collected are typically indicative of conditions that persist greater than a day (SCWA, 2006).

TABLE 4.3-2
BENEFICIAL USES OF LOWER RUSSIAN RIVER HYDROLOGIC AREA

Beneficial Uses	Lower Russian River Hydrologic Area		
	Austin Creek Hydrologic Subarea	Guerneville Hydrologic Subarea	Estuaries
Municipal and Domestic Supply (MUN)	E	E	P
Agricultural Supply (AGR)	E	E	P
Industrial Service Supply (IND)	E	E	P
Industrial Process Supply (PRO)	P	P	P
Groundwater Recharge (GWR)	E	E	
Freshwater Replenishment (FRSH)		E	P
Navigation (NAV)	E	E	E
Hydropower Generation (POW)	P	P	P
Water Contact Recreation (REC1)	E	E	E
Non-Contact Water Recreation (REC2)	E	E	E
Commercial and Sport Fishing (COMM)	E	E	P
Warm Freshwater habitat (WARM)	E	E	P
Cold Freshwater habitat (COLD)	E	E	E
Wildlife Habitat (WILD)	E	E	E
Rare, Threatened, or Endangered Species (RARE)	E	E	P
Fish Migration (MIGR)	E	E	E
Fish Spawning (SPWN)	E	E	E
Shellfish Harvesting (SHELL)		P	E
Estuarine Habitat (EST)		E	E
Aquaculture (AQUA)	P	P	P
Native American Culture (CUL)			P

E = Existing Beneficial Use
P = Potential Beneficial Use
EST use applies only to the estuarine portion of the waterbody.

SOURCE: RWQCB, 2007b

As previously noted with respect to nutrients, the USEPA has established section 304(a) nutrient criteria to provide for the protection and propagation of aquatic life and recreation (USEPA, 2002) and the Russian River is in Aggregate Ecoregion III. These criteria are also identified in **Table 4.3-3**. However, it is important to note that these criteria are established for freshwater systems, and as such, are only applicable to the freshwater portions of the Estuary. Currently, there are no numeric nutrient criteria established for estuaries.

As previously noted with respect to indicator bacteria, the CDPH's "Draft Guidance for Fresh Water Beaches" describes bacteria levels that, if exceeded, may require posted warning signs in order to protect public health. The CDPH draft guideline for total coliform is 10,000 most probable number (MPN) per 100 milliliters (ml). The MPN for *Enterococcus* is 61 per 100ml, and the MPN for *E. coli* is 235 per 100ml. However, it must be emphasized that these are draft

TABLE 4.3-3
BASIN PLAN WATER QUALITY OBJECTIVES FOR APPLICABLE BENEFICIAL USES

Parameter/ Constituent	Water Quality Objectives	Applicable Beneficial Use or Designation[5]
Temperature	Not to exceed 5ºF () above naturally receiving water temperature	Cold and warm freshwater habitat
Bacteria (shall not degrade beyond the natural background levels) Fecal Coliform	Median fecal coliform concentrations based on a minimum of not less than 5 samples for any 30-day period shall not exceed 50/100 milliliter (ml) of sample Nor shall more than 10% of total samples during any 30-day period exceed 400/100 ml	Water contact recreation
Dissolved Oxygen (Russian River Hydrologic Unit)	Minimum – 7 mg/L 90% Lower Limit (1) – 7.5 mg/L 50% Lower Limit (2) – 10 mg/L	Cold and Warm freshwater habitat
Biostimulatory substances (nitrogen, phosphorus) Algal productivity (see below)	Waters shall not contain in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.	Water contact recreation
Additional Non-Basin Plan Criteria		
USEPA – Total Nitrogen (3)	0.38 mg/L	Recommended Criteria for aquatic life and recreation
USEPA – Total Phosphates (3)	0.022 mg/L	Recommended Criteria for aquatic life and recreation
USEPA – Chlorophyll *a* (3)	0.0018 mg/L	Recommended Criteria for aquatic life and recreation
CDPH – Total Coliform (4)	10,000 MPN/100 milliliters	Draft Guidance for Freshwater Beaches
CDPH – Enterococcus (4)	61 MPN/100 milliliters	Draft Guidance for Freshwater Beaches
CDPH – E. Coli (4)	235 MPN/100 milliliters	Draft Guidance for Freshwater Beaches

1) 90% lower limits represent the 90 percentile values for a calendar year. 90% or more of the values must be greater than or equal to a lower limit.
2) 50% lower limits represent the 50 percentile values of the monthly means for a calendar year. 50% or more of the monthly means must be greater than or equal to a lower limit.
3) USEPA 304(a) (2002): Applicable to freshwater areas; no numeric criteria for Estuaries currently available.
4) California Department of Public Health (2006) Draft Guidance for Freshwater Beaches.
5) These are Beneficial Uses applicable within the Estuary Study Area and do not represent all Beneficial Uses protected by these standards that may apply outside the Estuary Study Area.

SOURCE: RWQCB, 2007b;

guidelines, not adopted standards, and are therefore both subject to change (if it is determined that the guidelines are not accurate indicators) and are not currently enforceable.

Groundwater

The North Coast Basin Plan (RWQCB, 2007b) defines groundwater as subsurface water in soils and geologic formations that are fully saturated all or part of the year. Groundwater is any subsurface body of water which is or can be beneficially used or usable. Existing and potential

beneficial uses applicable to groundwater in the North Coast Region include municipal, domestic, industrial and process, and agricultural water supply and freshwater replenishment to surface waters, among others. Occasionally, groundwater is used for other purposes (e.g., groundwater pumped for use in aquaculture operations). The water quality objectives in the Basin Plan (**Table 4.3-2** above) typically apply to groundwater that is used for such beneficial purposes. There is limited information (some of it anecdotal) available on the current groundwater usage in Jenner and near the Estuary. The available information suggests that groundwater in the project area is used for domestic water supply; other potential uses listed above are undocumented.

TMDL Implementation Under Clean Water Act

In accordance with Section 303(d) of the Clean Water Act, the NCRWQCB has identified impaired water bodies within its jurisdiction, and the pollutant or stressor responsible for impairing the water quality (see **Table 4.3-4**). The entire Russian River watershed, including the estuary, is impaired for sediment and temperature. Additionally, the NCRWQCB has identified the reach between Fife Creek in Guerneville and Dutch Bill Creek in Monte Rio as impaired for pathogens. This impaired reach is upstream of the Estuary Study Area, but portions are within the maximum backwater area, which extends upstream past Monte Rio to Vacation Beach.

4.3.3 Environmental Impacts and Mitigation Measures

This section describes the potential water quality impacts resulting from the implementation of the proposed project (i.e., continuation of the historic breaching practice for seven months [October 16 – May 14] and lagoon adaptive management from May 15 through October 15). The evaluation considered project plans, current conditions at the project site, and applicable regulations and guidelines. Potential impacts to hydrology, flooding, and drainage conditions, are presented in **Section 4.2, Hydrology and Flooding**, and impacts to fisheries are discussed in **Section 4.5, Fisheries**.

Significance Criteria

Based on Appendix G the CEQA Guidelines, a potential water quality impact would be considered significant if the proposed project results in any of the following:

1. Significant adverse effects on water quality; or
2. Exceed the water quality threshold.

Approach to Analysis

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to existing artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

TABLE 4.3-4
LOWER RUSSIAN RIVER WATER QUALITY IMPAIRMENTS

Lower Russian River Hydrologic subarea	Impairment/ Constituent	Purpose/ Source of the Impairment
Austin Creek	Sedimentation/siltation	1. Silviculture 2. Construction/Land Development 3. Disturbed Sites (Land Development) 4. Dam Construction 5. Flow Regulation/Modification 6. Erosion/Siltation
	Temperature	1. Hydromodification 2. Flow Regulation/Modification 3. Habitat Modification 4. Removal of Riparian Vegetation 5. Nonpoint Source
Guerneville	Sedimentation/siltation	1. Agriculture 2. Irrigated Crop Production 3. Specialty Crop Production 4. Agriculture-storm runoff 5. Agriculture-grazing 6. Silviculture 7. Construction/Land Development 8. Highway/Road/Bridge Construction 9. Land Development 10. Hydromodification 11. Channelization 12. Dam Construction 13. Upstream Impoundment 14. Flow Regulation/Modification 15. Habitat Modification 16. Removal of Riparian Vegetation 17. Stream bank Modification/Destabilization 18. Drainage/Filling Of Wetlands 19. Channel Erosion 20. Erosion/Siltation
	Temperature	1. Hydromodification 2. Upstream Impoundment 3. Flow Regulation/Modification 4. Habitat Modification 5. Removal of Riparian Vegetation 6. Stream bank Modification/Destabilization 7. Nonpoint Source
	Pathogens	1. Nonpoint source/ point source

SOURCE: RWQCB, 2007a

Surface Water Quality

The background / current measurements and concentrations of various physical parameters, inorganic and organic constituents, and microbiological parameters in the Estuary (SCWA, 2010; Anders et. al., 2006) are considered the indicators of the current conditions of the Estuary supporting beneficial uses such as aquatic habitat and recreation. The proposed project would result in a significant water quality impact if it would result in a substantial change in the current conditions that would:

1) Create a nuisance,
2) Significantly adversely affect the beneficial uses of the Estuary, or
3) Exceed the applicable water quality standards and recommendations discussed in Sections 4.3.1 and 4.3.2.

Groundwater

Water quality thresholds would apply to groundwater that is usable or has a beneficial use or purpose such as water supply. As described in the Setting, groundwater production is limited to domestic wells and no municipal groundwater systems are documented in the Estuary Study Area. The domestic usage appears to include small businesses and campgrounds. As noted in **Section 4.3.2, Regulatory Framework**, there is limited data available on the groundwater usage in Jenner, Duncans Mills, and near the Estuary. It is assumed that groundwater in the project area is used for domestic purpose. For the purpose of this analysis, the Project is considered to result in a significant effect on groundwater conditions if the project would substantially adversely affect the background or current groundwater conditions compared to the existing conditions.

The Estuary provides a tidal environment with seasonal variations in salinity, DO, and temperature as described in **Section 4.3.1 Setting**. The project objectives are to provide flood management and enhance freshwater habitat for rearing salmonids. The impact analysis below is based upon the net changes that may occur to the water quality in the Estuary during the lagoon adaptive management activities. There would be no changes in the current activities outside of the lagoon management period.

Impacts Analysis

Impacts are summarized and categorized as either “no impact,” “less than significant,” “less than significant with mitigation,” or “significant and unavoidable.”

Impact 4.3.1: The action of creating the outlet channel during the lagoon management period could adversely affect the water quality in the Estuary. (Less than Significant)

Creation and maintenance of the outlet channel would involve the use of one or two pieces of heavy equipment such as an excavator or a bulldozer, consistent with current artificial breaching activities. As noted in **Chapter 2.0, Project Description**, the frequency of equipment operation on the barrier during the lagoon management period may be incrementally increased compared to

existing conditions, and could include up to 18 maintenance activities over the course of the lagoon management period, depending upon the performance of the outlet channel. Operation of mechanized equipment would include the use of chemicals such as fuel, oil, and grease. Although these chemicals would not be stored onsite, inadvertent spills or release of these materials could occur during maintenance of the outlet channel. However, the Water Agency has standard operating procedures in place that help control and manage handling and usage of chemicals during such operations (please refer to **Section 4.13, Hazards and Hazardous Materials**, for details). Procedures such as assigning an onsite contact for emergency response and/or rescue procedures and to perform site control during heavy equipment operation, would continue to be implemented during the outlet channel formation to avoid or control any such spills. The impact would be less than significant.

Impact Significance. Less than Significant; no mitigation required.

Impact 4.3.2: The change in the barrier beach breaching operations during the lagoon management period could adversely affect salinity, dissolved oxygen and temperature levels in the Estuary. (Less than Significant)

The primary beneficial uses of the lower Russian River, including the Estuary, include water supply, freshwater replenishment, freshwater habitat, estuarine habitat, and recreation (see **Table 4.3-1**). The purpose of the project is to comply with NMFS' Russian River Biological Opinion (see **Chapter 2, Project Description**, for details) and maintain rearing habitat for steelhead by providing freshwater lagoon-type conditions. Protection of such beneficial uses is a function of levels of constituents such as salinity, DO, and temperature (see **Section 4.3.2** and **Table 4.3-2**). The following discussion, therefore presents the potential impacts associated with the proposed project in terms of any changes that may occur in the levels of such constituents (e.g., increase in temperature or reduction in DO) that may adversely affect RWQCB Basin Plan beneficial uses, create a nuisance, or exceed the significance thresholds discussed above.

Salinity

The Estuary exhibits conditions typical of estuarine environments with varying salinity levels. Salinity steadily increases from low levels (0-5 parts per thousand [ppt]) at the freshwater/Estuary interface in the upper reach, to moderate levels in the middle reach (approximately 15 ppt), to the highly saline tidal zone near the ocean (30-35 ppt) (Day et al., 1989). Salinity in the lower Estuary up to Sheephouse Creek (30 to 35 ppt) generally reflects tidal conditions. The Estuary becomes brackish upstream of Sheephouse Creek and transitions to a predominantly freshwater system in the Duncans Mills area. The saline influence from the ocean would be reduced as the barrier beach develops and closes the inlet. Salinity patterns observed during the shorter barrier beach closures (October 14-17 and October 22-27, 2009) were similar to that of the prolonged barrier beach closure from September 7 to October 5, 2009 (Behrens and Largier, 2010).

The extended closed barrier beach conditions would change the local distribution of salinity levels in the Estuary as fresh/saltwater stratification occurs. This would reduce salinity levels within some areas of the Estuary, and may increase it within other areas of the Estuary. With extended barrier beach closures, salinity conditions would be expected to follow the trends observed during the 29-day closure in 2009. Data collected during that closure showed development of stratified conditions, with a downward movement of the denser, more saline water (25-35 ppt) and the development of an increased freshwater surface layer up to 6 feet in depth **(see Figure 3-6, in Section 3.7, Extended Closure Conditions -2009**). Depending upon the hydrologic year type, and the timing of closure, the distribution and depth of this stratification would be variable; however, based on observed conditions, closure would increase the freshwater lagoon conditions in the upper layers of the estuarine water column. If these conditions are replicable, the proposed project could result in a beneficial impact in terms of enhancing the freshwater lagoon conditions and salmonid rearing habitat as a beneficial use of the Estuary (See **Section 4.5, Fisheries**).

As previously discussed, high salinity levels of greater than 30 ppt have been observed to persist in some of the deeper pools of the Estuary under both open and closed conditions. As conditions become stratified, migration of saline waters upstream in the lower part of the water column has also been observed during several monitoring years, especially during closed estuary conditions. The most upstream location exhibiting increased salinity during summer months is below Austin Creek. Depending upon the performance of the outlet channel and the duration of closure, these conditions could extend further upstream towards Monte Rio. Although the distribution of these higher saline conditions may be changed under the proposed project, conditions are not anticipated to exceed salinities generally experienced within the Estuary Study Area. Therefore, potential impacts are considered less than significant. Please refer to **Impact 4.3.4** below for further discussion of potential secondary effects to groundwater quality.

Dissolved Oxygen

The extended closed barrier beach conditions would change the distribution of DO levels in the Estuary as fresh/saltwater stratification occurs. As observed during previous monitoring efforts in the Russian River (see **Section 4.3.1**), DO levels are generally above 5 mg/L when the barrier beach is open and below 5 mg/L when the barrier beach is closed. In addition, DO levels in the lower Estuary are generally observed to be higher at the surface, followed by the mid-depth and then the bottom layers (SCWA, 2006). When the Estuary is open, DO typically ranges from approximately 7 -10 mg/l in the surface layers, and varies, on average, from 4 to 9 mg/l in bottom areas of estuary pools (NMFS, 2008). When the bar closes, salinity stratification results in pronounced DO stratification in the closed lagoon. Supersaturation, hypoxic, and anoxic events were observed, with prolonged hypoxic (2 mg/L) and/or anoxic events occurring at the bottom of the deeper portions of the estuary through the duration of Estuary closure. Decreasing DO concentrations were also observed in the middle layers of the water column during barrier beach closures. However, DO levels at the surface in the Estuary did not appear to be negatively impacted by Estuary closure and remained similar to pre-closure conditions, or increased in some instances (SCWA, 2006). DO concentrations near the surface remain similar to those found when the Estuary is open (7 to 10 mg/l). Similar stratified conditions were also observed when the

barrier beach was open during neap tides or low river flows, indicating that the deeper portions of the Estuary may not be subject to mixing even during open tidal conditions.

With extended barrier beach closures, salinity stratification that can affect DO levels would be expected to follow the trends observed during the 29-day closure in 2009. DO levels are anticipated to be higher and conducive for habitat in the upper six to nine feet of the water column where freshwater lagoon conditions are expected to persist. As shown in **Figure 3-7 of Section 3.7. Extended Closure Data Report**, by the end of the barrier beach closure period on October 5, the halocline boundary between fresh and saline water had become nearly horizontal, leaving a uniform, nine foot thick layer of freshwater with higher DO levels (10 mg/L) at the surface. As previously noted in the discussion of DO in **Section 3.6.2, Current Estuary Management and Fish Habitat**, hypoxic and anoxic conditions currently occur within the saline layers in the deeper parts of the Estuary; these conditions appear to persist under both open channel and closed barrier beach conditions, and are likely influenced by several factors that affect Estuary mixing. Although these conditions are not consistent with DO objectives identified in the Basin Plan, they are considered a naturally occurring condition within the deeper holes of the Estuary. The proposed project is not expected to substantially change the occurrence of hypoxic and anoxic conditions within the deepest portions of the Estuary. However, stratified conditions during outlet channel operations would likely contribute to longer periods of hypoxic to anoxic conditions in the saline layers in the deeper parts of the Estuary during the lagoon management period. After opening the barrier beach at the end of the lagoon management period, these conditions would revert to either mixed Estuary conditions or predominantly freshwater conditions with the onset of rains and increased inflow into the Estuary.

Temperature

The extended closed barrier beach conditions would change the distribution of temperature in the Estuary as fresh/saltwater stratification occurs. During the 29-day closure observed in 2009, a vertical temperature gradient was formed after the closure with initial temperatures of above 20ºC at the surface in early September and then decreasing to between 16 to 18ºC at the surface by early October (**see Figure 3-8, Section 3.7, Extended Closure Data Report - 2009**). A vertical gradient was formed (stratification), which continued through the closure period, and development of a three layer system was observed, with a cooler saline to brackish bottom layer that is below the effects of solar heating, a warmer mid-depth layer of saline to brackish water subject to the effects of solar heating, and a relatively warm freshwater layer on the surface. The temperature profiles resulting from barrier beach closures do not indicate any exceedances or major deviations from natural or existing conditions (i.e., within 5ºF increase in natural temperatures as listed in the Basin Plan and shown in Table 4.3-3). Further, any change in the temperatures would be consistent with existing conditions and would remain only during the course of the lagoon management period each year.

Summary

As described in **Chapter 4.0, Introduction and CEQA Requirements,** the Estuary is a complex environment subject to changing environmental conditions on daily, seasonal, and annual timeframes. Therefore, it may not be possible to precisely predict the effects of the proposed

Estuary Management Project to the degree typically provided for under CEQA. Implementation of the Estuary Management Plan would increase the frequency and duration of closed freshwater lagoon conditions, and would therefore alter water quality parameters within the Estuary. The duration and geographic extent of these water quality parameters would also be altered, and more saline conditions in the lower parts of the water column could be extended upstream past Austin Creek towards Monte Rio. These conditions would be limited to the five month lagoon management period, and would revert back to fresh water conditions with the onset of rains.

Freshwater lagoon conditions and stratification observed within the Estuary, in combination with the proposed Estuary Management Project, could result in physical processes and water quality conditions that could have a temporary, adverse effect on aquatic ecology. These conditions include breakdown of stratified conditions and upwelling of hypoxic or anoxic (low dissolved oxygen) water or other dynamic physical processes that could affect water quality. The potential for dynamic physical processes to adversely affect water quality currently exists within the Estuary, and their occurrence is considered part of the physical ecological regime of the Estuary. The Estuary Management Project is proposed in order to provide a more natural set of habitat conditions for juvenile salmonids. However, adverse water quality conditions have occurred as part of the natural physical processes of the Russian River Estuary under existing conditions, and may occur in the future both with, and without, implementation of the Estuary Management Project. Similarly, natural physical processes have contributed to temporary adverse water quality conditions in other estuaries on the West Coast, including those that are managed for salmonid habitat, such as Pescadero Creek.

It is anticipated that conditions would remain within the naturally occurring range of water quality parameters observed within the Estuary, based upon monitoring conducted by the Water Agency and others, and that conditions would be consistent with those observed in other estuary systems. Additionally, alterations in water quality are not anticipated to conflict with parameters established in the RWQCB Basin Plan to be protective of beneficial uses. Additional monitoring and continual updating of the Adaptive Management Plan with the best information available is a key element of the Estuary Management Project. Therefore, potential impacts associated with changes to salinity, dissolved oxygen and temperature levels as a result of implementation of the Estuary Management Plan are considered less than significant.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.3.3: The change in the barrier beach breaching operations during the lagoon management period could adversely affect the water quality due to increased nutrient or indicator bacteria levels in the Estuary. (Significant and Unavoidable)

Nutrients and Indicator Bacteria

In 2010, the Water Agency collected water quality samples as part of the Temporary Urgency Change Petition Water Quality Plan for 2010 to review whether summer time water quality

exhibited high nutrient loads. Total nitrogen concentrations in the upper estuary, including monitoring at Monte Rio, were predominantly below the USEPA criteria of 0.38 mg/L, with a few exceptions. Concentrations of approximately 0.4 mg/L were recorded at Monte Rio, Austin Creek, and Freezeout Creek in June, when spring flows were still high from an above average rainfall season. Total nitrogen concentrations of 0.83 mg/L were recorded on single occasions at the Monte Rio and Duncans Mills stations in October, at a time when barrier beach closures and natural breach events were occurring. The lower estuary, as represented by the Bridgehaven and Jenner stations, had more frequent occurrences above of the USEPA criteria of 0.38 mg/L, including a high value of 0.58 mg/L recorded at the Bridgehaven station and 0.75 mg/L recorded at the Jenner station. However, it is important to note that three of the five occurrences above the USEPA criteria at Jenner were during June and July when spring flows were still elevated above normal levels and the barrier beach was open, and another occurred in October following the breaching of the barrier beach.

Total phosphorus concentrations were above the USEPA criteria a majority of the time at all stations in the estuary, including the Monte Rio station. Detectable levels of total phosphorus ranged between 0.021 and 0.077 mg/L during the sampling period of June to October (SCWA, 2010). Total phosphorus concentrations were generally higher in June and July at all stations, when late springs flows were still elevated, and tended to decrease through the rest of the season into October. There were a couple of exceptions, most notably at the Bridgehaven station, where the 0.077 mg/L value was recorded in October following the breaching of the barrier beach (SCWA, 2010).

Chlorophyll *a* levels in the Estuary were generally lower in the upper estuary, including Monte Rio, and higher in the lower estuary, especially around the Bridgehaven station. Higher concentrations were typically observed early in the season during higher late spring flows and also late in the season during or following barrier beach closure and breaching. Chlorophyll *a* ranged from 0.0001 to 0.0037 mg/L at all stations other than Bridgehaven, with the majority of values below the USEPA criteria. The Bridgehaven station had the most occurrences above the USEPA criteria, and concentrations ranged from 0.0002 mg/L to 0.0083 mg/L. Higher values at Bridgehaven may be attributable to the location of the station at the mouth of Willow Creek, an area that may provide conditions beneficial to the production of algae, including chlorophyll *a*.

The primary sources of indictor bacteria for surface waters typically consist of point sources such as wastewater discharges and nonpoint sources such as septic systems and leach fields, agricultural uses, and storm drains. Although the CDPH draft guidelines were established for and are only applicable to fresh water beaches, they are being used in the context of potential public health issues when discussing observed Estuary values. Currently, there are no numeric criteria developed for estuarine areas.

Sampling events in 2009 and 2010 indicate there is a large variation in indicator bacteria levels observed through the different sections of the Estuary. These variations were observed to occur under both open and closed mouth conditions and may be seasonal as well. In 2009, total coliform counts were observed to be higher during open conditions in mid-summer than during

closed conditions, including the 29-day extended closure at the end of the management season. All three stations sampled in 2009 had at least one total coliform value above the draft guidance for freshwater beach posting of 10,000 MPN/100ml during open conditions, with the highest value of 24,196 MPN/100 ml occurring at the Jenner station. Total coliform values were relatively elevated during closed conditions, but not as high as during open mid-summer conditions, and the draft guidance was not exceeded at any station. *Enterococcus* and *E. coli* counts were generally low, but were observed to occasionally exceed recommended values in both open and closed conditions.

However, in 2010, total coliform counts were not significantly elevated during mid-summer open conditions (except at the Bridgehaven Station) and instead were observed to be significantly elevated during closed conditions at the end of the management season and were accompanied by high counts of *Enterococci* and *E. coli*. During preliminary sampling events in June and July 2010, the total coliform counts in the Estuary ranged from a low of 30 MPN/100ml at the Monte Rio station to an estimated value of greater than 1600 MPN/100 ml at the Bridgehaven station. However, variability in total coliform counts were observed at all stations including Monte Rio, which had a high count of 900 MPN/100ml, and Jenner, which had a low count of 110 MPN/100ml during this same time period. As such, variability was also observed with *Enterococcus* and *E. coli* counts (SCWA, 2010). Although there was no clear pattern of potential lagoon management influences on indicator bacteria levels early in the season, as there were elevated levels observed at various stations during both open and closed conditions, indicator bacteria levels were observed to increase and exceed the recommended guidance values at all stations during and following increased freshwater inflows related to upstream dam removals at the end of September, and during the repeated barrier beach closures in early October. At this time, it is not known what role increased inflows have on the elevated indicator bacteria levels observed during these closures and whether or not these increases would occur, or persist, without these inflows.

During the 2009 extended closure event, water temperatures increased and reached a peak in the middle of the water column at a depth where sunlight heats the water column, but freshwater/salinity stratification prevents mixing to allow cooling. Peak observed temperatures during the 2009 extended closure, which provide an indication of potential outlet channel conditions, was considerably less than 30ºC, which is lower than the optimal temperatures for growth of 37ºC for coliforms and other bacteria such as *Clostridium* species. Therefore, Estuary temperatures are not expected to be a significant contributor to increases in indicator bacteria production.

Under existing conditions, the residence time of water within the Estuary varies depending upon barrier beach conditions. Residence time is a function of river flows into the Estuary, discharge at the river mouth, seepage through the barrier beach, and other losses, such as evaporation and groundwater infiltration. Under current conditions, the estimated residence time in the Estuary ranges from approximately one day, during open tidal conditions, to approximately 27 days, under full closure conditions. With artificial breaching under existing conditions, the actual residence time within the Estuary during closure events is the time period between barrier beach

formation and mouth closure, and the implementation of artificial breaching by the Water Agency. This time period is typically between five and 14 days. During this timeframe, standing water conditions exist, as there is no outlet channel through the barrier beach, although seepage through the barrier beach still occurs.

Under the Estuary Management Project, the proposed outlet channel would convey water from the Estuary to the ocean, supporting a flow-through freshwater lagoon system that will function at a “steady-state” in terms of storage, maintaining lagoon water levels in a perched state that is also below flood stage. That is to say, inflow to the estuary would be matched primarily by outflow conveyed by the channel and seepage through the barrier beach. Other natural loses, such as evaporation, would provide additional, but minor losses. Therefore, establishment of the outlet channel would include flow through the Estuary towards the outlet channel, as opposed to full closure conditions, which limits output to seepage through the barrier beach.

As noted in **Chapter 3.0**, observed closure conditions in 2009 included establishment of stratified conditions, with a freshwater layer on top of a saline layer. Similar stratified layers are expected for the proposed outlet channel. Under stratified conditions, most flow through the Estuary would occur in the upper freshwater layer. Because the freshwater layer is also exposed to sunlight and is well-oxygenated, it is the layer most susceptible to nutrient and bacteria- related water quality impacts.

Based upon the lowest observed flows of 70-85 cfs, and stratified conditions observed during the 2009 closure, residence time for the proposed project is estimated to range between 14 days and 22 days, depending upon the depth of the freshwater layer that is established. This represents an increase in estimated residence time of approximately one week, compared to the typical residence time of between five and 14 days associated with artificial breaching under existing conditions. It should be noted that during the extended closure in October 2009, residence time was extended to the duration of the 29-day closure. During that time period, no nuisance conditions were observed.

The bottom saline layer would have higher residence times than the freshwater layer, since flow through this layer would be limited to mixing with the surface freshwater layer and seepage through the barrier beach. Estimates of flow exchanges in the bottom layer are not available. However, if flow is assumed to be negligible, then the residence time would be based upon the duration of the closure period. However, the bottom layer in the deeper portions of the estuary receive minimal sunlight and would likely be hypoxic to anoxic, so nutrient-induced algal growth or bacteria production are expected to be negligible in this deep layer.

Project implementation would not alter water quality inputs for bacteria or nutrients into the Estuary. Therefore, implementation is not anticipated to adversely affect nutrient or bacteria levels within the Estuary, as closed Estuary conditions would still include flow through processes. However, based on the information presented above, particularly the limited nature of nutrient and bacteria data collection during varying closure conditions, there is insufficient information to definitively conclude whether the adaptive management program would result in an increase, decrease, or no substantial adverse effect on nutrient or bacteria levels within the Estuary.

However, there is evidence to suggest that water quality conditions in the Estuary could be reduced following late summer or early fall increases in flow inputs into the Estuary, and that residence time within the Estuary would be increased compared to existing conditions experienced.

As discussed in **Chapter 4.0, Introduction and CEQA Requirements,** the precise response of the Estuary to the Estuary Management Project cannot be predicted with certainty. Localized water quality may be improved in some areas of the Estuary and diminished in others. Freshwater lagoon conditions and stratification observed within the Estuary, in combination with the proposed Estuary Management Project, could result in physical processes and water quality conditions that could have a temporary, adverse affect on aquatic ecology. These conditions include potential algal blooms associated with nutrient loading, or other dynamic physical processes that could affect water quality. The potential for dynamic physical processes to adversely affect water quality currently exists within the Estuary, and their occurrence is considered part of the physical ecological regime of the Estuary. The Estuary Management Project is proposed in order to provide a more natural set of habitat conditions for juvenile salmonids. However, adverse water quality conditions have occurred as part of the natural physical processes of the Russian River Estuary under existing conditions, and may occur in the future both with, and without, implementation of the Estuary Management Project. Similarly, natural physical processes have contributed to temporary adverse water quality conditions in other estuaries on the West Coast, including those that are managed for salmonid habitat, such as Pescadero Creek. However, it is anticipated that conditions would remain within the range of those experienced within the Estuary over the past 15 years, although the duration of those conditions during the lagoon management period would likely be increased. Additional monitoring and continual updating of the Adaptive Management Plan with the best information available would be required. Therefore, in the absence of technical certainty, this EIR concludes that the proposed project would have the potential to result in significant and unavoidable impacts to water quality related to bacterial and nutrient levels in the Estuary.

It should be noted that the Estuary Management Project's Adaptive Management Plan includes provisions for breaching in the event that flooding conditions, water quality conditions, or biological resource conditions warrant it, after consultation with the National Marine Fisheries Service and California Department of Fish and Game. Therefore, no additional mitigation measures are required or available relative to the occurrence of this impact.

Impact Significance: Significant and Unavoidable.

Impact 4.3.4: The change in the barrier beach breaching operations during the lagoon management period (i.e., May through October) could change the duration and/or geographic extent of saline conditions in the Estuary. This could extend the period of time groundwater wells experience brackish water intrusion. (Significant and Unavoidable)

As previously discussed, limited well water quality data (USGS, 1965; SCWA, 2010) along with anecdotal evidence suggests that groundwater in some wells near the Russian River Estuary become brackish during certain times of the year, especially the summer and fall. Reportedly, the brackish taste in the water dissipates after the rainy season begins. Although there is insufficient information to positively demonstrate that the reported temporary increase of brackish water in wells is associated with closure of the barrier beach, for purposes of this analysis, it is assumed that the seasonal variations of salinity in the groundwater would continue to occur during the lagoon management period proposed by the project. This analysis focuses on the effects the proposed project could have on the quality of groundwater in wells that may be influenced by surface water in the Estuary.

Tidally-influenced ocean water enters the Russian River Estuary, flows upstream and becomes stratified below fresh water. The influence of salt water can extend from the mouth of the Russian River upstream to the Heron Rookery (9.0 km mark on Figure 2-3) in most cases, and under certain conditions, Moscow Road Bridge (10.5 km mark on Figure 2-3) (Behrens and Largier, 2010).[5] As discussed in detail in **Section 4.3.1, Setting**, salinity monitoring showed that alignment and orientation of flow gradient contours within the river may respond to breaching and closure events. During periods that the barrier beach was closed (Behrens and Largier, 2010), the gradients were somewhat horizontal with higher salinity water at deeper reaches extending upstream to about Heron Rookery and lower salinity waters extending upstream to Moscow Road Bridge. Once in the Estuary, brackish water enters the estuarine groundwater system that supplies the local groundwater wells located along the Estuary margin; wells are screened at depth, and could more directly extract more highly saline water that occurs in the deeper areas of the Estuary. With the proposed project, the freshwater-saline stratification is not expected to be remarkably different; however, more fresh water may accumulate over the salt water in response to barrier beach closure prior to implementation of the outlet channel.

The reported brackish water intrusion in local groundwater wells is considered an existing condition and there is no evidence to indicate it would change under the proposed project. However, because the Estuary Management Project would maintain water levels of at least 7 feet during the lagoon management period, brackish conditions in the Estuary may adjust and might possibly extend the period of time that water in the wells remains brackish. The potential adjustment in brackish conditions could be caused by the increased fresh water that would overlie the brackish water or the amount of time brackish water remains in the deeper reaches of the Estuary. Any such resulting salinity in the groundwater wells would likely be a seasonal condition and would diminish after the lagoon management period ends October 15. Currently, anecdotal information indicates salinity decreases when the rains start, around the same time.

The proposed project could possibly extend the amount of time that some groundwater wells experience higher salinity during certain times of the year. It could also increase the geographic area of salinity intrusion, given longer migration time. This would not be considered a significant effect of the project because salt water influence has reportedly already been a recurring condition in wells located along the Estuary since at least the 1950s, based upon historical well logs. The

[5] Saline conditions exist in the deeper reaches of the river because salt water is denser than fresh water.

portion of Russian River from the mouth to two miles upstream is considered an area with a low or highly variable groundwater water yield. The wells that could be affected are not part of a municipal water system nor are there municipal groundwater supply wells in the area; municipal water is supplied, for the most part, by surface water sources or water sources located away from the river floodplain.

While this analysis has focused on the assumption that seasonal brackish conditions would continue to affect the groundwater and wells, it should also be noted that that the project could have a reverse effect on salinity in the Estuary. Depending upon timing and performance, the adaptive management of the barrier beach could ultimately reduce the inflow of seawater while increasing the accumulation of freshwater to such a degree that salinity could decrease in the wells previously affected by temporary brackish conditions. However, the depth of the Estuary and observed stratified conditions may limit the potential for freshwater lagoon conditions to directly influence groundwater.

As discussed in **Chapter 4.0, Introduction and CEQA Requirements,** the precise response of the Estuary to the Estuary Management Project cannot be predicted with certainty. Localized water quality, and subsequently, groundwater quality, may be improved in some areas of the Estuary and diminished in others. However, it is anticipated that conditions would remain within the range of those experienced within the Estuary over the past 15 years, although the duration of those conditions during the lagoon management period would likely be increased. Additional monitoring and continual updating of the Adaptive Management Plan with the best information available would be required. Therefore, in the absence of technical certainty, this EIR concludes that the proposed project would have the potential to result in significant and unavoidable secondary impacts to groundwater quality.

Impact Significance: Significant and Unavoidable.

4.3.4 References

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4.4 Biological Resources

4.4.1 Introduction

This section describes biological resources, with focus on terrestrial and wetland resources, and assesses potential impacts that could occur with implementation of the Russian River Estuary Management Project (Estuary Management Project or proposed project). Fisheries resources are addressed in **Section 4.5, Fisheries**. Terrestrial and wetland resources include terrestrial, wetland, and non-fisheries-related species, sensitive habitats or natural communities, special-status plant and animal species, and protected trees. Impacts on terrestrial and wetland resources are analyzed in accordance with the California Environmental Quality Act (CEQA) significance criteria (CEQA Guidelines, Appendix G). For impacts determined to be either significant or potentially significant, mitigation measures to minimize or avoid these impacts are identified.

Information Sources and Survey Methodology

The primary sources of information for this analysis are the existing biological resource studies and reports prepared for the Russian River Estuary (Estuary) (Heckel, 1994; Merritt Smith Consulting, 1997, 1998, 1999, 2000; Sonoma County Water Agency [Water Agency; SCWA in references] and Merritt Smith Consulting 2001; SCWA, 2006; SCWA and Stewards of the Coast and Redwoods, 2009). These reports, incorporated by reference, present the methods and results of vegetation classification and mapping, fish and invertebrate sampling, amphibian surveys, and observations of bird and pinniped[1] numbers and behavior, as well as other sampling efforts (e.g., water quality sampling) conducted in the Russian River Estuary.

In addition to the reports listed above, information was obtained from conservation and management plans and planning documents prepared for lands within the project vicinity (Prunuske Chatham, Inc., 2005; California Department of Parks and Recreation [State Parks], 2007), as well as the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service [USFWS], 2010), California Natural Diversity Database (CNDDB) (CDFG, 2010), California Native Plant Society (CNPS) Electronic Inventory (CNPS, 2010), and standard biological literature. Water Agency staff biologists also conducted field surveys in August 2010 to gather additional information on vegetation communities and wildlife habitats.

Definitions

Project Area, Estuary Study Area, Project Vicinity

As previously noted in **Chapter 2.0, Project Description,** the Estuary Study Area comprises the Russian River Estuary (Estuary), which extends approximately seven miles from the mouth of the Russian River upstream to just beyond the confluence of Austin Creek. Although Estuary water levels may backwater as far as Monte Rio when the barrier beach closes the Estuary, as described in **Section 2.2.2** the Estuary is defined as tidally influenced, saline waters extending from the

[1] Marine mammals including seals, sea lions, fur seals, and walrus.

mouth of the Russian River upstream to the community of Duncans Mills area and below Austin Creek. Therefore, for this analysis, *project area* is defined as the estuarine habitat supporting fish and other wildlife resources within the 9-foot contour line in the lower 7 miles of the Russian River. Included within the *project area* are the lower portions of the several tributaries to the Russian River in the project area, including Willow Creek, Sheephouse Creek, Freezeout Creek, and Austin Creek. This area also includes the mouth of the Russian River at Goat Rock State Beach, as well as the Goat Roack State Beach parking and beach access areas.

The *Estuary Study Area* includes the lands within the project area and immediately adjacent lands within the 14-foot contour line, creating a contiguous area around the project area within which indirect impacts may occur. Under certain closed conditions, the Estuary may backwater to Monte Rio, and as far upstream as Vacation Beach. Where appropriate, discussion of impacts within the Estuary Study Area and the larger *Maximum Backwater Area*, which extends upstream past Austin Creek approximately seven miles to Vacation Beach, is provided (Please refer to **Figure 2-3** in **Section 2.0, Project Description**). *Project vicinity* is occasionally used when discussing lands outside the Estuary Study Area, but which may be used by transient wildlife (e.g., birds with large spatial-use patterns).

Wildlife Movement and Nursery Sites

Wildlife movement is defined as movements that generally fall into one of the following three categories: dispersal, seasonal migration, and local movements within a home range[2]. A number of terms have been used in various wildlife movement studies, such as “travel route,” “wildlife corridor”, and “wildlife crossing” to refer to areas in which animals move from one area to another. *Wildlife nursery sites* are areas where animals concentrate for hatching and/or raising young, such rookeries and breeding areas.

Pinniped Haulouts

Harbor seals (*Phoca vitulina richardsi*), and occasionally California sea lions (*Zalophus californianus*) and northern elephant seals (*Mirounga angustirostris*), collectively referred to as pinnipeds, haulout at the mouth of the Russian River. Haulout is defined is an area where pinnipeds temporarily leave the water for land in between foraging periods to rest and nurse. The Jenner haulout, located at the mouth of the Russian River on Goat Rock State Beach, is considered the largest in Sonoma County. There are also several known haulouts in the Estuary at logs and rock outcroppings.

Special-Status or Sensitive Natural Communities

Special-status or sensitive natural communities are defined as communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special-status species (as defined below) or their habitat. Sensitive natural communities are usually identified by the California Department of Fish and Game (CDFG) in the CNDDB and/or by other agencies in local or regional plans, policies

[2] The extent of area with a defined probability of occurrence of an animal during a specific time period.

or regulations. Furthermore, most types of wetlands and riparian communities are considered special-status or sensitive natural communities due to their limited distribution in California.

Special-Status Plant and Animal Species

Special-status plant and animal species are defined as those species that fall into one or more of the following categories:

1. Officially listed or proposed for listing under the State and/or Federal Endangered Species Acts.
2. State or Federal candidate for possible listing.
3. Species meeting the criteria for listing, even if not currently included on any list, as described in Section 15380 of the CEQA Guidelines.
4. Protected under the Federal Marine Mammal Protection Act.
5. Species considered by the CDFG to be a "Species of Special Concern."
6. Species that are biological rare, very restricted in distribution, declining throughout their range, or have a critical, vulnerable stage in their life cycle that warrants monitoring.
7. Populations in California that may be on the periphery of a species' range, but are threatened with extirpation in California.
8. Species closely associated with habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands, vernal pools, etc.).
9. Species designated as a special-status, sensitive, or declining species by other state, or federal agencies, or non-governmental organizations.

Sensitive Biological Resources

Sensitive biological resources include special-status or sensitive natural communities, in addition to wetlands and other waters of the U.S. and state as defined by the U.S. Army Corps of Engineers (USACE), CDFG, and the State Water Resources Control Board (SWRCB) (see Section 4.4.3, Regulatory Framework, below), special-status plant and animal species, and protected tree species.

4.4.2 Setting

Regional Setting

As discussed in **Chapter 2, Project Description**, the Estuary is located approximately 60 miles northwest of the San Francisco Bay, near the community of Jenner, Sonoma County, California (see **Figure 2-1** and **Figure 2-2**). The Russian River Watershed encompasses a 1,485 square mile drainage basin, with numerous tributary streams feeding into the main river. The headwaters of the Russian River are in the Potter Valley area of Mendocino County, with the river joining the

Pacific Ocean 110 miles downstream, near Jenner. Warm summers and mild winters characterize the temperate Mediterranean climate of the Russian River Watershed. The watershed landscape generally consists of a series of valleys surrounded by mountain ranges, with elevations ranging from 4,480 feet to sea level. Vegetation communities and wildlife habitats within the Russian River Watershed include a mosaic of herbaceous, shrub, and tree dominated types, as well as aquatic and developed types. Broad vegetative community categories within the watershed include scrubs and chaparrals, oak savannas and woodlands, coniferous forests and woodlands, grasslands, and fresh and saline emergent wetlands (CDFG, 2008). Historically, these communities provided habitat for a rich diversity of terrestrial and wetland plant and animal species. Although many of the species that historically occupied the watershed are still present, some, such as yellow-billed cuckoo (*Coccyzus americanus*) and spotted skunk (*Spilogale gracilis*), are now non-existent or extremely rare, or have had their numbers substantially reduced (SCWA and Circuit Rider Productions, 1998). Such loss or reduction in species diversity has been attributed to habitat loss, ocean conditions, and a variety of other complex factors (SCWA and Circuit Rider Productions, 1998).

Local Setting

The Estuary extends from the mouth of the Russian River at Goat Rock State Beach upstream approximately seven miles between the community of Duncans Mills and Austin Creek. The Estuary is as narrow as 75 feet near the upstream end and gradually widens to over 249 feet near the mouth, and water depths vary but generally increase closer to the mouth (SCWA 2006). As illustrated in **Figure 2-3** in **Chapter 2.0, Project Description**, the Estuary is divided into three reaches, including the lower reach (sandbar to upper Penny Island), middle reach (upper Penny Island to Sheephouse Creek), and upper reach (Sheephouse Creek to below Austin Creek). The general climate pattern of this area is dominated by the westerly flow of marine air from the ocean, and is characterized by rainy winters with some clear sunny days and dry, cool summers with many foggy or overcast days. The general landscape in the vicinity of the Estuary is characterized by large, rolling hills and coastal terraces that slope down toward the ocean. As described in more detail below, the Estuary and surrounding area support various vegetation communities and wildlife habitats and plant and animal species.

Vegetation Communities and Wildlife Habitats

The vegetation communities identified in the Estuary Study Area are broadly classified as general units (e.g., beach and dune, coastal scrub, grassland, etc.). However, whenever possible, a natural community described in the *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland, 1986) and vegetation alliance or association described in *A Manual of California Vegetation* (Sawyer et al., 2009) is identified within these broader categories based on descriptions provided in existing biological resources studies and observations by Water Agency staff, as both classification systems are currently recognized by the CDFG (identified below by their California name and numeric code). In some cases, it was not possible to apply Sawyer et al. (2009) classification because the level of detail required to do so was beyond the scale of the studies that are part of this analysis. Also, some of the general units were identified as habitats because they are defined as much by their physical conditions as by their plant species

composition or lack of plants (i.e., beach and dune, seasonal and perennial waters and wetlands). The Water Agency recently mapped all vegetation communities within and adjacent to the Estuary, up to 14 feet in elevation. The vegetation communities and wildlife habitats, and their location with the Estuary Study Area are described below and illustrated in **Figures 4.4-1 – 4.4-5**.

Beach and Dune

Extensive beach and dune communities occur at the mouth of the Russian River near its confluence with the Pacific Ocean. These communities are generally dynamic, high-energy habitats that are shaped and influenced by multiple and interdependent abiotic (non-living) factors, such as sand movement, salt spray, and wind speed (Barbour et al. 2007). Beach habitat lies at the interface between terrestrial and marine communities. Because of intense wave action, rapid rate of sand movement, strong winds, and presence of sea water, as well as a number of other abiotic factors, plants are generally unable to successfully colonize this habitat, particularly directly along the shoreline and, therefore, little or no vegetation is present within the beach habitat in the Estuary Study Area.

Coastal dune habitat occurs further away from the immediate shoreline and is more protected from the effects of sand movement, wind, and salt spray. This habitat may also have more abundant groundwater (Holland, 1986). Such conditions allows for some patches of prostrate, herbaceous plants to establish. In the Estuary Study Area, this habitat is generally characterized by virtually mono-specific stands of European beach grass (*Ammophila arenaria*) and stands comprised of yellow sand-verbena (*Abronia latifolia*), sea rocket (*Cakile maritima*), beach morning-glory (*Calystegia soldanella*), beach bursage (*Ambrosia chamissonis*), coastal buckwheat (*Eriogonum latifolium*), dune sagebrush (*Artemisia pycnocephala*), seashore bluegrass (*Poa douglasii*), seaside woolly sunflower (*Eriophyllum staechadifolium*), yellow bush lupine (*Lupinus arboreus*), and beach primrose (*Camissonia cheiranthifolia*).

CDFG-recognized natural communities and/or vegetation alliances present within the Estuary Study Area that most closely match the beach and dune habitats broadly described above include Active Coastal Dunes (21.010.00), Coastal Foredunes (21.020.00), and Northern Dune Scrub (21.100.08)[3].

Compared to other habitats, beaches and dunes may appear to support few animal species. However, these communities are complex habitats and support many species of animals unique to shorelines, several of which are too small to notice. Successful animal inhabitants of beaches and dunes include benthic invertebrates that live between sand grains and annelid worms that burrow into the sand. Various bivalve and snail species, as well as many species of small crustaceans, also inhabit these habitats. Many bird species, as well as many species of mammals, use beaches and dunes as feeding and resting areas. Shorebirds and wading birds feed on prey that either wash out of the sand due to wave action, or come close enough to the shore to be captured. Others, prefer to nest or rest on bare sands within these habitats. Marine mammals, such as harbor seal, also give birth and molt here.

[3] CDFG-recognized natural communities and/or vegetation alliances referenced by general type and numerical coding system.

Coastal Scrub

Although coastal scrub is found in both northern and southern California, the form and plant species composition varies greatly between the two regions (Barbour et al. 2007). This variation is mainly a result of the shift from cooler-moister climates in the north to warmer-drier climates in the south. Coastal scrub occupies lands throughout the Estuary Study Area, particularly within the vicinity of the lower and middle reaches of the Estuary. This community is generally characterized by stands of coyote brush (*Baccharis pilularis*) and a somewhat indistinct assemblage of shrub and herbaceous understories. Understory species composition is influenced by light penetration through the canopy, as canopies vary from dense and closed with sparse understories to discontinuous with dense herbaceous understories. Common associated species include grasses and forbs, such as those found in the surrounding grassland communities (see below), as well as shrub species, such as California coffeeberry (*Rhamnus californicus*), California blackberry (*Rubus ursinus*), sticky monkeyflower (*Mimulus aurantiacus*), and poison oak (*Toxicodendron diversilobum*). This coastal scrub community most closely matches the Coastal Scrub (32.000.00) natural community and the Coyote brush scrub (32.060.00) vegetation alliance recognized by CDFG.

Animal species inhabiting coastal scrub habitats are predominantly those that have adapted to dry conditions, such as insects, spiders, and reptiles. There are also many birds and mammals that are associated with this habitat, but most are not restricted to coastal scrub and occur in the surrounding habitats. Typical mammals found in coastal scrub habitat include species such as black-tailed jackrabbit *(Lepus californicus*), coyote (*Canis latrans*), and striped skunk (*Mephitis mephitis*). Resident birds include such species as Anna's hummingbird (*Calypte anna*), Bewick's wren (*Thryomanes bewickii*), and California towhee (*Pipilo maculatus*). Coastal scrub habitat also provides year-round hunting grounds for many birds of prey, such as red-tailed hawk (*Buteo jamaicensis*) and turkey vulture (*Cathartes aura*). Reptiles such as western fence lizard (*Sceloporus occidentalis*), and western rattlesnake (*Crotalus viridis*) are also typically found in this habitat.

Grassland

Grassland communities, including those dominated by stands of non-native species, occupy lands throughout the Estuary Study Area. These grasslands occur primarily as distinct communities, but also as understory within openings in the various other communities present in the Estuary Study Area. In areas that have been altered, particularly along the Russian River for the purpose of conversion to various land uses (e.g., farming, grazing, and logging), the grassland community is characterized by stands comprised of primarily non-native grass species, such as wild oat (*Avena* spp.), brome (*Bromus* spp.), Italian ryegrass (*Lolium multiflorum*), velvet grass (*Holcus lanatus*), and canarygrass (*Phalaris aquatica*), and forb species, such as wild radish (*Raphanus sativa*), bull thistle (*Cirsium vulgare*), milk thistle (*Silybum marianum*), English plantain (*Plantago lanceolata*), and filaree (*Erodium* spp.). In addition to the non-native forbs mentioned above, native species may form a small percentage of the herbaceous cover within these stands, including grasses such as purple needlegrass (*Nassella pulchra*), Pacific reedgrass (*calamagrostis nutkaensis*), California oatgrass (*Danthonia californica*), tufted hairgrass (*Deschampsia cespitosa*), and forbs such as Douglas iris (*Iris douglasiana*), cow parsnip (*Heracleum lanatum*), yarrow (*Achillea millefolium*), California buttercup (*Ranunculus californicus*), California poppy (*Eschscholzia californica*), Pacific cinquefoil (*Potentilla anserina* ssp. *pacifica*), seaside daisy (*Erigeron*

No Photo Coverage

0 600
Feet

Elevation above mean sea level (NGVD 29)

- 4.5 ft
- 7 ft
- 9 ft
- 14 ft

Vegetation Communities

- Active Coastal Dunes
- Coastal and Valley Freshwater Marsh
- Developed
- Gravel Bar/ Mudflat
- Landscaping
- Mixed Evergreen Forest
- North Coast Riparian Forest
- North Coastal Riparian Scrub
- Northern Foredune
- Northern Franciscan Riparian/Coastal Scrub
- Non-Native Grassland
- Red Alder Riparian Forest
- Northern Franciscan Riparian and Coastal Scrub/ North Coastal Riparian Scrub

1

Jenner

Penny Island Profile Location 1

Penny Island

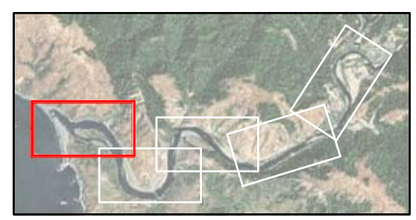
Jenner Gulch

Goat Rock
State Beach

Penny Island Profile Location 2

SOURCE: EDS, 2009; SCWA, 2010; (aerial photo, 2008)

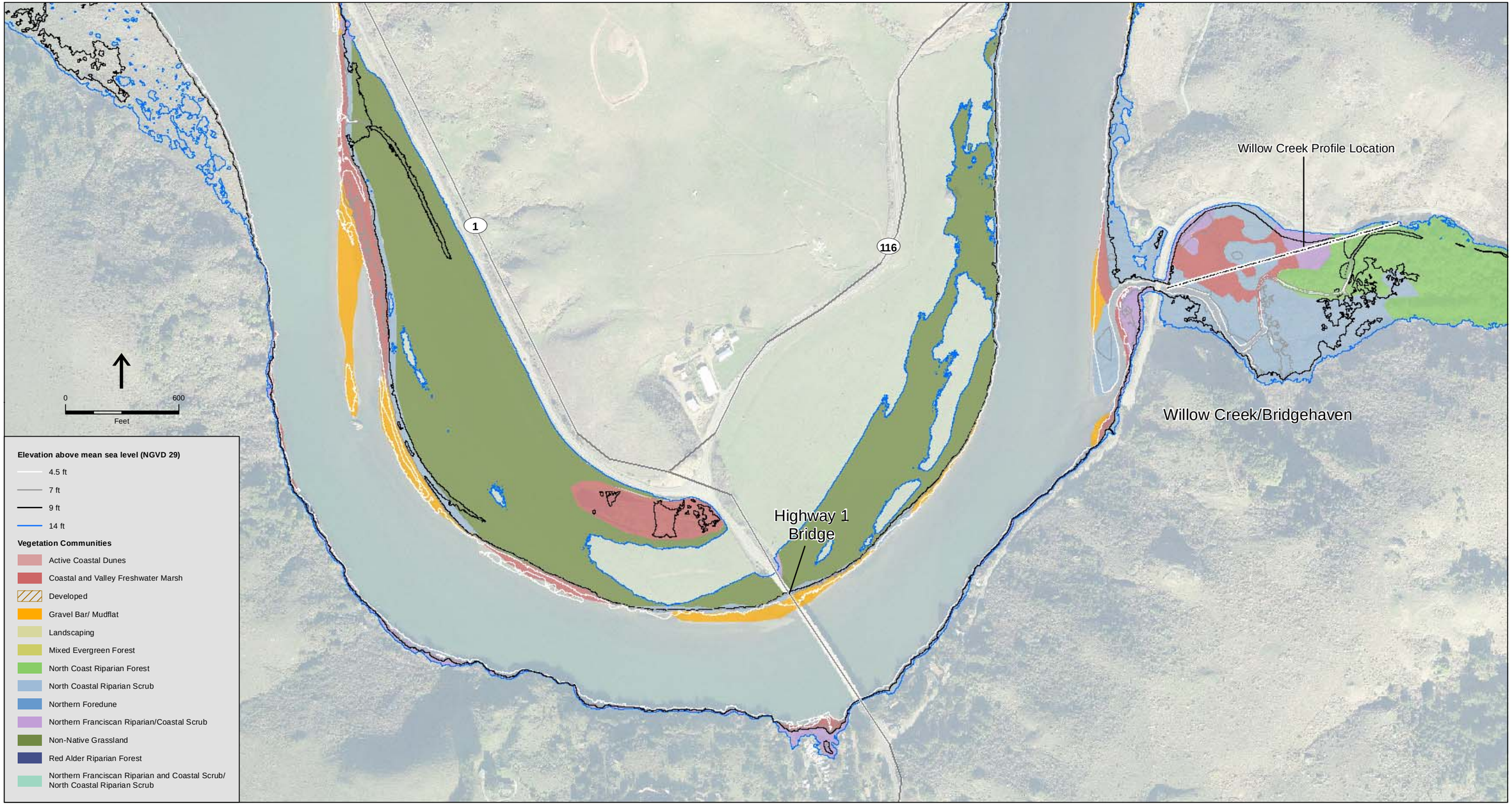
Note: Elevations show for display purposes only



Russian River Estuary Management Project. 207734.01

Figure 4.4-1

Estuary Study Area: Vegetation Communities
Within the 14 foot elevation (NGVD) Study Area



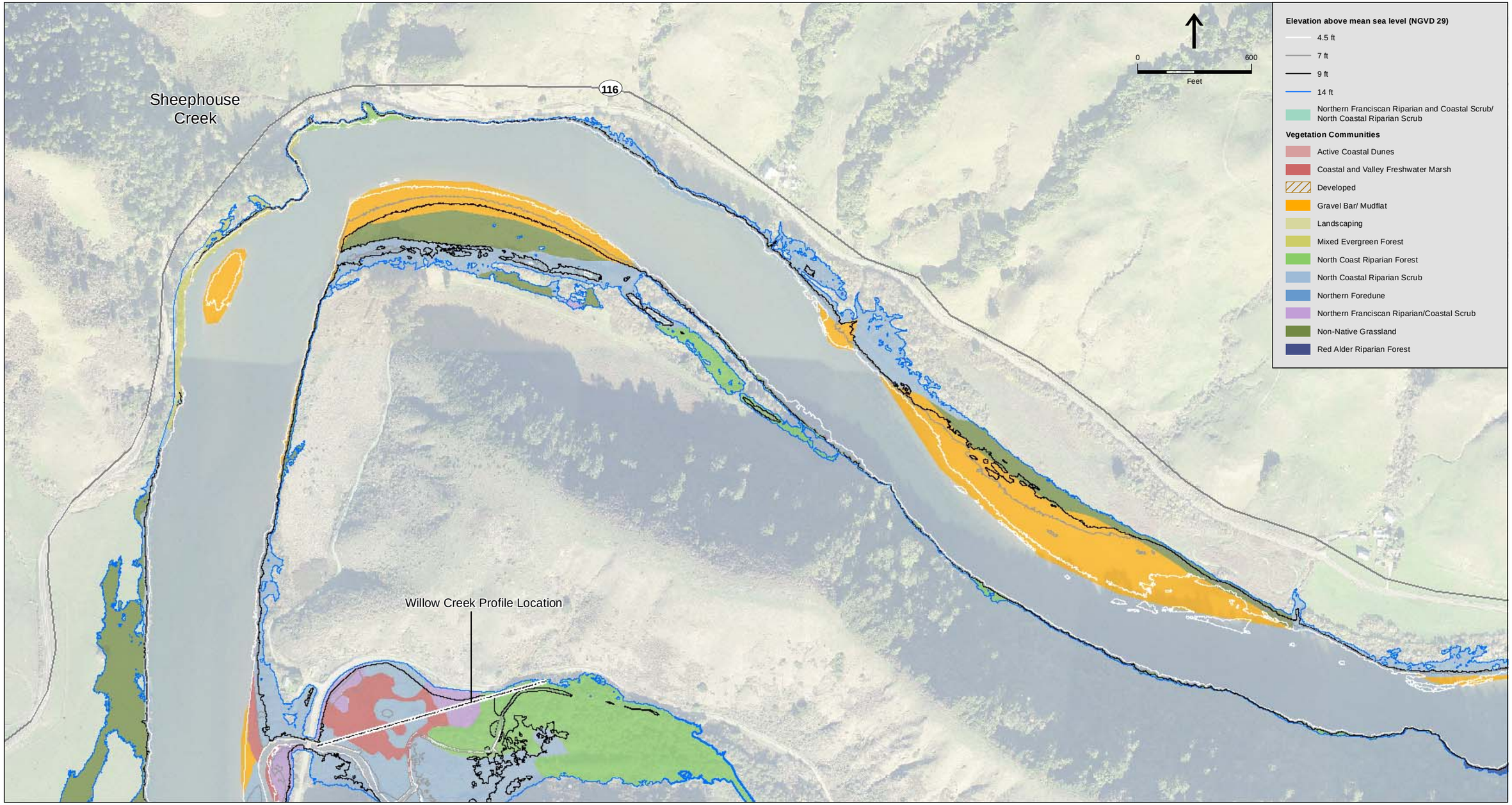
SOURCE: EDS, 2009; SCWA, 2010; (aerial photo, 2008)

Note: Elevations show for display purposes only

Russian River Estuary Management Project. 207734.01

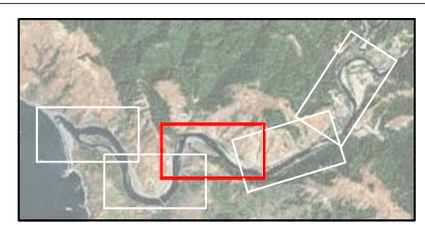
Figure 4.4-2

Estuary Study Area: Vegetation Communities
Within the 14 foot elevation (NGVD) Study Area



SOURCE: EDS, 2009; SCWA, 2010; (aerial photo, 2008)

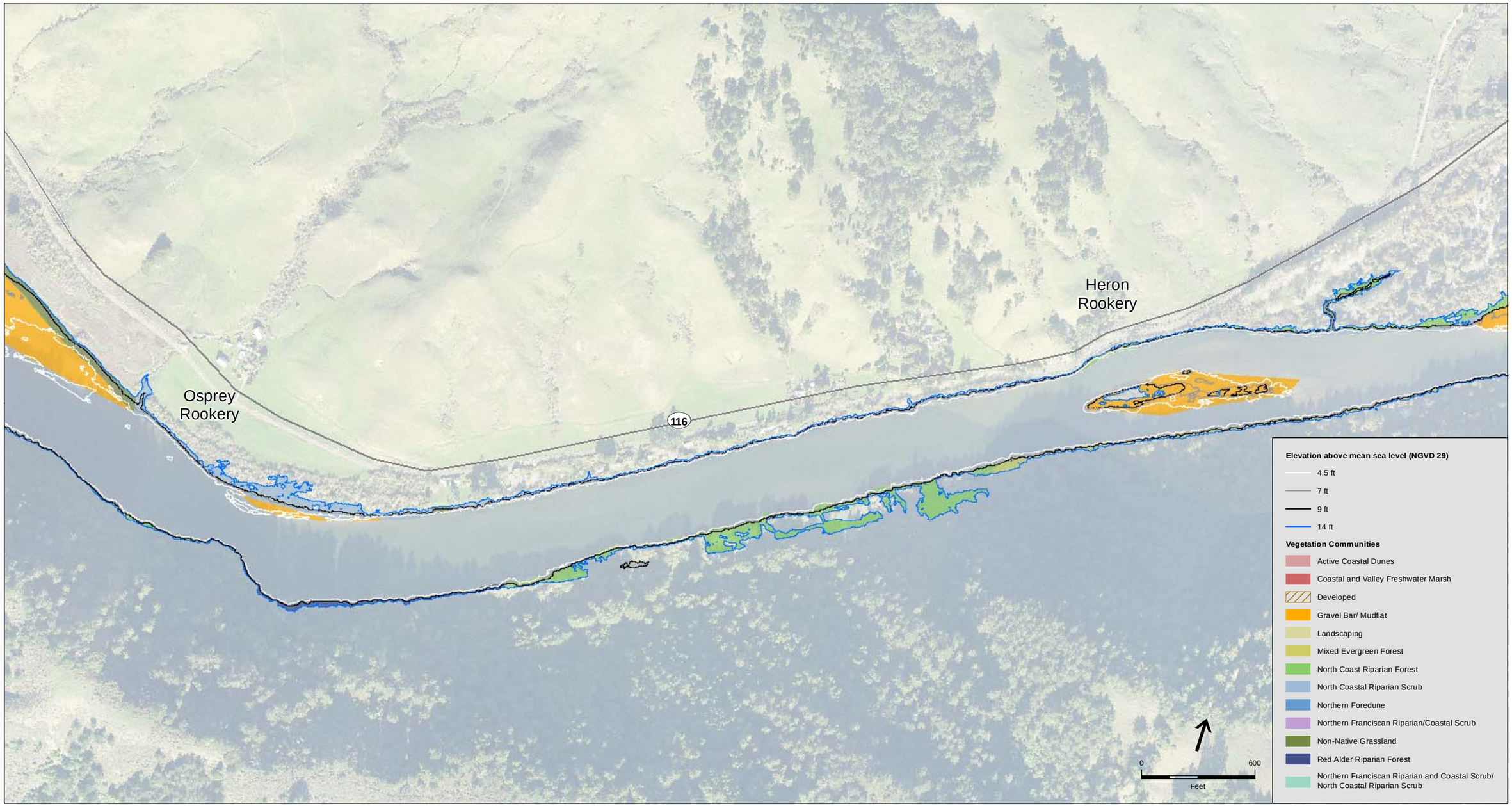
Note: Elevations show for display purposes only



Russian River Estuary Management Project. 207734.01

Figure 4.4-3

Estuary Study Area: Vegetation Communities Within the 14 foot elevation (NGVD) Study Area



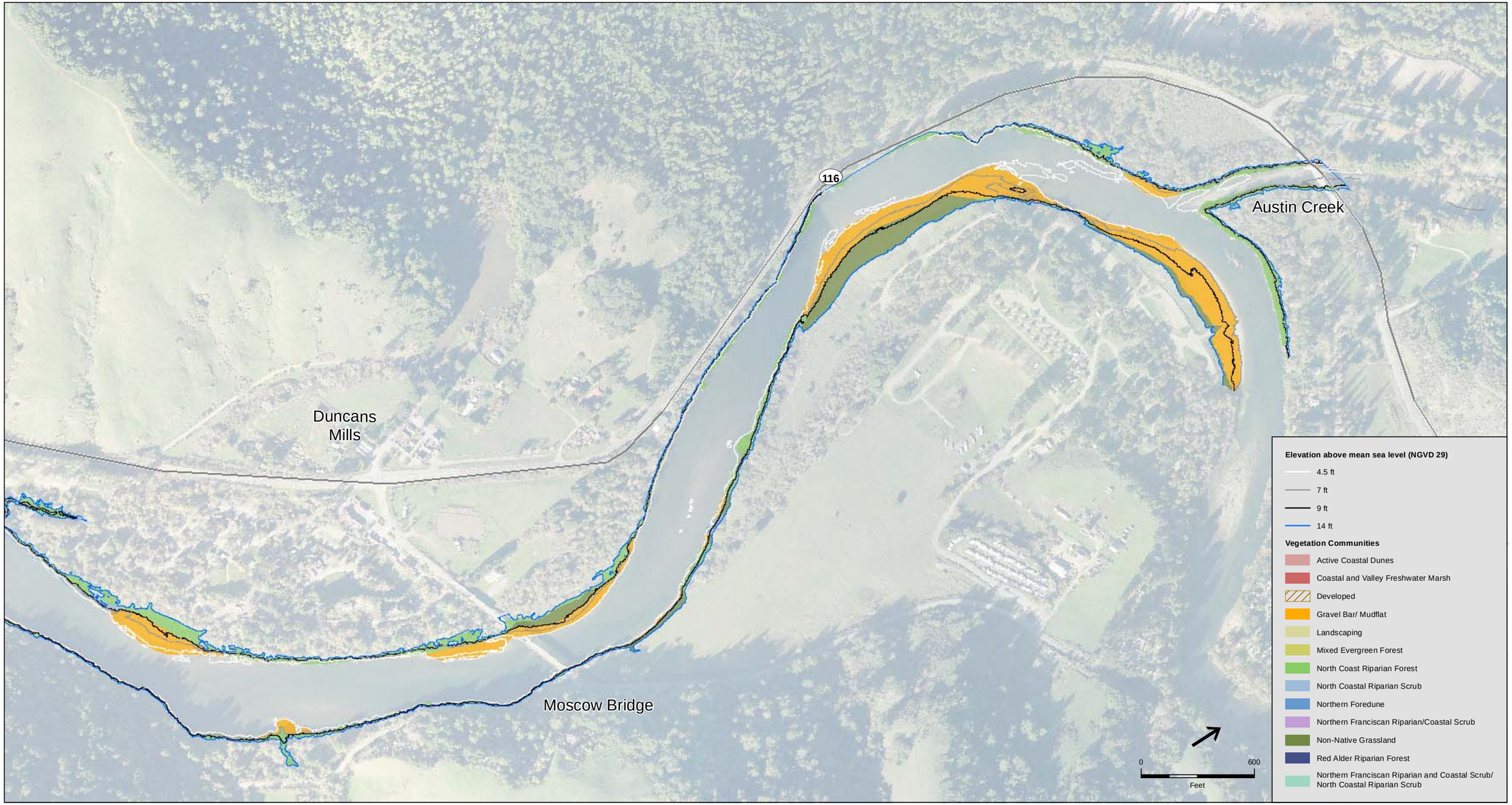
SOURCE: EDS, 2009; SCWA, 2010; (aerial photo, 2008)

Note: Elevations show for display purposes only

Russian River Estuary Management Project. 207734.01

Figure 4.4-4

Estuary Study Area: Vegetation Communities
Within the 14 foot elevation (NGVD) Study Area



SOURCE: EDS, 2009; SCWA, 2010; (aerial photo, 2008)

Note: Elevations show for display purposes only

Russian River Estuary Management Project. 207734.01

Figure 4.4-5

Estuary Study Area: Vegetation Communities
Within the 14 foot elevation (NGVD) Study Area

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glaucus), beach strawberry (*Fragaria chiloense*), and many-colored lupine (*Lupinus variicolor*). This grassland community most closely matches the California Annual Grassland (42.040.00) natural community recognized by the CDFG.

Animal species that typically inhabit grasslands are those that have adapted to dry conditions. These are grazing species, burrowing species, and their predators; insects and spiders are abundant. Some of these species forage in grasslands and retreat to the protective cover of the surrounding habitats (e.g., coastal scrub, upland forest) for shelter and nesting, while others disperse through this habitat. Animal species typically found in annual grasslands habitats include mammals, such as black-tailed jackrabbit, California ground squirrel (*Spermophilus beecheyi*), coyote, deer mouse (*Peromyscus maniculatus*), and mule deer (*Odocoileus hemionus*), and birds, such as, golden eagle (*Aquila chrysaetos*), red-tailed hawk, and western meadowlark (*Sturnella neglecta*). Reptiles are also frequently found within annual grassland habitat, such as gopher snake (*Pituophis catenifer*), western rattlesnake, and western fence lizard. In addition, grassland habitats that border wetlands provide habitat for amphibians, such as Sierran treefrog (*Pseudacris sierra*)[4] and western toad (*Bufo boreas*).

Seasonal and Perennial Waters and Wetlands

In addition to the perennial open water habitat and gravel bars and mudflats of the Russian River, which is addressed in **Section 4.5, Fisheries**, several streams and wetlands are located throughout the Estuary Study Area. The streams include unnamed and named tributary drainages to the Russian River that are seasonal and perennial in nature. Coastal scrub, grassland, riparian forest and woodland, and upland forest and woodland communities border these streams. Most of the streams originate at some elevated source, such as a seepage area, and flow downward to higher order streams or wetlands in the valley bottoms.

Freshwater marsh is present within the Estuary Study Area in shallow, standing, or slow-moving water at the edge of the river, as well as the tributary streams. Large expanses of freshwater marsh are located in and around Penny Island and at the mouth of Willow Creek near its confluence with the Russian River. The freshwater marsh habitat is dominated by stands of perennial, emergent plants, such as bulrush (*Schoenoplectus* spp.), rushes (*Juncus* spp.), sedges (*Carex* spp.), and cattails (*Typha* spp.). Other smaller hydrophytic species, such as water plantain (*Alisma platago-aquatica*), horsetails (*Equisetum* spp.), water mudwort (*Limosella aquatica*), and whorled marsh pennywort (*Hydrocotyle verticillata*) are also present. The freshwater marsh habitat described here most closely matches the Coastal and Valley Freshwater Marsh (52.100.01) natural community recognized by CDFG.

In addition to the freshwater marsh habitat mentioned above, seasonal wetlands may be present in the various vegetation communities within the Estuary Study Area in the form of depressions, seeps, and swales. These features typically dry before the summer, and support wetland-adapted plants, such as annual broad-leaf plants, rushes, and sedges.

[4] Sierran treefrog (also know as Pacific chorus frog and Pacific tree frog) could occur within wetlands bordering grassland habitats; grasslands within the project area are within the approximate range of the species.

The habitat value of seasonal and perennial waters and wetlands is generally considered to be high, due to the available surface water, abundance of insects, algae, and vascular plant forage, and protective cover of emergent vegetation when present. Although such habitats are usually too wet to support mammals, various birds, reptiles, and amphibians are often abundant. Animal species typically found in seasonal and perennial water and wetland habitats include birds, such as great blue heron (*Ardea herodias*), mallard (*Anas platyrhynchos*), marsh wren (*Cistothorus palustris*), and red-winged blackbird (*Agelaius phoeniceus*), reptiles, such as common garter snake (*Thamnophis sirtalis*), and amphibians, such as California newt (*Taricha torosa*), Sierran treefrog, and western toad.

Riparian Forest and Woodland

Warner and Hendrix (1984) generally define riparian vegetation as that which occupies lands adjacent to streams, creeks, and rivers, and is the interface between terrestrial and aquatic communities with soil moisture sufficiently in excess of that otherwise available through local precipitation to support the growth of mesic plants. The composition of riparian vegetation is greatly influenced by the physical processes of the adjacent aquatic habitat; species that are found in the active channel are usually not the same as those found on the floodplain.

In active channel areas (i.e., areas which are regularly flooded), plants are adapted to high levels of flood disturbance, often with substantial velocity and scour, during the winter, while tolerating the dry conditions of the gravel bars during the summer. Species occupying such areas within the Estuary Study Area include alder (*Alnus* spp.), willow (*Salix* spp.), stream dogwood (*Cornus sericea* var. *sericea*), mulefat (*Baccharis salicifolia*), and Pacific wax myrtle (*Myrica californica*). The riparian community in the active channel also supports herbaceous species similar to those mentioned above in the freshwater marsh description.

Floodplains are at higher elevations than the active channel and characterized by many more species and greater substantial structure (e.g., canopy layer, shrub layer, vine layer, and herbaceous layer) than the active channel. Such plants are adapted to flood scour and do not require as much summer moisture. Species occupying the floodplains within the Estuary Study Area include California bay laurel (*Umbellularia californica*), coast redwood (*Sequoia sempervrens*), poison oak (*Toxicodendron diversilobum*), and snowberry (*Symphoricarposa albus* var. *laevigatus*).

The CDFG-recognized natural community and vegetation alliance present within the Estuary Study Area that most closely match the riparian communities broadly described above include North Coast Riparian Scrub (63.901.00), Mixed Riparian Forest and Woodland (61.900.00) and Red Alder Riparian Forest (61.410.03).

Riparian habitats are extremely productive and have diverse values for animal species. The availability of water, the diversity and abundance of plant life, and the complex vegetation structure provide a number of animal species with food and water, cover, and movement corridor, as well as breeding and resting sites. Animals typically found in riparian habitats include birds, such as Bewick's wren (*Thryomanes bewickii*), common yellow throat (*Geothlypis trichas*), and wrentit (*Chamaea fasciata*), mammals, such as brush rabbit (*Sylvilagus bachmani*), deer mice, dusky footed woodrat

(*Neotoma fuscipes*), and raccoon (*Procyon lotor*), and amphibians, such as California slender salamander (*Batrachoseps attenuatus*) and Sierran treefrog.

Upland Forest

Upland forest communities occupy lands throughout the Estuary Study Area in a mosaic-like pattern and are generally characterized by dense to open canopy stands comprised of Douglas fir (*Pseudotsuga menziesii*), coast redwood, or coast live oak (*Quercus agrifolia*) as the dominant tree species. When present, common understory plants in Douglas-fir forests include species such as sword fern (*Polystichum munitum*), pink flowering currant (*Ribes sanguineum*), California figwort (*Scrophularia califronica*), coyote brush, and poison oak. California huckleberry (*Vaccinium ovatum*), redwood sorrel (*Oxalis oregona*), strawberry (*Fragaria vesca*), and whipplevine (*Whipplea modesta*) are common understory plants in coast redwood forests.

The CDFG-recognized natural communities and/or vegetation alliances present within the Estuary Study Area that most closely match the upland forest communities broadly described above include Upland Douglas-Fir Forest (82.200.68), Upland Redwood Forest (86.100.15), and Mixed Evergreen Forest (82.000.01).

Upland forests support a high abundance of animal species. Birds typical of these habitats include species such as acorn woodpecker (*Melanerpes formicivorus*), ash-throated flycatcher (*Myiarchus cinerascens*), varied thrush (*Ixoreus naevius*), northern flicker (*Colaptes auratus*), and western scrub jay (*Aphelocoma californica*). California ground squirrel, mule deer, and western gray squirrel (*Sciurus griseus*) also use these habitats, as well as many species of reptiles and amphibians.

Developed and Landscaped

Developed and landscaped areas do not consist of one type of habitat. Examples of unique habitats within developed and landscaped areas include campgrounds, residential yards, and business and parking areas. In general, developed and landscaped areas are those that have been transformed to better meet the need of humans. In the Estuary Study AreaEstuary Estuary Study Area, developed and landscaped areas include roadways, campgrounds, and residences and businesses, mostly associated with the communities of Jenner and Duncans Mills.

Given the extent of the developed and landscaped areas within the Estuary Study Area and the connectivity with natural habitats, many of the animal species using these habitats likely also forage, nest, roost, and disperse through the developed and landscaped areas.

Wildlife Movement and Nursery Sites

Due to the location and diversity of the vegetation communities and habitats present, the Estuary Study Area supports various types of wildlife movement (i.e., dispersal, seasonal migration, and local movements within home ranges). Terrestrial mammals, such as mule deer, use the cover of the riparian forests and woodlands for protection from predators as they move between foraging areas. Similarly, amphibians and reptiles use the protective cover of this habitat as they disperse

from their aquatic breeding sites. Migratory waterfowl use the waters and wetlands for their lush food supplies during their seasonal migration.

In addition to facilitating wildlife movement, the vegetation communities and habitats present in the Estuary Study Area support wildlife nursery sites. A great blue heron (*Ardea herodias*) rookery is present within the upper reach of the Estuary along the Russian River, roughly one mile downstream of Duncans Mills (CDFG, 2010). Also, the beach habitat at the mouth of the Russian River is a pupping site for harbor seals (SCWA, 2009). See **Section 3.0, Project Background and Environmental Setting** for more detail regarding seal pupping activity within the Estuary Study Area.

Pinniped Haulouts

Harbor seals haulout at the mouth of the Russian River. California sea lions and northern elephant seals are occasionally observed. The Jenner haulout, [5] located at the mouth of the Russian River on Goat Rock State Beach, is considered the largest in Sonoma County (SCWA, 2009a). There are also several known haulouts in the Estuary at logs and rock outcroppings (**Figure 4.4-6**). The first known records for the harbor seal haulout were established in 1972 and their numbers at the site have steadily grown (Hanan and Beeson 1994, Mortenson and Twohy 1994 in SCWA 2009a).

Historically, pinniped monitoring at the Jenner haulout has been conducted by Stewards of the Coast and Redwoods (Stewards) volunteers, California State Parks volunteer docents, local individuals, and Water Agency staff. The Seal Watch Public Education Program was established in 1985 to provide public outreach and volunteer at the river mouth to encourage visitors to comply with the 50-foot buffer around the harbor. Today, Stewards (California State Parks Volunteer Docents) volunteers assist the public in safeguarding the harbor seal haulout. These volunteers, either independently or under the guidance of the Stewards, have recorded the seal population, as well as recreational visitors, present on the beach on weekends from March through Labor Day. Dr. Joe Mortenson began his ongoing monthly seal counts at the Jenner haulout and Bodega Rock in 1987, with nearby haulouts added to the counts thereafter. Ms. Elinor Twohy began daily counts of seals and people at the Jenner haulout, including photographing the haulout, in 1989. Her daily counts are taken at different times on successive days to determine if there were diurnal patterns in use of the haulout (Mortenson and Twohy 1993 in SCWA 2009a).

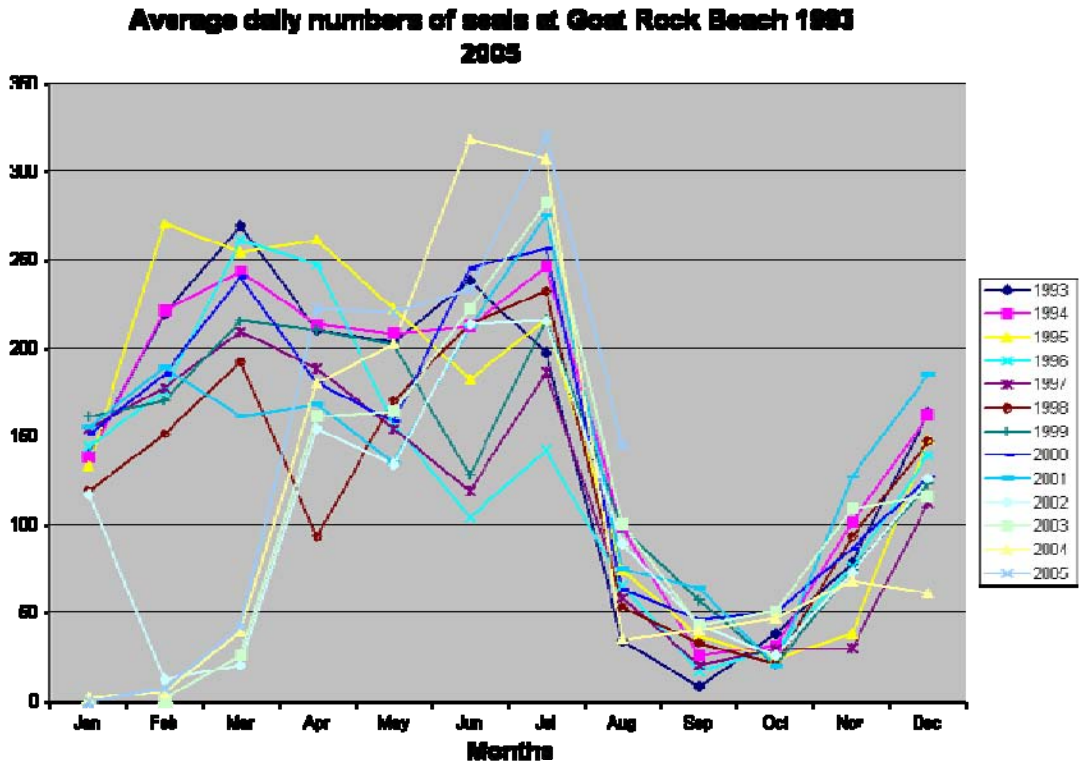
Figure 4.4-7 summarizes the average daily seal counts recorded by Seal Watch Program volunteers, by month, from 1993 to 2005 (DeAngelis in SCWA 2010a). As demonstrated by the data, the number of harbor seals at the haulout varies throughout the year. Data demonstrates the number of harbor seals at the Jenner haulout peaks in the late winter (February and March); at other harbor seal haulouts, peaks are typically observed during the pupping and molting season (spring and summer). Observations indicate pups were usually first seen at the Jenner haulout in late March, with maximum counts in May. In this study, pups were not counted separately from

[5] Haulout is defined is an area where pinnipeds (harbor seals) temporarily leave the water for land in between foraging periods.

SOURCE: SCWA; Mortenson, 2008.

Russian River Estuary Management Project . 207734.01

Figure 4.4-6
Pinniped Haulouts for the Russian River Estuary Management Project in the Russian River Estuary and Surrounds



Russian River Estuary Management Plan Project ▪ 207734

SOURCE: DeAngelis in SCWA, 2010a

Figure 4.4-7
Average Daily Numbers of Seals 1993 to 2005

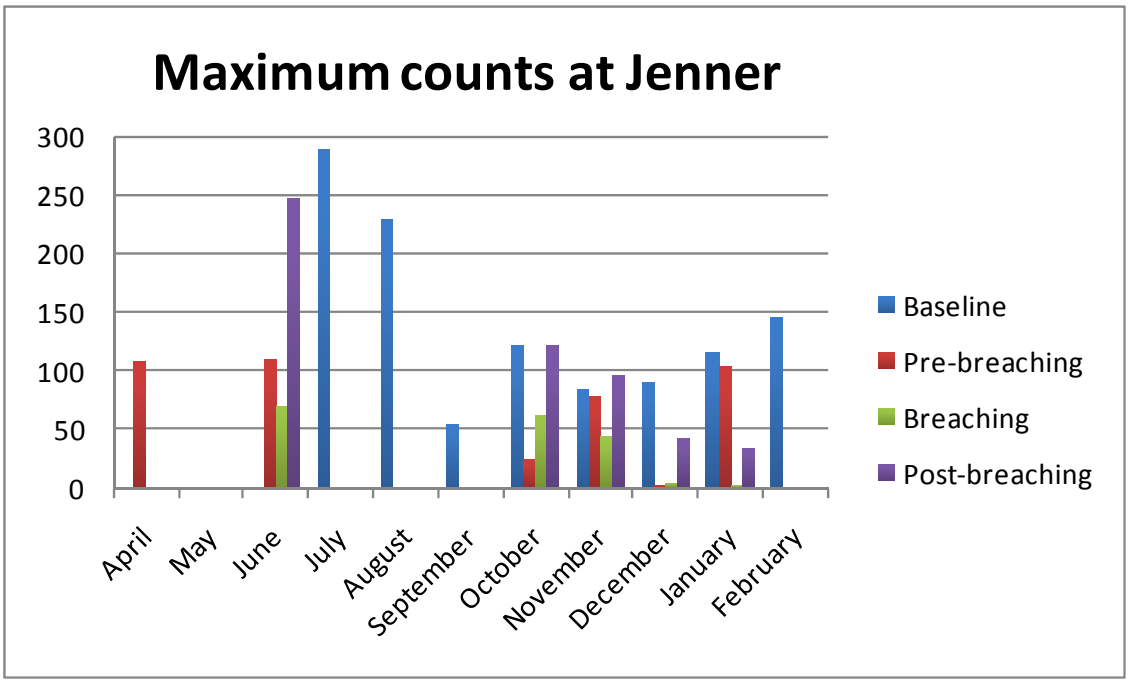
other age-classes at the haulout after August due to the difficulty in discriminating pups from small yearlings (Mortenson, 1996 in SCWA 2009a). This corresponds with the peaks observed at Point Reyes, where the first pups are born around the first to second week of March and the peak is the last week of April to early May (Mortenson and Allen in SCWA 2009a).

During the months from September to November, the number of harbor seals hauling out at Jenner declines significantly. The harbor seals normally return in greater numbers during the late winter (February and March) or early spring (April), and remain at the river mouth in great numbers until the end of July. Although the number of harbor seals at this haulout has fluctuated from year to year, average counts show a steady rise in population trend. During recent State censuses, the number of harbor seals observed during the single-day summer counts has continued to steadily increase above the baseline study, with nearly 350 seals observed in 1993 (Mortenson and Twohy 1994 in SCWA 2009a) and 315 in 2004, although over 500 animals have been recorded (Mortenson and Twohy 1994 in SCWA 2009a).

Data results indicate that the Jenner haulout is atypical in terms of the time of day seal count peaks are observed. At other harbor seal haulouts, daily peaks are typically observed at mid-afternoon low tides regardless of the season. Although daily harbor seal numbers at the Jenner haulout do peak at midday during the winter (November 16 to March 30) and in the

pupping and molting seasons (April/May and June/July/August, respectively), a midday peak is not observed during the fall (Mortenson and Twohy 1994 in SCWA 2009a).

The Water Agency monitored biological and water quality conditions before, during, and after artificial breaching events from 1996 to 2000. Pinniped responses to the Water Agency's artificial breaching activities were extensively monitored during that time period (Merritt-Smith Consulting 1997, 1998, 1999, 2000; SCWA and Merritt-Smith Consulting, 2001). **Figure 4.4-8** presents the average numbers of pinnipeds at the Jenner haulout before and after an artificial breach. **Table 4.4-1** shows the average number of harbor seals observed at the Jenner haulout during bar-closed conditions by month during monitoring of artificial breaching activities from 1996 to 2000.



Russian River Estuary Management Plan Project ▪ 207734

SOURCE: SCWA, 2010a

Figure 4.4-8
Maximum Harbor Seal Counts at Jenner Haulout
Pre- and Post-Breaching:1996 to 2000

TABLE 4.4-1
AVERAGE NUMBER OF HARBOR SEALS OBSERVED AT THE JENNER HAULOUT, GOAT ROCK STATE BEACH, CLOSED CONDITIONS, BY MONTH DURING MONITORING OF ARTIFICIAL BREACHING ACTIVITIES FROM 1996 TO 2000

April	May	June	July	August	September	October	November
173	103	100	75	17	5	22	11

SOURCE: Merritt Smith Consulting 1997, 1998, 1999 and 2000; SCWA and Merritt Smith Consulting, 2001.

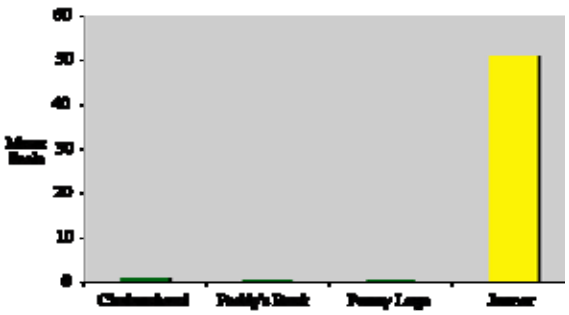
In all five years of monitoring, the number of pinnipeds hauled out at the mouth of the Estuary declined when the barrier beach was closed and increased soon after it was breached (SCWA and Merritt Smith Consulting 2001). Seals at the haulout responded most negatively to human disturbances on the beach (typically beach visitors approaching the haulout). When approaching the breaching location, Water Agency crews walked ahead of the bulldozer to ensure that no pinnipeds were harmed on the beach. Most pinnipeds usually abandoned the haulout prior to the bulldozer reaching the breaching location due to disturbance from visitors prior to crews arriving onsite. The remaining pinnipeds typically moved to the water as the crew approached the breaching location ahead of the heavy equipment. Once breaching was completed, equipment and crews left the beach and pinnipeds returned to the haulout within a day.

Trends in data indicate that the number of seals present at the Jenner haulout declined during closed barrier beach conditions (Mortenson 1996 in SCWA 2009a). The Water Agency's pinniped monitoring from 1996 to 2000 focused on the barrier beach artificial breaching activities and its effects on the Jenner haulout. Harbor seal counts and disturbances were recorded one to two days prior to breaching, the day of breaching, and the day after breaching (Merritt Smith Consulting 1997, 1998, 1999, 2000; SCWA and Merritt Smith Consulting, 2001). In each year, the trend observed was that harbor seal numbers declined during a beach closure (occasionally, the numbers rose again and then declined again during a closure) and increased the day following an artificial breaching event. Observations of disturbances to the Jenner haulout show that the numbers of seals at the haulout (during barrier beach closures) were higher in the morning than later in the day. While seals often alerted to distant sources of disturbance, such as the sound of trucks braking on Highway 1 nearby, seals primarily fled the haulout as a result of disturbances on the beach. The number of harbor seals declined during the day due to disturbances by people on the beach or kayakers/boaters approaching the haulout. Disturbances on the beach typically increased as the morning progressed (greater number of visitors on the beach in the late mornings and early afternoons).

The current pinniped monitoring program includes haulouts at North Jenner and Odin Cove, to the north, and Pocked Rock, Kabemali, and Rock Point, to the south, and Jenner logs, Patty's Rock, and Chalanchawi in the Estuary to define possible relationships between the use of the Jenner haulout and other nearby locations. **Figures 4.4-9** and **4.4-10** present previous data comparison between average seal counts between the Jenner haulout, other coastal haulouts, and river haulouts.

Special-Status or Sensitive Natural Communities

The CNDDB was searched by U.S. Geological Survey (USGS) 7.5-minute quadrangles for special-status or sensitive natural community occurrences recorded in the project vicinity. The quadrangles used for the proposed project included Arched Rock, Duncans Mills, Camp Mecker, Cazadero, Guerneville, Fort Ross, Bodega Head, and Valley Ford. Based on the search of these quadrangles, the following four sensitive natural communities are recorded in the project vicinity: Coastal Terrace Prairie, Northern Coastal Salt Marsh, Coastal Brackish Marsh, and Coastal and Valley Freshwater Marsh (CDFG, 2010). The CNDDB includes only the later two communities, Coastal Brackish Marsh and Coastal and Valley Freshwater Marsh, within the Estuary Study Area. However, Coastal and Valley Freshwater Marsh is the only sensitive community included in the



SOURCE: Stewards and SCWA, 2010a.

Figure 4.4-9
Average Seal Numbers at Jenner Haulout versus River Haulouts (July 2009 through February 2010)

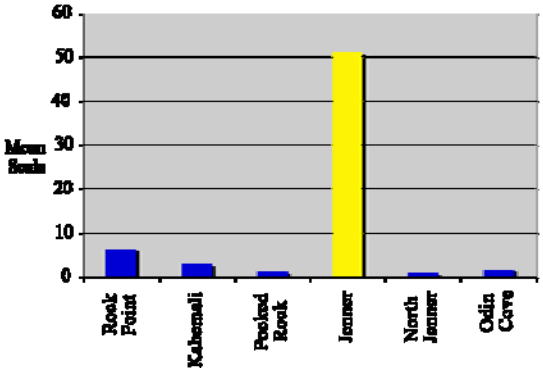


Figure 4.4-10
Average Seal Numbers at Jenner Haulout versus Regional Haulouts (July 2009 through February 2010)

CNDDB that is present in the Estuary Study Area. The Coastal Brackish Marsh included in the Estuary Study Area by CNDDB was based on the USFWS National Wetland Survey Maps of 1982. Recent vegetation mapping conducted by the Water Agency (SCWA, 2010c) classified this area as freshwater marsh. Additionally, although not included within the project vicinity in the CNDDB, Northern Dune Scrub is also present in the Estuary Study Area. The Northern Dune Scrub and Coastal and Valley Freshwater Marsh communities are known or believed to be rare within the state.

In addition to the sensitive natural communities mentioned above, the regulatory and resource agencies consider oak woodlands, waters and wetlands, and riparian woodlands and forests sensitive (see Regulatory Framework section below). As discussed above, these communities and habitats, with the exception of oak woodlands, are present within the Estuary Study Area.

Special-Status Plant and Animal Species

The potential occurrence of special-status plant and animal species in the Estuary Study Areawas initially evaluated by developing a list of special-status species that are known to or have the potential to occur in the project vicinity. This list was primarily derived from a search of the CNDDB (CDFG, 2010) and CNPS Electronic Inventory (CNPS, 2010) for special-status species occurrences recorded on the Arched Rock, Duncans Mills, Camp Mecker, Cazadero, Guerneville, Fort Ross, Bodega Head, and Valley Ford USGS 7.5-Minute Quadrangles, and review of the USFWS list of federal endangered and threatened species for the Arched Rock and Duncans Mills USGS 7.5-Minute Quadrangles. Other sources used included existing biological resources studies and reports for the Russian River Estuary (Nielsen and Light, 1994; Merritt Smith Consulting, 1997, 1998, 1999, 2001; SCWA and Merrit Smith Consulting 2001, SWCA, 2005; SCWA, 2006; SCWA and Stewards of the Coast and Redwoods, 2009), and conservation and management plans and planning documents for lands within the project vicinity (Prunuske Chatham, 2005; State Parks, 2007). The potential for occurrence of those species included on the list

were then evaluated based on the habitat requirements of each species relative to the observed existing conditions, and results of previous biological resources studies.

Tables 4.4-2 and **4.4-3** present those special-status plant and animal species, respectively, that are known to or have the potential to occur in the project vicinity, as well as each species' regulatory status, habitat requirements, and ranking of potential for occurrence in the Estuary Study Areaand **Figures 4.4-11** and **4.4-12** illustrate the identity and location of known occurrences of special-status species in the project vicinity.

Special-Status Plants

Based on review of the databases and other information sources, 64 special-status plant species and two special-status moss species have been documented as occurring or potentially occurring in the vicinity of the Estuary Study Area. Forty-one of these plants and one of the moss are considered unlikely to occur or to have a low potential to occur within the Estuary Study Area for reasons such as absence of essential habitat requirement for the species, the distance to known occurrences and/or the species distributional range, or the species not being detected during past or present field surveys. These species are not discussed further in this section. The remaining 23 plants and one moss are considered to have moderate to high potential to occur within the Estuary Study Area, based on known occurrences and availability of suitable habitat. These species are discussed below.

Pink Sand-Verbena. Pink sand-verbena (*Abronia umbellata* ssp. *breviflora*) is a CNPS List 1B.1 species. This prostrate perennial herb has a round inflorescence composed of 8 to 27 small pink flowers and is a member of four o'clock family (Nyctaginaceae). The blooming period for this species occurs between June and October. The pink sand-verbena occupies coastal dune and coastal strand habitats at elevations between 0 and 30 feet. This species is found along the coast in the Pacific Northwest. In California, its range extends along the coast from Del Norte County south to Marin County.

The beach and dune habitat within the Estuary Study Area provides potentially suitable habitat for the pink sand-verbena. Although there are no CNDDB occurrence records for this plant within five miles of the Estuary Study Area, it is known from the South Salmon Creek and Doran Beaches in Bodega Bay, approximately six miles south of Estuary Study Area. This species has a moderate potential to occur within the Estuary Study Area due to presence of suitable habitat and known occurrence records in similar habitat.

Blasdale's Bent Grass. Blasdale's bent grass (*Agrostis blasdalei*) is a CNPS List 1B.2 species in the grass family (Poaceae). It is a rhizomatous herb found in coastal bluff scrub, coastal dunes, and coastal prairie habitats between 15 and 490 feet in elevation. This coastal species is endemic to California and occurs within Mendocino, Sonoma, Marin, San Mateo and Santa Cruz counties. It produces slender, dense inflorescences between May and July.

TABLE 4.4-2
SPECIAL-STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Phenology[a]**	**Flowering Period**	**Habitat**	**Potential to Occur**
Pink sand-verbena *Abronia umbellata* ssp. *breviflora*	CNPS 1B.1	Perennial herb	Jun – Oct	Coastal dunes. Elevation 0 to 30 feet.	Moderate. Potentially suitable habitat present at Estuary Study Area. Present in the South Salmon Creek Beach area, approximately six miles south of Estuary Study Area.
Blasdale's bent grass *Agrostis blasdalei*	CNPS 1B.2	Perennial herb (rhizomatous)	May – Jul	Coastal bluff scrub, coastal dunes, and coastal prairie. Elevation 15 to 490 feet.	High. Potentially suitable habitat present in Estuary Study Area. Present in multiple locations within five miles of Estuary Study Area; nearest location less than ¼ mile south of Estuary Study Area.
Franciscan onion *Allium peninsulare* var. *franciscanum*	CNPS 1B.2	Perennial herb (bulbiferous)	May – Jun	Cismontane woodland and valley and foothill grassland associated with clay soil; often on serpentine. Elevation 170 to 980 feet.	Low. Range above Estuary Area elevations and suitable substrate generally not present in Estuary Study Area. Present on roadside ocean cliffs approximately three miles north of Bodega Bay.
Sonoma alopecurus *Alopecurus aequalis* var. *sonomensis*	FE CNPS 1B.1	Perennial herb	May – Jul	Freshwater marshes and swamps and riparian scrub. Elevation 15 to 1,200 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present at Duncans Mills Marsh area; location less than ¼ mile north of Estuary Study Area.
Napa false indigo *Amorpha californica* var. *napensis*	CNPS 1B.2	Shrub (deciduous)	Apr – Jul	Chaparral, cismontane woodland, and openings in broadleaved upland forest. Elevation 390 to 6,560 feet.	Low. Range above Estuary Study Area elevation. Known from vicinity of Monte Rio within maximum backwater area; historical observation on road between Guernville and Monte Rio.
Baker's manzanita *Arctostaphylos bakeri* ssp. *bakeri*	CR CNPS 1B.1	Shrub (evergreen)	Feb – Apr	Broadleaved upland forest and chaparral. Often on serpentine soil. Elevation 250 to 980 feet.	Low. Range above Estuary Study Area elevation and suitable substrate not generally present in Estuary Study Area. Present north of Dutch Bill Creek, approximately two miles south of Estuary Study Area.
The Cedars manzanita *Arctostaphylos bakeri* ssp. *sublaevis*	CR CNPS 1B.2	Shrub (evergreen)	Feb – May	Closed-cone coniferous forest and chaparral associated with serpentine seeps. Elevation 610 to 2,490 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Vine Hill Manzanita *Arctostaphylos densiflora*	CE CNPS 1B.1	Shrub (evergreen)	Feb – Apr	Chaparral on acid marine sand. Elevation 160 to 390 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Rincon Ridge Manzanita *Arctostaphyos stanfordiana* ssp. *decumbens*	CNPS 1B.1	Shrub (evergreen)	Feb – Apr	Chaparral and cismontane woodland. Elevation 245 to 1,215 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
The Cedars fairy-lantern *Calochortus raichei*	CNPS 1B.2	Perennial herb (bulbiferous)	May – Aug	Closed-cone coniferous forest and chaparral associated with serpentine seeps. Elevation 660 to 1,600 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Coastal bluff morning-glory *Calystegia purpurata* ssp. *saxicola*	CNPS 1B.2	Perennial herb	May – Sep	Coastal dunes, coastal scrub, and North Coast coniferous forest. Elevation 30 to 340 feet.	High. Potentially suitable habitat present in Estuary Study Area. Present in multiple locations within five miles of Estuary Study Area; Nearest location less than ¼ mile south of the Estuary Study Area.

TABLE 4.4-2 (Continued)
SPECIAL-STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Phenology[a]**	**Flowering Period**	**Habitat**	**Potential to Occur**
Swamp harebell *Campanula californica*	CNPS 1B.2	Perennial herb (rhizomatous)	Jun – Oct	Bogs and fens, meadows and seeps, freshwater marsh and swamps, and mesic closed-cone coniferous forest, coastal prairie, and North Coast coniferous forest. Elevation 3 to 1,330 feet.	High. Potentially suitable habitat present in Estuary Study Area. Present at Duncans Mills Marsh area; location less than ¼ mile north of Estuary Study Area.
Sonoma white sedge *Carex albida*	FE CE CNPS 1B.1	Perennial herb (rhizomatous)	May – Jul	Bogs and fens and freshwater marshes and swamps. Elevation 50 to 295 feet.	Low. Range above Estuary Study Area elevation. Present in vicinity of Sebastopol, nearly 10 miles southeast of Estuary Study Area.
Bristly sedge *Carex comosa*	CNPS 2.1	Perennial herb (rhizomatous)	May – Sep	Coastal prairie, valley and foothill grassland, and margins of marshes and swamps. Elevation 0 to 2,050 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Historically documented in vicinity of Guerneville, approximately two miles northeast of Estuary Study Area.
Deceiving sedge *Carex saliniformis*	CNPS 1B.2	Perennial herb (rhizomatous)	Jun	Coastal salt marshes and swamps, meadows and seeps, and mesic coastal prairie and coastal scrub. Elevation 10 to 755 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present near Russian Gulch and Meyers Grade, between State Route 1 and the ocean; location less than one mile north of Estuary Study Area.
Rincon Ridge ceanothus *Ceanothus confusus*	CNPS 1B.1	Shrub (evergreen)	Feb – Jun	Closed-cone coniferous forest, chaparral, and cismontane woodland associated with volcanic or serpentine soil. Elevation 250 to 3,490 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Holly-leaved ceanothus *Ceanothus purpureus*	CNPS 1B.2	Shrub (evergreen)	Feb – Jun	Chaparral and cismontane woodland associated with rocky, volcanic soil. Elevation 390 to 2,100 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Dwarf soaproot *Chlorogalum pomeridianum* var. *minus*	CNPS 1B.2	Perennial herb (rhizomatous)	May – Aug	Chaparral on serpentine soil. Elevation 1,000 to 3,280 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
San Francisco Bay spineflower *Chorizanthe cuspidata* var. *cuspidata*	CNPS 1B.2	Annual herb	Apr – Jul	Coastal dunes and sandy coastal bluff scrub, coastal scrub, and coastal prairie. Elevation 10 to 705 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Historically documented in the vicinity of Bodega Head, approximately eight miles south of Estuary Study Area.
Woolly-headed spineflower *Chorizanthe cuspidata* var. *villosa*	CNPS 1B.2	Annual herb	May – Jul	Coastal dunes, and sandy coastal prairie and coastal scrub. Elevation 10 to 200 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present in the vicinity of Bodega Head, approximately eight miles south of Estuary Study Area.
Sonoma spineflower *Chorizanthe valida*	FE CE CNPS 1B.1	Annual herb	Jun – Aug	Sandy coastal prairie. Elevation 30 to 1,000 feet.	Low. Potentially suitable habitat present in Estuary Study Area. However, last documented from Fort Ross area; may be extinct in Sonoma County.
Franciscan thistle *Cirsium andrewsii*	CNPS 1B.2	Perennial herb	Mar – Jul	Mesic broadleaved upland forest, coastal bluff scrub, coastal prairie, and coastal scrub. Sometimes on serpentine soil. Elevation 0 to 490 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Historically documented from Bodega Head, approximately eight miles south of Estuary Study Area.

TABLE 4.4-2 (Continued)
SPECIAL-STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Phenology[a]**	**Flowering Period**	**Habitat**	**Potential to Occur**
Point Reyes bird's-beak *Cordylanthus maritimus* ssp. *palustris*	CNPS 1B.2	Annual herb (hemiparasitic)	Jun – Oct	Coastal salt marshes and swamps. Elevation 0 to 30 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Pennell's bird's-beak *Cordylanthus tenuis* ssp. *capillaris*	FE CR CNPS 1B.2	Annual herb (hemiparasitic)	Jun – Sep	Closed-cone coniferous forest and chaparral on serpentine. Elevation 150 to 1,000 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Baker's larkspur *Delphinium bakeri*	FE CE CNPS 1B.1	Perennial herb	Mar – May	Often mesic broadleaved upland forest, coastal scrub, and valley and foothill grassland on decomposed shale. Elevation 260 to 1,000 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area
Golden larkspur *Delphinium luteum*	FE CR CNPS 1B.1	Perennial herb	Mar – May	Rocky chaparral, coastal prairie, and coastal scrub. Elevation 0 to 330 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present in multiple locations within 10 miles of Estuary Study Area; nearest location approximately six miles south of Estuary Study Area.
Norris' beard moss *Didymodon norrisii*	CNPS 2.2	Moss		Intermittently mesic cismontane woodland and lower montane coniferous forest on rock. Elevation 1,970 to 6,470 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Western leatherwood *Dirca occidentalis*	CNPS 1B.2	Shrub (deciduous)	Jan – Mar	Riparian forest and woodland, and mesic broadleaved upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, and North Coast coniferous forest. Elevation 160 feet to 1,295 feet.	Low. Range above Estuary Study Area elevation. Present along Salmon Creek Road, approximately two miles west of Bodega Bay.
Greene's narrow-leaved daisy *Erigeron greenei*	CNPS 1B.2	Perennial herb	May – Sep	Chaparral on serpentine or volcanic soil. Elevation 260 to 3,300 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Serpentine daisy *Erigeron serpentinus*	CNPS 1B.3	Perennial herb	May – Aug	Chaparral associated with serpentine seeps. Elevation 200 to 2,200 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
The Cedars buckwheat *Eriogonum cedrorum*	CNPS 1B.3	Perennial herb	Jun – Sep	Closed-cone coniferous forest on serpentine soil. Elevation 1,200 to 1,800 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Snow Mountain buckwheat *Eriogonum nervulosum*	CNPS 1B.2	Perennial herb (rhizomatous)	Jun – Sep	Chaparral on serpentine soil. Elevation 980 to 6,910 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Coast fawn lily *Erythronium revolutum*	CNPS 2.2	Perennial herb (bulbiferous)	Mar – Jul	Bogs and fens, and mesic broadleaved upland forest and North Coast coniferous forest. Often associated with streambanks. Elevation 0 to 4,430 feet.	Low. Suitable habitat generally not present in Estuary Study Area. Nearest location over 45 miles north of Estuary Study Area.
Fragrant fritillary *Fritillaria liliacea*	CNPS 1B.2	Perennial herb (bulbiferous)	Feb – Apr	Cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland. Often on serpentine soil. Elevation 10 to 1,345 feet.	Low. Suitable substrate not generally present in Estuary Study Area. Present in vicinity of Camp Meeker, approximately six miles southeast of Estuary Study Area.
Blue coast gilia *Gilia capitata* ssp. *chamissonis*	CNPS 1B.1	Annual herb	Apr – Jul	Coastal dunes and coastal scrub. Elevation 10 to 660 feet.	High. Potentially suitable habitat present in Estuary Study Area. Present in multiple locations within ten miles of Estuary Study Area, including a location at Goat Rock State Beach.

TABLE 4.4-2 (Continued)
SPECIAL-STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Phenology[a]**	**Flowering Period**	**Habitat**	**Potential to Occur**
Woolly-headed gilia *Gilia capitata* ssp. *tomentosa*	CNPS 1B.1	Annual herb	May – Jul	Rocky coastal bluff scrub on outcrops. Elevation 50 to 510 feet.	Low. Range above Estuary Study Area elevation and suitable substrate not generally present in Estuary Study Area.
Dark-eyed gilia *Gilia millefoliata*	CNPS 1B.2	Annual herb	Apr – Jul	Coastal dunes. Elevation 10 to 100 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present in the vicinity of Bodega Head, approximately eight miles south of Estuary Study Area.
Pale yellow hayfield tarplant *Hemizonia congesta* ssp. *congesta*	CNPS 1B.2	Annual herb	Apr - Nov	Valley and foothill grassland. Sometimes along roadsides. Elevation 70 to 1,840 feet.	Low.Range above Estuary Study Area elevation. Historically documented from along State Route 1 approximately four miles north of Jenner.
Short-leaved evax *Hesperevax sparsiflora* var. *brevifolia*	CNPS 1B.2	Annual herb	Mar – Jun	Coastal dunes and sandy coastal bluff scrub. Elevation 0 to 705 feet.	High. Potentially suitable habitat present in Estuary Study Area. Present in multiple locations within five miles of Estuary Study Area; nearest location approximately ½ mile south of Estuary Study Area.
Point Reyes horkelia *Horkelia marinensis*	CNPS 1B.2	Perennial herb	May – Sep	Coastal dunes and sandy coastal prairie and coastal scrub. Elevation 20 to 1,150 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present in the vicinity of Bodega Head, approximately eight miles south of Estuary Study Area.
Thin-lobed horkelia *Horkelia tenuiloba*	CNPS 1B.2	Perennial herb	May – Jul	Broadleaved upland forest, chaparral, and valley and foothill grassland in mesic, sandy openings. Elevation 160 to 1,640 feet.	Low. Range above Estuary Study Area elevation. Present in vicinity of Bohemian Grove, approximately three miles southwest of Estuary Study Area.
Baker's goldfields *Lasthenia californica* ssp. *bakeri*	CNPS 1B.2	Perennial herb	Apr – Oct	Coastal scrub, meadows and seeps, marshes and swamps, and openings in closed-cone coniferous forest. Elevation 200 to 1,710 feet.	Low. Range above Estuary Study Area elevation. Historically documented in vicinity of Johnson Gulch, approximately 7 miles south of Estuary Study Area.
Perennial goldfields *Lasthenia californica* ssp. *macrantha*	CNPS 1B.2	Perennial herb	Jan – Nov	Coastal dunes, coastal bluff scrub, and coastal scrub. Elevation 20 to 1,710 feet.	High. Present in multiple locations, including a location in the Estuary Study Area.
Contra Costa goldfields *Lasthenia conjugens*	FE CNPS 1B.1	Annual herb	Mar – Jun	Vernal pools and mesic cismontane woodland, valley and foothill grassland and alkaline playas. Elevation 0 to 1,540 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Jepson's leptosiphon *Leptosiphon jepsonii*	CNPS 1B.2	Annual herb	Mar- May	Chaparral and cismontane woodland. Usually on volcanic soil. Elevation 330 to 1,640 feet.	Unlikely.Potentially suitable habitat not present in Estuary Study Area.
Rose leptosiphon *Leptosiphon rosaceus*	CNPS 1B.1	Annual herb	Apr – Jul	Coastal bluff scrub. Elevation 0 to 330 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area.
Crystal Springs lessingia *Lessingia arachnoidea*	CNPS 1B.2	Annual herb	Jul – Oct	Often along roadsides in cismontane woodland, coastal scrub, and valley and foothill grassland on serpentine soil. Elevation 200 to 660 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Sebastopol meadowfoam *Limnanthes vinculans*	FE CE CNPS 1B.1	Annual herb	Apr – May	Vernal pools, meadows and seeps, and vernally mesic valley and foothill grassland. Elevation 50 to 1,000 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.

TABLE 4.4-2 (Continued)
SPECIAL-STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Phenology[a]**	**Flowering Period**	**Habitat**	**Potential to Occur**
Tidestrom's lupine *Lupinus tidestromii*	FE CE CNPS 1B.1	Perennial herb (rhizomatous)	Apr – Jun	Coastal dunes. Elevation 0 to 330 feet.	High. Present within the Estuary Study Area, but outside the project area, in sand dunes north and east of the Goat Rock State Beach.
Marsh microseris *Microseris paludosa*	CNPS 1B.2	Perennial herb	Apr – Jun	Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland. Elevation 20 to 1,800 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area.
Robust monardella *Monardella villosa* ssp. *globosa*	CNPS 1B.2	Perennial herb (rhizomatous)	Jun – Jul	Valley and foothill grassland, cismontane woodland, coastal scrub, and openings in broadleaved upland forest and chaparral. Elevation 330 to 3,000 feet.	Low. Range above Estuary Study Area elevation. Present east of Bodega Bay, nearly 10 miles south of Estuary Study Area.
White-flowered rein orchid *Piperia candida*	CNPS 1B.2	Perennial herb	May – Sep	Broadleaved upland forest, lower montane coniferous forest, and North Coast coniferous forest. Sometimes on serpentine soil. Elevation 100 to 4,300 feet.	Low. Range above Estuary Study Area elevation and suitable substrate not generally present in Estuary Study Area. Present in vicinity of Cazadero, approximately five miles north of Estuary Study Area.
North Coast semaphore grass *Pleuropogon hooverianus*	CT CNPS 1B.1	Perennial herb (rhizomatous)	Apr – Jun	Meadows and seeps and mesic openings in broadleaved upland forest and North Coast coniferous forest. Elevation 30 to 2,200 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area.
Oregon polemonium *Polemonium carneum*	CNPS 2.2	Perennial herb	Apr – Sep	Coastal prairie, coastal scrub, and lower montane coniferous forest. Elevation 0 to 6,000 feet.	Moderate. Potentially suitable habitat present in Estuary Estuary Study Area. Present in the vicinity of Bodega Bay, approximately eight miles south of Estuary Estuary Study Area.
Point Reyes checkerbloom *Sidalcea calycosa* ssp. *rhizomata*	CNPS 1B.2	Perennial herb (rhizomatous)	Apr – Sep	Freshwater marshes and swamps near the coast. Elevation 10 to 250 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present at Duncans Mills Marsh area; location less than ¼ mile north of Estuary Study Area.
Marin checkerbloom *Sidalcea hickmanii* ssp. *viridis*	CNPS 1B.3	Perennial herb	May – Jun	Chaparral on serpentine soil. Elevation 160 to 1,410 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Purple-stemmed checkerbloom *Sidalcea malviflora* ssp. *purpurea*	CNPS 1B.2	Perennial herb (rhizomatous)	May – Jun	Broadleaved upland forest and coastal prairie. Elevation 0 to 100 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present in multiple locations within five miles of Estuary Study Area; nearest location less than ½ miles south of Estuary Study Area.
Hoffman's bristly jewel-flower *Streptanthus glandulosus* var. *hoffmanii*	CNPS 1B.3	Annual herb	Mar – Jul	Rocky chaparral, cismontane woodland, and serpentine valley and foothill grassland. Elevation 390 to 1,560 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Three Peaks jewel-flower *Streptanthus morrisonii* ssp. *elatus*	CNPS 1B.2	Perennial herb	Jun – Sep	Chaparral on serpentine soil. Elevation 295 to 2,670 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Dorr's Cabin jewel-flower *Streptanthus morrisonii* ssp. *hirtiflorus*	CNPS 1B.2	Perennial herb	Jun	Chaparral and closed-cone coniferous forest on serpentine soil. Elevation 610 to 2,690 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.

TABLE 4.4-2 (Continued)
SPECIAL-STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Phenology[a]**	**Flowering Period**	**Habitat**	**Potential to Occur**
Morrison's jewel-flower *Streptanthus morrisonii* ssp. *morrisonii*	CNPS 1B.2	Perennial herb	May – Sep	Rocky, serpentine chaparral. Elevation 390 to 1,920 feet.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Two-fork clover *Trifolium amoenum*	FE CNPS 1B.1	Annual herb	Apr – Jun	Coastal bluff scrub and valley and foothill grassland. Sometimes on serpentine soil. Elevation 20 to 1,360 feet.	Low. Suitable substrate not generally present in Estuary Study Area. Present approximately five miles south of Estuary Study Area.
Santa Cruz clover *Trifolium buckwestiorum*	CNPS 1B.1	Annual herb	Apr – Oct	Margins of gravelly broadleaved upland forest and cismontane woodland. Elevation 340 to 2,000 feet.	Low. Range above Estuary Study Area elevation and suitable substrate not generally present in Estuary Study Area.
Saline clover *Trifolium depauperatum* var. *hydrophilum*	CNPS 1B.2	Annual herb	Apr – Jun	Vernal pools, marshes and swamps, and mesic alkaline valley and foothill grassland. Elevation 0 to 980 feet.	Low. Suitable substrate not generally present in Estuary Study Area. Historically documented in the vicinity of Occidental.
San Francisco owl's-clover *Triphysaria floribunda*	CNPS 1B.2	Annual herb	Apr – Jun	Coastal prairie, coastal scrub, and valley and foothill grassland. Usually on serpentine soil. Elevation 30 to 525 feet.	Low. Suitable substrate not generally present in Estuary Study Area.
Coastal triquetrella *Triquetrella californica*	CNPS 1B.2	Moss		Coastal bluff scrub and coastal scrub. Elevation 30 to 330 feet.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present in the vicinity of Bodega Head, approximately eight miles south of Estuary Study Area.

[a] Phenology is the study of periodic occurrences in nature, such as the ripening of fruit, and their relation to climate.

CODES:

FE: Federally listed as Endangered
FT: Federally listed as Threatened
CE: State of California listed as Endangered
CT: State of California listed as Threatened
CR: State of California listed as Rare

CNPS = California Native Plant Society
1A: Presumed extinct in California
1B: Rare, Threatened, or Endangered in California and elsewhere
2: Rare, Threatened, or Endangered in California, but more common elsewhere

POTENTIAL TO OCCUR
Unlikely = Habitat not present in the Estuary Study Area and/or species is not known to occur in the Estuary Study Area based on CNDDB occurrences, recent field surveys or species distribution information.
Low = Habitat not present in the Estuary Study Area and/or few occurrence in the region.
Moderate = Marginal habitat present in the Estuary Study Area and/or some occurrences in the region.
High = Good habitat present in the Estuary Study Area and nearby occurrences or species is known to occur in the Estuary Study Area based on CNDDB occurrences or recent field surveys.

SOURCES: CDFG, 2010; CNPS, 2010

TABLE 4.4-3
SPECIAL-STATUS ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Habitat**	**Potential to Occur**
Invertebrates			
San Bruno elfin butterfly *Callophrys mossii bayensis*	FE	Coastal mountainous areas with chaparral and grassland habitats, mainly in the vicinity of San Bruno Mountain, San Mateo County. Colonies are located on steep, north-facing slopes within the fog belt. Larval host plant is stonecrop (*Sedum spathulifolium*).	Unlikely. Estuary Study Area located outside the normal range for this species; colonies are all restricted to the coastal mountains of northern San Mateo County.
Monarch butterfly *Danaus plexippus*	SA	Winter roost sites extend along the coast of California from Marin County in the north to San Diego County in the South. Roosts are usually wooded areas dominated by eucalyptus trees, Monterey pines, and Monterey cypresses, and are located in sheltered bays or farther inland.	Low. Potentially suitable winter roosts not generally present in Estuary Study Area. Nearest documented roost located at Wrights Beach Campground, approximately four miles south of Estuary Study Area.
Black abalone *Haliotis cracherodii*	FE	Rocky intertidal and subtidal habitats from Point Arena, California to Bahia Tortugas and Isla Guadalupe, Mexico.	Unlikely. Estuary Study Area located outside the normal range for this species; considered rare north of San Francisco. Furthermore, potentially suitable habitat not present in Estuary Study Area.
White abalone *Haliotis sorenseni*	FE	Open low and high relief rock and boulder habitat from Point Conception, California to Runta Abreojos, Baja Californica.	Unlikely. Estuary Study Area located outside the normal range for this species. Furthermore, potentially suitable habitat not present in Estuary Study Area.
Behren's silverspot butterfly *Speyeria zerene behrensii*	FE	Early successional coastal terrace prairie habitat extending along the northern coast of California, from the mouth of the Russian River (north bank) in Sonoma County northward to the vicinity of Point Arena in Mendocino County. May also inhibit coastal sand dune systems. Larval host plant is western dog violet (*Viola adunca*).	High. Specimens collected near Jenner, at the mouth of the Russian River are unclear, possibly an intermediate zone with Myrtles's silverspot butterfly (see below).
Myrtle's silverspot *Speyeria zerene myrtleae*	FE	Coastal dunes, coastal scrub, and coastal prairie habitat extending along the northern coast of California, from the mouth of the Russian River (south bank) in Sonoma County southward to Point Ano Nuevo in San Mateo county. Larval host plant is western dog violet (*Viola adunca*).	High. Present in multiple locations within five miles of Estuary Study Area, including a 1975 occurrence from the Estuary Study Area.
California freshwater shrimp *Syncaris pacifica*	FE CE	Endemic to low-elevation and low gradient perennial freshwater streams in Marin, Sonoma, and Napa Counties, California.	High. Known from Austin Creek within the maximum backwater area. Also has a moderate potential to occur within the Estuary Study Area.
Fish			
(See Section 4.5, Fisheries)			
Amphibians			
Foothill yellow-legged frog *Rana boylii*	CSC	Partially shaded, low-gradient streams and riffles with a rock substrate in a variety of habitats. Needs at least some cobble-sized substrate for egg-laying and, at least, 15 weeks to attain metamorphosis.	High. Present in multiple locations within five miles of Estuary Study Area, including a location in the Estuary Study Area.
California red-legged frog *Rana draytonii*	FT CSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development; must have access to aestivation habitat.	High. Potentially suitable habitat present in Estuary Study Area. Present in multiple locations within five miles of Estuary Study Area; nearest location approximately ½ mile southeast of the Estuary Study Area along Willow Creek.

TABLE 4.4-3 (Continued)
SPECIAL-STATUS ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Habitat**	**Potential to Occur**
Reptiles			
Western pond turtle *Actinemys marmorata*	CSC	Variety of aquatic habitats, both permanent and intermittent, with suitable aerial and aquatic basking sites. Needs upland habitats for nesting, overwintering, and aestivating.	High. Present in multiple locations in Estuary Study Area.
Loggerhead turtle *Caretta caretta*	FT	Globally distributed, occurring throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. Occupies the terrestrial, oceanic, and neritic zones during their lives.	Unlikely. Potentially suitable habitat not present in Estuary Study Area; juveniles mostly documented off the coast of California.
Green turtle *Chelonia mydas*	FT	Globally distributed, occurring generally in the tropical and subtropical waters. In the eastern North Pacific, occurs from Baja California to southern Alaska. Occupies the terrestrial, oceanic, and neritic zones during their lives.	Unlikely. Estuary Study Area located outside the normal range for this species.
Leatherback turtle *Dermochelys coriacea*	FE	Globally distributed. Known as a pelagic species, but also forages in coastal waters.	Unlikely. Estuary Study Area located outside the normal range for this species. Furthermore, potentially suitable habitat not present in Estuary Study Area.
Olive ridley sea turtle *Lepidochelys olivacea*	FT	Globally distributed, occurring throughout the tropical regions of the South Atlantic, Pacific, and Indian Oceans. Known as a pelagic species, but has been known to inhabit coastal areas, including bays and estuaries.	Unlikely. Estuary Study Area located outside the normal range for this species.
Birds			
Tricolored Blackbird (Nesting colony) *Agelaius tricolor*	CSC	Highly colonial species, most numerous in the Central Valley and San Francisco Delta regions; largely endemic to California. Requires open water, protected nesting substrate, and suitable foraging area providing adequate inset prey within a few miles of the nesting colony.	Moderate. Potentially suitable habitat present in Estuary Study Area. May occur as a seasonal non-breeding resident or as a transient.
Great blue heron (Rookery site) *Ardea herodias*	SA	Variety of habitats near sources of water. Nests commonly high in tops of secluded large snags or live trees.	High. Rookery site present in Estuary Study Area.
Burrowing owl (Burrowing sites and some wintering sites) *Athene cunicularia*	CSC	Primarily a grassland species, but thrives in some environments highly altered by human activity. Requires burrows for roosting and nesting and relatively short vegetation with only sparse shrubs and taller vegetation.	Moderate. Potentially suitable habitat present in Estuary Study Area. May occur as a seasonal non-breeding resident or as a transient. Present in vicinity of Bodega Bay, south of Coleman Valley Road.
Marbled murrelet (Nesting) *Brachyramphus marmoratus*	FT CE	Feeds near-shore; nests inland along coast in California, from Eureka to Oregon border and from Half Moon Bay to Santa Cruz. Nests in old-growth forests, characterized by large trees, multiple canopy layers, and moderate to high canopy closure. Forests are located close enough to the marine environment for the birds to fly to and from nest sites.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present offshore of Arched Rock, approximately one mile south/southwest of Estuary Study Area.
Rhinoceros auklet (Nesting colony) *Cerorhinca monocerata*	SA	Undisturbed islands with friable soil for digging burrows and productive, pelagic waters near breeding colony for foraging.	Low. Potentially suitable nesting habitat not present in Estuary Study Area; however, may forage offshore.
Western snowy plover (Nesting) *Charadrius alexandrinus nivosus*	FT CSC	Nests primarily above the high tide line on coastal beach habitats. In winter, found on many of the beaches used for nesting, as well as on beaches where they do not nest, in man-made salt ponds, and on estuarine sand and mud flats.	Moderate. Potentially suitable nesting and foraging habitat present in Estuary Study Area. Present at Salmon Creek Beach during spring and fall, but no nesting documented.

TABLE 4.4-3 (Continued)
SPECIAL-STATUS ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Habitat**	**Potential to Occur**
Birds (cont.)			
Western yellow-billed cuckoo (Nesting) *Coccyzus americanus occidentalis*	FC CE	Requires patches of at least 25 acres of dense riparian forest with a canopy cover of at least 50 percent in both the understory and overstory; nests typically in mature willows.	Low. Estuary Study Area located outside the normal breeding range for this species; may occur as a transient. Nearest documented location nearly 7 miles south of the Estuary Study Area.
Northern harrier (Nesting) *Circus cyaneus*	CSC	Marshes, meadows, grasslands, and cultivated fields. Nests on ground commonly near low shrubs, in tall weeds or reeds.	High. Suitable habitat present in Estuary Study Area.
Black swift (Nesting) *Cypseloides niger*	CSC	Breeding known from three distinct areas in California, including central coast, central and southern Sierra Nevada, and San Bernardino and San Jacinto Mountains. Breeds in small colonies behind or beside permanent or semipermanent waterfalls, on perpendicular cliffs near water, and in sea caves. Forages far from nest and over a wide variety of habitats to locate insect prey.	Unlikely. Estuary Study Area located outside the normal breeding range for this species.
White-tailed kite *Elanus leucurus*	FPS	Savanna, open woodland, marshes, partially cleared lands and cultivated fields, mostly in lowland habitats. Nests in trees, often near marshes.	Moderate. Potentially suitable nesting and foraging habitat present in Estuary Study Area. Nearest documented nesting site nearly 10 miles northwest of Estuary Study Area.
American peregrine falcon *Falco peregrinus anatum*	FD CE FPS	Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, and mounds, as well as human-made structures. Nest consists of a scrape on a depression or ledge in an open site.	High. Potentially suitable foraging habitat present in Estuary Study Area. Historical nest sites near Goat Rock.
Tufted puffin (Nesting colony) *Fratercula cirrhata*	CSC	Breed on offshore rocks and island or, rarely, steep mainland cliffs that are largely free from mammalian predators and human disturbance.	Low. Potentially suitable nesting habitat not present in Estuary Study Area; however, may forage offshore.
Osprey (Nesting) *Pandion haliaetus*	SA	Occurs in ponderosa pine and mixed conifer habitats along seacoasts, lakes, and rivers. Foraging areas require large snags and open trees near large, clear, open water.	High. Suitable nesting and foraging habitat present in Estuary Study Area. Several nest sites present in the upper Estuary.
California brown pelican (Nesting colony and communal roosts) *Pelecanus occidentalis californicus*	FD CD	Breeding restricted to islands in the Gulf of California and along the outer coast from Baja California to West Anacapa and Santa Barbara Island in Southern California. Roosting and loafing sites include offshore rocks and islands, river mouths with sand bars, breakwaters, pilings, and jetties along the Pacific Coast and San Francisco Bay.	High. Suitable roosting and loafing sites present in Estuary Study Area.
Double-crested cormorant (Rookery site) *Phalacrocorax auritus*	SA	Colonial nester on coastal cliffs and offshore islands, and along inland lake margins located near foraging areas.	High. Suitable foraging and nesting habitat present in Estuary Study Area; rookery site documented at Russian River Rocks, located north of Russian River mouth.
Short-tailed albatross *Phoebastria albatrus*	FE CSC	Breeding restricted to two small island groups: Izu Island (south of Japan) and Senkaku Islands (northeast of Taiwan). When not on breeding grounds, widespread within regions of high marine productivity in the North Pacific, from Torishima to western and southern Bering Sea, Gulf of Alaska, and southward to California.	Unlikely. Estuary Study Area located outside the normal range for this species.
Bank swallow (Nesting) *Riparia riparia*	CT	Colonial nester mostly along coastal areas and rivers in northern and central California. Nesting restricted to vertical banks or bluffs with friable soils suitable for burrowing. Vegetation is varied; nesting sites are mostly selected for suitability of the nesting bank.	Moderate. Suitable foraging and nesting habitat present in Estuary Study Area. Historically present in the vicinity of Jenner.

TABLE 4.4-3 (Continued)
SPECIAL-STATUS ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Habitat**	**Potential to Occur**
Birds (cont.)			
Northern spotted owl *Strix occidentalis caurina*	FT CSC	Generally found in mature and old-growth forest, supporting the following elements: high canopy closure; a multilayered, multispecies canopy with larger overstory trees; and a presence of broken-topped tree or other nesting platforms.	High. Present in multiple locations within five miles of Estuary Study Area, including known nesting sites in Willow Creek drainage.
Mammals			
Pallid bat *Antrozous pallidus*	CSC	Arid deserts and grasslands of low elevations in California; often near rocky outcrops and water. Usually roosts in rock crevice or building, less often in cave, tree hollow, mine, etc. Prefers narrow crevices in caves as hibernation sites.	Moderate. Potentially suitable foraging habitat present in Estuary Study Area. Maternity roost documented in vicinity of Occidental, approximately six miles southeast of Estuary Study Area.
Sonoma tree vole *Arborimus pomo*	CSC	Old growth and other forests, mainly Douglas-fir, redwood, and montane hardwood-conifer habitats along the coast of California, from Sonoma County north to the Oregon border. Restricted to the fog belt.	High. Present in multiple locations in Estuary Study Area.
Guadalupe fur seal *Arctocephalus townsendi*	FT CT FPS MMPA	Tropical waters of the Southern California/Mexico region.	Unlikely. Estuary Study Area located outside the normal range for this species.
Sei whale *Balaenoptera borealis*	FE MMPA	Globally distributed, occurring in subtropical to subpolar waters on the continental shelf edge and slope.	Unlikely. Potentially suitable habitat not present in Estuary Study Area
Blue whale *Balaenoptera musculus*	FE MMPA	Globally distributed, occurring in subtropical to subpolar waters.	Unlikely. Potentially suitable habitat not present in Estuary Study Area
Finback whale *Balaenoptera physalus*	FE MMPA	Globally distributed, occurring primarily in temperate to subpolar waters.	Unlikely. Potentially suitable habitat not present in Estuary Study Area
Northern fur seal *Callorhinus ursinus*	MMPA	Across the Pacific Ocean using primarily open ocean and rocky beaches.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Townsend's big-eared bat *Corynorhinus townsendii*	CSC	Occurs in mesic habitats characterized by coniferous and deciduous forest, but occupies a variety of habitats. Maternity and hibernation colonies typically are in caves and mine tunnels. Prefers relatively cold places for hibernation, often near entrances and in well-ventilated areas. Uses caves, buildings, and tree cavities for night roosts	Moderate. Potentially suitable foraging and roosting habitat present in Estuary Study Area. Present near Bodega Bay, approximately eight miles south of Estuary Study Area.
Right whale *Eubalaena glacialis*	FE MMPA	Inhabit temperate to subpolar waters of the Atlantic Ocean, occurring primarily in coastal or shelf waters.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
Steller sea-lion *Eumetopias jubatus*	FT CSC MMPA	Prefer colder temperate to sub-artic waters of the North Pacific. Haulouts and rookeries usually consist of beaches, ledges, and rocky reefs.	Low. Potentially suitable habitat present in Estuary Study Area; tends to remain offshore or haulout in unpopulated areas. Present on offshore rocks near Jenner and Fort Ross.
Western red bat *Lasiurus blossevillii*	CSC	Associated with riparian habitat. Roosts primarily in the foliage of trees or shrubs, but may also occasionally use caves. Day roosts commonly in edge habitats.	Moderate. Potentially suitable foraging and roosting habitat present in Estuary Study Area. Present in the vicinity of Forestville, approximately six miles east of Estuary Study Area.

TABLE 4.4-3 (Continued)
SPECIAL-STATUS ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ESTUARY STUDY AREA

Common Name ***Scientific Name***	**Status**	**Habitat**	**Potential to Occur**
Mammals (cont.)			
Northern elephant seal *Mirounga angustirostris*	MMPA	Eastern and central North Pacific. Usually in ocean waters but when on land, prefer sandy beaches.	High. Suitable habitat present in Estuary Study Area; occasionally haulout at mouth of Russian River.
Harbor seal *Phoca vitulina*	MMPA	Inhabit temperate coastal habitats and use rocks, reefs, beaches, and drifting glacial ice as haulout and pupping sites.	High. Suitable habitat present in Estuary Study Area; regularly haulout at mouth of Russian River, as well as other suitable haulout sites within the Estuary.
Sperm whale *Physeter catodon*	FE MMPA	Globally distributed, primarily occurring in temperate and tropical waters.	Unlikely. Potentially suitable habitat not present in Estuary Study Area.
American badger *Taxidea taxus*	CSC	Prefers open areas and may also frequent brushlands with little groundcover. When inactive, occupies underground burrows that are elliptical shaped and eight or more inches in diameter.	Moderate. Potentially suitable habitat present in Estuary Study Area. Present in multiple location within 10 miles of Estuary Study Area; nearest location approximately six miles south of Estuary Study Area.
California sea lion *Zalophus californianus*	MMPA	Eastern Pacific Ocean in shallow coastal and estuarine waters. Preferred haulout sites are sandy beaches, but also use marina docks, jetties, and buoys.	High. Suitable habitat present in Estuary Study Area; occasionally haulout at mouth of Russian River, as well as other suitable haulout sites within the Estuary.

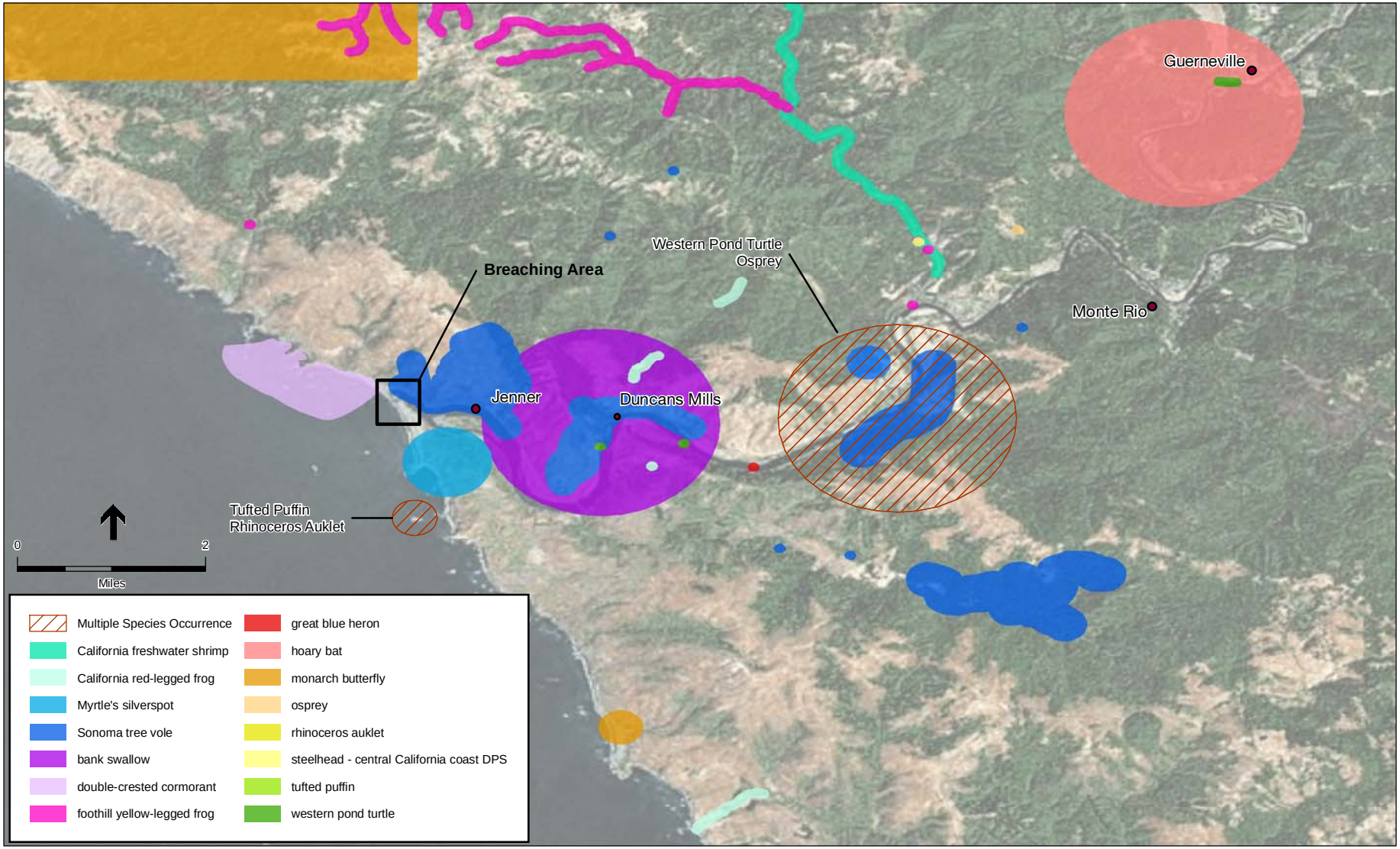
CODES:

FC: Federal Candidate for listing
FE: Federally listed as Endangered
FT: Federally listed as Threatened
FD Federal Delisted
CE: State of California listed as Endangered
CT: State of California listed as Threatened
CP: State of California Proposed for listing
CSC: California Species of Special Concern
CD: State of California Delisted
FPS: California Fully Protected Species
SA: CDFG Special Animal
MMPA: Marine Mammal Protection Act

POTENTIAL TO OCCUR

Unlikely = Habitat not present in the Estuary Study Area and/or species is not known to occur in the Estuary Study Area based on CNDDB occurrences, recent field surveys or species distribution information.
Low = Habitat not present in the Estuary Study Area and/or few occurrence in the region.
Moderate = Marginal habitat present in the Estuary Study Area and/or some occurrences in the region.
High = Good habitat present in the Estuary Study Area and nearby occurrences or species is known to occur in the Estuary Study Area based on CNDDB occurrences or recent field surveys.

SOURCES: CDFG, 2010; Jennings and Hayes, 1994; Shuford and Gardali, 2008;USFWS, 2010; Zeiner et al., 1988, 1990a, and 1990b.

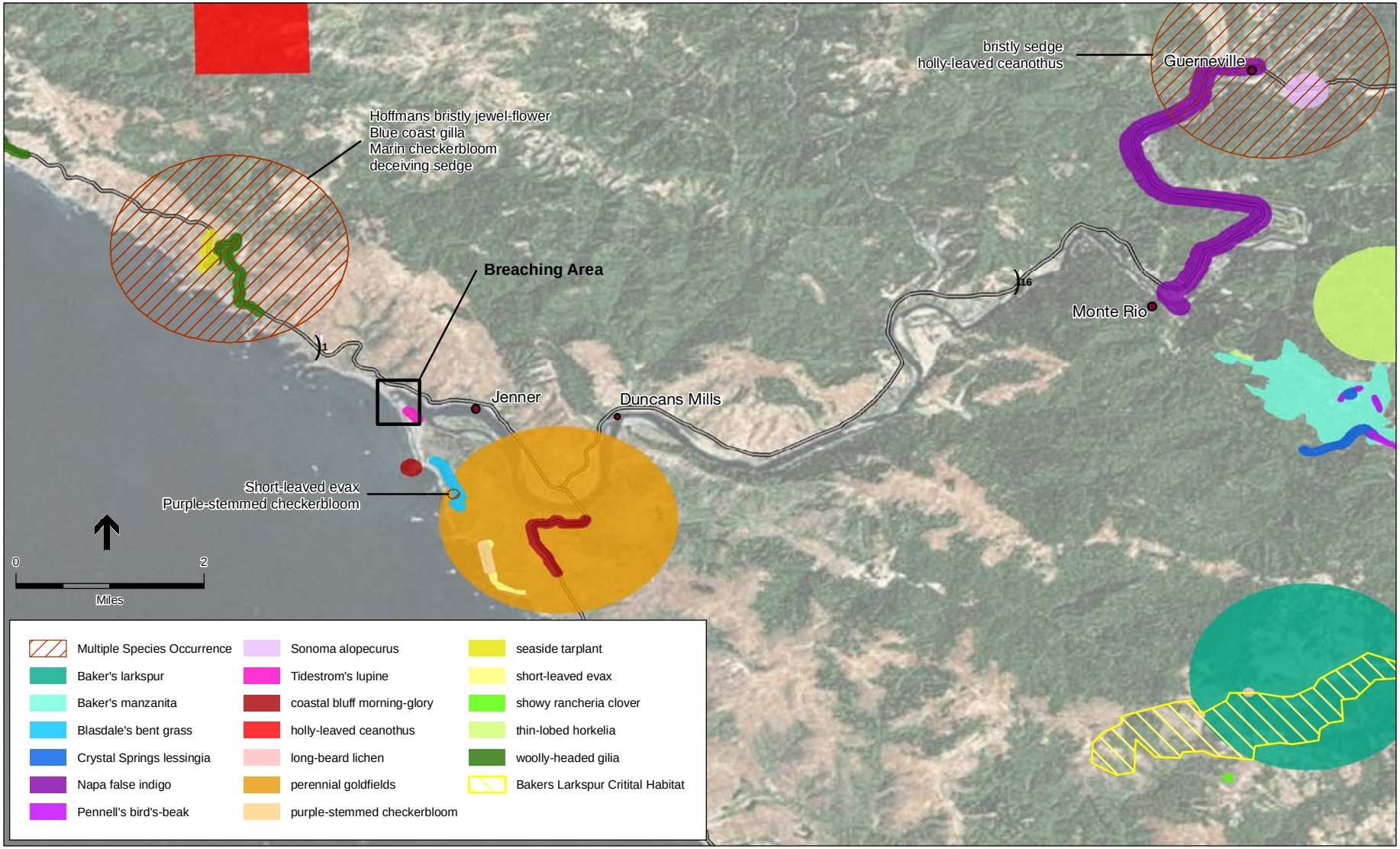


SOURCE:DFG,2010; FWS, 2010

Russian River Estuary Management Project. 207734.01

Figure 4.4-11

CNDDB Special Status Animals



SOURCE:DFG,2010; FWS, 2010

Russian River Estuary Management Project. 207734.01

Figure 4.4-12

CNDDB Special Status Plants and Critical Habitat

The beach and dune, coastal scrub, and grassland habitats located within the Estuary Study Area provide potentially suitable habitat for this species. Blasdale's bent grass is known from several locations within five miles of the Estuary Study Area. The closest location is approximately 0.25 miles south of the Estuary Study Area within the coastal bluff habitat of Blind Beach within Sonoma Coast State Beaches. There are several other known locations within the Sonoma Coast State Beach system at Furlong Gulch, Duncans Point, Schoolhouse Beach, and near Salmon Creek. This species has a high potential for occurrence based on the presence of suitable habitat in the Estuary Study Area and known occurrence records in close proximity to the Estuary Study Area.

Sonoma Alopecurus. Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*) is a federally listed endangered and CNPS List 1B.1 species. This perennial herb is a member of the grass family (Poaceae). It produces short, compact inflorescences during its May to July blooming season. Spikelets are usually violet-gray at the tip. Sonoma alopecurus occurs in freshwater marshes and swamps and riparian scrub habitats between 15 and 1,200 feet in elevation. It is a California endemic species that is known from Sonoma and Marin counties. Eleven populations have been extirpated[6] and eight natural populations are believed extant[7].

The freshwater marsh located along the edges of the Russian River and other freshwater wetlands that occur within the Estuary Study Area may provide suitable habitat for the Sonoma alopecurus. This plant is known to occur within Duncans Mills Marsh, less than 0.25 mile from the Estuary Study Area. It is also known from Guerneville Marsh, adjacent to the Russian River, approximately three miles upstream of the Estuary Study Area. There are several other occurrence records for this species over five miles southeast of the Estuary Study Area in marshes near Freestone, Occidental, and Forestville. There is a high potential for this species to occur within the Estuary Study Area due to the presence of suitable habitat and proximity to known populations.

Coastal Bluff Morning-Glory. Coastal bluff morning-glory (*Calystegia purpurata* ssp. *saxicola*) is a CNPS List 1B.2 species. It is a perennial herb of the morning-glory family (Convolvulaceae). This bindweed produces weakly climbing stems and large white flowers. The blooming period extends from May through September. This species occurs within coastal dunes and rocky coastal scrub habitats between 30 and 340 feet in elevation. Its range includes the coastal portions of Mendocino, Marin, and Sonoma Counties, with one historical record from Contra Costa County.

The coastal dune and scrub habitats within the Estuary Study Area provide potentially suitable habitat for coastal bluff monrning-glory. This plant is known from several locations within five miles of the Estuary Study Area. Coastal bluff morning-glory was photographed at Goat Rock State Beach in 2005. It is also known from a 1930 collection just south of the Estuary Study Area boundary at the southern edge of the Russian River. This species was also collected in 1997, approximately 4.5 miles south of the Estuary Study Area, just south of Schoolhouse Beach. This

6 "Extipated" is defined as removed occurrences.
7 "Extant" is defined as presumed currently present occurrences.

species has a high potential for occurrence based on the presence of suitable habitat in the Estuary Study Area and known occurrence records in close proximity to the Estuary Study Area.

Swamp Harebell. Swamp harebell (*Campanula californica*) is a CNPS List 1B.2 species found in the bellflower family (Campanulaceae). It is endemic to California and extant in Marin, Sonoma, and Mendocino counties, with historical occurrences in Santa Cruz County. It is known to grow at elevations between 3 and 1,330 feet. This harebell is a perennial rhizomatous herb that produces pale blue bell-shaped flowers during its June to October blooming period. Swamp harebell occurs within wetland areas such as bogs and fens, meadows and seeps, freshwater marsh and swamps and can also be found in wetter portions of coastal prairie and closed-cone coniferous forest.

The Estuary Study Area contains potentially suitable habitat to support this species. Freshwater marsh occurs within the edges of the middle and upper reaches of the Russian River Estuary and at the confluence of Willow Creek and the Russian River. Seasonal wetlands, including meadows and seeps, may be present within the Estuary Study Area and could also support this species. The swamp harebell is known from less than 0.25 miles north of the Estuary Study Area in Duncans Mills Marsh. There is a high potential for this species to occur within the Estuary Study Area due to the presence of suitable habitat and known occurrences within the vicinity of the Estuary Study Area.

Bristly Sedge. Bristly sedge (*Carex comosa*) is a CNPS List 2.1 species. It is a rhizomatous herb of the sedge family (Cyperaceae) that occurs in marshes and swamps in elevations ranging from 0 to 2,050 feet. Bristly sedge can also occur along lake margins and in valley and foothill grassland. The plant is closely associated with coastal prairie. Bristly sedge is fairly widely distributed, but apparently rarely collected. In California bristly sedge is known from Contra Costa, Lake, Mendocino, Sacramento, San Bernardino, Santa Cruz, San Francisco, San Mateo, Shasta, San Joaquin, and Sonoma counties. It has also been found in Oregon, Washington, Idaho, and elsewhere. The blooming season for bristly sedge is from May to September.

The Estuary Study Area contains marshes and grassland, which are potentially suitable habitat for the bristly sedge. The closest record for this species near the Estuary Study Area is a historical occurrence within the vicinity of Guerneville, approximately two miles northeast of the Estuary Study Area. Bristly sedge has a moderate potential to occur within the Estuary Study Area. The only other CNDDB occurrence record within ten miles is located approximately six miles southeast of the Estuary Study Area near Bodega Bay, but the record lacks detail on the collection date. The Estuary Study Area contains suitable habitat for this species, and a historical record is known within the vicinity of the Estuary Study Area. For this reason, bristly sedge has a moderate potential to occur within the Estuary Study Area.

Deceiving Sedge. Deceiving sedge (*Carex saliniformis*) is a CNPS List 1B.2 species of the sedge family (Cyperaceae). It grows in mesic coastal prairie and scrub, coastal salt marshes and swamps, and meadows and seeps between 10 and 755 feet in elevation. Its range extends along coastal northern California in Humboldt, Mendocino, and Sonoma counties; it is believed extirpated from Santa Cruz County. This perennial, rhizomatous herb blooms in June and less commonly in July.

The Estuary Study Area contains coastal scrub and grassland and a variety of seasonal wetland habitats, which may provide suitable habitat for the deceiving sedge. There is one known occurrence record for the deceiving sedge within ten miles of the Estuary Study Area. The exact location of this record is unknown, but it is within the vicinity of Meyers Grade, between Highway 1 and the Pacific Ocean, approximately one mile northwest of the Estuary Study Area. Deceiving sedge has a moderate potential to occur within the Estuary Study Area given the presence of suitable habitat and proximity to an occurrence record.

San Francisco Bay Spineflower. The San Francisco Bay spineflower (*Chorizanthe cuspidata* var. *cuspidata*) is a CNPS List 1B.2 of the knotweed family (Polygonaceae). This species is known from Sonoma, Marin, San Francisco, and San Mateo counties and believed extirpated from Alameda County. Suitable habitats for this species include coastal bluff scrub, sandy coastal scrub, coastal dunes, and coastal prairie between 10 and 705 feet in elevation. This spineflower has pink-red stems and small flowers held in tight inflorescences. It blooms from April through July and uncommonly into August.

The Estuary Study Area contains coastal dunes and coastal scrub, which are potentially suitable habitat for this species. There is only one CNDDB occurrence record in Sonoma County. It is from a 1930 collection located approximately eight miles south of the Estuary Study Area within the vicinity of Bodega Head. Although there is only one historical record in Sonoma County, the Estuary Study Area contains suitable habitat. Therefore, the San Francisco Bay spineflower has a moderate potential for occurrence.

Woolly-Headed Spineflower. Woolly-headed spineflower (*Chorizanthe cuspidata* var. *villosa*) is a CNPS List 1B.2 species. It is an annual herb of the knotweed family (Polygonaceae) found in coastal Marin and Sonoma counties. This small buckwheat species produces small white and pink flowers in tight inflorescences. Suitable habitat for this species includes sandy coastal scrub, coastal dunes, and coastal prairie between 10 and 200 feet in elevation. The blooming period for this species extends from May through July and uncommonly into August.

Coastal dune and scrub and grassland habitats within the Estuary Study Area provide potentially suitable habitat for the woolly-headed spineflower. The closest known occurrence record is from approximately eight miles south of the Estuary Study Area in a sandy draw of Bodega Head; this record is from 1962. There is another record over ten miles south of the Estuary Study Area within coastal bluff scrub along Dillon Beach; 20 plants were observed as recently as 2004. Due to the presence of suitable habitat in the Estuary Study Area and known records of this species in coastal Sonoma County, the woolly-headed spineflower has a moderate potential to occur within the Estuary Study Area.

Franciscan Thistle. Franciscan thistle (*Cirsium andrewsii*), is a CNPS List 1B.2 species and a member of the sunflower family (Asteraceae). This perennial herb produces dark red-purple and densely cobwebby inflorescences from March through July. Franciscan thistle occurs in broadleafed upland forest, coastal bluff scrub, coastal prairie, mesic coastal scrub, and sometimes on serpentinite coastal scrub habitats at 0 to 490 feet in elevation. This species is endemic to California and its range extends from Sonoma south to San Mateo County.

The Estuary Study Area contains coastal scrub, grassland, and upland forest habitats, which are potentially suitable habitat for the Franciscan thistle. The closest occurrence record is from Bodega Head, approximately eight miles south of the Estuary Study Area. There are no current reports from this record, and the occurrence may be extirpated. There is a moderate potential for Franciscan thistle to occur within the Estuary Study Area due to the presence of suitable habitat and historical records within coastal Sonoma County.

Golden Larkspur. Golden larkspur (*Delphinium luteum*) is a federally-listed endangered, state-listed rare, and CNPS List 1B.1 species. This perennial herb is a member of the buttercup family (Ranunculaceae). Golden larkspur produces bright yellow flowers during its March though May blooming period. It is known from fewer than 20 occurrences within Sonoma and Marin counties. Typical habitats for this species include moist rocky habitats, particularly rocky coastal scrub, coastal prairie and chaparral between 0 and 330 feet in elevation.

Coastal scrub and grassland habitats within the Estuary Study Area provides potentially suitable habitat for this species. There are several occurrence records for the golden larkspur within ten miles of the project site. Most records are located between five and 9 miles south of the Estuary Study Area within the vicinity of Bodega Bay, with one historical record approximately eight miles southeast of the Estuary Study Area. All records within the vicinity of Bodega Bay are described as occurring within rock outcrops or other rocky habitats. There is a moderate potential for the golden larkspur to occur within the Estuary Study Area due to the presence of potential habitat and known distribution in Sonoma County.

Blue Coast Gilia. Blue coast gilia (*Gilia capitata* ssp. *chamissonis*) is a CNPS List 1B.1 species. This annual herb is a member of the phlox family (Polemoniaceae). As its name suggests, the blue coast gilia has bright blue-violet flowers that bloom between April and July. This species occurs in coastal dunes and coastal scrub at elevations between 10 and 660 feet. Its range includes Sonoma, Marin and San Francisco counties.

The Estuary Study Area contains coastal dunes and coastal scrub habitats, which are potentially suitable habits for the blue coast gilia. There are also several known occurrence records for this species within ten miles of the Estuary Study Area. This species is present within the coastal dunes of Goat Rock State Beach, approximately 0.25 miles north of the Estuary Study Area (State Parks, 2007). There is one record located less than one mile northwest of the Estuary Study Area, however this population is presumed extirpated. The remaining records are located between five and eight miles south of the Estuary Study Area in the vicinity of Bodega Bay; these are all historical records that are presumed extant. There is a high potential for blue coast gilia to occur within the Estuary Study Area due to the presence of potential habitat and close proximity of known occurrences.

Dark-Eyed Gilia. Dark-eyed gilia (*Gilia millefoliata*) is a CNPS List 1B.2 species of the phlox family (Polemoniaceae). This annual herb produces clusters of two to six small purple flowers within its April through July blooming period. In California, it grows in stable coastal dune habitats within Del Norte, Humboldt, Mendocino, and Sonoma counties and is believed extirpated from San Francisco County. Its range extends from 10 to 100 feet in elevation.

The Estuary Study Area contains coastal dune habitat, which is potentially suitable habitat for the dark-eyed gilia. There are three CNDDB occurrence records for this species within ten miles of the Estuary Study Area. One is from a collection near Fort Ross, approximately six miles north of the Estuary Study Area, although the date of collection is unknown. The remaining two records are approximately eight miles south of the Estuary Study Area in the vicinity of Bodega Head. The dark-eyed gilia has moderate potential for occurrence based on the presence of suitable habitat within the Estuary Study Area and known records within coastal Sonoma County.

Short-leaved evax. Short-leaved evax (*Hesperevax sparsiflora* var. *brevifolia*) is a CNPS List 1B.2 species of the sunflower family (Asteraceae). It is an annual herb with small, woolly leaves and small flowers. The short-leaved evax has a March through June blooming period. This species occurs in sandy coastal bluff scrub and coastal dune habitat along the coast from Oregon south to San Mateo County between 0 and 705 feet in elevation.

The Estuary Study Area contains coastal dune and coastal scrub habitat, which is potentially suitable habitat for the short-leaved evax. There are also several occurrence records for this species within one mile of the Estuary Study Area. Multiple plants were observed at Blind Beach, Furlong Gulch, and at a beach south of Peaked Hill, which are all beaches within the Sonoma Coast State Beach system. There is a high potential for short-leaved evax to occur within the Estuary Study Area based on the presence of suitable habitat and existing populations less than one-mile from the Estuary Study Area.

Point Reyes horkelia. Point Reyes horkelia (*Horkelia marinensis*) is a CNPS List 1B.2 species and a member of the rose family (Rosaceae). This perennial herb is endemic to California and its range extends from Mendocino south to Santa Cruz County. It grows in sandy coastal scrub, coastal prairie and coastal dune habitats at elevations between 20 and 1,150 feet. This small plant produces flowers with narrow, white petals during its May through September blooming period.

Coastal dune, scrub, and grassland habitats within the Estuary Study Area provide potentially suitable habitat for the Point Reyes horkelia. The closest known occurrence records for this species are within the vicinity of Bodega Head, approximately eight miles south of the Estuary Study Area. Point Reyes horkelia has a moderate potential to occur within the Estuary Study Area based on the presence of potentially suitable habitat and know records within coastal Sonoma County.

Perennial goldfields. Perennial goldfields (*Lasthenia californica* ssp. *macrantha*) is a CNPS List 1B.2 species of the sunflower family (Asteraceae). It is a perennial herb that produces yellow inflorescences during its January through November blooming period. Perennial goldfields grow within coastal dune, coastal bluff scrub, and coastal scrub habitats between 20 and 1,710 feet in elevation. This is a California endemic species whose range includes coastal Mendocino, Sonoma, Marin, San Mateo, and San Luis Obispo counties.

Perennial goldfields have been documented within the Estuary Study Area boundary and at several locations within the vicinity of the Estuary Study Area. There is one historical CNDDB occurrence record within the vicinity of the mouth of the Russian River, south of Jenner. This

species has also been observed at several locations within Sonoma Coast State Beaches (State Parks, 2007). There are also multiple CNDDB records between six and 9 miles south of the Estuary Study Area near Bodega Bay and one known record eight miles north of the Estuary Study Area north of Windermere Point.

Rose leptosiphon. Rose leptosiphon (*Leptosiphon rosaceus*) is a CNPS List 1B.1 species. It is an annual herb of the phlox family (Polemoniaceae). It produces small pink or white flowers within its April through July blooming period. This species is found within coastal bluff scrub in Marin and San Mateo counties and believed extirpated from San Francisco and Sonoma Counties. It occurs at elevations between 0 and 330 feet.

The Estuary Study Area contains coastal scrub habitat, which is potentially suitable habitat for the rose leptosiphon. This species is historically known from Sonoma County. There is one CNDDB record for rose leptosiphon within ten miles of the Estuary Study Area; plants were observed within coastal bluff habitat near Fort Ross, but are believed extirpated. This species has a moderate potential to occur within the Estuary Study Area based on the presence of suitable habitat and historical presence within coastal Sonoma County.

Tidestrom's lupine. Tidestrom's lupine (*Lupinus tidestromii*) is a federal and state-listed endangered and CNPS List 1B.1 species. It is a perennial, rhizomatous herb of the legume family (Fabaceae) with silvery leaves. This species grows in coastal dune habitats in Marin, Sonoma, and Monterey counties between 0 and 330 feet in elevation. It produces light blue to lavender-colored flowers during its April through June blooming period.

Tidestrom's lupine is known within the Estuary Study Area. Plants have been observed within the stabilized dunes north and east of Goat Rock State Beach as recently as 2005, though they occur outside the project area. They were found in association with other stabilized dune species such as San Francisco wallflower (*Erysimum franciscanum*) and coastal sagewort (*Artemisia pycnocephala*), and the population is monitored by State Parks, which issues a Temporary Use Permit each year for breaching activities.

Marsh microseris. Marsh microseris (*Microseris paludosa*) is a CNPS List 1B.2 species and a member of the sunflower family (Asteraceae). This species produces bright yellow inflorescences during its April through June blooming period. It grows within a variety of habitats including closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland. Its range includes Mendocino, Sonoma, Marin, Santa Cruz, San Benito, Monterey, and San Luis Obispo counties between 20 and 1,800 feet in elevation. It is believed extirpated from San Francisco and San Mateo Counties.

The Estuary Study Area contains coastal scrub, grassland, and forest habitats, which are potentially suitable habitat for marsh microseris. There are no occurrence records for this species within ten miles of the project site. The closest known record for this species is from a 1921 collection, near Windsor, approximately 12 miles northeast of the project site. There is a moderate potential for this species to occur within the project site based on the presence of suitable habitat and known occurrence records in Sonoma County.

North Coast semaphore grass. North Coast semaphore grass (*Pleuropogon hooverianus*) is a state-listed threatened and CNPS List 1B.1 species and member of the grass family (Poaceae). This rhizomatous grass grows in meadows and seeps and within mesic[8] openings in broadleaved upland forest and North Coast coniferous forest. Its range includes Mendocino, Sonoma, and Marin counties at elevations between 30 and 2,200 feet. The blooming period for this species extends from April through June.

The Estuary Study Area contains forests, as well as meadows and seeps, which provide potentially suitable habitat for the North Coast semaphore grass. There is one CNDDB occurrence record for this species within ten miles of the Estuary Study Area. Plants were observed within a ditch in 1974, but may have been extirpated by road creation. There is a moderate potential for the North Coast semaphore grass to occur within the Estuary Study Area due to the presence of suitable habitat and records from Sonoma County.

Oregon polemonium. Oregon polemonium (*Polemonium carneum*) is a CNPS List 2.2 species of the phlox family (Polemoniaceae). This perennial herb grows in coastal prairie, coastal scrub, and lower montane forests between 0 and 6,000 feet in elevation. Its range includes Del Norte, Siskiyou, Humboldt, Sonoma, Marin, Alameda, and San Mateo counties. Oregon polemonium produces pale pink to purple flowers during its April through September blooming period.

Coastal scrub, grassland and forest habitats within the Estuary Study Area provide potentially suitable habitat for Oregon polemonium. There is one occurrence record for this species within ten miles of the project; it was observed in 1935 near Bodega Bay, approximately eight miles south of the Estuary Study Area. There is a moderate potential for this species to occur within the Estuary Study Area due to the presence of potentially suitable habitat and known occurrence within coastal Sonoma County.

Point Reyes checkerbloom. Point Reyes checkerbloom (*Sidalcea calycosa* ssp. *rhizomata*) is a CNPS List 1B.2 species of the mallow family (Malvaceae). This perennial, rhizomatous herb produces pale purple flowers during its blooming period, which occurs April through September. It can be found in coastal freshwater marshes and swamps between 10 and 250 feet in elevation. Its range extends from Mendocino County south to Marin County.

The Estuary Study Area contains freshwater marsh along the edges of the Russian River, which is potentially suitable habitat for the Point Reyes checkerbloom. There is one known occurrence record for this species within ten miles of the Estuary Study Area. This record is from an 1882 collection in the vicinity of Duncans Mills Marsh, less than 0.25 miles north of the Estuary Study Area. This species has a moderate potential to occur within the Estuary Study Area based on the presence of suitable habitat and occurrence record near the Estuary Study Area.

Purple-stemmed checkerbloom. Purple-stemmed checkerbloom (*Sidalcea malviflora* ssp. *purpurea*) is a CNPS List 1B.2 species and a member of the mallow family (Malvaceae). This

8 In ecology, the term mesic refers to a habitat type that is characterized by, related to, or requires a moderate amount of moisture.

plant produces bright pink-rose colored flowers with white veins. It is a perennial, rhizomatous herb that blooms between May and June. The purple-stemmed checkerbloom grows in coastal prairie, meadows, and broadleaved upland forest between 0 and 100 feet in elevation. It is a California endemic species known from Mendocino, Sonoma, and Marin counties.

The Estuary Study Area contains coastal bluff, grassland, and forest habitats, which are potentially suitable habitats for the purple-stemmed checkerbloom. There are multiple occurrence records for this species within five miles of the Estuary Study Area. The records are within Sonoma Coast State Beaches from 0.5 to 2.5 miles south of the Estuary Study Area. There is a moderate potential for this species to occur within the Estuary Study Area due to the presence of suitable habitat and known occurrence within 0.5 miles of the Estuary Study Area in similar habitat.

Coastal triquetrella. Coastal triquetrella (*Triquetrella californica*) is a CNPS List 1B.2 species. It is a moss that grows within ten miles of the coast in coastal scrub, coastal bluff scrub, and valley and foothill grasslands. It has also been observed in open gravels on roadsides, hillsides, and rocky slopes. This species has been documented in Del Norte, Mendocino, Sonoma, Marin, San Francisco, San Mateo, and San Diego counties.

Coastal scrub and grassland within the Estuary Study Area provide potentially suitable habitat for coastal triquetrella. There is one CNDDB occurrence record for this species within ten miles of the Estuary Study Area. It was collected in 2002 near the Bodega Marine Laboratory of the University of California, approximately eight miles on the hillside. Coastal triquetrella has a moderate potential to occur within the Estuary Study Area based on the presence of suitable habitat and known records within coastal Sonoma County.

Special-Status Animals

Based on review of the databases and other information sources, 50 special-status animal species have been documented as occurring or potentially occurring in the vicinity of the Estuary Study Area, and have varying potential for occurrence within the habitats present in the Estuary Study Area. Twenty-one of these special-status animal species are considered unlikely to occur or to have a low potential to occur in the Estuary Study Area for reasons such as absence of essential habitat required for the species, the distance to known occurrences and/or the species distributional range, or the species not being detected during past or present field surveys. These species are not discussed further in this section. The remaining 26 special-status animal species are considered to have moderate to high potential to occur within the Estuary Study Area, based on occurrences and availability of suitable habitat. These species are discussed below.

Invertebrates

Behren's Silverspot Butterfly and Myrtle's Silverspot Butterfly. There are two subspecies of *Speyeria zerene* that occur within Sonoma County: Behren's silverspot butterfly (*Speyeria zerene behrensii*) and Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*). Both are federally listed as endangered (Federal Register, 1992a and 1997) and neither have designated critical habitat. The western dog violet (*Viola adunca*), as well as other violets (*Viola* spp.), are host plants for both

of these butterflies. Both occur within coastal habitats, but the USFWS generally considers the Behren's silverspot distribution as north of the Russian River and Myrtle's as south (USFWS, 2003).

Behren's silverspot occurs in coastal terrace prairie and coastal dune habitats. It was historically found within six locations from the City of Mendocino, Mendocino County, south to Salt Point State Park, Sonoma County, with an additional potential occurrence record near Jenner at the mouth of the Russian River.

Myrtle's silverspot butterfly is restricted to areas immediately adjacent to the coast, which include dunes, scrub, and grasslands (Essig Museum of Entomology, 2006). Historically, the Myrtle's silverspot butterfly was found along the coast, from the mouth of the Russian River in Sonoma County south to San Mateo County (Federal Register, 1992a). Extant populations are reported to occur only in Sonoma and Marin counties (CDFG, 2010). No butterflies have been observed at the historical population sites near Pacifica and San Mateo in San Mateo County since before 1992 (Federal Register, 1992a).

There is one occurrence record for Myrtle's silverspot butterfly within the Estuary Study Area, although this is the potential occurrence record for the Behren's silverspot (CDFG, 2010). This record is from a 1975 collection near Jenner, south of the Russian River. This species was recorded as a Myrtle's silverspot, but the collected species exhibited characteristics of Behren's silverspot. There has been considerable debate if the Jenner metapopulation is closer to Myrtle's or Behren's or an intermediate zone where the two subspecies overlap. There are multiple known occurrence records for Myrtle's silverspot within five miles of the Estuary Study Area; all are at least four miles south of the Estuary Study Area.

There are no occurrence records for the Behren's silverspot within ten miles of the Estuary Study Area. The Estuary Study Area contains coastal dune and scrub habitats, which are potentially suitable habitats for this butterfly. Due to the presence of suitable habitat and a potential occurrence record within the Estuary Study Area, Behren's silverspot butterfly has a high potential to occur within the Estuary Study Area.

California Freshwater Shrimp. California freshwater shrimp (*Syncaris pacifica*) is a federal and state-listed endangered species (Federal Register, 1988; CDFG 2009). This shrimp occurs in low gradient freshwater streams with exposed roots, undercut banks, overhanging woody debris, or overhanging vegetation. It can tolerate a broad range of water temperature conditions within small, perennial coastal streams. In the winter, the shrimp is often found beneath undercut banks with overhanging vegetation, while in the spring and summer it prefers submerged leafy braches. The California freshwater shrimp is endemic to Marin, Sonoma and Napa counties, although it is only found in 17 stream segments within these counties (USFWS, 1998). It is known in several stream segments that are tributary to the lower Russian River.

California freshwater shrimp is known from several streams within ten miles of the Estuary Study Area, including Austin Creek and East Austin Creek, which are tributary to the lower Russian River. According to the CNDDB, shrimp were detected in Austin Creek during surveys

conducted in 1990 (CDFG, 2010). The southern end of this occurrence record is located within the maximum backwater area. Shrimp have also been detected within East Austin Creek above its confluence with Austin Creek (CDFG, 2010). Within the Estuary Study Area, the perennial tributaries to the lower Russian River provide potentially suitable habitat for this shrimp. The California freshwater shrimp is known within the maximum backwater area and has a moderate potential to occur within the Estuary Study Area due to the presence of suitable habitat and known occurrence in Austin Creek.

Amphibians

Foothill Yellow-legged Frog. Foothill yellow-legged frog (*Rana boylii*) is a California species of special concern (CDFG, 2009). This species inhabits foothill and mountain streams in the Coast Ranges from sea level to about 6,000 feet from the Oregon border southward to the Transverse Mountains in Los Angeles County, in most of northern California west of the Cascade crest, and along the western flank of the Sierra Nevada southward to Kern County. Most records are for occurrences below 3,500 feet. The foothill yellow-legged frog is found in a variety of habitats, including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow types (Zeiner et al., 1988).

Home ranges are small, but these frogs may move several hundred yards to spawning habitat. Adult frogs congregate at suitable spawning sites as spring runoff declines when water temperatures reach 12 to 15 degrees Celsius (C) (usually any time from mid-March to May, depending on local water conditions). The breeding season at any locality is usually about two weeks for most populations. Spawning frogs favor low to moderately steep-gradient streams (0 to 8 degrees). Females deposit eggs in shallow edge-water areas with water velocities less than 4 inches per second (Seltenrich and Pool, 2002). Egg masses are often attached to the downstream sides of cobbles and boulders, or to gravel, wood, or other materials. Eggs hatch in approximately a few weeks. Tadpoles transform in three to four months and stay for a time in breeding habitat, but eventually disperse. They feed on diatoms or algae on the surface of the substrate (Stebbins, 1951). Tadpoles favor calm, shallow water. Juvenile and adult frogs bask on midstream boulders or in terrestrial sites along riffles, cascades, main channel pools, and plunge-pools, often in dappled sunlight near low overhanging vegetation. They are relatively strong swimmers and prefer faster water habitat than do other foothill frog species such as the exotic bullfrog (*Rana catesbeianus*) or the California red-legged frog. Post-metamorphic foothill yellow-legged frog prey almost exclusively on terrestrial insects and arachnids (Van Wagner, 1996).

Foothill yellow-legged frog is known within the Estuary Study Area. In September 2005, one juvenile foothill yellow-legged frog was observed along a gravel bar at the confluence of Austin Creek and the Russian River (CDFG, 2010). Foothill yellow-legged frog egg masses were also observed within Austin Creek in 2008, less than 0.1 mile upstream of the maximum backwater area and less than 0.5 mile north of the Estuary Study Area. Foothill yellow-legged frog have been observed at several other locations within five miles of the Estuary Study Area including Blue Jay Creek, approximately 4.5 miles north of the Estuary Study Area; Kidd Creek, a tributary

of Austin Creek located approximately 2.5 miles north of the Estuary Study Area; and in Russian Gulch, approximately 1.5 miles north of the Estuary Study Area.

California Red-legged Frog. California red-legged frog (*Rana [aurora] draytonii*) is federally listed as threatened (Federal Register, 1996a) and is a California species of special concern (CDFG, 2009). The USFWS released a recovery plan in 2002 (USFWS, 2002), and critical habitat for the California red-legged frog was designated in 2010 after several legal and regulatory actions (Federal Register, 2010). The Estuary Study Area is not within designated critical habitat for the California red-legged frog.

The California red-legged frog ranges from coastal mountains from southern Mendocino County southward to northern Baja California, and inland to the Sierra Nevada foothills (Jennings et al., 1992; Shaffer et al., 2004). The frog has been apparently extirpated from approximately 70% of its historic range (USFWS 2002). California red-legged frogs are usually confined to aquatic habitats such as creeks, streams, and ponds, and occur primarily in areas that have pools about 3 feet deep, with adjacent dense emergent or riparian vegetation (Jennings and Hayes, 1988). Adult frogs move seasonally between their egg-laying sites and foraging habitat, but they rarely move long distances from their aquatic habitat. At one site in Santa Cruz County, 78 to 89 percent of adult frogs remained resident at their breeding location year-round, moving less than 425 feet from water (Bulger et al., 2003). Long-distance movement of more than two miles between aquatic sites has been reported (Bulger et al., 2003), but is likely a relatively rare event. California red-legged frogs breed from November to March. Egg masses are attached to emergent vegetation (Jennings and Hayes, 1994) and hatch within about two weeks. Metamorphosis generally occurs between July and September.

California red-legged frog is known from multiple locations within five miles of the Estuary Study Area, including two tributaries of the Russian River. One adult and two juvenile California red-legged frogs were observed in Willow Creek in 1999, less than 0.5 miles upstream of the Estuary Study Area. One adult California red-legged frog was observed within Sheephouse Creek, less than 0.25 miles north of the Estuary Study Area, as recently as 2007, and another adult was observed within the same creek in 1996, just over one mile upstream of the Estuary Study Area (CDFG, 2010). Willow Creek, as well as other tributary drainages, within the Estuary Study Area contain potentially suitable habitat for the California red-legged frog, and there is a high potential for California red-legged frog to occur here.

Reptiles

Western Pond Turtle. Western pond turtle (*Actinemys marmorata*) is a California species of special concern and is uncommon to common in suitable aquatic habitats throughout California, west of the Sierra-Cascade crest and absent from desert regions, except in the Mojave Desert along the Mojave River and its tributaries (CDFG, 2008). Western pond turtles are associated with a variety of aquatic habitats, both permanent and intermittent, including rivers, creeks, small lakes and ponds, marshes, irrigation ditches, and reservoirs. They may also occur in brackish to saltwater (Stebbins, 2003). Although pond turtles spend much of their lives in water, they require terrestrial habitats for nesting. They also may overwinter on land and may spend part of the

warmest months in aestivation on land. Use of terrestrial habitats for overwintering and aestivation may vary considerably with latitude and habitat type, as some turtles do not leave aquatic habitat (Stebbins, 2003).

In general, nesting occurs between late April and early August (Jennings and Hayes, 1994). Females typically leave the water in late afternoon or early evening and travel to an upland location that may be a considerable distance from aquatic habitat. Eggs are deposited in the flask-shaped nest excavated by the female. Because digging the nest may require several hours, the female commonly remains on or near the nest site overnight (Jennings and Hayes, 1994). The young hatch and may overwinter in the nest, emerging from the nest site and moving to the aquatic habitat in the spring. Hatchlings spend much of their time feeding in shallow water that typically has a relatively dense vegetation of submergents or short emergents. Threats to western pond turtle include impacts to nesting habitat from agricultural and grazing activities, human development of habitat, and increased predation pressure from native and non-native predators as a result of human-induced landscape changes (Jennings and Hayes, 1994).

Western pond turtle is known from multiple locations within the Estuary Study Area. One turtle was observed in the Estuary, 0.6 miles upstream of Sheephouse Creek confluence, in 2004 (CDFG, 2010). Another turtle was observed on the same date within the Estuary, 0.7 miles upstream from the Highway 1 Bridge. There is also a California Academy of Sciences specimen record for western pond turtle within the vicinity of Duncans Mills, although the collection date is unknown.

Birds

Tricolored Blackbird. Tricolored blackbird (*Agelaius tricolor*) is a California species of special concern that is largely endemic to California. Tricolored blackbird is found mostly throughout the Central Valley and San Francisco Bay Delta regions (Hamilton, 2004) and is highly gregarious, foraging and nesting in flocks. Tricolored blackbirds forage in annual grasslands; wet and dry vernal pools and other seasonal wetlands; and croplands. They also forage occasionally in riparian scrub habitats and along marsh borders. Tricolored blackbirds nest near freshwater marshes. The three basic requirements for nesting sites include open accessible water; a protected nesting substrate, including either flooded or thorny or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few miles of the nesting site (Hamilton et al., 1995; Beedy and Hamilton, 1997, 1999). The breeding season generally extends from mid-March into mid-July (Hamilton, 2004). Nests built of mud and plant material are usually located a few feet over, or near, freshwater, but may be hidden on the ground among low vegetation. Primary threats to tricolored blackbirds are the direct loss and alteration of habitat, but other human activities and predation also threaten tricolored blackbirds.

There are no CNDDB occurrence records for the tricolored blackbird within ten miles of the Estuary Study Area, and the Estuary Study Area is outside of the known breeding range for this species. However, potentially suitable foraging habitat for this species is present. The margins of the Russian River Estuary contain freshwater marsh, dominated by bulrush and cattail, which may serve as foraging and roosting habitat for the tricolored blackbird. Additionally, tricolored

blackbirds may forage and roost in a variety of habitats present in the Estuary Study Area including grasslands and seasonal wetlands. Since the Estuary Study Area is outside of the known breeding range for the tricolored blackbird, but does contain potential foraging habitat, this species has a moderate potential to occur within the Estuary Study Area as a seasonal non-breeding resident or as a transient.

Great Blue Heron. Great blue heron rookery sites are protected by the CDFG. The great blue heron is fairly common all year throughout most of California and is found in a wide variety of habitats near sources of water, including sheltered, shallow bays and inlets, sloughs, marshes, wet meadows, and shores of lakes, and rivers (Zeiner et al, 1990a). The great blue heron usually breeds in colonies containing a few to several hundred pairs. Breeding generally occurs from March to May. Nests are usually placed in the tops of secluded large snags or live trees, usually among the tallest available (Zeiner et al, 1990a).

One great blue heron rookery has been recorded in the Estuary Study Area (CDFG, 2010). At least 7 individual heron nests were observed at this rookery in 2004 in mature Douglas fir trees along the Russian River, approximately 1.4 miles southwest of Duncan's Mills. The lower, middle, and some upper reaches of the Russian River support foraging habitat for great blue heron, and other rookeries could occur in large trees adjacent to the river.

Burrowing Owl. The western burrowing owl is a California species of special concern. The burrowing owl was once fairly common and widespread throughout western North America. However, populations of owls have declined, or in some cases disappeared altogether, primarily due to habitat loss from land conversions for agricultural and urban development, and habitat degradation and loss due to reductions of burrowing mammal populations (Klute et al. 2003). Burrowing owl is a resident of open habitats (e.g., annual and perennial grasslands and deserts and arid scrublands with bare ground or low-growing vegetation) and requires burrows for protection, cover, and nesting. It typically uses burrows made by fossorial mammals, such as California ground squirrels or American badger (*Taxidea taxus*), but will also use man-made structures, such as culverts, concrete, asphalt, and wood piles. The burrowing owl may use a site for breeding, wintering, foraging, and/or migratory stopovers, and the breeding season generally occurs between February and August (Zeiner et al, 1990a). Although burrowing owl is often seen during the day, most of its time searching for prey is during the night. Prey items include a broad array of arthropods (i.e., centipedes, spiders, beetles, crickets, and grasshoppers), small rodents, birds, amphibians, reptiles, and carrion) (Klute et al. 2003).

Three adults were observed at burrow sites approximately five miles north of the Russian River in mixed annual and native grassland habitat (CDFG, 2010). While Sonoma County is not within the current breeding range of the burrowing owl, grasslands within the Estuary Study Area could still support foraging and wintering burrowing owls. For these reasons, burrowing owl has a moderate probability of being found in the project area.

Marbled Murrelet. Marbled murrelet (*Brachyramphus marmoratus*) is federally listed as threatened (Federal Register, 1992b) and is state listed as endangered. Murrelets occupy the near-shore environment in the ocean and feed on zooplankton, squid, and fish, primarily Pacific sand

lance, northern anchovy, Pacific herring, smelt, and Pacific sardine. At sea, their distribution appears to vary between seasons (USFWS, 1997).

In California, this murrelet nests along the coast in two areas: from Eureka to the Oregon border and from Half Moon Bay to Santa Cruz, although its breeding range extends north into British Columbia, southern Alaska, and the Aleutian Islands (USFWS, 1997). Nesting habits remained an ornithological mystery until 1974, when a tree trimmer found a nestling high in an old-growth Douglas fir tree in Big Basin Redwoods State Park, located in the Santa Cruz Mountains of central California. This tree nesting habit is unique among diving seabirds. Murrelets lay a single egg high in old-growth trees on large horizontal limbs. Most nest sites are located in large intact stands of old-growth forest, but some nest sites have been found in smaller stands of large trees, or in areas where a few old-growth trees still exist in a second-growth landscape. The nesting season for this species runs from late March through mid-September (USFWS, 1997).

There is a moderate potential for marbled murrelet to be present within the Estuary Study Area. Murrelets could potentially nest within stands of old-growth Douglas fir or redwoods in the middle or upper reaches of the Russian River. Critical habitat for marbled murrelet was designated in 1996 (Federal Register, 1996b). No critical habitat units are located in the Estuary Study Area, but Critical Habitat Unit CA-08-b is approximately six miles north of the Estuary Study Area, and Critical Habitat Unit CA-08-a is approximately 10 miles northwest of the Estuary Study Area.

Western Snowy Plover. The western snowy plover (*Charadrius alexandrinus nivosus*) breeds on the Pacific coast from southern Washington to southern Baja California, Mexico, and in interior areas of Oregon, California, Nevada, and several other western states. The Pacific Coast population of the snowy plover is a federally threatened species and a California species of special concern. Snowy plovers nest primarily above the high tide line on coastal beaches, sand spits, dune-backed beaches, sparsely-vegetated dunes, beaches at creek and river mouths, and salt pans at lagoons and estuaries (USFWS, 2007). Less common nesting habitat includes bluff-backed beaches, dredged material disposal sites, salt pond levees, dry salt ponds, and river bars. The breeding season on the California coast occurs from March through September, with peak activity from mid-April to mid-June (USFWS, 2007). Nests consist of shallow scrape or depression line with beach debris (e.g., small pebbles, shell fragments, plant debris, and mud chips). Although the majority of snowy plovers are site-faithful, returning to the same nesting site in subsequent breeding season, some also disperse within and between years (USFWS, 2007). While some snowy plovers remain in their coastal breeding areas year-round, others migrate south or north for winter. They feed on invertebrates in the wet sand and amongst surf-cast kelp within the intertidal zone, in dry, sandy areas above the high tide, on salt pans, on spoil sites, and along the edges of salt marshes, salt ponds, and lagoons (USFWS, 2007).

Two snowy plover occurrences were reported approximately eight miles south of the Estuary Study Area at Bodega Bay, and plovers have been observed at Salmon Creek Beach, but no nesting has been observed (CDFG, 2010). Snowy plovers found at Salmon Creek have been absent during May and June, typical breeding months for the species (DRP, 2007). Sandy beaches

at the mouth of the Russian River, as well as on banks of the lower Estuary, could support nesting and foraging snowy plovers. Due to potentially suitable habitat within the Estuary Study Area and observations of plovers at nearby beaches, there is a moderate potential for western snowy plover to occur here.

Northern Harrier. Northern harrier (*Circus cyaneus*) is a California species of special concern (CDFG, 2009). This species is a permanent resident of northeastern California, coastal California, and the Central Valley, preferring open habitats such as grasslands, meadows, desert sinks, and freshwater and saltwater emergent wetlands (Zeiner et al., 1990a). Northern harrier is a widespread winter resident where suitable habitat is available. The breeding season for northern harrier extends from April to September, and nesting typically takes place on the ground in shrubby vegetation at the edges of marshes or along rivers and lakes. This species may also nest in grasslands, grain fields, and sagebrush flats. Northern harrier forages in low flights over open ground, feeding primarily on voles and other small mammals. However, northern harrier will also prey on birds, frogs, reptiles, crustaceans, insects, and even (rarely) on fish (Zeiner et al., 1990a).

Northern harriers are known from the Estuary Study Area, and are not uncommon in open fields near marshes in northern California. Suitable habitat includes both shrubby vegetation and grasslands adjacent to marshes for nesting and foraging.

White-tailed Kite. The white-tailed kite (*Elanus leucurus*) is not listed under the Federal or State Endangered Species Acts, but is considered a fully protected species by the state of California. White-tailed kite occupy nearly all areas of California up to the western Sierra Nevada foothills and southeast deserts, inhabiting low elevation, open grasslands, savannah-like habitats, but are rarely found away from agricultural areas (Zeiner et al, 1990a). They nest in trees, usually with a dense canopy, but nest trees can vary from single, isolated trees to trees within large woodlands. Habitat elements that influence nest site selection and nesting distribution include habitat structure (usually a dense canopy) and prey abundance and availability. The breeding season occurs from approximately January to October, with peak activity occurring from May through August (Zeiner et al., 1990a). Nests are constructed of loosely piled sticks and twigs that are lined with grass, straw, or rootlets, and are placed near the top of a dense oak, willow, or other tree.

White-tailed kite has been recorded approximately ten miles northeast of the Estuary Study Area, in oak savannah habitat north of Guerneville. Large tree stands within the vicinity of open areas or agricultural fields along the Russian River could support nesting or foraging kites, and patches of these habitats are present within the Estuary Study Area. White-tailed kite has a moderate potential to occur within the Estuary Study Area.

American Peregrine Falcon. American peregrine falcon (*Falco peregrinus anatum*) is state listed as endangered and is a California fully protected species (CDFG, 2009). This species was formerly federally listed as endangered (Federal Register, 1970a, 1970b), but was delisted in 1999 (Federal Register, 1999). This medium-sized bird breeds from non-Arctic portions of Alaska and Canada, southward to Baja California (except on the coast of southern Alaska and in British Columbia), and locally in central Arizona and Mexico. American peregrine falcons usually winter in their breeding range. The primary nesting habitat for American peregrine falcon

tends to be cliffs or series of cliffs that dominate the surrounding landscape. However, suitable nesting sites can also be found in river cutbanks, trees, and man-made structures, including tall towers and the ledges of tall buildings. American peregrine falcons hunt their prey in the air, usually over open habitat types such as waterways, fields, and wetland areas, diving at speeds of up to 200 miles per hour to strike their targets. Jays, flickers, meadowlarks, pigeons, starlings, shorebirds, waterfowl, and other readily available species make up the American peregrine falcon's diet. This species may travel 10 to 12 miles from their nests in search of prey. Breeding takes place in later March and April, with a usual clutch size of three to four eggs. Adults continue to feed fledglings for up to two months after the fledglings leave the nest.

Peregrine falcons were observed within Sonoma Coast State Park, north of Jenner in 2003 (DRP 2007), and more recently at Haystack Rock (also known as Babe Rock) at the mouth of the Russian River in 2009 (Martini-Lamb, 2010). Peregrine falcons also historically nested south of Goat Rock. There is no suitable nesting habitat within the Estuary Study Area. However, the open water Estuary, grassland, coastal dune, and coastal scrub habitats serve as potentially suitable foraging habitat for this species. These habitats are occupied by a variety of prey species including common passerines and waterfowl. Due to the documented occurrences and presence of suitable habitat, American peregrine falcons have a high potential to forage within the Estuary Study Area.

Osprey. Osprey (*Pandion haliaetus*) is a California species of special concern (CDFG, 2009). This species is found primarily in ponderosa pine and mixed conifer habitats along seacoasts, lakes, and rivers. It preys mostly on fish at or below the water surface, but will also take small mammals, birds, reptiles, amphibians, and invertebrates. Foraging areas require large snags and open trees near large, clear, open waters. Ospreys typically swoop from flight and hover or perch to catch prey. The species breeds primarily in northern California and typically builds nests in large conifers, but may also use artificial platforms as nesting areas. The breeding season is from March to September. Nests are built on platforms of sticks at the top of large snags, dead-topped trees, on cliffs, or on human-made structures. A nest may be as much as 250 feet above ground and is usually within 1,000 feet of fish-producing water. Osprey need tall, open-branched "pilot trees" nearby for landing before approaching the nest and for use by young for flight practice. Typically, this species migrates in October southward along the coast and the western slope of the Sierra Nevada to Central and South America (Zeiner et al., 1990a).

Osprey have been recorded within the Estuary Study Area. In 1971, two young were observed in a redwood within the vicinity of Duncans Mill; at that time the nest was reported to be at least 50 years old (CDFG, 2010). Additionally, there are a number of nests located on the south side of the Estuary in the upper reach, near the Heron Rookery (Martini-Lamb, 2010). Other nest sites are also known in the vicinity of the Estuary Study Area, including one from approximately 0.5 miles northeast of the Estuary Study Area at Villa Grande. In 2009, one adult was observed within the nest, which was located within a decayed Douglas fir. The Douglas fir and coast redwood dominated forests within the Estuary Study Area provide nesting habitat for osprey and the open water Estuary serves as optimal hunting habitat for this species.

California Brown Pelican. The brown pelican (*Pelecanus occidentalis californicus*) is a large, shore-dwelling bird found in coastal and nearshore marine habitats along the Pacific, Atlantic, and Gulf coasts of North America. Following reproductive failure, severe population declines and colony losses from the 1940s to 1970s, as a result of severe exposure to DDT and other contaminants through consumption of contaminated fish, the brown pelican was federally-listed as endangered by the USFWS in 1970 under the Endangered Species Preservation Act, a precursor to the current FESA of 1974. The California subspecies (one of the two distinct regional populations of brown pelican that occur in North America) was further protected when it was state-listed as endangered by the California Fish and Game Commission in 1971. A recovery plan for the California brown pelican was completed in 1983 (USFWS, 1983). By 1985, Atlantic Coast brown pelicans had recovered significantly, and they were removed from the endangered species list. According to a recent review by the USFWS, pelicans in other places, including California, have recovered too. In November 2009, the USFWS announced the delisting of the brown pelican from the list of threatened and endangered species under the Federal Endangered Species Act. The California Fish and Game Commission has also delisted the California brown pelican from the state endangered species list (CDFG, 2009).

The California brown pelican breeds along the Pacific coast from southern California south to central Mexico (including the Gulf of California) and on the California Channel Islands and the Salton Sea (American Ornithologists' Union, 1998; Sturm, 1998). The breeding season extends from December to early August, peaking usually between February and May (Anderson and Gress, 1983). Specific sites tend to be used year after year until changes in nesting habitat, food availability, or human disturbance induce colony relocation. Much of the post-breeding dispersal occurs northward (as far north as southern British Columbia), and by June many post-breeding pelicans are present in central California. Local abundance in central California usually peaks from August to October (Briggs et al., 1987; Jaques, 1994). Although a small number of non-breeding birds may be found locally year-round, most pelicans return to their southern breeding grounds by January. Roosting is an essential life-history trait for pelicans. Major roosts are found on man-made structures such as piers, breakwater, and jetties, on islands and offshore rocks, and on beaches at the mouth of estuaries. Small, surface-schooling fishes make up the bulk of the diet of pelicans, which they capture by surface plunging.

California brown pelican is known to forage and roost along the Sonoma County coastline; however it does not breed in northern California. California brown pelicans are commonly observed on Goat Rock State Beach (Martini-Lamb, 2010), and have been observed within the Estuary Study Area (Nielsen and Light, 1994). The Estuary provides suitable foraging habitat for the California brown pelican and logs and exposed sand/gravel bars, provide loafing and roosting habitat.

Double-crested Cormorant. The double-crested cormorant (*Phalacrocorax auritus*) is a California species of special concern (CDFG, 2009). This species is a yearlong resident along the entire coast of California and on inland lakes, typically in fresh, salt, and estuarine waters. From August to May, this cormorant is fairly common to locally very common along the coast, as well as in estuaries and salt ponds. This species rests in daytime and roosts overnight beside water on

offshore rocks, islands, steep cliffs, dead tree branches, wharfs, jetties, or even transmission lines. Double-crested cormorant must visit perches periodically during the day to dry plumage, and the perching sites must be devoid of vegetation. This species sometimes rests, or even sleeps, on water in daytime. It requires either a considerable stretch of water or an elevated perch for takeoff (Remsen, 1978).

Double-crested cormorants feed mainly on fish, but also on crustaceans and amphibians. They dive from the waters' surface to pursue prey underwater, typically in water that is less than 30 feet deep with a rocky or gravel bottom, but may catch fish as deep as 72 feet (Remsen, 1978). This cormorant requires undisturbed nest sites beside water, on islands or the mainland, for breeding success. For nesting sites, this species prefers to utilize wide rock ledges on the rugged slopes of cliffs, and live or dead trees, especially tall ones (Remsen, 1978).

A known double-crested cormorant breeding colony from 1979 was recorded at Russian River Rocks north of the mouth of the Russian River (CDFG, 2010). Additionally, cormorants are commonly observed on the beach and rocks at the mouth of the Russian River (Martini-Lamb, 2010). Cormorants forage along most of the Russian River within the Estuary Study Area, and exposed rocks and large trees near the Pacific Ocean provide quality breeding habitat for this species.

Bank Swallow. The bank swallow (*Riparia riparia*) is state listed as threatened (CDFG, 2009). This species arrives in California from South America in early March and remains until early August, when colonies are abandoned and southern migration begins. Bank swallow is found primarily in riparian and other lowland habitats in California west of the desert, and is a common migrant within the interior of the state while less common along the coast. There are few records of species presence during the winter months in California. During the summer, bank swallow is restricted to riparian, lacustrine, and coastal areas with vertical banks, bluffs, and cliffs with fine-textured or sandy soils. Bank swallows breed from early May through July, digging horizontal nesting tunnels and burrowing along the side of stream banks and cliffs. Most colonies contain 100 to 200 nesting pairs. Approximately 75 percent of the current breeding population in California nests along the banks of the Sacramento and Feather Rivers in the northern Central Valley. The species feeds predominantly over open riparian areas, but will also forage over brushland, grassland, wetlands, water, and irrigated cropland. The diet of bank swallows includes a wide variety of aerial and terrestrial soft-bodied insects, including flies, bees, and beetles (Zeiner et al., 1990a).

A bank swallow colony comprised of four burrows was observed near Jenner in 1960 (Madrone Audubon Society, Inc., 1995; CDFG, 2010). This colonyis occurrence is within the project area. While there are no breeding records of bank swallow for the *Sonoma County Breeding Bird Atlas* (Madrone Audubon Society, Inc., 1995), acoording to a study conducted over six nesting seasons beginning in 1986, and there are no other reports of this species in Sonoma County in recent years, potentially suitable nesting habitat is still presumed present for bank swallow along the lower reaches of the Russian River (Madrone Audubon Society, Inc., 1995).

Northern Spotted Owl. The northern spotted owl (*Strix occidentalis caurina*) is a federally-listed threatened species and a California species of special concern. It is a large, dark-eyed, round-headed, dark brown owl with white spotting on the head, back, and underparts. It inhabits old-growth forests throughout the Pacific Northwest. The 2008 Northern Spotted Owl Recovery Plan specifies the following vegetation alliances as their preferred nesting habitat: Douglas-fir, western hemlock, grand fir (*Abies grandis*), white fir (*Abies concolor*), ponderosa pine (*Pinus ponderosa*), Shasta red fir (*Abies magnifica*), mixed evergreen, mixed conifer hardwood, coastal redwood (*Sequoia sempervirens*), Bishop pine (*Pinus muricata*), and mixed evergreen-deciduous hardwood (USFWS, 2008).

Northern spotted owl's current range extends from southeast British Columbia through the Cascade Mountains, coastal ranges, and intervening forested lands in Washington, Oregon, and California, as far south as Marin County, California. Median annual home range for pairs in California, Oregon, and Washington varies from 2,955 to 14,211 acres (USFWS, 2008). Pairs are non-migratory and remain on their home range throughout the year. The northern spotted owl breeding period extends from February, when courtship begins, to September.

Northern flying squirrel (*Glaucomys sabrinus*) is the dominant prey species in the western hemlock/Douglas-fir (*Tsuga heterophylla/Pseudotsuga menziesii*) forests, in their northern range. Dusky-footed woodrat (*Neotoma fuscipes*) is more important in the drier southern, mixed-conifer/mixed-evergreen forests (USFWS, 2008).

The Estuary Study Area contains Douglas fir and redwood forests, which are potentially suitable habitat for northern spotted owl. There are multiple known spotted owl breeding sites and territories known within five miles of the Estuary Study Area (CDFG, 2010). The closest known breeding sites are less than 0.25 miles north of the Estuary Study Area near Orrs Creek, approximately 0.5 miles south near Freezeout Creek, approximately 0.5 miles north of the Estuary Study Area at Sawmill Gulch, and approximately one mile south of the Estuary Study Area near Willow Creek. There is a high potential for northern spotted owl occurrence due to the presence of suitable habitat and known breeding sites within close vicinity of the Estuary Study Area.

Mammals

Pallid Bat. The pallid bat, a California species of special concern (CDFG, 2009), occurs throughout California, except in parts of the high Sierra and the northwestern corner of the state (Zeiner et al., 1990b). The pallid bat inhabits a variety of habitats, such as grasslands, shrublands, woodlands, and forests; however, it is most abundant in open, dry habitats with rocky areas for roosting. Pallid bats roost alone, in small groups, or gregariously (Sherwin, 1998). Roosts include caves, crevices in rocky outcrops and cliffs, mines, trees, and various man-made structures (e.g., bridges, barns, porches), and generally have unobstructed entrances/exists and are high above the ground, warm, and inaccessible to terrestrial predators. Year-to-year and night-to-night roost reuse is common; however, bats may switch day roosts on a daily and seasonal basis (Sherwin, 1998). Mating occurs from late October to February, and maternity colonies of up to 100 individuals form in early April (CDFG, 2005). One or 2 pups are usually born May or June, and

are weaned in approximately 6 to 7 weeks. Maternity colonies disperse between August and October (CDFG, 2008).

Three occurrences of pallid bat are present within 10 miles of the Estuary Study Area (CDFG, 2010). Rocky areas and large trees near the Russian River, especially in areas not typically disturbed by humans, provide potentially suitable habitat for this species. For these reasons, this species is considered to have a moderate potential to occur within the Estuary Study Area.

Sonoma Tree Vole. The Sonoma tree vole is a California species of special concern (CDFG, 2010), occurring within the fog belt from Sonoma County north to the Oregon border. Sonoma tree voles feed almost exclusively on Douglas fir and Grand fir needles or tender tree bark. Both males and females nest in trees from 6-150 feet above the ground, with females building larger nests up to three feet in diameter (Zeiner et al., 1990b). Sonoma tree voles breed year-round. Typical home range of male voles likely encompasses several trees, while females often live in one tree. The species' main predator is the northern spotted owl.

More than 15 occurrences for the Sonoma tree vole are recorded within ten miles of the Estuary Study Area (CDFG, 2010). A historical occurrence of retained museum specimens is located around the community of Jenner, at the mouth of the Russian River, and a nest was observed in 1996 around Sawmill Gulch approximately 1 miles east of Jenner. Several nests have also been observed within the Estuary Study Area further upstream (CDFG, 2010). Based on these CNDDB occurrence records and the presence of fir trees within the Estuary Study Area, Sonoma tree vole is presumed present in the Estuary Study Area.

Townsend's Big-eared Bat. Townsend's western big-eared bat is a California species of special concern (CDFG, 2009) that typically inhabits caves, buildings, and rock outcrops usually in association with desert scrub and/or pinon-juniper plant communities. While most common in mesic sites, this bat is found in a wide variety of habitats throughout California. Maternity roosts are found in caves, tunnels, mines, and buildings, and most young are born between May and June (Zeiner et al., 1990b). This species requires drinking water, and forages on small moths and soft-bodied insects. Maternity roosting sites are very sensitive to disturbance, and all known nursery colonies in limestone caves have been abandoned (Zeiner et al., 1990b).

The nearest CNDDB occurrence is located in Bodega Bay, approximately eight miles south of the project area (CDFG, 2010). While no suitable maternity roost are present, potentially suitable foraging and day/night roosting habitat is present within the Estuary Study Area. This species has a moderate potential to occur within the Estuary Study Area.

Western Red Bat. The western red bat (*Lasiurus blossevillii*) is a California species of special concern (CDFG, 2009). It is a riparian obligate species (i.e., a species that can exist only in riparian habitat) that is ubiquitous throughout most of California except the northern Great Basin region. They roost individually in dense clumps of tree foliage in riparian areas, orchards, and suburban areas. Western red bats are primarily moth specialists, but will forage for a variety of other insects. Individuals have been observed foraging around street lamps and floodlights in suburban areas (Bolster, 2005).

One occurrence for this species is located approximately six miles east of the Estuary Study Area at a quarry near Guerneville (CDFG, 2010). Western red bats were detected in 2003 within tree cavities in a mixed evergreen forest composed of Douglas fir, madrone, oak, maple, and bay. Potentially suitable foraging habitats, as well as tree cavities for roosting, are present within the Estuary Study Area and could support western red bats.

Northern Elephant Seal. Northern elephant seal (*Mirounga angustirostris*) is protected by the Marine Mammal Protection Act of 1972. This seal's range extends along the coast from Alaska south to Mexico. They typically breed in California on protected islands, such as the Channel Islands, or on the mainland. Northern elephant seals spend about 9 months of the year in the eastern and central North Pacific Ocean (NMFS, 2010a). Adult seals return to land between March and August to molt and return in the winter for breeding (SCWA, 2009). The breeding season begins mid-December and extends until March (Zeiner et al. 1990b).

Northern elephant seal is known from the Estuary Study Area. Elephant seals have been observed at the mouth of the Russian River during surveys conducted between 1987 and 1995, and have been observed in other years as well (SCWA, 2009). The numbers of seals observed during these surveys was usually low, with only one to two seals observed at a time. A single male northern elephant seal utilized the Jenner haulout over several years. It is believed the elephant seal utilized the site throughout his development from a juvenile to sub-adult, and was observed harassing harbor seals at the site (SCWA, 2009). See Section 4.4.2, Setting, Pinniped Haulouts, for more detail regarding northern elephant seal presence within the Estuary Study Area.

Harbor Seal. The harbor seal is also protected by the Marine Mammal Protection Act of 1972. It is a common, resident marine mammal along the west coast. These seals prefer to stay close to shore in subtidal and intertidal habitats such as bays and estuaries, and sometimes venture into rivers. Groupings of various sizes can haulout on rocks, mudflats, and sandy/cobble coves (Zeiner et al. 1990b). In general, the same sites are used over many years. Harbor seals feed opportunistically in shallow water on fish, crustaceans, and a few cephalopods (CDFG, 2008). Harbor seals haulout on land for a variety of reasons, including rest, thermoregulation, and giving birth (NMFS, 2010b). They mate at sea and, in California, give birth from March to June, although the timing varies geographically and among local populations (CDFG, 2008).

. See Section 4.4.2, Setting, Pinniped Haulouts, for more detail regarding harbor seal presence within the Estuary Study Area.

American Badger. American badger (*Taxidea taxus*) is a California species of special concern (CDFG, 2009). This species is an uncommon but permanent resident found throughout most of the state. The badger is active throughout the year in most of its range in California, except in the North Coast area where it enters variable periods of torpor in winter. This species is both nocturnal and diurnal, and frequents drier open stages of most shrub, forest, and herbaceous habitats. Badgers dig burrows in friable soil for cover. They frequently reuse old burrows, although some may dig a new den each night, especially in summer. Home range estimates vary geographically and seasonally. Ranges recorded in other western states varied from 338 to 1,549 acres, with the males usually occupying the larger territories. Badgers mate in summer and

early fall, with young born mostly in March and April in burrows that are usually found in areas with sparse overstory cover (CDFG, 2010).

American badger has been observed at multiple locations within ten miles of the Estuary Study Area. The closest CNDDB occurrence record for this species is approximately six miles south of the Estuary Study Area (CDFG, 2010). In 2007, at least 20 badger dens were observed within coastal terrace prairie habitat in the vicinity of Bodega Bay. Coastal scrub, grassland, and forest habitats within the Estuary Study Area support potentially suitable habitat for badger. There is a moderate potential for American badger to occur within the Estuary Study Area due to the presence of suitable habitat and observations within ten miles of the Estuary Study Area.

California Sea Lion. Like the other marine mammals discussed above, the California sea lion (*Zalophus californianus*) is protected by the Marine Mammal Protection Act. A common, abundant marine mammal, California sea lions are found along the west coast from southern Mexico to British Columbia, Canada. They breed in Southern California and the Channel Islands after which they migrate up the Pacific coast towards the San Francisco Bay. Breeding typically occurs between May and August. California sea lions haulout on offshore rocks, sloping rock outcroppings, sandy and cobblestone beaches, jetties, and buoys (Zeiner et al. 1990b). They are opportunistic and will feed on a variety of aquatic animals including squid, anchovy, rockfish and octopus.

California sea lions are known to occur within the Estuary Study Area. Solitary sea lions have been reliably observed at the mouth of the Russian River and between the mouth of the Russian River and the Jenner Visitor's Center (SCWA, 2009),with reports up to Duncans Mills (Martini-Lamb, 2010). A number of juvenile sea lions were observed in the Estuary and on small rocks at the mouth of the Russian River during the summer and fall 2009 (Martini-Lamb, 2010). See Section 4.4.2, Setting, Pinniped Haulouts, for more detail regarding California sea lion presence within the Estuary Study Area.

4.4.3 Regulatory Framework

The following discussion identifies federal, state, and local regulations that serve to protect sensitive biological resources relevant to the CEQA review process.

Federal Regulations

Federal Endangered Species Act

The Secretary of the Interior (represented by the USFWS) and the Secretary of Commerce (represented by the National Marine Fisheries Service, NMFS) have joint authority to list a species as threatened or endangered under the Federal Endangered Species Act (FESA) (United States Code [USC], Title 16, Section 1533[c]). FESA prohibits the "take" of endangered or threatened fish, wildlife, or plants species in areas under federal jurisdiction or in violation of state law, in addition to adverse modifications to their critical habitat. Under FESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to

attempt to engage in any such conduct." The USFWS and NMFS also interpret the definition of "harm" to include significant habitat modification that could result in the take of a species.

If an activity would result in the take of a federally listed species, one of the following is required: an incidental take permit under Section 10(a) of FESA, or an incidental take statement issued pursuant to federal interagency consultation under Section 7 of FESA. Such authorization typically requires various measures to avoid and minimize species take, and to protect the species and avoid jeopardy to the species' continued existence.

Pursuant to the requirements of Section 7 of FESA, a federal agency reviewing a proposed project which it may authorize, fund, or carry out must determine whether any federally listed threatened or endangered species, or species proposed for federal listing, may be present in the project area and determine whether implementation of the proposed project is likely to affect the species. In addition, the federal agency is required to determine whether a proposed project is likely to jeopardize the continued existence of a listed species or any species proposed to be listed under FESA or result in the destruction or adverse modification of critical habitat proposed or designated for such species (16 USC 1536[3], [4]).

Generally, the USFWS implements FESA for terrestrial and freshwater fish species and the NMFS implements FESA for marine and andromous fish species. USFWS and/or NMFS must authorize projects where a federally listed species is present and likely to be affected by an existing or proposed project. Authorization may involve a letter of concurrence that the project will not result in the potential take of a listed species, or may result in the issuance of a Biological Opinion that describes measures that must be undertaken to minimize the likelihood of an incidental take of a listed species. A project that is determined by USFWS or NMFS to jeopardize the continued existence of a listed species cannot be approved under a Biological Opinion.

Where a federal agency is not authorizing, funding, or carrying out a project, take that is incidental to the lawful operation of a project may be permitted pursuant to Section 10(a) of FESA through approval of a habitat conservation plan (HCP).

FESA requires the federal government to designate "critical habitat" for any species it lists under the Endangered Species Act. "Critical habitat" is defined as: (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to the species conservation, and those features that may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the regulatory agency determines that the area itself is essential for conservation.

Federal Marine Mammal Protection Act

The Secretary of Commerce (represented by NMFS) and the Secretary of the Interior (represented by the USFWS) have joint responsibility in protecting marine mammals under the Marine Mammal Protection Act (50 CFR 216). The NMFS is responsible for cetaceans and pinnipeds (other than walrus), and USFWS is responsible for all other marine mammals, including sea otter,

walrus, polar bear, dugong and manatee. The Marine Mammal Protection Act (MMPA) established a moratorium on the taking of marine mammals in U.S. waters. It defines "take" to mean "to hunt, harass, capture, or kill" any marine mammal or attempt to do so. Exceptions to the moratorium can be made through permitting actions for take incidental to commercial fishing and other non-fishing activities, for scientific research, and for public display at licensed institutions.

Federal Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA) (16 USC, Section 703, Supp. I, 1989), as amended by the Migratory Bird Treaty Reform Act, prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. The act addresses whole birds, parts of birds, and bird nests and eggs. For projects that would not cause direct mortality of birds, the MBTA is generally interpreted in CEQA analyses as protecting active nests of all species of birds that are included in the "List of Migratory Birds" published in the Federal Register in 1995 and as amended in 2005. Though the MBTA allows permits to be issued for import and export, banding, scientific collecting, taxidermy, and rehabilitation, among other reasons, there is no provision in the MBTA that allows for species take[9] related to creation or other development (Code of Federal Regulations, Title 50: Wildlife and fisheries Part 21; Migratory Bird Permits).

Federal Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle…[or any golden eagle], alive or dead, or any part, nest, or egg thereof." The act defines "take" as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb."

River and Harbor Act and Clean Water Act

The Secretary of the Army (represented by the Corps of Engineers [USACE]) has permitting authority over activities affecting waters of the United States under Section 10 of the River and Harbors Act (33 USC 403) and Section 404 of the Clean Water (33 USC 1344). Waters of the United States are defined in Title 33 CFR Part 328.3(a) and include a range of wet environments such as lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. Section 10 of the River and Harbor Act requires a federal license or permit prior to accomplishing any work in, over, or under navigable[10] waters of the United States, or which affects the course, location, condition or capacity of such waters. Section 404 of the Clean Water Act requires a federal license or permit prior to discharging dredged or fill material into waters of the United States, unless the activity is

9 "Take" is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct.

10 "Navigable waters of the United States" (33 CFR Part 329) are defined as water that have been used in the past, are now used, or are susceptible to use as a means to transport interstate or foreign commerce up to the head of navigation.

exempt (33 CFR 324.4) from Section 404 permit requirements (e.g., certain farming and forestry activities). To obtain a federal license or permit, project proponents must demonstrate that they have attempted to avoid the resource or minimize impacts on the resource; however, if it is not possible to avoid impacts or minimize impacts further, the project proponent is required to mitigate remaining project impacts on all federally-regulated waters of the United States.

Section 401 of the Act (33 USC 1341) requires any project proponents for a federal license or permit to conduct any activity including, but not limited to, the creation or operation of facilities, which may result in any discharge into navigable waters of the United States to obtain a certification from the state in which the discharge originates or would originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable waters at the point where the discharge originates or would originate, that the discharge will comply with the applicable effluent limitations and water quality standards. A certification obtained for the creation of any facility must also pertain to the subsequent operation of the facility. The responsibility for the protection of water quality in California rests with the State Water Resources Control Board (SWRCB) and its 9 Regional Water Quality Control Boards (RWQCBs).

State Regulations

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA) and Section 2081 of the California Fish and Game Code, a permit from the CDFG is required for activities that could result in the take of a state-listed threatened or endangered species (i.e., species listed under CESA). The definition of “take” is to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (Fish and Game Code Section 86).

Unlike the federal definition of “take”, the state definition does not include “harm” or “harass”. As a result, the threshold for take under CESA is typically higher than that under FESA. Section 2080 of the Fish and Game Code prohibits the taking of plants and animals listed under the authority of CESA, except as otherwise permitted under Fish and Game Code Sections 2080.1, 2081, and 2835. Under CESA, the California Fish and Game Commission retains a list of threatened species and endangered species (Fish and Game Code Section 2070). The California Fish and Game Commission also maintains two additional lists:

1. Candidate species (CDFG has issued a formal notice that the species is under review for addition to either the list of endangered species or the list of threatened species)

2. Species of special concern (which serves as a watch list)

A lead agency reviewing a proposed project within its jurisdiction must determine whether any state-listed threatened or endangered species may be present in a project area and determine whether the proposed project may take a listed species, consistent with the requirements of CESA. If a take would occur, an incidental take permit would be required from the CDFG, including a mitigation plan that provides measures to minimize and fully mitigate the impacts of the take. The measures must be roughly proportional in extent to the impact of the taking and

must be capable of successful implementation. Issuance of an incidental take permit may not jeopardize the continued existence of a state-listed species. For species that are also listed as threatened or endangered under the FESA, CDFG may rely on a federal incidental take statement or incidental take permit to authorize an incidental take under CESA.

California Fully Protected Species and Species of Special Concern

The classification of "fully protected" was the CDFG's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, amphibian and reptiles, birds, and mammals. Most of the species on these lists have subsequently been listed under CESA and/or FESA. The California Fish and Game Code sections (fish at Section 5515, amphibian and reptiles at Section 5050, birds at Section 3511, and mammals at Section 4700) dealing with "fully protected" species states that these species "…may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected species," although take may be authorized for necessary scientific research. This language makes the "fully protected" designation the strongest and most restrictive regarding the "take" of these species. In 2003, the code sections dealing with fully protected species were amended to allow the CDFG to authorize take resulting from recovery activities for state-listed species.

Species of special concern are broadly defined as animals not listed under the FESA or CESA, but which are nonetheless of concern to the CDFG because are declining at a rate that could result in listing or historically occurred in low numbers and known threats to their persistence currently exist. This designation is intended to result in special consideration for these animals by the CDFG, land managers, consulting biologists, and others, and is intended to focus attention on the species to help avert the need for costly listing under FESA and CESA and cumbersome recovery efforts that might ultimately be required. This designation also is intended to stimulate collection of additional information on the biology, distribution, and status of poorly known at-risk species, and focus research and management attention on them. Although these species generally have no special legal status, they are given special consideration under the CEQA during project review.

California Department of Fish and Game Code Sections 3503

Independent of the MBTA, birds of prey are protected in California under the Fish and Game Code (Section 3504.5, 1992). Section 3504.5 states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes (diurnal birds of prey) or Strigiformes (owls) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to nest abandonment. The CDFG considers any disturbance that causes nest abandonment and/or loss of reproductive effort to be "taking."

Marine Life Protection Act

The Marine Life Protection Act (MLPA) was enacted in 1999 and is part of the California Fish and Game Code (Sections 2850-2863). The MLPA requires California to reevaluate all existing

marine protected areas (MPAs) and potentially design new MPAs that together function as a statewide network. MPAs are developed on a regional basis and are evaluated over time to assess their effectiveness. There are three different types of MPAs including: state marine reserve, state marine park, state marine recreation area (Russian River Estuary mouth to Highway 1 bridge) and state marine conservation area. Each designation provides authority for different levels of restriction on human uses and includes various objectives.

The MLPA sets the following goals for the Program [California Fish and Game Code subsection 2853(b)]:

1. To protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.

2. To help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted.

3. To improve recreational, educational, and study opportunities provided by marine ecosystems that are subject to minimal human disturbance, and to manage these uses in a manner consistent with protecting biodiversity.

4. To protect marine natural heritage, including protection of representative and unique marine life habitats in California waters for their intrinsic value.

5. To ensure that California's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines.

6. To ensure that the state's MPAs are designed and managed, to the extent possible, as a network.

The Estuary Study Area westward of the Highway 1 Bridge is within the Russian River State Marine Recreation Management Area and the Russian River State Marine Conservation Area. The regulations that follow are associated with these MPAs.

Russian River State Marine Recreation Management Area

Regulations: Take of all living marine resources is prohibited except recreation hunting of waterfowl is allowed unless otherwise restricted by hunting regulations.

Russian River State Marine Conservation Area

Regulations: Take of all living marine resources is prohibited EXCEPT:

1. Only the following species may be taken recreationally: Dungeness crab by trap, and surf melt using hand-held dip net or beach net.

2. Only the following species may be taken commercially: Dungeness crab by trap.

California Native Plant Protection Act

The California Native Plant Protection Act (Fish and Game Code Sections 1900-1913) and the Natural Communities Conservation Planning Act provide guidance on the preservation of plant resources; these two acts underlie the language and intent of Section 15380(d) of the CEQA Guidelines. Vascular plants listed as rare or endangered by the CNPS (2001), but which have no designated status or protection under state or federal endangered species legislation, are defined as follows:

1. List 1A: Plants presumed extinct
2. List 1B: Plants rare, threatened, or endangered in California and elsewhere
3. List 2: Plants rare, threatened, or endangered in California, but more numerous elsewhere
4. List 3: Plants about which more information is needed – a review list
5. List 4: Plants of limited distribution – a watch list

In general, plants appearing on CNPS List 1A, 1B, or 2 are considered to meet the criteria for endangered, threatened, or rare as laid out in Section 15380 of the CEQA Guidelines. Additionally, plants listed on CNPS List 1A, 1B, or 2 also meet the definition of Section 1901, Chapter 10 (Native Plant Protection Act) and Sections 2062 and 2067 (CESA) of the California Fish and Game Code.

California Department of Fish and Game Code Sections 1600-1616

Streams, lakes, and riparian vegetation as habitat for fish and other wildlife species, are subject to jurisdiction by the CDFG under Sections 1600-1616 of the California Fish and Game Code. Any activity that would do one or more of the following: (1) substantially obstruct or divert the natural flow of a river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake generally require a 1602 Lake and Streambed Alteration Agreement. The term “stream”, which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as follows: “a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life”. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation” (14 CCR 1.72). In addition, the term stream can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife. Riparian is defined as “on, or pertaining to, the banks of a stream;” therefore, riparian vegetation is defined as, “vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself”. Removal of riparian vegetation also requires a Section 1602 Lake and Streambed Alteration Agreement from the CDFG.

State Water Resources Control Board

The State Board was created by the legislature in 1967. The mission of the State Board is to ensure the highest reasonable quality for waters of the State while at the same time allocating those waters to achieve the optimum balance of beneficial uses. Waters of the state are defined by the Porter-Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state." The State Water Board protects all waters in its regulatory scope, but has special responsibility for isolated wetlands and headwaters. These waterbodies have high resource value, are vulnerable to filling, and may not be regulated by other programs, such as Section 404 of the Clean Water Act. Waters of the State are regulated by the Water Boards under the State Water Quality Certification Program, which regulates discharges of dredged and fill material under Section 401 of the Clean Water Act and the Porter-Cologne Water Quality Control Act. Projects that require a USACE permit, or fall under other federal jurisdiction, and have the potential to impact waters of the State are required to comply with the terms of the Water Quality Certification Program. If a proposed project does not require a federal license or permit, but does involve activities that may result in a discharge of harmful substances to waters of the State, the Water Boards have the option to regulate such activities under its State authority in the form of Waste Discharge Requirements or Certification of Waste Discharge Requirements.

California State Lands Commission

The California State Lands Commission was established by the California legislature in 1938, and was given the authority and responsibility to manage and protect the important natural and cultural resources on certain public lands within the state and the public's rights to access these lands. The public lands under the Commission's jurisdiction are of two distinct types—sovereign and school lands. Sovereign lands encompass approximately 4 million acres statewide. These lands include the beds of California's naturally navigable rivers, lakes and streams, as well as the state's tide and submerged lands along the state's more than 1,100 miles of coastline, extending from the shoreline out to three miles offshore. The CSLC's jurisdiction extends to more than 120 rivers and sloughs, 40 lakes and the state's coastal waters. Public and private entities may apply to the CSLC for leases or permits on state lands for many purposes including marinas, industrial wharves, dredging, sand mining, tanker anchorages, grazing, right-of-ways, bank protection, and recreational uses. The Sonoma County Water Agency possesses a land lease permit issued by the CSLC, in accordance with Article 2 of the Leasing and Permits Regulations, to conduct artificial breaching within CSLC jurisdiction (CSLC, 2007).

California Coastal Act Policies

The California Coastal Commission, in partnership with coastal cities and counties, plans and regulates the use of land and water in the coastal zone under the California Coastal Act (CCA). On land the coastal zone varies in width from several hundred feet in highly urbanized areas up to five miles in certain rural areas, and offshore the coastal zone includes a three-mile-wide band of ocean. The coastal zone established by the CCA does not include the San Francisco Bay, where development is regulated by the Bay Conservation and Development Commission. Development activities, which are broadly defined by the CCA to include (among others) creation of buildings, divisions of land, and activities that change the intensity of use of land or public access to coastal

waters, generally require a coastal development permit from either the Commission or the local government. The CCA includes goals and policies that constitute the statutory standards applied to planning and regulatory decisions made by the Commission and by local governments. See the County of Sonoma Local Coastal Plan in Section 4.4 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**, for more detail.

Local

Local policies established in the *Sonoma County General Plan 2020*, Sonoma County Tree Ordinance, *Sonoma County Local Coastal Program*, and *Sonoma Coast State Park General Plan* and associated EIR, that govern biological resources in the Estuary Study Area are summarized in Section 4.4 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**.

4.4.4 Environmental Impacts and Mitigation Measures

Significance Criteria

The criteria used to determine the significance of an impact are based on the environmental checklist in Appendix G of the CEQA Guidelines. For this analysis, implementation of the proposed Estuary Management Project would be considered to have a significant impact associated with biological resources if it would:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the CDFG, USFWS, or NMFS;

2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the CDFG or USFWS;

3. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the CWA (including but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

4. Interfere substantially with the movement of any native resident or migratory fish[11] or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

5. Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or substantially reduce the number or restrict the range of an endangered, rare, or threatened species;

6. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or

[11] Fish are discussed in Section 4.5.

7. Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved plan.

All of the significance criteria listed above will be included in the impact analysis, except for the following criterion, which is determined to be not relevant to the proposed project:

> *Conflict with the provisions of an adopted plan.* There are no adopted habitat conservation plans, natural community conservation plans, or other approved plan for the project area and, therefore, impacts related to conflict with such a plan are not applicable and are not further discussed. Plans related to fisheries are discussed in Section 4.5.

Approach to Analysis

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment and general procedures would be equivalent to current practices, as described in Section 2.2.1. No change to existing artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

The impact analysis below considers the following two elements of the proposed project: creation and maintenance of the outlet channel and lagoon adaptive management. The impact analysis for the creation and maintenance of the lagoon outlet channel mostly focuses on the changes (direct effects) that would occur on biological resources within the general location of the outlet channel (i.e., the lagoon outlet channel management area) and access route, defined as the area around the Goat Rock State Beach parking lot and the beach area used to access the outlet channel location (see **Figure 2-6**). The impact analysis for the lagoon adaptive management element mostly focuses on the changes that could potentially occur on biological resources from the increased duration of fresh or brackish water lagoon conditions. The duration of inundation may increase from the currently experienced duration of five to 14 days (on average) to the estimated duration of one to five months with implementation of the proposed project. Conditions that may occur under a longer duration of freshwater lagoon conditions have not been empirically recorded. Although such changes are not measurable effects at this point in time, impacts are primarily based on water quality monitoring and reports that provide a comparison between fully tidal conditions and closed-mouth conditions at the Estuary (see **Section 4.3, Water Quality**), review of literature on plant and animal species habitat requirements for and tolerance of periodic and sustained inundation or fluctuation in water quality parameters (i.e. saline to freshwater conditions), and professional judgment.

Estuaries are complex, dynamic ecosystems, normally experiencing changes between seasons, between years, and between different places in the same estuary. This condition makes estuaries difficult to study (Desmond et al., 2002). Moreover, an evaluation of the effects of changes due to Estuary management must bear in mind that, when anticipating future conditions, determination of significance is judged relative to the baseline required by CEQA (i.e. current conditions). Under the current Estuary management practices, water depth and salinity, as well as other water

quality parameters, fluctuate at varying degrees and continuously across a wide range. Therefore, for many of the impacts discussed below, particularly with regards to the lagoon adaptive management element, the effects of the proposed Estuary management practices may not be sufficiently known to reach a determination of "less than significant."

Impacts on biological resources are evaluated based on the likelihood that special-status plant and animal species, special-status or sensitive natural communities, wildlife corridors and nursery sites, and other protected biological resources are present within the Estuary Study Area (as discussed in Section 4.4.2, Setting), and the likely effects that creation and maintenance[12] of the lagoon outlet channel and lagoon adaptive management may have on these resources. Sensitive biological resources that are considered unlikely or have a low potential to occur within the Estuary Study Area are not considered in the impact analysis (see Section 4.4.2).

For the purpose of this section, the definition of "substantial," as used in the significance criteria above, has three principal components, each of which contributes to the determination of impacts on biological resources and their significance:

1. Magnitude and duration of the impact (e.g., substantial/not substantial)
2. Uniqueness of the affected resource (rarity)
3. Susceptibility of the affected resource to disturbance

Impacts Analysis

The following impact analysis focuses on potential impacts of the proposed Estuary Management Project related to biological resources. The evaluation considers project plans, current conditions at the project area, and applicable regulations and guidelines. Impacts are summarized and categorized as either "no impact", "less than significant impact", "less than significant with mitigation", or "significant and unavoidable".

Creation and Maintenance of Lagoon Outlet Channel

Impact 4.4.1: Special-Status Plant and Animal Species. The creation and maintenance of the lagoon outlet channel could adversely affect special-status plant and animal species. (Less than Significant with Mitigation)

Although a number of special-status plant and animal species are known or have potential to occur within the Estuary Study Area (see **Tables 4.4-1** and **4.4-2**), few are known or expected to occur within the outlet channel management area or access route. These areas are comprised of developed and beach habitats with little or no vegetation. Because of the lack of potentially suitable habitat, as well as the distances from known occurrences, no impacts on the following eight special-status animal species are anticipated during creation and maintenance of the outlet

[12] As noted in **Chapter 2.0, Project Description**, the frequency of equipment operation on the barrier beach during the lagoon management period may be incrementally increased compared to existing conditions, and could include up to 18 maintenance activities over the course of the lagoon management period, depending upon the performance of the outlet channel. This represents a potential increase over existing artificial breaching activities.

channel: California freshwater shrimp, foothill yellow-legged frog, California red-legged frog, western pond turtle, pallid bat, Sonoma tree vole, Townsend's big-eared bat, western red-bat, and American badger. Impacts on the remaining special-status plant and animal species with a moderate to high potential to occur in the Estuary Study Area are discussed below and, where appropriate, groups of species are discussed collectively.

Plants, Butterflies, and Birds

Habitats within the outlet channel management area and access route are not expected to support special-status plant or butterfly species, or nesting birds, given their geologic and physical structure and existing level of disturbance, as well as lack of observations during ongoing monitoring efforts. However, adjacent habitats, particularly those bordering the access route in proximity to the parking lot at Goat Rock State Beach, may support such species. For example, a population of Tidestrom's lupine is known to occur north and east of the parking lot, and a historical occurrence of Myrtle's silverspot butterfly is known from along a State Park road near Goat Rock. There is high potential for such species, as well as other special-status plants (Blasdale's blade grass, coastal bluff morning glory, swamp harebell, blue coast gilia, short-leaved evax, perennial goldfields), butterflies (Behren's silverspot butterfly), and nesting birds (great blue heron, northern harrier, American peregrine falcon, Osprey, California brown pelican, double crested cormorant), to be inadvertently affected by the creation and maintenance of the outlet channel through direct loss of individuals or habitat loss or modification. Such impacts would be potentially significant. However, construction vehicles and equipment would avoid vegetated portions of the beach and dune habitats during ingress and egress, using the access point and barrier beach driving route that are currently used by lifeguarding trucks and other State Park vehicles. This includes activities conducted in cooperation with biological monitoring and compliance with all regulatory permits obtained for the proposed project. The effects of these practices in addition to implementation of **Mitigation Measures 4.4.1a** (pre-construction biological resources survey) and **4.4.1b** (worker environmental training) below would reduce potentially significant impacts on special-status plant and butterfly species, and nesting birds potentially occurring within adjacent habitats. Implementation of these measures would reduce potential impacts to less than significant.

In addition to nesting habitat, the areas adjacent to the outlet channel management area and access route support suitable roosting and foraging habitat for special-status bird species including various song birds, birds of prey, wading birds, shorebirds, seabirds, and water birds. If such species are roosting or foraging within habitat in or near the outlet channel management area or access route during the creation and maintenance of the outlet channel, increased noise and vibrations from construction vehicles, equipment, and personnel could cause minor alteration in these birds' behavior. Roosting or foraging birds may be flushed due to the human-related disturbances, or may avoid suitable habitats in or near the outlet channel management area and access route due to such disturbances. Although flushing may increase the birds' energy demands, it is not expected to result in a substantial adverse effect on any special-status birds potentially present. The CEQA baseline for the proposed project includes frequent human-related disturbances within the outlet channel management area and access route. This includes (but is not limited to) disturbances associated with artificial breaching events and recreation activities.

Additionally, human-related disturbances associated with the proposed project would be temporary and suitable roosting and foraging habitat is present throughout the Estuary and along the northern California coast. For these reasons, impacts on roosting and foraging birds would be less than significant.

Marine Mammals

Harbor seals regularly haulout at the mouth of the Russian River (referred to as the Jenner haulout), and California sea lions and northern elephant seals are occasional visitors. Haulout sites are also present within the Russian River Estuary at various logs and rock piles. When seals and sea lions, especially pups, (collectively referred to as pinnipeds) haulout, they are vulnerable to human disturbance, a phenomenon noted in surveys conducted as part of the proposed project (Merritt Smith Consulting, 1997, 1998, 1999, and 2000; SCWA and Merritt Smith Consulting, 2001) and in others throughout the range of the species (e.g. Matthews and Driscoll, 2001). Creation and maintenance of the outlet channel would disturb pinnipeds occupying beach haulout sites by the presence of construction vehicles, equipment, and personnel, and associated noise. Pinniped response to such disturbance typically includes alerts (lifting heads towards source of disturbance), moving to a different location on the beach, or flushing into the water (Merritt Smith Consulting, 1997, 1998, 1999, and 2000; SCWA and Merritt Smith Consulting, 2001), although it is not unusual for pinnipeds to remain on or near the haulout during breaching events (Hanson, 1993). Additionally, pinnipeds occupying beach haulout sites, as well as river haulout sites, could be disturbed during monitoring efforts associated with Estuary management by the presence of boats and other equipment and monitoring personnel. Such human-related disturbance would disrupt pinniped behavioral patterns and, therefore, would be a potentially significant impact.

The NMFS issued an Incidental Harassment Authorization (IHA, Level B harassment)[13] for the proposed project on March 30, 2010 (NMFS, 2010c). The IHA is valid through March 31, 2011 and allows the Water Agency to disturb (or harass) a small number of pinnipeds incidental to the proposed project, specifically the artificial breaching of the barrier beach, creation and maintenance of the outlet channel, and physical and biological monitoring of the Estuary. The IHA includes a number of conditions to avoid and minimize impacts on pinnipeds at the Jenner haulout. The following conditions will be incorporated into the proposed project:

> *Pupping Season (March 15- June 30): The following conditions apply only during the pupping season:*
>
> 1. If a pup less than one week old is on the beach where heavy machinery will be used or on the path used to access the work location, the breaching event will be delayed until the pup has left the site or the latest day possible to prevent flooding while still maintaining suitable fish rearing habitat. Pups less than one week old will be characterized by being up to 15 kg, thin for their body length, or an umbilicus or natal pelage is present. The Water Agency will coordinate with the locally

[13] Level B harassment is defined under the 1994 Amendments to the MMPA as harassment that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

established seal monitoring program to determine if pups less than one week old are on the beach ; prior to a breaching event.

2. A water level management event will not occur for more than two consecutive days unless flooding threats cannot be controlled.

3. The Water Agency will maintain a one week (7 day) "no work" period between water level management events (unless flooding is a threat to the low-lying residential community) to allow for adequate disturbance recovery period. During the "no-work" period, equipment will be removed from the beach.

4. If crew or marine mammal observers sight any pup which may be abandoned, the Water Agency will contact NMFS stranding response network '[Marine Mammal Center, 415- 289-7350] immediately and report the incident to NMFS' Southwest Regional Office and NMFS Headquarters within 48 hours. Observers will not approach or move the pup.

5. Physical and biological monitoring will not be conducted if a pup less than one week old is present at the monitoring site or on a path to the site.

Year-Round: The following conditions apply year-round:

1. Water Agency crew will slowly and cautiously approach the haulout ahead of heavy equipment to minimize the potential for flushes to result in a stampede.

2. Water Agency staff will avoid walking or driving equipment through the seal haulout.

3. Crews on foot will take caution to approach the haulout slowly and to make an effort to be seen by the seals from a distance, if possible, rather than appearing suddenly at the top of the sandbar.

4. Equipment will be driven slowly on the beach and care will be taken to minimize the number of equipment shut-downs and start-ups.

5. The Water Agency will contact NMFS' Southwest Regional Office, Santa Rosa Office, and Headquarters to inform them of the potential flooding threat and event schedule.

6. Physical and biological monitoring will be conducted in a manner which results in the least amount of pinniped harassment practical. The Water Agency personnel will approach the haulout slowly and cautiously and only when necessary to carry out monitoring.

In addition to the conditions above, the proposed project will incorporate the following monitoring measures contained in the IHA:

1. Pinnipeds will be monitored from the overlook on the bluff along Highway 1 adjacent to the haulout with high powered spotting scopes. The method and disturbance behavior will be recorded following Mortenson (2006).

2. During the pupping season (March 15- June 30), the Water Agency will conduct a pre-lagoon outlet channel survey one to three days prior to an event to determine the number of animals on the beach and if any pups are present.

3. The day of an event, the Water Agency will begin pinniped monitoring at least one hour prior to crew and equipment accessing the beach.

4. Monitoring will continue for the duration of an event to determine how many animals have been taken and end no sooner than one hour after equipment leaves the beach.

5. In addition to event days, seal counts will also be conducted in accordance with the Water Agency's most current *Russian River Estuary Management Activities Pinniped Monitoring Plan.*

The effect of these conditions and monitoring measures would reduce impacts associated with the creation and maintenance of the outlet channel to less than significant. This conclusion is supported by the Water Agency's finding that, over five years of monitoring (1996 to 2000), once the breaching event was completed and construction vehicles, equipment and personnel left the beach, pinnipeds returned to the haulout within a day (SCWA, 2009). Additionally, the Water Agency will renew the IHA annually, unless otherwise required by the NMFS. The conditions and monitoring measures included in the renewed IHA would superseded and replace those incorporated herein.

Mitigation Measures

Mitigation Measure 4.4.1a: The Water Agency shall conduct a pre-construction biological resources survey to identify special-status plants and butterflies (or larval host species) and nesting birds present within 150 feet of the general location of the outlet channel management area and access route. The pre-construction survey shall:

- Be conducted by a qualified biologist no more than 30 days prior to commencement of the lagoon management period (defined as from May 15 to October 15). The biologist shall have familiarity with special-status plants and butterflies (or larval host species) of the area and experience with conducting special-status species and nesting bird surveys.

- If no special-status plants or butterflies (or larval host species), or nesting birds are encountered, no further mitigation would be required for at least 30 days, unless additional measures are required by regulatory permit conditions obtained for the proposed project.

- Additional pre-construction surveys, specifically for nesting birds, shall be conducted such that no more than 30 days will have lapsed between the survey and outlet channel creation or maintenance activities.

- If a special-status plant or larval host species for special-status butterflies or nesting birds are encountered, the location shall be documented and species-specific avoidance and minimization measures shall be prepared by the qualified biologist in coordination with the Water Agency and appropriate resource agencies.

- The avoidance and minimization measures shall be implemented to prevent the loss of the species or abandonment of active nests, but shall also take the goal of the proposed project (i.e., managing the lagoon water surface elevations high enough to enhance

salmon rearing habitat while also minimizing flooding of the low-lying properties) into consideration.

Mitigation Measure 4.4.1b: A worker environmental awareness training shall be included to inform construction personnel of their responsibilities regarding sensitive biological resources that are present within 150 feet of the general location of the outlet channel management area and access route. The training shall comply with the following measures:

- The training shall be developed by a qualified biologist familiar with the sensitive biological resources that are known or have the potential to occur in the area.
- The training shall be completed by all construction personnel before any work occurs in the outlet channel management area, including construction equipment and vehicle mobilization. If new personnel are added to the proposed project, the Water Agency shall ensure that new personnel received training before they start working.
- The training shall provide educational information on the special-status species that are known or have potential to occur in the area, how to identify the species, as well as other sensitive biological resources (e.g., sensitive natural communities, federal and state jurisdictional waters). The training shall also review the required mitigation measures to avoid impacts on the sensitive resources, and penalties for noncompliance with biological mitigation requirements.

Impact Significance after Mitigation: Less than Significant.

Impact 4.4.2: Sensitive Natural Communities. The creation and maintenance of the lagoon outlet channel could adversely affect sensitive natural communities. (Less than Significant)

Of the various special-status or sensitive natural communities identified within the Estuary Study Area, Northern Dune Scrub borders the outlet channel management area access route in proximity to the parking lot at Goat Rock State Beach. Consistent with current management practices, construction vehicles, equipment, and personnel would access the barrier beach from the paved parking lot at Goat Rock State Beach and would approach the outlet channel area by walking and/or driving north onto the beach. Although much of this area is developed or beach habitat, Northern Dune Scrub community is present adjacent to the access route and there is potential for this community to be inadvertently affected by encroachment by construction vehicles, equipment, or personnel during creation and maintenance of the outlet channel. Such impact would be potentially significant. However, construction vehicles and equipment would avoid vegetated portions of the beach and dune habitats during ingress and egress, using the access point and barrier beach driving route that are currently used by lifeguarding trucks and other State Park vehicles. Also, the outlet channel, with the exception of its configuration, would be constructed and maintained consistent with with all regulatory permit obtained for the proposed project. The effects of these practices in addition to implementation of **Mitigation Measure 4.4.1b** (worker environmental awareness training) above would reduce potentially significant impacts on sensitive natural communities adjacent to the access route to less than significant.

Mitigation Measures

Implement **Mitigation Measure 4.4.1b**.

Impact Significance after Mitigation: Less than Significant.

Impact 4.4.3: Waters and Wetlands. Creation and maintenance of the lagoon outlet channel could adversely affect federal and state jurisdictional waters. (Less than Significant)

Creation and maintenance of the outlet channel would involve one or two pieces of heavy equipment to excavate a channel with a bed elevation below the lagoon water surface elevation to allow outflow from the lagoon to pass over the barrier beach, but high enough to minimize the inflow of ocean water into the lagoon. Such activities would adversely affect federal and state jurisdictional waters through direct modification by discharges of dredge material. However, the CEQA baseline for the proposed project includes artificial breaching events, although the frequency of modifications to jurisdictional waters for the proposed project may be greater than currently occurs. The proposed project would require authorization from the USACE under the Rivers and Harbors Act Section 10 and the CWA Section 404, the RWQCB under the CWA Section 401, and the CDFG under the Fish and Game Code Section 1602. Such authorizations will include a number of conditions to avoid and minimize impacts to federal and state jurisdictional waters. This may include pre-construction notification, water quality protection measures (e.g.,scheduling restrictions, erosion and sediment controls, non-sediment pollution controls), and post construction monitoring and reporting. Compliance with the conditions contained in the regulatory permits, in addition to implementation of **Mitigation Measure 4.4.1b** (worker environmental awareness training) above, would reduce potentially significant impacts on federal and state jurisdictional waters to less than significant.

Mitigation Measures

Implement **Mitigation Measure 4.4.1b**.

Impact Significance: Less than Significant.

Impact 4.4.4: Wildlife Movement and Nursery Sites. Creation and maintenance of the lagoon outlet channel could interfere with wildlife movement or impede the use of nursery sites. (Less than Significant with Mitigation)

Habitats within the general location of the outlet channel management area and access route support wildlife movement, as well as wildlife nursery sites. For example, harbor seals regularly use the beach and channel as a travel route between the ocean and river habitats, and California sea lions and northern elephant seals are occasional users. Harbor seals also use the beach and open water habitats of the Russian River as sites to raise their pups. The presence of construction

vehicles, equipment, and personnel during the creation and maintenance of the outlet channel could disrupt seals and sea lions (collectively referred to as pinnipeds) and other wildlife species movement patterns and/or rearing activities. Such impact would be potentially significant. However, although creation and maintenance of the outlet channel may increase the frequency of vehicles and equipment operation on the beach, the CEQA baseline for the proposed project includes frequent human-related disturbances within the outlet channel management area and access route. This includes (but is not limited to) disturbances associated with artificial breaching events and recreation activities. Additionally, the outlet channel would be located within the area that the river mouth has been observed to naturally form and, with the exception of its configuration, would be constructed and maintained consistent with current management practices. This includes activities conducted in cooperation with biological monitoring and compliance with all regulatory permit conditions obtained for the proposed project**.** The effects of these practices in addition to implementation of **Mitigation Measure 4.4.1b** (worker environmental awareness training) above would reduce potentially significant impacts on wildlife movement and nursery sites to less than significant.

Mitigation Measures

Implement **Mitigation Measure 4.4.1b**.

Impact Significance after Mitigation Less than Significant.

Impact 4.4.5: Local Policies and Ordinances. Creation and maintenance of the lagoon outlet channel would not conflict with any local policies or ordinances protecting biological resources. (No Impact)

The analysis of local policies and ordinances is generally used as an indicator of the resources that may be affected by a project. Inconsistency with a policy may indicate a significant physical impact, but the inconsistency is not itself an impact. Policies related to biological resources were included in this analysis (see **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**). Agencies with jurisdiction, such as Sonoma County Permit and Resource Managemenrt Deparment, are charged with project review and making a consistency determination. Based on the setting of the Estuary Study Area, the proposed management practices, and compliance with conditions contained in regulatory permits obtained for the proposed project, creation and maintenance of the outlet channel is consistent with the applicable local policies related to biological resources. Therefore, no impacts related to a conflict between creation and maintenance of the outlet channel and any applicable land use plan, policy, or regulation related to biological resources are anticipated.

Impact Significance: No Impact; no mitigation required.

Long-term Lagoon Adaptive Management

Impact 4.4.6: Sensitive Natural Communities. Long-term adaptive management of the Estuary as a lagoon could adversely affect sensitive natural communities. (Less Than Significant)

Implementation of the Estuary Management Project could change the extent, composition, and distribution of the vegetation communities within and adjacent to the Estuary. The Water Agency recently mapped all vegetation communities within and adjacent to the Russian River Estuary, up to 14 feet in elevation. **Figures 4.4-1 – 4.4-5** show the mapped communities with their approximate existing elevations. The extent of inundation of each community within the marked elevations can be inferred from these figures, which illustrates water surface elevations of 4.5, 7, 9, and 14 feet onto the maps. Although lagoon adaptive management would increase the duration of inundation associated with perched freshwater lagoon conditions, the exact length and extent of inundation cannot be predicted with certainty, as it would depend upon barrier beach formation and outlet channel performance. This analysis makes the assumption that a water surface elevation of up to 7 feet for periods of one to five months represents a frequency, duration and depth that would be experienced under the proposed project, and that this assumption provides a way to estimate the impacts to vegetation communities.

At least some portion of nearly all of the vegetation communities mapped, with the exception of Northern Foredune and Active Coastal Dune, lie between 4.5 and 7 feet in elevation. The percentage[14] of each mapped vegetation community that occurs in this elevation zone ranges from one percent (non-native grassland) to 66 percent (gravel bar/mudflat). The percentage of each community within each elevation range are summarized in **Table 4.4-4**. As previously mentioned, an increase in the duration of inundation within these areas could decrease the ability of each vegetation community to successfully inhabit that area.

Coastal and Valley Freshwater Marsh is the only CDFG sensitive natural community mapped within the Estuary Study Area that could be adversely affected by changes in surface water elevation, duration of inundation, or water quality parameters (e.g., salinity, dissolved oxygen, temperature). Northern Foredune Scrub, a CDFG Sensitive Natural Community, would not be substantially affected by the proposed project. Riparian habitats are generally considered sensitive communities, although the riparian scrub habitats present in the Estuary are not generally considered to be rare. **Table 4.4-4** summarizes the extent of existing vegetation communities within elevation ranges (as shown in **Figures 4.4-1 – 4.4-5**) and provides a basis for predicting change in the extent of vegetation communities during lagoon adaptive management. This data only provides an estimate of the extent of habitat that may be inundated during a closure of the barrier beach. As identified in **Table 4.4-4**, of the approximately 26.5 acres of Coastal and Valley Freshwater Marsh within the Estuary Study Area, approximately 9.5 acres (36 percent) occur between 4.5 and 7 feet in elevation, and approximately 13 acres (48 percent) occur between 7 and 9 feet in elevation. Under current conditions, the 9 acres that occur below 7 feet in elevation have

[14] Percentages are on an area basis, and are relative to the total area of each vegetation community as mapped by the Water Agency within the 14-foot elevation contour.

TABLE 4.4-4
EXTENT OF VEGETATION COMMUNITIES WITHIN EXISTING TOPOGRAPHICAL RANGES ADJACENT TO RUSSIAN RIVER ESTUARY – WITHIN 14 FOOT ELEVATION

	4.5-7		7-9		9-14		
Elevation Range	**acres**	**% of total mapped**	**acres**	**% of total mapped**	**acres**	**% of total mapped**	**Total by Vegetation Type (acres)**
Coastal and Valley Freshwater Marsh	9.486	36%	12.809	48%	4.131	16%	26.426
Developed	0.0824	6%	0.0552	4%	1.205	90%	1.3426
Gravel Bar/ Mudflat	17.958	66%	6.321	23%	2.984	11%	27.263
Landscaping	0.1031	22%	0.096	21%	0.261	57%	0.4601
Mixed Evergreen Forest	0.214	11%	0.438	23%	1.253	66%	1.905
North Coast Riparian Forest	1.841	7%	3.603	14%	20.538	79%	25.982
North Coastal Riparian Scrub	4.515	14%	10.509	33%	17.213	53%	32.237
Northern (Franciscan) Riparian and Coastal Scrub	1.003	9%	2.179	19%	8.442	73%	11.624
North Coastal Riparian Scrub/Northern Franciscan riparian and coastal scrub	0.539	2%	7.159	21%	26.806	78%	34.504
Non-Native Grassland	0.626	1%	1.804	3%	60.344	96%	62.774
Red Alder Riparian Forest	0.093	12%	0.160	21%	0.507	67%	0.76
Northern Foredune		0%		0%	0.0396	100%	0.0396
Active Coastal Dunes		0%	0.007	2%	0.386	98%	0.393
Total Mapped Acres below 14 feet	**36.460**		**45.140**		**144.109**		**225.7103**

SOURCE: SCWA, 2010; ESA 2010.

been inundated 52 of the 101 recorded breaching events occurring over the last 14 years. Inundation has been for a duration of between five to 14 days, before artificial breaching restores water surface elevations. The 13 acres occurring above the 7 foot elevation have been inundated 48 times, for a similar duration of between five to 14 days. With increased duration of inundation, mudflat, Coastal and Valley Freshwater Marsh, and northern riparian/coastal scrub assemblages may convert or shift towards higher elevations (i.e., some additional wetland and riparian vegetation may grow above the managed surface water elevation because increasing groundwater levels would induce suitable conditions for the establishment of such vegetation, such as prolonged inundation or soil saturation during the growing season).

Under the Estuary Management Project, both the 9.5 acres of Coastal and Valley Freshwater Marsh occurring below 7 feet in elevation, and the 13 acres of freshwater marsh occurring in the 7 and 9 foot elevation range, would be inundated for a period of one to five months, depending upon outlet channel performance and resulting water surface elevations. During extended inundation, a portion of the 9.5 acres of freshwater marsh within the 4.5 to 7 foot elevation range may convert to open water or mudflat habitat if vegetation is not able to tolerate prolonged inundation (i.e. a substantial increase in depth and duration), while the 13 acres of freshwater marsh in the higher elevation range between 7 and 9 feet would likely not be substantially

affected. The greatest extent of Coastal and Valley Freshwater Marsh habitat between 4.5 and 7 feet in elevation occurs in and around Penny Island, and at the confluence of Willow Creek and the Russian River. These areas could potentially see the greatest conversion from a vegetated community to an open water or mudflat habitat.

Riparian communities, such as North Coast Riparian Forest and North Coast Riparian Scrub, may also be impacted by changes in extent and duration of inundation. Of the 26 acres of North Coast Riparian Forest within the mapped area, 1.8 acres (7 percent) occur between 4.5 and 7 feet in elevation and 3.6 acres (14 percent) occur between 7 and 9 feet in elevation. The majority of North Coast Riparian Forest mapped within the Estuary Study Area (79 percent) is above the 9 foot elevation and would not be impacted by the proposed project. Additionally, of the approximately 31 acres of North Coast Riparian Scrub within the mapped 14-foot contour area, approximately 4.5 acres (14 percent) lies between 4.5 and 7 feet in elevation and approximately 10.5 acres (33 percent) occur between 7 and 9 feet in elevation. These areas would likely convert to Coastal and Valley Freshwater Marsh, which is dominated by more inundation-tolerant vegetation; thereby providing a potential net gain of approximately 5 acres of sensitive Coastal and Valley Freshwater Marsh. The gain in this sensitive natural community would be a beneficial impact.

Much of the North Coast Riparian Scrub is located upstream and downstream of the Highway 1 bridge adjacent to non-native annual grassland. It may be expected that some non-native annual grassland would transition to North Coast Riparian Scrub as this community becomes established at a higher elevation in the Estuary. Inundation of North Coast Riparian Scrub near the confluence with Willow Creek may not re-establish, or “retreat,” to a higher elevation readily because the adjacent slopes are steep, and the higher water table may be above rooting depth for the willow (*Salix*) species that dominant this vegetation type. North Coast Riparian Scrub is not a sensitive natural community in California (as designated by CDFG) nor is it a rare community in the Estuary Study Area. The potential conversion of or shift in North Coast Riparian Scrub habitat would be less than significant.

The adaptation of vegetative communities along the shoreline fringe of the Estuary is difficult to predict, as it is subject to several factors. It is anticipated that conditions resulting from the Estuary Management Project would be consistent with the range of conditions currently experienced in the Estuary, and that its implementation would result in conditions that are more natural relative to observed conditions in other estuary systems on the West Coast. Although the adaptation of vegetative communities cannot be precisely predicted, the above analysis demonstrates that changes in vegetative assemblages would likely be towards potential increases in sensitive Coastal and Valley Freshwater Marsh. Therefore, the long-term adaptive management of the Estuary as a lagoon would not result in a substantially adverse effect to sensitive natural communities and is less than significant.

Impact Significance: Less Than Significant; no mitigation required.

Impact 4.4.7: Special-Status Plant and Animal Species. Long-term adaptive management of the Estuary as a lagoon could adversely affect special-status plant and animal species. (Less than Significant)

Although a number of special-status plant and animal species are known or have the potential to occur within the Estuary Study Area (see **Tables 4.4-2** and **4.4-3**), few could be adversely affected by lagoon adaptive management. This discussion focuses on the plant and animal species considered and summarized in **Tables 4.4-21** and **4.4-3** with a moderate to high potential to occur in the Estuary Study Area and those species that are primarily associated with freshwater marsh and riparian habitats, and open water habitat and beaches, gravel bars, and mudflats. No impacts on the remaining species with a moderate to high potential to occur in the Estuary Study Area are anticipated by lagoon adaptive management because their specific habitat types are outside of the area that would potentially be impacted. Impacts on special-status plant and animal species with the potential to be adversely affected by lagoon adaptive management are discussed below and, where appropriate, groups of species are discussed collectively.

Plants, Amphibians, Reptiles, and Birds

Special-status plant and animal species associated with freshwater marsh and riparian habitats, such as bristly sedge, deceiving sedge, California freshwater shrimp, foothill yellow-legged frog, California red-legged frog, western pond turtle, northern harrier, and great blue heron, could be adversely affected by adaptively managing the Estuary as a summer lagoon. The increased duration of fresh or brackish water lagoon conditions from the currently experienced duration of five to 14 days to the estimated duration of one to five months could affect the freshwater marsh and riparian communities present in the Estuary Study Area through changes in the various water quality parameters (e.g., salinity, dissolved oxygen, temperature). In turn, changes in water quality could induce changes in the extent, composition, and distribution of the freshwater marsh and riparian communities (see **Impact 4.4.6** [Sensitive Natural Communities] below). Such changes could subsequently affect special-status plant and animal species that rely on these communities through habitat loss or modification.

Although the change in duration of inundation could affect freshwater marsh and riparian communities, it is anticipated that while some freshwater marsh and riparian habitat may be lost in the lower elevations of the Estuary, some may be gained in the upper elevations (i.e., some additional wetland and riparian vegetation may grow above the managed surface water elevation because increasing groundwater levels would induce suitable conditions for the establishment of such vegetation, such as prolonged inundation or soil saturation during the growing season. Therefore, effects on specials-status plant and animals species potentially occurring in these habitats could be offset by the habitat gains. Additionally, estuaries are complex, dynamic ecosystems, normally experiencing changes between seasons, between years, and between different places in the same estuary. Plant and animal species within these systems are adapted to fluctuating environmental conditions. For these reasons, the loss or modifications of the freshwater marsh and riparian habitats is not expected to result in a substantial adverse effect on specials-status plants and animals potentially occurring within these communities.

Special-status birds, such as various wading birds, shorebirds, seabirds, and water birds, using the open water habitat and beaches, gravel bars, and mudflats of the Russian River for roosting and/or foraging could be adversely affected by lagoon adaptive management. Beaches, gravel bars, and mudflats may become submerged, and depths of the open water habitat may become less suitable for foraging by some species, while favored by others. Although the loss or modifications of these habitats could result in concentration of birds in fewer locations, it is not expected to result in a substantial adverse effect on any special-status birds potentially using the open water habitat and beaches, gravel bars, and mudflats of the Russian River. As discussed above, estuary species are adapted to fluctuating environmental conditions. Additionally, suitable roosting and foraging habitat is present along the northern California coast.

Impact Significance: Less Than Significant; no mitigation required.

Impact 4.4.8: Protected Marine Mammals. Long-term adaptive management of the Estuary as a lagoon could adversely affect protected marine mammal species. (Significant and Unavoidable)

Lagoon adaptive management could adversely affect harbor seals, as well as California sea lions and northern elephant seals (collectively referred to as pinnipeds), through habitat loss or modification during the one to five month lagoon management period. This potential habitat modification is addressed under two scenarios: 1) impeded access into the Estuary due to barrier beach closure and establishment of an outlet channel; and 2) inundation of interior river haulouts.

As discussed previously in **Section 4.4.2, Setting, Pinniped Haulouts**, harbor seals use the Jenner haulout at the mouth of the Russian River, which is the largest concentration of harbor seals north of Drakes Estero in Point Reyes (approximately 50 miles south of the project area). Monitoring data indicates the highest number of harbor seals occur during open barrier beach and tidal Estuary conditions. During open (breached) conditions, harbor seals haul out to rest or nurse, or use the open mouth to enter into the Estuary to forage or use interior river haulouts. Under existing conditions, closures at the barrier beach may occur for five to fourteen days, and monitoring results indicate lower numbers at the Jenner haulout, and increased activity at interior river and other regional haulouts. Harbor seal numbers generally increase again after tidal conditions are established. During the proposed lagoon management period, haulout sites at the mouth of the Russian River may become less suitable for pinnipeds due to the establishment of a shallow outlet channel, rather than the current practice of artificial breaching, which could impede easy access to haul out and ready escape to the ocean. This impeded access, coupled with increased levels of human-related disturbances which have historically contributed to the notable decline in numbers of pinnipeds hauled-out when the mouth is closed (Hanson, 1993), could be considered significant. However, although the lagoon outlet channel may be configured differently than open mouth conditions under existing artificial breaching practices, observations of harbor seal behavior during perched Estuary conditions and the July 2010 outlet channel pilot indicate that pinnipeds are able to access the lagoon and interior river haulout locations via the outlet channel (SCWA, 2010b). **Figure 4.4-13** shows pinniped (harbor seal) use of both

Photo 1. Pinniped (Harbor seal) access to Estuary during created outlet channel, July 1, 2010

Photo 2. Pinniped (Harbor seal) access to Estuary during natural breach condition via naturally occurring, shallow channel, June 2010

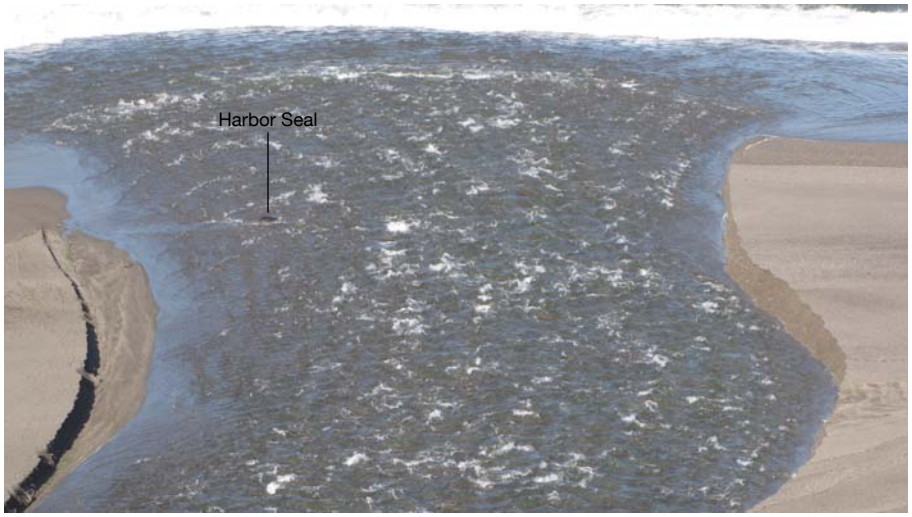


Photo 3. Pinniped (Harbor seal) in naturally occurring, shallow channel, June 2010

SOURCE: ESA

Russian River Estuary Management Project . 207734.01

Figure 4.4-13
Pinniped Use of Outlet Channel
During Open Esturary Conditions

artificially created and naturally occurring shallow outlet channels. Additionally, historic conditions would be restored during the months outside of the lagoon management period; therefore access to the Estuary and interior river haulouts via would not be permanently restricted. Continued monitoring of the Jenner haulout and peripheral haulouts would provide an indicator of haulout use or decline, provide a tracking mechanism for assessing future impacts, and provide a basis for shifting adaptive management activities to respond to changes in haulout use. The Incidental Harassment Authorization (IHA) issued by NMFS under the Marine Mammal Protection Act (NMFS, 2010c) does not provide for long-term harassment or alteration of habitat conditions that would contribute to abandonment of the Jenner haulout, nor could such an authorization be expected in the future. Therefore, the potential impact for restricted access for a longer duration during the lagoon management period is considered less than significant with implementation of **Mitigation Measure 4.4.6**.

Harbor seals use regular haulouts located within the mainstem Estuary, including the Jenner (Penny) logs, Paddy's Rock, and Chalanchawi. Under the proposed project, water levels would be increased up to 7 to 9 feet for a longer duration, which could inundate the mudflat/gravel bar areas that provide suitable haulout sites within the river, reducing their availability of haulout locations within the Estuary itself. Such modification of suitable habitat would be a potentially significant impact, as it could affect pinniped resting, foraging, and movement patterns, and rearing activities. To evaluate the potential haulout modification or loss, water levels at 7-, 9-, and 14-feet contours were projected onto aerial imagery of the Jenner (Penny) logs, Paddy's Rock, and Chalanchawi haulout sites (see **Figure 4.4-1 series**). A 7-foot elevation would submerge portions of the Jenner logs, Paddy's Rock, and Chalanchawi, thereby temporarily restricting use of these haulouts during the lagoon management period. Although availability of suitable haulout sites along the mainstem Russian River would be affected by higher water surface elevations, the duration of these would be dependent upon outlet channel performance. Tidal conditions would be restored during the months outside of the lagoon management period. Therefore, the project effect on interior river haulouts would be seasonal. Additionally, there are other haulout sites available regionally. Continued monitoring of the interior river haulouts and peripheral haulouts would provide an indicator of haulout use or decline, and provide a tracking mechanism for assessing future impacts, and provide a basis for shifting adaptive management activities should the proposed project have a significant effect on the harbor seals. Therefore, the potential inundation impact on interior river haulouts for a longer duration during the lagoon management period is considered to remain significant with implementation of **Mitigation Measure 4.4.6**.

As discussed previously in **Section 4.4.2, Setting**, Pinniped Haulouts, pinniped distribution and use of haulout locations is difficult to predict, as it is subject to several factors. Monitoring of the Jenner haulout indicates that seasonal changes are the largest factor in pinniped distribution, but that closure events do have an inverse correlation with pinniped haulout use. The Water Agency, in implementing the Estuary Management Project as required by NMFS, has in place both short-term measures to avoid impacts associated with creation and maintenance of the freshwater lagoon, as well as long-term monitoring programs that will allow for the review and determination of potential adverse effects associated with implementation of the Estuary Management Plan. It is anticipated that conditions resulting from the Estuary Management Plan

would be consistent with the range of conditions currently experienced in the Estuary, and that its implementation would result in conditions that are more natural relative to observed conditions in other estuary systems on the West Coast. Implementation of **Mitigation Measure 4.4.6** below would reduce this impact to the degree feasible.

Mitigation Measures

Mitigation Measure 4.4.8: In compliance with the Incidental Harassment Authorization (NMFS, 2010c), the Water Agency will conduct seal counts at the Jenner haulout and at nearby coastal and river haulouts in accordance with methods described in the *Russian River Management Activities Pinniped Monitoring Plan* (Pinniped Monitoring Plan), dated September 9, 2009, or as updated by requirements of NMFS under the MMPA. If monitoring during the lagoon management period indicates decreases in overall use at the Jenner haulout are correlated with increases in use at the three closest haulouts, the Water Agency shall consult with NMFS and CDFG to alter the Estuary Management Plan such that the haulout site is maintained as a resource. The IHA does not provide for long-term harassment or alteration of habitat conditions that would contribute to abandonment of the Jenner haulout.

Level of Significance after Mitigation: Impacts related to seasonal inundation of river haulout locations would remain Significant and Unavoidable.

Impact 4.4.9: Waters and Wetlands. Long-term adaptive management of the Estuary as a lagoon could adversely affect federal and state jurisdictional waters. (Less than Significant)

To comply with conditions stipulated in the Russian River Biological Opinion (NMFS, 2008), the Water Agency would pursue an alternative approach for management of water levels in the Estuary, and would adaptively manage a lagoon outlet channel to achieve an average daily water surface elevation of at least 7 feet during the lagoon management period from May 15 to October 15. This could change the jurisdictional limits of federal and state waters, including wetlands, in the Estuary. Because potential effects of the lagoon adaptive management on natural communities addressed freshwater marsh, which would be considered wetlands (see Impact 4.4.7, Natural Communities), this discussion focuses on waters (i.e., open waters of the Russian River).

The increased duration of inundation suggests that the elevation of 7 feet may become "ordinary high water," [15] newly delimiting the extent of jurisdictional federal and state waters (i.e., an increase over the CEQA baseline conditions). However, if water surface elevations do not establish the elevation of 7 feet as the ordinary high water, there would not be a net change in the extent of federal and state jurisdictional waters. Therefore, no significant impact (e.g., net loss of waters) is anticipated.

[15] Ordinary high water is an approach for identifying the lateral limits of non-wetland waters. It is defined in 33 CFR Part 328.3 as a line on the shore established by fluctuations of water and indicated by phyiscally characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, or the presence of litter and debris.

Level of Significance after Mitigation. Less than Significant; no mitigation required.

Impact 4.4.10: Wildlife Movement and Nursery Sites. Long-term adaptive management of the Estuary as a lagoon could interfere with wildlife movement or impede the use of nursery sites. (Less than Significant with Mitigation)

The increased duration of inundation and potentially induced changes in vegetation community composition would not alter the ability of animals to move along the river edge. There would be no significant impact on the movement of wildlife along the Russian River corridor. There could be some adverse change in the availability of riverine marsh, tributary streams, or back-channel ponding for amphibian breeding (nursery) sites. In the wetland communities where these sites occur, the discussion in Impact 4.4.6 (Natural Communities) predicts a combination of offsetting increases or losses as the water is retained for longer periods and a potential increase in wetland communities (Coastal and Valley Freshwater Marsh), and hence no net loss of amphibian nursery sites. Impacts, and mitigation, associated with effects to pinniped movement and nursery sites, are discussed in Impacts 4.4.1 and 4.4.7 above. The impact would be less than significant with implementation of **Mitigation Measure 4.4.6**.

Mitigation Measures

See **Mitigation Measure 4.4.8**.

Level of Significance after Mitigation. Less than Significant.

Impact 4.4.11: Local Policies and Ordinances: Adaptive management of the lagoon would not conflict with any local policies or ordinances protection biological resources. (No Impact)

As discussed above in Impact 4.4.5 (Local Policies and Ordinances), proposed Estuary management practices are consistent with the applicable local policies related to biological resources. Therefore, no impacts related to a conflict between lagoon adaptive management and any applicable land use plan, policy, or regulation related to biological resources is anticipated.

Level of Significance. No impact; no mitigation required.

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4.5 Fisheries

4.5.1 Introduction

This section describes fisheries resources in the Russian River Estuary (Estuary) area and evaluates the potential impacts of implementing the proposed Russian River Estuary Management Project (Estuary Management Project or proposed project) management activities on these resources. The Setting section describes fisheries resources and associated aquatic habitat in the proposed project area. The primary focus of the setting information is on special-status fish species as well as the aquatic habitats capable of supporting such species. The Regulatory Framework section outlines the relevant regulatory considerations relating to the proposed action. This is followed by an assessment of the affects of implementing the proposed project in the Environmental Impact section. Both short term and long term effects to fisheries resources and aquatic habitat associated with the proposed project are analyzed in the context of applicable laws and regulations to determine their significance under CEQA. When project impacts are determined to be significant, or potentially significant, mitigation measures to avoid or reduce those impacts are identified if feasible.

Information Sources and Methodology

The evaluation and analysis of fisheries and aquatic habitat impacts are based, in part, on review of various sets of monitoring data and reports. The primary sources include available resources from National Marine Fisheries Service (NMFS), the California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (USFWS), and monitoring reports on water quality and fisheries survey data compiled by the Sonoma County Water Agency (Water Agency). The principal sources of information used for the setting and impact analysis presented here are as follows:

1. Russian River Estuary Sandbar Breaching 2005 Monitoring Report, SCWA 2006.

2. Russian River Estuary Sandbar Breaching 2009 Monitoring Report, SCWA 2010.

3. Preliminary Study of Russian River Estuary: Circulation and Water Quality Monitoring - 2009 Data Report, Largier and Behrens 2010.

4. Russian River Outlet Channel Adaptive Management Plan, PWA 2010.

5. Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and Mendocino County Russian River Flood Control and Water Conservation District in the Russian River Watershed, NMFS 2008.

6. Russian River Biological Assessment: Prepared for U.S. Army Corps of Engineers, San Francisco District, San Francisco, California, and Sonoma County Water Agency, Santa Rosa, California. Entrix, September 29, 2004.

These technical reports, summarized here and incorporated by reference, present the methods and results of recent fisheries habitat surveys, water quality monitoring, and additional studies conducted for the proposed project and as part of long term monitoring efforts within the Estuary.

Definitions and Study Area

Estuary Study Area

The Estuary Study Area is defined as that portion of the Russian River with seawater from the Pacific Ocean or brackish water extending from the mouth of the Russian River upstream to the Duncans Mills area and below Austin Creek. As previously noted in **Chapter 2.0, Project Description,** the Estuary Study Area comprises the Estuary, which extends approximately seven miles (11 kilometers [km]) from the mouth of the Russian River upstream to just beyond the confluence of Austin Creek. Under certain closed conditions, the Estuary may backwater to Monte Rio, and as far upstream as Vacation Beach. Where appropriate, discussion of fisheries impacts within the Estuary Study Area and the larger maximum backwater area to Vacation Beach, is provided (Please refer to **Figure 2-3a** in **Section 2.0, Project Description**.

Special Status Species

Special status species, for the purpose of this document, are either (1) protected, or proposed for protection, under the federal Endangered Species Act (ESA); (2) protected, or proposed for protection, under the California Endangered Species Act (CESA); (3) managed as part of a Federal Fishery Management Plan (FMP) under the Magnuson-Stevens Fishery Conservation and Management Act (MSA); or (4) considered a species of concern by US Fish and Wildlife Service (USFWS) and/or California Department of Fish and Game (CDFG).

Critical Habitat and Essential Fish Habitat

Both Critical Habitat and Essential Fish Habitat (EFH) are designated within the project area for various special-status species. Both of these habitat types are important components in considering potential project-related impacts as part of this assessment. The federal ESA defines critical habitat as “the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time it is listed that are determined by the Secretary to be essential for the conservation of the species.” EFH is defined in the MSA as “those waters or substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.”

4.5.2 Setting

Regional Setting

The Estuary is located about 60 miles (97 km) northwest of San Francisco in Jenner, Sonoma County, California (**Figure 2-1, Chapter 2.0, Project Description**). The Russian River is approximately 110 miles long and the watershed encompasses 1,485 square miles in Sonoma, Mendocino, and Lake counties (SCWA, 2008). Historically, streamflows in the Russian River ranged from approximately <1 to 94,900 cubic feet per second (cfs). Currently, most flows in the Russian River during the wet season (November through May) are maintained by runoff following rainfall events. During the dry season (June through October), most of the flow in the Russian River is water released from Lake Mendocino and Lake Sonoma. The Estuary is constrained by the narrow valley walls in the lower reach of the Russian River. A barrier beach occasionally forms naturally across the mouth of the river, impounding water and forming a lagoon. The barrier beach opens naturally when hydraulic conditions in the Russian River and Pacific Ocean change, or when it is artificially breached. When the barrier beach is open, the Estuary is open to full tidal mixing.

The Russian River watershed supports a diverse fish community. Aquatic habitats range from small, cool, high gradient streams to warm, low gradient riverine and estuarine habitat. The fish assemblage native to the Russian River watershed reflects this habitat diversity. The Russian River fish community is comprised of a variety of native and introduced species (discussed below). Substantial sections of the mainstem Russian River and many of the tributaries have been altered through activities such as agriculture, rural and urban development, construction of seasonal and permanent dams, channel maintenance for flood control and bank stabilization, gravel mining, agriculture, and timber harvest. These disturbances, along with changes in ocean productivity and competition from hatchery-raised fish and introduced species, have likely resulted in a decline in the distribution and abundance of various native species of fish (SCWA, 2008).

Local Setting

An extensive discussion of the NMFS' Russian River Biological Opinion (Russian River Biological Opinion) and existing conditions within the Estuary is presented in **Chapter 3.0, Project Background and Environmental Setting, Section 3.5, Historical Estuary Conditions and NMFS' Russian River Biological Opinion**. In summary, the current practice of artificial breaching during the period from late spring to early fall has created a dynamic estuarine/marine dominated environment in the Estuary in the summer. Each time the barrier beach is artificially breached, much of the freshwater lens in the Estuary that develops following formation of the barrier beach is discharged to the ocean. Near the mouth of the Estuary aquatic conditions (*e.g.*, salinity and temperature) are typical of marine conditions. Under current practices, stable freshwater aquatic habitat is currently only maintained in the upper Estuary, where freshwater inflow maintains low salinity conditions regardless of tidal action. However, summer water temperatures during summer months are sub-optimal for rearing salmonids. The high salinity in the Estuary may limit food supply for juvenile salmonids rearing in the Estuary. Additionally, the rapid changes to habitat water quality characteristics across such a broad range (e.g. 0 to

35 ppt salinity in the lower Estuary) under the current breaching practices may result in localized stress and mortality to some fish species subjected to abruptly changing habitat conditions with little time to acclimate to or behaviorally avoid unsuitable habitat conditions (NMFS, 2008).

Fish Communities in the Estuary

The Estuary provides habitat for a variety of fish species including salmonids and other important recreational fish species such as American shad and smallmouth bass. In terms of conservation, much attention is given to three ESA-listed salmonid species that are known to occur in the Russian River watershed. These are Central California Coast steelhead (*Oncorhynchus mykiss*), California Coastal Chinook salmon (*O. tshawytscha*), and Central California Coast coho salmon (*O. kisutch*; NMFS, 2010). The Estuary is important for adult and juvenile passage for the three ESA-listed salmonids (NMFS, 2008). The Estuary provides an opportunity for smolts to acclimate to ocean conditions before migrating to the ocean, as well as potentially providing rearing habitat for steelhead and Chinook salmon.

The Water Agency surveys fisheries within the Estuary to document the distribution, abundance, and condition of fish; to document salmonid residence times in the Estuary; and to assess the habitat parameters that affect salmonid presence and distribution in the Estuary. The Water Agency conducts fisheries monitoring via beach-deployed seine net stations located throughout the lower, middle, and upper Estuary, in a variety of habitat types based on substrate type (i.e., mud, sand, and gravel), depth, and tidal and creek tributary influences (**Figure 3-6**). Fish captures from seine surveys in the Estuary from 1992, 1993, 1996 to 2000, and 2003 to 2009 are summarized here to characterize existing species composition, abundance, and distribution.

Over fifty fish species have been detected during 11 years of monitoring (SCWA, 2006; SCWA, unpublished data). The distribution of fish in the Estuary is, in part, based on species' preference for, or tolerance of, salinity. In general, the influence of cold seawater from the ocean results in high salinity levels and cool temperatures in the lower reaches transitioning to warmer freshwater in the upper and middle reaches of the Estuary.

Fish commonly found in the lower Estuary are marine and estuarine species including topsmelt (*Atherinops affinis*), surf smelt (*Hypomesus pretiosus*), staghorn sculpin (*Leptocottus armatus*), and starry flounder (*Platichthys stellatus*). The middle reach Estuary has a broad range of salinities and a diversity of fish tolerant of these conditions. Common fish in the middle Estuary include those found in the lower Estuary and shiner surfperch (*Cymatogaster aggregata*), three-spine stickleback (*Gasterosteus aculeatus*), and prickly sculpin (*Cottus asper*). Freshwater dependent species, such as the Sacramento sucker (*Catostomus occidentalis*) and California roach (*Lavinia symmetricus*), are predominantly distributed in the upper reach of the Estuary. These species tend to move down into the Estuary during the summer and return upstream in the fall (Entrix, 2004). Anadromous fish that can tolerate a broad range of salinities, such as steelhead (*O. mykiss*) and American shad (*Alosa sapidissima*), occur throughout the Estuary. The upper Estuary is important for juvenile-rearing salmonids during periods of cool water temperatures. Although young steelhead typically rear in freshwater throughout the year, they have been caught in the brackish middle Estuary and may make use of other suitable portions of the Estuary. Most

adult salmonids migrate up the Russian River during the period when the mouth is naturally open, usually late fall to early spring.

Typically, the highest species diversity is in the lower Estuary near Jenner Gulch. This pattern of species diversity may be due to a higher diversity of habitat features and fluctuating salinity levels that change habitat conditions from freshwater during the spring to brackish later in the season when freshwater flows decrease (SCWA, 2006). In general, fisheries monitoring demonstrates an increase in fish abundance in an upstream direction dominated by freshwater species. One possible explanation for this fish abundance pattern is the higher diversity of habitat features at these stations.

Macro-invertebrates

The Water Agency has surveyed macro-invertebrates in the Estuary annually since 2004 (SCWA, 2010a; SCWA, unpublished data). Although breaching permits do not require this monitoring, the purpose of the surveys is to determine the relative abundance and distribution of macro-invertebrates in the Estuary.

Crab and shrimp traps are deployed at six stations in the lower and middle Estuary monthly during the summer. Three marine crab species and one freshwater crayfish species have been recorded. However, nearly all of the captures have been Dungeness crab (Metacarcinus [=*Cancer*] *magister*). The Estuary is a nursery for juvenile Dungeness crabs. However, there is wide variation in the abundance of juveniles annually. This bust or boom pattern may be a result of atypical winter ocean temperatures and currents that affect larval Dungeness crab survival and migration to inshore areas and estuaries. Occasionally European green crabs (*Carcinus maenus*) are trapped and one hairy rock crab (*Cancer jordani*) has been found. In addition, fish seining surveys incidentally captured red swamp crayfish (*Procambarus clarkii*) and signal crayfish (*Pacifastacus leniusculus*). Both crayfish species are abundant in freshwater, but not native to the Russian River watershed. Bay shrimp (*Crangon stylirostris*) were detected at most fish seining stations.

Special-Status Species

The Russian River watershed provides potential habitat to a number of special-status species. Three federally-listed salmonids are found in the Russian River watershed: Central California Coast steelhead, California Coastal Chinook salmon, and Central California Coast coho salmon. Stray pink salmon (*O. gorbuscha*) are observed in the Russian River sporadically. If present, it is likely that pink salmon will use the Estuary similarly to Chinook salmon, as adult and smolt migration times and estuarine residence times are similar between the two species (NMFS, 2008). These salmonid species are sensitive to changes in streamflows and increases in water temperature, and their habitat requirements are often more limiting than for other fish species found in the watershed. For this reason, the focus of this section is on the three federally-listed salmonids. The following is a general description of the special-status fish species found in the Estuary or with the potential to occur in the project area, including life history, distribution, and habitat requirements. **Table 4.5-1** summarizes the special-status fish species that occur or have the potential to occur in the project area.

TABLE 4.5-1
SPECIAL-STATUS SPECIES OBSERVED IN THE RUSSIAN RIVER WATERSHED

Scientific Name	Common Name	Status	Anadromous/ Resident	Regulatory Status	Habitat	Potential to Occur
Spirinchus thaleichthys	Longfin smelt	Native	Anadromous	CT	Utilize freshwater rivers to spawn. Adults occur in estuaries, bays, and coastal areas	Moderate. Use of Estuary appears very low Status of smelt population in the Russian River uncertain.
Oncorhynchus mykiss	steelhead	Native	Anadromous	FT	Associated with migratory and rearing habitat in Estuary and mainstem Russian River. Utilize upper watershed and tributaries for spawning. Smolts utilize Estuary to acclimate to seawater.	High. Suitable rearing and migratory habitat present in study area; regularly observed in fisheries monitoring surveys.
Oncorhynchus kisutch	Coho salmon	Native	Anadromous	FE/CE	Associated with migratory habitat in Estuary and mainstem Russian River and with tributaries for spawning and streams with deep pools and submerged large woody cover for rearing. Some juveniles may rear in the freshwater portions of estuaries and lagoons and smolts may acclimate to seawater in estuaries.	High. Suitable rearing and migratory habitat present in study area; regularly observed in fisheries monitoring surveys.
Oncorhynchus tshawytscha	Chinook salmon	Native	Anadromous	FT	Associated with migratory and rearing habitat in Estuary and mainstem Russian River and with spawning habitat in mainstem Russian River and larger tributaries.	High. Suitable rearing and migratory habitat present in study area; regularly observed in fisheries monitoring surveys.
Oncorhynchus gorbuscha	Pink salmon	Native/Stray	Anadromous	Extinct[a]	Similar to Chinook salmon (described above).	Unlikely. There is no established run of pink salmon in the Russian River.
Lampetra tridentata	Pacific lamprey	Native	Anadromous	FSC	Associated with migratory habitat in Estuary and Russian River. Spawns in coldwater streams and young use deep pools and submerged large woody cover for rearing. Some juveniles may rear in the freshwater portions of estuaries and lagoons and smolts acclimate to seawater in estuaries.	High. Suitable rearing and migratory habitat present in study area; commonly found in the mainstem Russian River as well as in the lower and middle reaches of tributaries.
Lampetra ayresii	river lamprey	Native	Anadromous	CSC	Similar to the Pacific lamprey (described above).	Moderate. Suitable rearing and migratory habitat present in study area; reported in the Russian River but rarely observed in fisheries monitoring surveys.

TABLE 4.5-1 (Continued)
SPECIAL-STATUS SPECIES OBSERVED IN THE RUSSIAN RIVER WATERSHED

Scientific Name	Common Name	Status	Anadromous/ Resident	Regulatory Status	Habitat	Potential to Occur
Hysterocarpus traskii pomo	Russian River tuleperch	Native	Resident	CSC	Associated with mainstem Russian River and the lower reaches of larger tributaries with abundant cover elements such as aquatic plants, large woody debris, overhanging vegetation and riprap.	High. Suitable habitat present in study area; commonly observed in freshwater habitats of the middle and upper Estuary in fisheries monitoring surveys.
Acipenser medirostris	green sturgeon	Native/visitor	Anadromous	FT	Utilize rivers to spawn in deep fast water. Early life stage may rear in freshwater up to 2 years.	Unlikely. The Russian River is not recorded as a spawning river for the green sturgeon and none have been found during Water Agency fish studies.
Lavinia symmetricus navarroensis	Clear Lake- Russian River roach	Native	Resident	CSC	Utilize habitats ranging from cold headwater streams, to warm, low gradient rivers. Can occupy large pools as well as shallow water habitats along the shoreline in riffles.	High. Suitable habitat present in study area; Roach observed in the mainstem Russian River and in freshwater habitats in the upper Estuary and can be abundant in the lower sections of tributaries. The subspecies Navarro Roach may occur in the Russian River watershed and is listed as CSC. However, the distribution and taxonomy of each subspecies is unclear.
Mylopharodon conocephalus	hardhead	Native	Resident	CSC	Utilize low- to mid-elevation well-oxygenated streams with deep pools and low-velocity run habitat. Absent from streams where introduced species (centrarchids) predominate.	Low. Observed infrequently during fisheries monitoring surveys (last observed 1992-3; Merrit Smith, 2000).

[a] Pink salmon are thought to be extinct in the Russian River. However, small numbers of this species were observed during video monitoring conducted by the Water Agency in 2003, and are thought to be strays from other watersheds.

Regulatory Status Definitions:

FT = Federal Threatened
FE = Federal Endangered
FSC = Federal Species of Concern
CE = California Endangered
CT = California Threatened
CSC = California Species of Special Concern

Potential to Occur:

Unlikely = Habitat not present in the project area and/or species is not known to occur in the project area based on fisheries monitoring surveys or species distribution information.
Low = Habitat not present in the project area and/or few occurrences in the project area observed.
Moderate = Marginal habitat present in the project area and/or some occurrences in the project area observed.
High = Suitable habitat present in the project area and nearby occurrences observed or species is known to occur in the project area based on fisheries monitoring surveys.

SOURCES: Moyle, 2002; Cook et al. 2010; NMFS, 2008; Smith, 1990, Bond et al., 2008; SCWA, 2008, 2010; Merritt Smith, 2000.

Longfin Smelt. The California threatened longfin smelt is an anadromous species that typically ranges from 3 to 4 inches in length with a 2-year lifecycle. They spend their adult life in bays, estuaries, and nearshore coastal areas, and migrate into freshwater rivers to spawn. Most descriptions of longfin smelt life history in California focus on San Francisco Bay populations. Relatively little is known about North Coast longfin smelt or specifics about their life history (DFG, 2009). The longfin smelt is a small, planktivorous fish that can tolerate a broad range of salinity concentrations. Adult and juvenile longfin smelt occupy open waters of estuaries, mostly in the middle or at the bottom of the water column. They are found at salinities ranging from nearly pure seawater to completely fresh water, although most seem to prefer salinities in the 15-30 parts per thousand range. They can occupy water as warm as 20º C (68º F) in summer, but prefer summer temperatures around 16-18º C (61-64º F). The wide salinity and temperature preferences reflect the ability of the longfin smelt to occupy different portions of an estuary according to time of year and stage of life cycle (Moyle, 2002). Spawning occurs primarily from January through March, after which most adults die (DFG, 2009). Spawning takes place in fresh-to-brackish water over sandy-gravel substrates, rocks, or aquatic vegetation (Moyle, 2002). Overall, longfin smelt are found between Monterey Bay (southern most extreme of range) northward to Alaska. Populations in California have historically been known from the San Francisco Estuary, Humboldt Bay, the Eel River Estuary, and the Klamath River estuary (Moyle, 2002). Population declines have been defined only in the California portion of the range. Longfin smelt have also been collected within the Russian River estuary in 1996 (Moyle, 2002) and in subsequent years (observed during biological surveys from 1997 to 1999; Merrit Smith, 2000). However, longfin smelt use of the Russian River estuary appears very low and the status of the longfin smelt population in the Russian River is uncertain.

General Salmonid Life Cycle. Anadromous salmonids share similar life cycle patterns. Anadromous fish live in the oceans as adults, growing and maturing in the food-abundant environment. After reaching maturity in the ocean, salmonids immigrate[1] to their natal (place of hatching) streams to spawn. Spawning generally takes place in the tails of pools and riffles. Substrate size and quality is important for successful spawning. The suitable substrate is free of silt and size varies from small gravel to cobble (0.5 to 6 inches in diameter), depending on the fish species. Eggs are deposited in a gravel nest, called a redd, and hatch in 30 to 60 days depending on the temperature of the water and the species. In the Russian River, juvenile salmonids typically spend between two months (Chinook salmon), one and one-half years (coho salmon), and two years (steelhead) growing in the freshwater habitat before emigrating[2] to the ocean. Prior to emigration, juvenile salmonids go through a physiological process that allows them to adapt from a freshwater environment to a marine environment (smoltification). The emigrating fish, called smolts, leave the freshwater environment for the ocean during the spring. Due to this anadromous life cycle, salmonids encounter a range of distinct habitat types throughout their life history.

1 Migrate into the freshwater environment/watershed from the marine environment.
2 Migrate out of the freshwater environment/watershed to the marine environment.

During emigration, juvenile salmonids typically enter estuarine habitats, which can vary widely in their physical characteristics (as described in **Section 3.5, Historic Estuary Conditions and NMFS' Russian River Biological Opinion**). Salmonid use of estuarine habitats has been well documented, and the time spent in an estuary and the benefits received from estuarine habitat can vary widely among species and watersheds (Bond et al., 2008; Smith, 1990). Some salmonids move through estuaries in days, whereas other species remain for many months (described in more detail by species, below). Studies have demonstrated that lagoon environments, such as the likely historic conditions of the Russian River Estuary, are beneficial to the growth of juvenile steelhead in central California due to their residency time prior to emigration (NMFS, 2008; Bond et al., 2008). Fresh or brackish water lagoons at the mouths of many streams in California often provide freshwater depths, water quality, and productivity that are highly favorable to the growth and ocean survival of rearing salmon and steelhead (NMFS, 2008; Smith, 1990, Bond et al., 2008).

Steelhead. Steelhead range from Russia and Alaska to Baja, Mexico. The Russian River once supported the third most productive watershed for steelhead in California (Moyle 2002). Although steelhead have declined, wild steelhead continue to occur throughout most of the Russian River basin and spawn in the upper mainstem and numerous tributaries and are the most abundant and widespread of the ESA-listed species in the Russian River watershed. Hatchery steelhead raised at the Don Clauson Fish Hatchery are stocked in the Russian River and tributaries to mitigate for the loss of habitat upstream of Lake Sonoma and Lake Mendocino.

Steelhead/rainbow trout are adapted to a variety of habitats and show considerable flexibility in life history patterns. Fish that spend their adult life in the ocean and migrate to freshwater streams to spawn (i.e., anadromous) are called steelhead, while fish that spend their entire life cycle in freshwater streams (i.e., resident fish) are called rainbow trout. Steelhead in the ocean take advantage of the abundance of food and can grow up to 70 cm in length. Rainbow trout have limited food resources and reach maturity at much smaller sizes. Adult steelhead migrate from the ocean during winter to natal freshwater streams were they spawn. Adults may spawn up to 4 times in their life. Juvenile steelhead, called parr or smolts, spend 1 or 2 years rearing in freshwater streams or estuaries before entering the ocean where they mature. Because of the broad plasticity in this species life history, there are intermediate or differing patterns for steelhead that take advantage of local conditions.

Due to the distribution of the species and plasticity of life history, water temperature requirements for steelhead vary in the literature (SCWA, 2008). Optimal summer water temperatures for steelhead in California range from approximately 10 to 15°C. A useful criterion for determining habitat suitability based on the available literature suggests that average daily temperatures should be less than 20°C and daily maximum temperatures should be less than 24°C to allow acceptable steelhead/rainbow trout growth (Bell, 1973; Barnhardt, 1986). The 20°C criterion represents a water temperature below which reasonable growth of steelhead/rainbow trout may be expected. Data in the literature suggest that temperatures above 21.5°C result in no net growth or a loss of condition in rainbow trout and a reduced capacity for respiration (Barnhardt, 1986). The upper incipient lethal temperature for steelhead/rainbow trout is approximately 24°C (75°F; Bell, 1973;

Barnhardt, 1986). In general, salmonids in warmer waters require more food and oxygen because their metabolism increases with temperature (Moyle, 2002).

In the absence of more definitive data on the thermal tolerance of steelhead, the thermal tolerance criteria (frequency of average daily temperatures greater than 20°C, and frequency of maximum daily temperatures greater than 24°C) should not be used as absolute thermal thresholds, but rather represent general guidelines for assessing the biological significance of water temperature conditions. However, steelhead have been documented in habitat with temperatures ranging from 0°C in winter to as high as 26-27°C in summer (Moyle, 2002). Temperatures greater then 23°C can become lethal if acclimation is not gradual. Even with acclimation, temperatures between 24-27°C are typically lethal other than for short exposures (Moyle, 2002).

The seasonal abundance of steelhead captured in the Estuary varies annually, but is usually highest in May and decreases in succeeding summer months. The spatial distribution of steelhead in the Estuary varies greatly. Most age 0+ steelhead are typically captured in the upper and middle Estuary (fresh and brackish water) during May and June (SCWA, 2010b). Few steelhead are captured in the lower Estuary during this period. Conversely, from July to September most steelhead are captured in the middle and lower Estuary (brackish and marine salinity conditions). Steelhead have rarely been captured at the two lower sample stations (River Mouth and Penny Island) during all survey years (SCWA, 2010b).

Recent research by Bond et al. (2008) has specifically attributed the importance of estuarine lagoon rearing to the survival of returning adult steelhead. Steelhead reared in a lagoon were shown to be significantly larger for all years studied than juveniles migrating directly to the ocean in spring (Bond et al., 2008). Lagoon residents were consistently larger than downstream migrants who spent little time rearing in lagoons. Size-selective survival is the largest determinant in driving which individuals contribute to the adult population. Steelhead smolts experience a strong size-selective mortality in the marine environment (that is, smaller individuals have a lower probability of survival). Bond et al. (2008) demonstrate a survival advantage for larger lagoon-reared individuals and over 95% of returning adults were lagoon-reared. These patterns of growth and ocean survival are driven by the difference in growth rates between productive estuary/lagoon waters and the relatively oligotrophic[3] upstream habitat (Bond et al., 2008). There is strong evidence of the importance of lagoon habitat as a nursery to coastal California steelhead populations (Bond et al., 2008; Smith, 1990, NMFS, 2008) demonstrating the importance of lagoons in producing larger smolts that contribute to the majority of the adult population.

Coho salmon. Coho salmon range from Asia and Alaska to Central California as far south as Santa Cruz County. This salmon is state and federally listed as endangered due to a 90-95% decline in abundance (Moyle, 2002). There is little historical documentation regarding the distribution and abundance of coho salmon in the Russian River (SCWA, 2010b). However, an early estimate put the coho salmon population at 5,000 fish, which utilized the tributaries near Duncans Mills (SCWA, 2008). Although there are no current estimates of coho salmon in the Russian River, recent juvenile surveys indicate that the wild coho population has been reduced to very low levels and are only

[3] A deficiency of plant nutrients accompanied by an abundance of dissolved oxygen.

known to persist in a few creeks. In an attempt to recover the Russian River run, the Coho Salmon Broodstock Program was initiated. The program propagates local coho at the Don Clauson Fish Hatchery located adjacent to Warm Springs Dam and releases young into several Russian River tributaries with historic occurrences of coho.

Coho salmon is an anadromous species with a three-year life cycle. Adults spend approximately two years at sea before migrating in late-fall and winter to their natal stream to spawn. Once spawning is completed adults die within a few days or weeks. Young spend their first year rearing in streams with deep pools and submerged large woody cover. Emigration occurs in spring usually before June to avoid warmer summer temperatures. Smolts may acclimate to seawater in estuaries before entering the ocean. Coho salmon are the most temperature sensitive of the three salmonids in the Russian River watershed and require permanent cool clean water for spawning and rearing young. Optimal juvenile habitat for growth is characterized by temperatures of 12-14°C. Coho do not persist in streams where summer temperatures reach 22-25°C for extended periods of time or where there are high fluctuations in temperature at the upper end of their tolerance range (Moyle, 2002). Additionally, although coho typically rear in clear streams, some juveniles rear in the freshwater portions of estuaries and lagoons rather than streams (Moyle, 2002), but summer lagoon rearing appears to be rare among coho salmon along the central California coast, probably due to the lower tolerance of the species to high water temperatures compared to steelhead.

Very few coho salmon smolts have been captured in the Estuary during fish monitoring surveys (SCWA 2006, 2010a). A total of 77 smolts have been captured since 2004. Low coho captures in the Estuary are related to their low numbers in the Russian River watershed, but also the timing of Water Agency fish surveys that begin in late-May or June when most smolts have already migrated to the ocean. Nearly all smolts are captured during May or early June (SCWA, 2010a). Most smolts seined in the Estuary had a clipped adipose fin indicating a hatchery origin from the Coho Salmon Captive Broodstock Program (SCWA, 2010b).

Chinook salmon. Russian River Chinook salmon follow the life history pattern of fall-run Chinook salmon, which is an adaptation to avoid summer high water temperatures. Fall-run adult salmon migrate from the ocean to spawn in the main channels of rivers and large tributaries in late summer and fall, and die soon after spawning. Fry[4] emerge in spring and move downstream within a few months. Young Chinook salmon may rear in the mainstem of rivers or estuaries during spring before water temperatures increase in the summer. Estuary-reared juvenile Chinook salmon may grow to a larger size than river-reared fish, which is likely to improve their chances for ocean survival and return (McKeon, 1985; cited in Entrix, 2004). Once accustomed to saltwater, smolts emigrate out to sea where they spend between 1 and 5 years maturing before returning to their natal stream to spawn and complete their lifecycle. Upstream migration from the ocean to spawn in the mainstem of the Russian River and tributaries occurs from the last week in August through December (primarily October through November). Spawning begins in November and likely continues through early January, when the salmon die after spawning.

[4] Life stage of trout and salmon between hatching and full absorption of the yolk-sac.

A major limiting factor for juvenile Chinook salmon is temperature, which strongly affects growth and survival (Moyle, 2002). Typically, optimal temperatures are from 13-18ºC and few Chinook salmon can survive temperatures greater then 24°C, even for short periods with mortality experienced in wild populations at around 22-23°C (Moyle, 2002). At sublethal temperatures, growth is reduced. There are likely slight differences (1-2 ºC) in optimal and lethal temperatures of Chinook salmon of different runs and stocks (Moyle, 2002).

Chinook salmon smolts are typically most abundant in May or June during Water Agency fish surveys and then by July are rarely captured in the Estuary. Chinook salmon smolts are well distributed throughout the Estuary with captures at most sample stations annually (SCWA, 2006, 2010). Chinook salmon primarily utilize the Estuary as migratory habitat.

Pacific Lamprey. Pacific lamprey, a federally listed species of concern, are anadromous with a generalized life cycle similar to steelhead. In California, Pacific lampreys spend approximately 18 months in the marine environment before returning to freshwater to spawn during the winter and spring and are known to spend up to a year in freshwater prior to spawning. Pacific lamprey spawn in riffles with gravel/cobble substrates. Adult Pacific lampreys migrate upstream during the spring from April through mid-June. The young, worm-like Pacific lamprey, called ammocoetes, emerge from the buried nest after approximately three weeks and drift downstream to suitable rearing habitat consisting of backwater areas with soft mud/sand substrates. Ammocoetes burrow tail first into the soft substrate, where they feed on detritus and are commonly found in the mainstem Russian River as well as in the lower and middle reaches of tributaries. Ammocoetes pass through a transformation process similar to the smolting phase in salmonids. The newly transformed ammocoetes, called marcopthalmia, develop eyes and functioning mouthparts and migrated to the ocean where they take up a predaceous feeding lifestyle.

River Lamprey. River lamprey are a California species of special concern. Although the lifecycle of river lampreys has not been studied in California, it is known to be similar to the Pacific lamprey (described above). The major difference is that river lampreys are smaller and spend less time in the marine environment (approximately three to four months) before returning to freshwater to spawn. Although river lampreys have been documented in the Russian River, they are rarely seen, and little is known about their status in the river. However, the uncertainty regarding the abundance and distribution of the species may be the result of the difficulty inherent in distinguishing between lamprey species.

Russian River Tule Perch. This subspecies of tule perch, a California listed species of concern, inhabit the mainstem Russian River and the lower reaches of the larger tributaries. Tule perch are often found in pools, although they can forage in relatively fast water habitats. They are often associated with heavy cover elements such as aquatic plants, large woody debris, overhanging vegetation and riprap (Moyle, 2002). Tule perch feed on small invertebrates picked off the substrate or off of plants. Important food items in the Russian River include the larvae of mayflies and midges. Tule perch are viviparous, meaning that they give birth to live young (as opposed to laying eggs) in May and June. Russian River tule perch are common in freshwater habitats of the middle and upper Estuary (Cook et al. 2010).

Green Sturgeon. There has been little study of the lifecycle of the federally threatened green sturgeon because of its generally low abundance and limited spawning distribution. Green sturgeon is the most marine species of sturgeon and comes into rivers mainly to spawn, although the early life stage is in freshwater and may last as long as two years. Juveniles and adults are bottom feeders feeding on shrimp, amphipods, and small fish. Green sturgeon typically spawn between March and July with a peak from mid-April to mid-June in water temperatures from 8-14ºC. Spawning takes place in deep, fast water. In California the abundance of green sturgeon gradually increases north of Point Conception. The southern-most spawning population is in the Sacramento River. The Russian River is not recorded as a spawning river for the green sturgeon and none have been found during Water Agency fish studies. However, green sturgeon are occasionally captured in ocean waters, estuaries, and bays.

California Roach. California roach, as a whole, are not considered a special-status species. However, the Navarro Roach subspecies, which may occur in the Russian River watershed, is a California species of concern (Moyle et al., 1995). The distribution and taxonomy of each subspecies is unclear, including in the Russian River. California roach are a small, relatively short-lived species, seldom living longer than three years. Roach inhabit environments ranging from cold headwater streams, to warm, low gradient rivers. Roach are seldom abundant in the presence of large numbers of other fish species. When found alone, they occupy waters of large pools. In the presence of predatory fish, such as pikeminnow, roach occupy shallow water habitats along the shoreline in riffles. Roach appear to be particularly vulnerable to competition with green sunfish (*Lepomis cyanellus*). Roach are omnivores, feeding primarily on algae, aquatic insects, and small crustaceans. Roach are found in the mainstem Russian River and can be very abundant in the lower sections of tributaries such as Santa Rosa Creek. Roach are also found in freshwater habitats in the upper Estuary.

Hardhead. Hardhead are widely distributed in low- to mid-elevation streams in the main Sacramento-San Joaquin drainage and are also present in the Russian River (Moyle, 2002). This freshwater native minnow is a California species of special concern. They are typically found in undisturbed areas of streams with summer temperatures in excess of 20°C with optimal temperature in the range of 24-28°C (Moyle, 2002).Hardhead are intolerant of low oxygen levels, limiting distribution to well oxygenated streams and surface waters of reservoirs, preferring clear deep pools (>80cm) and runs with a sand-gravel-boulder substrate and low water velocities (Moyle, 2002). Hardhead are often found in association with Sacramento pikeminnow and Sacramento sucker, but are typically absent from streams dominated by introduced species, especially centrarchids (Moyle, 2002). Hardhead are commonly observed in the Russian River, but rarely have been found in the brackish Estuary (Merritt Smith, 2000).

Federally Managed Marine Species

Marine species are primarily distributed in the lower and middle Estuary with some limited distribution into upper portions of the Estuary as salinity levels change based on the condition of the barrier beach (open/closed) and based on tidal influence. As described in **Section 3.5, Historic Estuary Conditions and NMFS' Russian River Biological Opinion**, when the mouth closes, marine fish distribution shifts towards the lower portion of the Estuary and concentrates

around the river mouth where the highest salinities are sustained for longer periods as the Estuary undergoes limited transition to fresh or brackish water habitat. After the Estuary is opened, fewer marine species are typically detected in the project area and estuarine species are typically redistributed into the lower and middle Estuary as tidal influence resumes. Following breaching (natural or artificial) it is typical for marine species to once more enter the lower Estuary as habitat conditions once again become suitable.

The Estuary occurs within Essential Fish Habitat (EFH) for various federally-managed marine fish species within the Pacific Salmon Fishery Management Plan (FMP), the Coastal Pelagics FMP, and the Pacific Groundfish FMP. **Table 4.5-2** lists the FMP-managed species that have been observed in the project area. As described in detail above, the Russian River basin contains habitat necessary to Pacific salmon and other anadromous species for spawning, breeding, and feeding or growth while rearing. Species managed under the Coastal Pelagics and Pacific Groundfish FMPs use the Estuary primarily for juvenile rearing, though some species may use the area for spawning as well.

TABLE 4.5-2
FEDERALLY-MANAGED MARINE FISH SPECIES WITH DESIGNATED ESSENTIAL FISH HABITAT IN THE RUSSIAN RIVER ESTUARY

Scientific Name	**Common Name**	**Fisheries Management Plan**
Clupeidae		
Sardinops sagax	Pacific sardine	Coastal Pelagic
Engraulidae		
Engraulis mordax	northern anchovy	Coastal Pelagic
Salmonidae		
Oncorhynchus gorbuscaha	pink salmon	Pacific Salmon
Oncorhynchus kisutch	coho salmon	Pacific Salmon
Oncorhynchus tshawytscha	Chinook salmon	Pacific Salmon
Sebastidae		
Sebastes paucispinis	bocaccio	Pacific Groundfish
Sebastes melanops	black rockfish	Pacific Groundfish
Sebastes spp.	copper blackfish complex	Pacific Groundfish
Hexagrammidae		
Hexagrammos decagrammus	kelp greenling	Pacific Groundfish
Ophiodon elongates	lingcod	Pacific Groundfish
Cottidae		
Scorpaenichthys marmoratus	cabezon	Pacific Groundfish
Carangidae		
Trachurus symmetricus	jack mackerel	Coastal Pelagic
Bothidae		
Citharischthys sordidus	Pacific sanddab	Pacific Groundfish
Plueronectidae		
Platichthys stellatus	starry flounder	Pacific Groundfish

SOURCE: NMFS, 2010.

4.5.3 Regulatory Framework

Please refer to **Section 4.4, Biological Resources** for a detailed discussion of federal and State regulations and local policies germane to the Estuary Management Project, including the Federal and State Endangered Species Acts, Federal and State Clean Water Act, Section 1600 of the California Fish and Game Code, California Coastal policies. Local policies established in the *Sonoma County General Plan 2020* and Local Coastal Program that govern fisheries resources in the project area are summarized in Section 4.5 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**.

In addition to the above mentioned regulations, the following apply to the Estuary Management Project.

Magnuson-Stevens Fishery Conservation and Management Act – Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), requires that all federal agencies consult with NMFS on activities or proposed activities authorized, funded, or undertaken by that agency that may adversely affect EFH of commercially-managed marine and anadromous fish species. EFH is defined in the Magnuson-Stevens Act as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The components of this definition are interpreted as follows: “Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers a species’ full life cycle. In addition, the Estuary Management Project area occurs within areas designated as Habitat Areas of Particular Concern (HAPC) for species managed under the Pacific Groundfish FMP. HAPC are described in the regulations as subsets of EFH which are rare, particularly susceptible to human induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under Magnuson- Stevens Act; however, Federal projects with potential adverse impacts to HAPC will be more carefully scrutinized during the consultation process.

The Sustainable Fisheries Act of 1996 amended the Magnuson-Stevens Act to establish new requirements for EFH descriptions in federal FMPs and to require federal agencies to consult with NMFS on activities that may adversely affect EFH. The Magnuson-Stevens Act requires all fishery management councils to amend their FMPs to describe and identify EFH for each managed fishery. The EFH provisions of the Magnuson-Stevens Act are designated to protect fishery habitat from being lost due to disturbance and degradation. The Act requires that EFH must be identified for all species federally managed by the Pacific Fishery Management Council (PFMC), which is responsible for managing commercial fishery resources along the coasts of Washington, Oregon, and California.

The PFMC has designated the Russian River Estuary as EFH to protect and enhance habitat for coastal marine fish and macroinvertebrate species that support commercial fisheries. The EFH provisions of the Sustainable Fisheries Act are designated to protect fishery habitat from being lost due to disturbance and degradation. The Act requires that EFH must be identified for all species federally managed by the PFMC, which is responsible for managing commercial fishery resources along the coasts of Washington, Oregon, and California. Three fishery management plans cover species that occur in the project area, and designate EFH within the entire Estuary:

1. Pacific Groundfish Fishery Management Plan: bocaccio, black rockfish, copper rockfish complex, other unidentified juvenile rockfish, kelp greenling, lingcod, cabezon, Pacific sanddab, starry flounder, green sturgeon

2. Coastal Pelagic Fishery Management Plan: northern anchovy and Pacific sardine, jack mackerel

3. Pacific Salmon Fishery Management Plan: pink salmon, coho salmon, Chinook salmon

4.5.4 Environmental Impacts and Mitigation Measures

Significance Criteria

Implementation of the Estuary Management Plan would have a significant impact on fisheries resources if it were to:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFG, U.S. Fish and Wildlife Service (USFWS), or NMFS;

2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFG or USFWS[5];

3. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, coastal, etc.) through direct removal, filling, hydrologic interruption, or other means;

4. Interfere substantially with the movement of any native resident or migratory fish, or impede the use of native fish nursery (rearing) sites;

5. Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish species, cause a fish population to drop below self-sustaining levels, threaten to eliminate a fish community, or substantially reduce the number or restrict the range of an endangered, rare, or threatened species;

6. Conflict with any local policies or ordinances protecting biological resources; or

[5] Addressed in Section 4.4, Biological Resources.

7. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

For the purpose of this EIR, the word "substantial", as used in the significance criteria (above), has three principal components, each of which contributes to the determination of impacts on fisheries resources and their significance:

1. Magnitude and duration of the impact (e.g., substantial/not substantial);
2. Uniqueness of the affected resource (rarity);
3. Susceptibility of the affected resource to disturbance.

The evaluation of significance must also consider the interrelationship of these three components. For example, a relatively small-magnitude impact on a state or federally listed fish species could be considered significant because the species is rare and is believed to be very susceptible to disturbance. Conversely, a natural fish population such as prickly sculpin is not necessarily rare or sensitive to disturbance, and thus, a much larger magnitude of impact would be required to result in a significant impact. Impacts on fisheries resources are considered *significant* when project-related habitat modifications (e.g., development, introduction of non-native species, increased human intrusion, barriers to movement, or landscape management) could reduce fish species populations to the extent that they become locally less numerous; impacts on habitats are considered *significant* when the habitats could not continue to support viable populations of associated fish species as a result of project implementation.

Approach to Analysis

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

The Estuary Management Project is to reduce the current frequency of artificial breaching in the Estuary during the lagoon management period, and thereby allow the Estuary to function more naturally and in a manner likely more consistent with historic conditions. The proposed management actions are intended to limit tidal exchange between the ocean and the Estuary from May 15 to October 15, when a freshwater lagoon would be expected to form. Instead of the existing tidal Estuary, the proposed project will manage the Estuary as a perched lagoon with water levels above tidal elevations during the lagoon management period. With tidal inflows limited, the proposed project aims to enhance the extent of freshwater habitat for the benefit of salmonid rearing and to reduce the frequent and abrupt transitioning between states from marine to freshwater habitat that occurs under current practices. As discussed in **Section 3.6.2, Current Estuary Management and Fish Habitat**, the current practice results in artificial breaching of the barrier beach during the proposed lagoon management period resulting in potentially degraded habitat conditions throughout the summer for both freshwater and marine species. Under the

proposed project, management would allow the Estuary to transition to freshwater/brackish habitat for a longer duration, thereby benefitting salmonid rearing.

The Russian River Biological Opinion (NMFS, 2008) requires the Water Agency to collaborate with NMFS and CDFG and to modify Estuary management in order to reduce marine influence (high salinity and tidal inflow) and promote a higher water level in the Estuary (formation of a fresh or brackish water lagoon) from May 15 to October 15. The Estuary Management Project would involve three primary actions (described in detail below): lagoon adaptive management including monitoring and response to physical conditions, construction of a lagoon outlet channel to control water surface elevation, and artificial breaching consistent with current practices and as allowed under the Russian River Biological Opinion.

The Water Agency will continue the historical practice of artificially breaching the barrier beach outside the lagoon management period (October 16 to May 14) to minimize the potential for flooding of low-lying properties. Additionally, the techniques used to manage the outlet channel or to undertake breaching of the barrier beach during the proposed management period are identical in nature to the current practices in terms of use of heavy equipment to on the barrier beach. The frequency of equipment use may be increased during the lagoon management period in order to maintain the outlet channel. However, the increased use of equipment would not be expected to result in direct impacts to fish or aquatic habitat from construction-related breaching practices or lagoon outlet channel management. For this reason, construction related impacts to fisheries from management of the outlet channel are unlikely and are not assessed further in this section.

As described in the Setting section, above, three federally-listed salmonids are found in the Russian River watershed: Central California Coast steelhead, California Coastal Chinook salmon, and Central California Coast coho salmon. There is no established run of pink salmon in the Russian River and is not expected to be affected by the proposed project. Green sturgeon (*Acipenser medirostris*) is considered unlikely to occur in the project area based on monitoring data (SCWA, 2006) and known occurrences, and is not expected to be affected by the proposed project. Longfin smelt (*Spirinchus thaleichthys)* use of the Estuary appears to be very low based on historic monitoring data and the status of a longfin smelt population in the Russian River is uncertain. Longfin smelt are tolerant of a broad range of salinities and typically spawn January through March (outside of the proposed estuary management period). Therefore, longfin smelt are not expected to be affected by the proposed project. The special-status freshwater species listed in Table 4.5-1 (Russian River tuleperch, Clear Lake-Russian River roach, and hardhead), are typically restricted to freshwater areas in the upper Estuary that would remain fresh under lagoon conditions resulting from the proposed project and formation of a freshwater lagoon would likely benefit these species. Therefore, Russian River tuleperch, Clear Lake-Russian River roach, and hardhead are not expected to be affected by the proposed project. Adult lamprey return to freshwater habitats from the ocean during the winter and spring (outside of the proposed management period) and typically migrate upstream to spawn from April to June and spend up to a year in freshwater prior to spawning. Juvenile lamprey can rear in the freshwater portions of estuaries and lagoons acclimate to

seawater in estuaries in a process similar to the smolting phase in salmonids. Therefore, lamprey are not expected to be affected by the proposed project.

The salmonid species occurring in the Estuary Management Project area are sensitive to changes in habitat conditions, and their habitat requirements are often more limiting than for other fish species found in the watershed. For this reason, the following impact assessment focuses on these salmonid species in terms of potential impacts to fisheries resources. Potential impacts are assessed for salmonid species under **Impact 4.5.1** and **4.5.2** and are applicable to potential impacts to other freshwater and estuarine fish species resident in the Estuary. Federally managed marine species and associated Essential Fish Habitat impacts are assessed under **Impact 4.5.3**.

Impact Analysis

The following impact analysis focuses on potential impacts of the proposed Estuary Management Project related to fisheries. The evaluation considered project plans, current conditions at the project site, and applicable regulations and guidelines. Impacts are summarized and categorized as either “no impact,” “less than significant,” “less than significant with mitigation,” or “significant and unavoidable.”

Impact 4.5.1: Habitat Availability. Estuary management to promote freshwater lagoon conditions would increase the frequency, duration and volume of freshwater storage within the Estuary during the lagoon management period, thereby increasing potential habitat availability for juvenile salmonids. (Beneficial)

Table 4.5-3 summarizes the anticipated surface area and volume of storage that would be provided by average water surface elevations under existing conditions (2 feet) versus those provided by the proposed project (7 feet average, 9 feet maximum). The volume of storage within the Estuary Study Area was estimated based upon bathymetric survey data available between the mouth and Austin Creek (EDS, 2009). The volume of storage within the reach between Austin Creek and Vacation Beach was estimated using two storage curves developed for the Estuary by Behrens (2010): one extending from the Estuary mouth up to Austin Creek and one extending up to Monte Rio.[6] The volumetric difference between the two curves was extended, through linear interpolation, upstream to Vacation Beach. Under existing conditions, the average water surface elevation of 2 feet provides approximately 345 acres of surface area within the Estuary Study Area, with a corresponding storage volume of 1,750 acre-feet. Upstream of Austin Creek, an additional storage volume of 36 acre-feet is provided, for a total storage volume of 1,786 acre-feet at 2 feet.

6 Behrens (2010) developed a storage curve for the Estuary, up to Austin Creek, based upon recent bathymetric survey data. The storage curve was extended upstream to Monte Rio using unpublished notes and data related to an earlier study of the Estuary (Goodwin et al., 1993).

TABLE 4.5-3
STORAGE VOLUME PROVIDED BY PROPOSED PROJECT

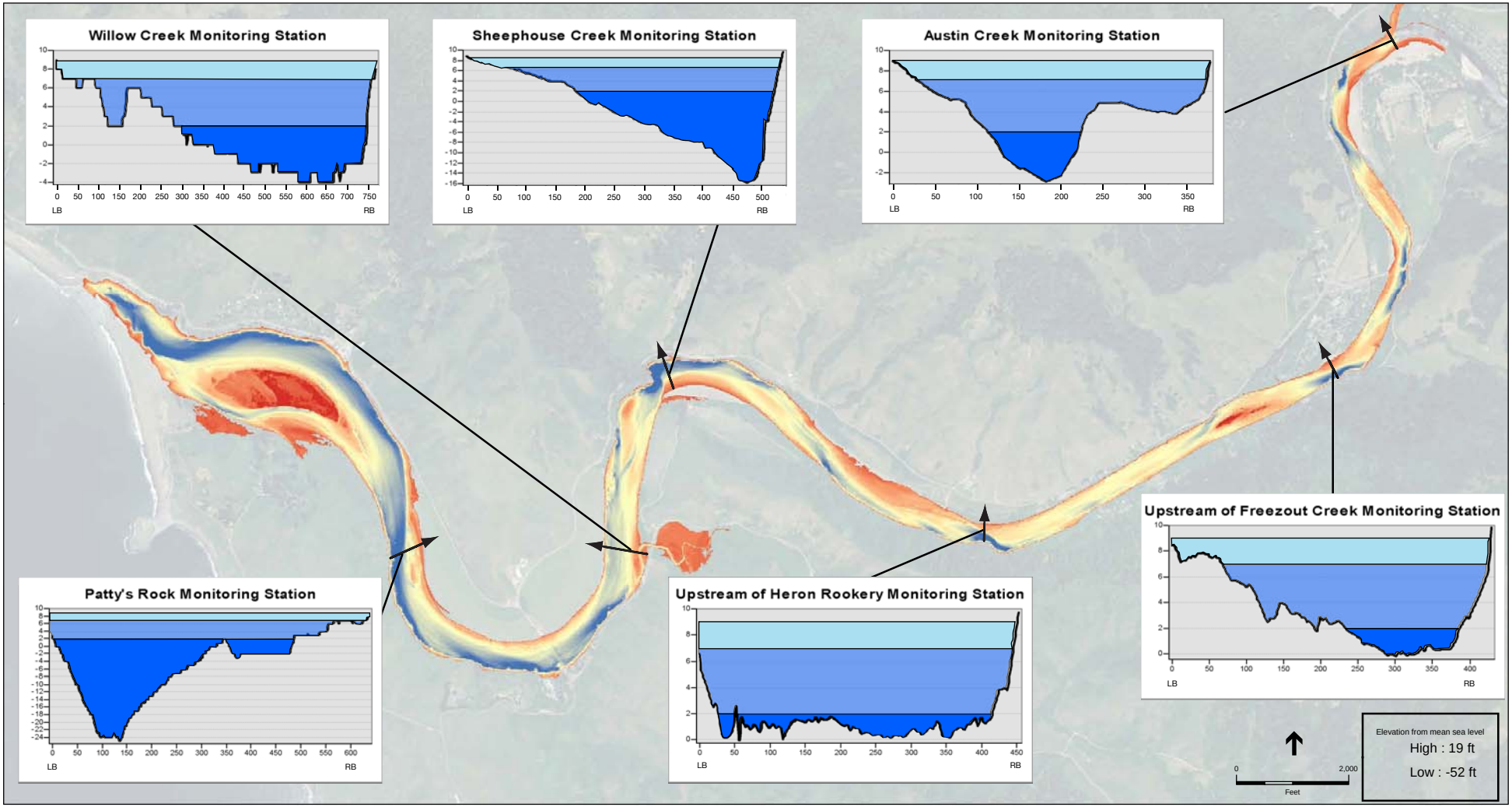
	Estuary Study Area[a]			Austin Creek to Vacation Beach[b]			Project Total	
WSE	Area (acres)	Storage Volume (AF)	Storage Increase from Existing	Area (acres)	Storage Volume (AF)	Storage Increase from Existing	Storage Volume (AF)	Storage Increase (AF)
2 feet (Existing Average)	345	1,750	--	NA	36	--	1,786	--
7 feet (Project Average)	421	3,832	2,082	NA	725	689	4,557	2,771
9 feet (Project Maximum)	524	4,838	3,088	NA	1,513	1,477	6,351	4,565

[a] Calculated based upon SCWA bathemetric mapping of Estuary Study Area, 2009.
[b] Estimated using storage curves provided by Behrens (2010).

Figure 4.5-1 presents bathymetric data for the Estuary Study Area and cross sections at typical locations within the Estuary Study Area to illustrate how increased water surface elevations associated with the proposed project would increase storage volumes within the Estuary Study Area. Under the proposed project maximum water surface elevation of 9 feet, the Estuary Study Area is estimated to provide an additional 3,088 acre-feet of storage. Upstream of Austin Creek, an additional storage volume of approximately 1,477 acre-feet is provided at the maximum water surface elevation of 9 feet. Therefore, under the proposed project, it is anticipated that up to 4,565 acre-feet of additional storage, or the difference in storage between 2 feet and 9 feet, could be provided within the project area between the river mouth and Vacation Beach.

The amount of actual habitat provided by this additional storage volume would be dependant upon several factors, including water quality (salinity, temperature and dissolved oxygen levels), food source production, and cover and habitat structure conditions. However, when compared to existing conditions, this amount of additional storage volume would substantially increase the volume of water available for freshwater habitat conditions favorable to juvenile salmonids to develop and be present during the lagoon management period.

The proposed project would either result in a full transition from tidally influenced marine habitat to productive freshwater estuarine lagoon habitat or maintain stratified conditions with increased stable freshwater habitat in the upper portion of the water column. Based on currently available research of lagoon productivity and benefits to juvenile salmonid rearing, management of the Estuary under the proposed project is expected to result in greater estuarine habitat productivity, increased juvenile steelhead growth and increased subsequent adult recruitment to the population (Bond et al., 2008; Smith, 1990; NMFS, 2008; McKeon, 1985 as cited in Entrix, 2004). Additionally, the proposed project would result in a reduction in the frequency of abrupt and prolonged changes to habitat conditions and water quality parameters that may result in stress or mortality to resident fish. No adverse impacts to the abundance and distribution of other, non-salmonid, species have been observed to date from prolonged closure of the barrier beach.



Estuary Study Area

Existing Average WSE – 2 feet
Area: 345 Acres
Volume: 1,750 AF

Proposed Project – 7 feet
Area: 421 Acres
Volume: 3,832 AF
Project Increment: 2,082 AF

Proposed Project – 9 feet
Area: 524 Acres
Volume: 4,838 AF
Project Increment: 3,088 AF

Austin Creek to Vacation Beach

Existing Average WSE – 2 feet
Area: NA
Volume: 36 AF

Proposed Project – 7 feet
Area: NA
Volume: 725 AF
Project Increment: 689 AF

Proposed Project – 9 feet
Area: NA
Volume: 1,513 AF
Project Increment: 1,477 AF

Total Estimated Volume: Mouth to Vacation Beach

Proposed Project – 7 feet
Area: NA
Volume: 4,557 AF
Project Increment: 2,771 AF

Proposed Project – 9 feet
Area: NA
Volume: 6,357 AF
Project Increment: 4,565 AF

SOURCE: EDR, 2009; SCWA, 2008; ESA, 2010

Note: Elevations show for display purposes only

Russian River Estuary Management Project . 207734.01

Figure 4.5-1

Estuary Study Area: Typical River Profiles and Estimated Volume Summary

Standardized fish surveys conducted before and during a prolonged river mouth closure, lasting 29 days (described in detail in **Section 3.4, 2009 Data Report**) from September 6 through October 5, 2009, showed that other estuarine and freshwater fish groups maintained distributions throughout the Estuary during barrier beach closure (SCWA, 2010b). However, marine fish, especially demersal fish, were restricted to near the mouth and did not quickly redistribute after reopening. Implementation of the proposed project and establishment of freshwater lagoon conditions would reduce the abundance and distribution of most marine and estuarine fish species. Please refer to **Impact 4.5.2** for additional discussion.

Impact 4.5.2: Habitat quality. Management of the Estuary could result in changes in water quality conditions (water temperature, dissolved oxygen, and salinity) becoming stressful for rearing salmonids, special status, and other native fish species inhabiting the Estuary, resulting in reduced quantity and quality of habitat. (Less than Significant)

Under the proposed project, the Estuary would be managed to create a lagoon in the summer as a restoration and enhancement action. The lagoon will be managed to remain closed for a longer period (described in **Section 3.5, Historic Estuary Conditions and NMFS' Russian River Biological Opinion**). The ecological benefits of naturally functioning lagoons have been documented extensively (e.g., Smith, 1990; Bond et al., 2008; NMFS, 2008). However, implementation of the Estuary Management may not fully transition the Estuary to freshwater conditions, resulting in stratified conditions that may reduce habitat function and productivity. Therefore, it remains unclear whether the proposed project would result in a highly productive freshwater lagoon system during the lagoon management period, or whether the less productive and potentially adverse conditions characteristic of a partially converted stratified lagoon would predominantly occur.

A partially converted lagoon could potentially impact resident fish species, especially rearing steelhead, due to a reduction of water quality and habitat function, leading to increased stress or mortality as a result of increased water temperatures, reduced dissolved oxygen levels, or reduced foraging potential due to loss of estuarine productivity. A reduction in productivity or habitat function within the Estuary could result in a further potential indirect impact related to increased competition in unaffected areas where suitable habitat persists. Additionally, stratification could result in a reduction in the total area of available suitable habitat for a range of fish species due to adverse water quality conditions in the lower water column. Also, as the smaller juvenile stages of steelhead and other freshwater species are concentrated in the shallow freshwater lens of a temporarily stratified Estuary, they are more susceptible to significant amounts of avian predation (NMFS, 2008). Failure to fully transition the lagoon to freshwater habitat could result in an increased potential for such predation. Thus, the potential impact to aquatic species and habitat from implementing the proposed project stems from uncertainty regarding the potential success of the proposed management regime to more closely emulate natural lagoon functions and the possibility that the proposed action may result in persistent adverse habitat conditions and stress to resident fish species.

Salmonid spawning habitat is not present within the Estuary Management Project area for the listed salmonids in the Russian River. The Estuary serves as migratory habitat for adult and juvenile passage from and to the ocean, as transition habitat for salmonids smolts, and has the potential to serve as important rearing habitat for juvenile salmonids, particularly steelhead. Adult salmonids typically immigrate upstream following winter storms outside the proposed management period, when the Estuary would be open due to natural or artificial breaching. Chinook salmon can begin immigrating as early as August (a few individuals), but peak migration into the Estuary is typically in November and December, after the proposed management period. Delaying entry into the Estuary for a few early individuals during the summer when water temperatures can be high (and therefore stressful) is unlikely to significantly impede Chinook salmon adult immigration into the Russian River for spawning.

With respect to outmigration of Chinook and coho smolts, SCWA monitoring data in 2009 and 2010 indicate the timing of outmigration varies year to year, but that in most years the peak of the run may be expected between mid-April and mid-May, generally before the beginning of the lagoon management period. However, in certain years, it is likely that smolts will still be outmigrating at the beginning of the lagoon management period, and Chinook smolts may outmigrate well into the lagoon management period. Under these conditions, smolts would have to swim the lagoon outlet channel to enter the ocean (or spend time in the estuary). The confines of the outlet channel may make the smolts more suspectible to predation by birds and seals. The Russian River Biological Opinion indicates that Chinook salmon migrants will be able to enter and exit the outlet channel and that most coho salmon are expected to move into the ocean prior to the summer, and are therefore not likely to be adversely affected by lagoon management. Therefore, potential impacts to either the spawning or migratory life stages for the three ESA-listed salmonids are anticipated to be less than significant.

In other estuary/lagoon systems, the repeated turnover from salt to freshwater from breaching of barrier beaches has been observed to reduce food productivity and the presence of saltwater also likely impedes the successful rearing of steelhead (NMFS, 2008).[7] Other natural lagoon systems in California studied by Smith (1990) converted to unstratified freshwater lagoons when sufficient freshwater inflow was available to displace impounded high salinity sea water. Once the lagoons studied by Smith (1990) converted, water quality was characterized by relatively low temperature with high dissolved oxygen levels, so long as adequate freshwater inflow was maintained. Smith's (1990) research in the Pescadero, San Gregorio, and Wadell estuary/lagoons showed that juvenile steelhead survival and growth is excellent when lagoons remain open to full tidal mixing or when the closed lagoons are converted to freshwater. Smith (1990) documented that lagoon productivity and steelhead growth tends to be reduced during the marine to freshwater transition period, but then resumes and increases once freshwater conversion has been completed. Growth and habitat function is poor during long, stratified transition periods between barrier beach closure and conversion of the lagoons to freshwater (Smith, 1990), such as occurs under the current management practice due to the short durations of the barrier beach typically persisting for only five to 14 days.

[7] This is a conservative assumption that assumes that the Russian River system functions similar to other studied systems.

In some years, with low freshwater inflow, natural lagoons have been documented to remain stratified throughout the summer and fall, with denser saltwater on the bottom forming high temperature, low dissolved oxygen saltwater lenses and reduced invertebrate abundance (Smith, 1990). Similarly, the Navarro River Estuary, which is more similar in size and configuration to the Russian River Estuary than the smaller estuary/lagoons studied by Smith (1990) and Bond et al. (2008), did not always fully convert to freshwater after it closed, but remained stratified in some years (NMFS, 2008). Steelhead productivity in the Navarro remained high despite prolonged stratification due to abundant food (potentially a result of the freshwater lens flooding streamside fringe habitat) and a stable surface freshwater layer (NMFS, 2008).

Additionally, freshwater conditions and enhanced steelhead rearing habitat have been documented to result from artificially managed perched lagoons, a condition where an estuary is closed to ocean tides but freshwater flows out over the sandbar, as is proposed for the Russian River Estuary. The freshwater outflow through the discharge channel can entrain a portion of the saltwater at the boundary between fresh and salt layers, steadily removing saltwater from the lagoon, as has been documented in the managed Carmel Lagoon (NMFS, 2008). The City of Capitola has managed the Soquel Creek Lagoon since approximately 1990 as a perched lagoon during the summer months to enhance fisheries habitat (Habitat Restoration Group, 1990; D.W. Alley & Associates, 2004). The primary fish species of interest in the managed lagoon is steelhead (D.W. Alley & Associates, 2004). The lagoon is managed as a perched, rather then closed, lagoon to ensure flood protection of low lying properties; thus maintaining a stable lagoon water surface elevation during the management period (Habitat Restoration Group, 1990; D.W. Alley & Associates, 2004, 2010). The managed lagoon provides valuable nursery habitat for juvenile steelhead (D.W. Alley & Associates, 2004). Juveniles grow rapidly in the productive lagoon environment there and have maintained a stable summer density since management of the lagoon for enhanced steelhead habitat began in the 1990s (D.W. Alley & Associates, 2004, 2010). Water temperature and oxygen levels have been maintained within the physiological tolerance of steelhead (D.W. Alley & Associates, 2004, 2010). Annual water quality monitoring of the Soquel Creek Lagoon in the deepest sections (7-8 feet depth) has demonstrated that typically no lagoon stratification or thermocline[8] occurs (D.W. Alley & Associates, 2010). The Soquel Creek Lagoon is subject to daily inland breezes that circulate the water, surface to bottom, resulting in complete, diurnal (daily) mixing of the water column in the lower and middle estuary, except in deeper pockets where a temporary, dense anoxic saline layer can develop (D.W. Alley & Associates, 2010). Although the lagoon is generally shallow (two to eight feet deep) and temperatures become elevated in summer (>21 °C), the abundance of food and lagoon productivity allows juvenile steelhead to grow rapidly and in relatively high numbers compared to steelhead production in the mainstem Soquel Creek. In most years, the lagoon produces a significant proportion (10–35%) of the smolt sized juveniles in the Soquel Creek system (D.W. Alley & Associates, 2004, 2010).

Therefore, when compared to other managed and natural lagoon systems, it is likely that the current practice of breaching the Russian River Estuary for flood control reduces the value of the Estuary for salmonid rearing in summer months (Smith, 1990; Bond et al., 2008; NMFS, 2008). Breaching causes repeated abrupt changes in habitat conditions (depth of freshwater, salinity, temperature, and

[8] Zone of rapid temperature change between warm surface waters (epilimnion) and cooler deep waters (hypolimnion)

DO) in the Estuary that reduce habitat function and likely results in stress and/or mortality to various resident fish species as well as reducing the beneficial effects of lagoon formation for salmonids (Smith, 1990; Bond et al., 2008). Current practices during the lagoon management period do not allow for a full transition to a freshwater lagoon due to frequency of breaching and the short durations of the barrier beach persisting (typically five to 14 days) due to the need to artificially breach the barrier beach.

While salmonids are highly mobile and can move away from unsuitable areas following breaching of the barrier beach, most of their foodbase is not as mobile and may experience population fluctuations during repeated breachings. The reduction of this foodbase may thereby reduce the suitability of the Estuary for juvenile salmonids and other resident freshwater and estuarine species under the current breaching regime (Entrix, 2004; NMFS, 2008). Therefore, under the current breaching regime, lagoon habitat function and productivity is reduced because the Estuary does not remain closed for a long enough period to fully transition to a freshwater lagoon during the summer season in most years. This degradation of habitat likely contributes to reduced survival of juvenile salmonids that emigrate to the Estuary (Bond et al., 2008; Smith, 1990) as well as reduced adult recruitment of returning steelhead (Bond et al., 2008). The Russian River Biological Opinion concluded that the combination of high inflows into the Estuary and current breaching practices likely impact rearing habitat by interfering with natural processes that would otherwise potentially allow a freshwater lagoon to form behind the barrier beach for a longer duration.

The proposed project includes an adaptive management element designed to reduce the likelihood of additional impacts to fish species through a range of monitoring, assessment, agency consultation, and management actions. The adaptive management plan developed for the proposed project requires monitoring of biological productivity, water quality, and physical processes in the Estuary in response to changes in water surface elevations in the estuary-lagoon system; and refinement of management actions to achieve desired water levels to support biological productivity, while simultaneously providing flood control for properties adjacent to the Estuary. The adaptive management of future conditions in the Estuary will be closely coordinated with NMFS and CDFG staff. Therefore, unexpected impacts potentially resulting from the proposed management of the Estuary relating to habitat critical water quality conditions becoming stressful for rearing listed juvenile salmonids, special status, and other native fish species inhabiting the Estuary are considered less than significant.

Impact Significance: Less than Significant.

Impact 4.5.3: Essential Fish Habitat. Management of the Russian River Estuary could affect essential fish habitat (EFH) for various federally managed marine species within the Pacific Salmon FMP, the Coastal Pelagics FMP, and the Pacific Groundfish FMP. (Less than Significant)

The proposed project occurs within EFH for various federally-managed marine fish species within the Pacific Salmon FMP, the Coastal Pelagics FMP, and the Pacific Groundfish FMP. Table 4.5-2 lists the FMP-managed species with designated EFH in the Russian River Estuary. The Russian

River basin contains habitat necessary to Pacific salmon for spawning, breeding, and rearing. The Pacific Salmon FMP includes Coho and Chinook salmon species and the potential project-related impacts to these salmon species are discussed under **Impact 4.5.1** and **4.5.2**, above. Marine species managed under the Coastal Pelagics FMP with designated EFH in the Russian River Estuary include northern anchovy, Pacific sardine, and jack mackerel. Marine species managed under the Pacific Groundfish FMP with designated EFH in the Russian River Estuary include starry flounder, Pacific sanddab, cabezon, lingcod, kelp greenling, rockfish, and bocaccio. Potential impacts to these marine species from the proposed project are assessed here.

Many marine species utilize estuaries, primarily for juvenile rearing, though some species may use estuaries for spawning as well (NMFS, 2008). As defined in the Pacific Groundfish FMP, the Russian River watershed contains Estuary habitat – a habitat designated as a HAPC. Estuaries are important elements of Pacific Groundfish EFH, as estuaries provide prey items, foraging areas, habitat complexity, nursery areas, and refugia. Estuaries provide the same vital elements for species managed under the Coastal Pelagic FMP, as well as many other fish species and macroinvertebrates, such as Dungeness crab.

Under current practices, artificial breaching of the barrier beach at the mouth of the Russian River is required to minimize potential flooding of low-lying properties adjacent to the Estuary. The barrier beach typically persists for approximately five to 14 days. Water quality surveys monitoring showed that the Estuary remains stratified following formation of the barrier beach, and conversion to a freshwater lagoon has not yet been observed; possibly due to the barrier beach persisting only for short durations. Typically, when a closed estuary stratifies, and especially during the conversion period to a freshwater lagoon, lower portions of the water column (highly saline water) are not mixed and develop very low dissolved oxygen conditions which can create temporary adverse habitat conditions for most fish species.

The current management regime causes the Estuary to open, through artificial breaching, with a frequency and duration that is inconsistent with other natural lagoons in California (discussed in detail under **Impact 4.5.1**, above). Following breaching events, the abundance and diversity of marine and estuarine fish increases in the project area as marine fish move into the open estuary. Following re-creation of the barrier beach the abundance and diversity of marine and estuarine fish decreases over time (SCWA, 2006) due to rapidly changing habitat conditions (salinity, temperature, dissolved oxygen). Additionally, when the barrier beach forms, marine fish become less dispersed in the Estuary and are concentrated near the river mouth where the highest salinities occur (SCWA, 2010b).

The abundance of most marine species in the Estuary is low as these species are dependent on marine conditions (i.e., cabezone, ling cod, rockfish). Also, pelagic fish (northern anchovy, pacific sardine, and jack mackerel) are rarely caught in the Estuary (SCWA, 2010a). However, Dungeness crab and starry flounder prefer brackish to freshwater. These two species use the Estuary for rearing and can be very abundant during summer. The proposed project would manage the Estuary so that the naturally formed barrier beach persists for a longer duration during the lagoon management period to either enable a full transition from tidally influenced

marine habitat to productive freshwater estuarine lagoon habitat, or maintained stratified conditions with increased stable freshwater habitat in the upper portion of the water column. Managing the Estuary as proposed, to allow formation of a freshwater lagoon that persists through the lagoon management period, would reduce the number of times (between May and October) that species managed under the Coastal Pelagics, Pacific Groundfish FMPs, and other marine species have opportunity to access the Estuary and utilize suitable habitat that is present under tidally-influenced conditions. Additionally, prolonged closure and conversion to freshwater lagoon conditions may locally affect the distribution of marine species within the Estuary during the management period. However, from a population and habitat area standpoint, the numbers of marine fishes in the relatively small Estuary are minima compared to the inshore coastal waters and the San Francisco Bay. Therefore, these localized effects from the Estuary Management Plan to fish managed under the Coastal Pelagic, and Pacific Groundfish FMPs, as well as other marine fish species and macroinvertebrates that use portions of the Estuary are unlikely to represent a substantial adverse affect and impacts are considered less than significant.

As part of the proposed project, the Water Agency has developed, in consultation with NMFS, an adaptive management plan to better understand the potential impacts associated with the proposed project. The adaptive management plan incorporates monitoring and adaptive management to better understand, minimize, or otherwise mitigate (within the context of the overall goals) any adverse effects Estuary management may have regarding estuary water surface elevation, water transport through the barrier beach, estuarine water quality, and habitat quantity and quality.

Impact Significance: Less than Significant.

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4.6 Land Use and Agriculture

4.6.1 Introduction

This section evaluates whether implementation of the Russian River Estuary Management Project (Estuary Management Project) would result in potential adverse impacts related to local land use and agriculture. The Setting section describes existing land uses, areas under agricultural production, and property ownership conditions. The Regulatory Framework describes pertinent state and local laws related to land use and agriculture near the proposed project. The Impacts and Mitigation Measures section defines significance criteria used for the impact assessment and presents a discussion of potential project-related impacts. The evaluation and analysis are based, in part, on review of various maps, aerial imagery, and reports. The primary sources include available resources from the *Sonoma County General Plan 2020* (2008), California Department of Conservation, and California State Parks, as well as some preliminary summaries compiled by the Sonoma County Water Agency (Water Agency).

The Estuary Management Project was evaluated for long term effects on land use and agriculture. The land use section draws upon the analyses in **Sections 4.9, Noise**; **4.10, Air Quality**; and **4.11, Transportation and Traffic**, in which the direct impacts on those resource areas are analyzed, to determine overall land use impacts. The agriculture section analyzes existing agriculture lands in respect to the project site to determine overall impacts.

4.6.2 Setting

The proposed project site is located in the lower portion of the Russian River watershed in unincorporated Sonoma County. The Russian River watershed is in the coastal ranges of Sonoma, Mendocino, and Lake counties and encompasses 1,485 square miles of drainage area. Major communities within the watershed include Ukiah, Hopland, Cloverdale, Potter Valley, Healdsburg, Windsor, Forestville, Sebastopol, Santa Rosa, Rohnert Park, Cotati, and the lower Russian River area. The lower Russian River area stretches from the mouth of the Russian River to Mirabel Park and includes the communities of Jenner, Duncans Mills, Monte Rio, Guerneville, and Rio Nido (USACE, 1982).

The Russian River watershed within Sonoma County is primarily agricultural land with focus on vineyards and orchard crops. Hay and grain production, in addition to sheep and cattle ranching, are also present in the areas surrounding the Russian River Valley. Until the recent economic downturn, there was a growing trend towards more housing, commercial development and light industry in the areas surrounding Santa Rosa. Industrial activities in the watershed include light manufacturing operations, and gravel mining, as well as agricultural production and processing of timber, wine, and other agricultural products (Sonoma County, 2008).

Existing Land Uses

The Land Use Element of the Sonoma County General Plan (2008) governs land uses in the unincorporated area surrounding the project site, which lies within the Sonoma Coast/Gualala

Basin Planning Area, and encompasses 40 miles of the Pacific Coast, including several coastal communities and small inland towns. Land use designations are shown in **Figure 4.6-1**. Residential land use is sparse outside of the small established towns and communities due to its remoteness and inaccessibility. The area's economy is focused towards tourism and recreation, in addition to commercial fishing, sheep ranching, and timber production. Land use designations in the project vicinity are described as follows:

1. *Diverse Agriculture* is established to enhance and protect those land areas where soil, climate, and water conditions support farming but where small acreage intensive farming and part time farming activities are predominant. In these areas, farming may not be the principal occupation of the farmer. The primary purpose of this category is to protect a full range of agricultural uses and to limit further residential intrusion.

2. *Land Extensive Agriculture* is established to enhance and protect lands capable of and generally used for animal husbandry and the production of food, fiber, and plant materials. Soil and climate conditions typically result in relatively low production per acre of land. The objective in land extensive agricultural areas shall be to establish and maintain densities and parcel sizes that are conducive to continued agricultural production.

3. *Resources and Rural Development* allows very low density residential development and intents to not extensively provide public services and facilities. The categories main purpose is to protect timberlands, lands for aggregate resource production, and natural resource lands including watershed, fish, and wildlife habitat.

4. *Rural Residential* provides for very low density residential development on lands that have few if any urban services but have access to County maintained roads. The primary use shall be detached single family homes. Densities range from one to twenty acres per dwelling.

5. *Recreation/Visitor Serving Commercial* allows for visitor serving use such as restaurants, lodging, developed campgrounds, resorts, marinas, golf courses, and similar types of uses.

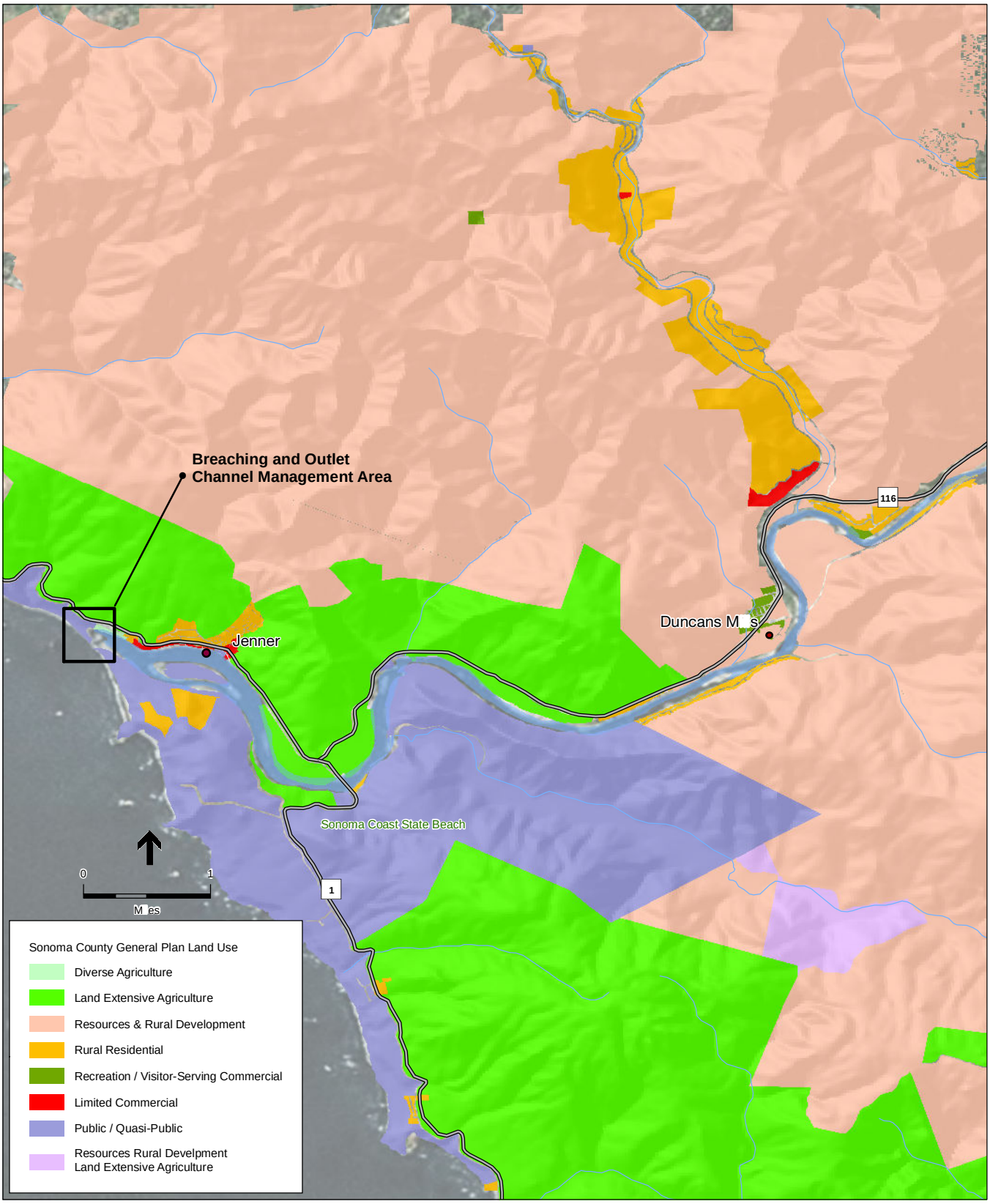
6. *Public/Quasi-Public* provides sites that serve the community or public need and are owned or operated by government agencies, non profit entities, or public utilities. Uses include schools, places of religious worship, parks, libraries, governmental administration centers, fire stations, cemeteries, airports, hospitals, sewage treatment plants, waste disposal sites, etc.

7. *Limited Commercial* allows a smaller range of commercial uses and may be applied to areas either outside or inside Urban Service Areas. In rural community areas, this category may limit commercial uses to retail and service uses that are local serving. This category also provides opportunities for mixed residential and commercial uses where the residential use is compatible with the commercial use.

Agricultural Resources

The existing agricultural environment is classified by:

1. The California Farmland Mapping and Monitoring Program (FMMP), and
2. Williamson Act Contracts.



SOURCE: SCWA, 2010; Sonoma County, 2006

Russian River Estuary Management Project. 207734.01

Figure 4.6-1

General Plan Land Use Designations

Farmland Mapping

The California Department of Conservation, under the Division of Land Resource Protection, has established the Farmland Mapping and Monitoring Program (FMMP). The FMMP identifies the state's priority farmlands and monitors the conversion of farmland to and from agricultural use. The California Department of Conservation, Office of Land Conservation, creates maps of important farmland throughout California and updates those maps every two years. Important farmlands are divided into the following five categories based on their suitability for agriculture:

1. *Prime Farmland* has the best combination of physical and chemical characteristics for crop production. It has the soil quality, growing season and moisture supply needed to produce sustained high yields of crops when appropriately treated and managed.
2. *Farmland of Statewide Importance* is land other than Prime Farmland that has a good combination of physical and chemical characteristics for crop production.
3. *Unique Farmland* does not meet the criteria for Prime Farmland or Farmland of Statewide importance which has been used for the production of specific high economic value crops.
4. *Farmland of Local Importance* is either currently producing crops, or has the capability of production, and does not meet the criteria of the categories above.
5. *Grazing Land* is land in which the existing vegetation is suited to the grazing of livestock.

Three categories of farmland are considered valuable and any conversion of land within these categories is typically considered to be an adverse impact: (1) Prime Farmland, (2) Farmland of Statewide Importance, and (3) Unique Farmland.

Williamson Act

The California Land Conservation Act of 1965, also known as the Williamson Act, is designed to preserve agricultural and open space lands by discouraging their premature and unnecessary conversion to urban uses. The Act creates an arrangement whereby private landowners contract with counties and cities to voluntarily restrict their land to agricultural and compatible open-space uses. In return, Williamson Act contracts offer tax incentives by ensuring that land will be assessed for its agricultural productivity rather than its highest and best uses. Contracts run for a period of ten years, however, some jurisdictions exercise the option of making the term longer, up to twenty years. Contracts are automatically renewed unless the landowner files for non-renewal or petitions for cancellation. As of 2007, Sonoma County contained a total of 273,258 acres of prime and non-prime agricultural land held under Williamson Act Contracts (California Department of Conservation, 2008). Williamson Act Contract enrolled lands meet one the following descriptions:

1. *Prime Agricultural Land* is enrolled under California Land Conservation Act contract and meets any of the following criteria: (1) Land which qualifies for rating as class I or class II in the Natural Resources Conservation Service land use capability classifications; (2) Land which qualifies for rating 80 to 100 in the Storie Index Rating; (3) Land which supports livestock used for the production of food and fiber; (4) Land planted with fruit or nut-bearing trees, vines, bushes or crops and has an annual gross value of not less than two hundred dollars per acre, or (5) Land which has returned from the production of unprocessed agricultural plant production and has an annual gross value of not less than two hundred dollars per acre.

2. *Non-Prime Agricultural Land* is enrolled under California Land Conservation Act contract and does not meet any of the criteria for classification as Prime Agricultural Land. Non-Prime Land is defined as Open Space Land of Statewide Significance. Most lands have agricultural uses such as grazing or non-irrigated crops.

Portions of the proposed project are adjacent to areas that are currently enrolled under Williamson Act contract. Approximately one and one half miles of Williamson Act Prime Agricultural Land is located on the north side of the Russian River Estuary (Estuary), south of the Highway 1 and State Route 116 intersection, as shown in **Figure 4.6-2**. The Estuary is also adjacent to approximately three miles of Williamson Act Non-Prime Agricultural Land east of the community of Jenner (Department of Conservation, 2008).

Local Land Use Adjacent to the Estuary

The Russian River Estuary extends from the Pacific Ocean upstream approximately seven miles, between the community of Duncans Mills and Austin Creek.[1] The mouth of the Estuary and the Russian River is located at Goat Rock State Beach, which is part of Sonoma Coast State Beach. Owned by the California State Parks, Sonoma Coast State Beach encompasses 17 miles of beaches, separated by rock bluffs and headlands. The land use designation for Goat Rock State Beach is public/quasi-public land use which was recently expanded when the California Department of Parks and Recreation acquired the 3,373 acre Willow Creek area. The land includes a network of old logging and ranch roads previously used for timber production, and has a public/quasi-public land use designation. The communities of Duncans Mills and Jenner are closest to the Russian River Estuary Management Project area. Land use designations in Jenner, as shown in Figure 4.6-1, include agriculture (diverse, land extensive), resources and rural development, rural residential, public/quasi-public, and limited commercial. Land use designations in the town of Duncans Mills include resources and rural development, rural residential, public/quasi-public, and recreation/visitor-serving commercial. Land adjacent to the Estuary is designated primarily for resources and rural development, land extensive agriculture, and public/quasi-public land uses with smaller areas designated for rural residential and limited commercial uses. Resources and rural development land along the Estuary includes mainly grazing land and timberland.

There are a number of rural residential land use designations, along the Estuary that are used as either permanent residences or vacation homes. These properties may consist of a boat dock or beach closest to the Estuary, followed by houses, sheds, and garages placed further away from the Estuary, usually above 12 foot elevation. Various types of infrastructure are also located near the Estuary, typically at the 14 foot and higher elevations, including wells, septic, roads, bridges, and telephone poles. When the Estuary mouth is closed by a naturally-forming barrier beach, water begins to fill the Estuary and some lower elevations of properties along the Estuary may become

[1] As previously noted in **Chapter 2.0**, **Project Description**, under certain closed conditions, the Estuary may backwater to Monte Rio, and as far upstream as Vacation Beach. Although this condition may periodically occur, potential impacts related to land use are generally thought to be limited to the seven mile area downstream of Austin Creek, which is typically defined as the Russian River Estuary. Where appropriate, discussion of land use impacts within the Estuary Study Area and the larger Project Area, which includes the Russian River reach between Austin Creek and Vacation Beach, is provided (Please refer to **Figure 2-3** in **Section 2.0, Project Description)**.

inundated before the river naturally breaches the barrier beach (SCWA, 2010). There are approximately 96 properties along the Estuary that experience different degrees of inundation during periods of Estuary closure, depending on water surface level (SCWA, 2010).

Locally Important Farmlands

Portions of the proposed project area adjacent to areas that are currently in agricultural use, some of which are protected by the Williamson Act. The Estuary is adjacent approximately 3,200 acres of grazing land and approximately 120 acres of Farmland of Local Importance, as shown in **Figure 4.6-2** (Department of Conservation, 2006). According to the FMMP, the project area is not adjacent to Prime Farmland, Farmland of Statewide Importance, or Unique Farmland.

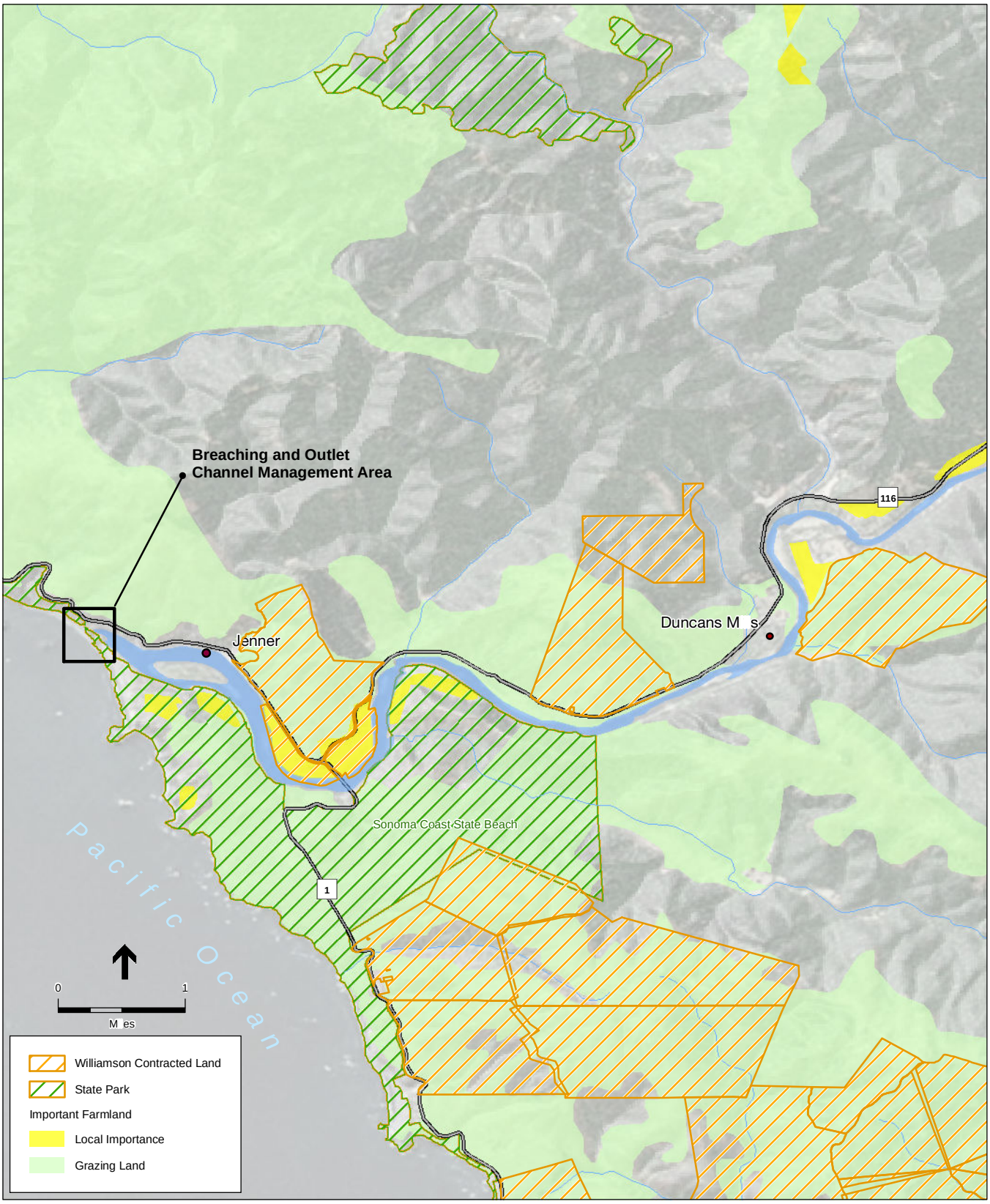
Goat Rock State Beach is adjacent to "other land" use. The FMMP's Sonoma County Important Farmland 2006 map describes other land as "land not included in any other category including low density rural developments, brush, timber, wetland, and riparian areas not suitable for grazing, confined livestock, poultry, or aquaculture facilities, strip mines, borrow pits, and water bodies smaller than 40 acres."

Conservation and Recreation Lands

The Sonoma County Agriculture Preservation and Open Space District (SCAPOSD) acquired land, including the Willow Creek and Freezeout Creek watersheds, for the Sonoma Coast State Park. These areas are also designated as other land use, as the land was previously used for timber production and is now forestland which is open to the public for recreational opportunities. On the north side of the Russian River are the newly conserved Jenner Headlands. The 5,600-acre ranch was recently protected by the Sonoma Land Trust and is managed by the Wildlands Conservancy. The purchase was facilitated by numerous grants from both public and private organizations (Sonoma Land Trust, 2009).

California State Sovereign Lands

The California State Lands Commission (CSLC) was established by the California legislature in 1938, and was given the authority and responsibility to manage and protect the important natural and cultural resources on certain public lands within the state and the public's rights to access these lands. The public lands under the Commission's jurisdiction are of two distinct types—sovereign and school lands. Sovereign lands encompass approximately 4 million acres statewide. These lands include the beds of California's naturally navigable rivers, lakes and streams, as well as the state's tide and submerged lands along the state's more than 1,100 miles of coastline, extending from the shoreline out to three miles offshore. The CSLC's jurisdiction extends to more than 120 rivers and sloughs, 40 lakes and the state's coastal waters. Public and private entities may apply to the CSLC for leases or permits on state lands for many purposes including marinas, industrial wharves, dredging, sand mining, tanker anchorages, grazing, right-of-ways, bank protection, and recreational uses. The Sonoma County Water Agency possesses a land lease permit issued by the CSLC, in accordance with Article 2 of the Leasing and Permits Regulations, to conduct artificial breaching within CSLC jurisdiction (CSLC, 2007).



SOURCE: SCWA, 2010; FMMP, 2006; DOC, 2006

Russian River Estuary Management Project. 207734.01

Figure 4.6-2

Important Farmland and
Williamson Act Contracted Land

4.6.3 Regulatory Framework

This section discusses the state and local regulatory framework for managing land use, agricultural resources, and recreational resources within the project area. This section introduces the applicable plans, including General Plans, Local Coastal Plans, and Area Plans, as well as other policies and regulatory constraints that apply to the Estuary Management Project. The goals, policies, and programs were considered in this analysis to define sensitive land uses, prime agricultural resources, determine project consistency with policies, and evaluate significant impacts in the following section.

State

California Coastal Act

The California Coastal Act was enacted by the State Legislature in 1976 to provide long-term protection of the state's 1,100-mile coastline for the benefit of current and future generations. The Coastal Act created a unique partnership between the State (acting through the California Coastal Commission [CCC]) and local government entities (15 coastal counties and 58 cities) to manage the conservation and development of coastal resources through a comprehensive planning and regulatory program. Coastal Act policies, the heart of the coastal protection program, are the standards used by the CCC in its coastal development permit decisions and review of LCPs prepared by local governments and submitted to the Commission for approval.

Priority Uses

The Coastal Act recognizes that there is a limited amount of coastal land in the State and prioritizes coastal-dependent development of coastal areas. These types of priority uses and development include:

1. Lower-cost visitor and recreation facilities (Section 30213),
2. Visitor-serving commercial recreational facilities designed to enhance public opportunities for coastal recreation (Section 30222),
3. Aquaculture facilities (Section 30222.5),
4. Upland areas for coastal recreation (Section 30223),
5. Recreational boating and associated facilities (Section 30224),
6. Commercial fishing and recreational boating facilities (Section 30234),
7. Prime agricultural land (Section 30241), and
8. Coastal-dependent development (Section 30255).

Additionally, Section 30231 encourages the protection of, and continued biological productivity of marine resources and environmentally sensitive habitat areas including the biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms.

Public Access

A primary focus of the Coastal Act is to provide public access to the coast. The Act includes several policies related to public access and recreation, most of which provide strong support for the public's ability to use and enjoy coastal areas. The primary public access policies are:

1. Access, recreational opportunities, and posting (Section 30210),
2. Development not to interfere with access (Section 30211),
3. Requirements for new development projects (Section 30212),
4. Distribution of public facilities (Section 30212.5),
5. Lower-cost visitor and recreation facilities (Section 30213),
6. Implementation of public access policies (Section 30214),

Additionally, Section 30220 states that "Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses." This relates to activities such as surfing and is related to the proposed project. The potential inconsistency with policies regarding recreational opportunities is discussed further in **Section 4.7, Recreation**.

Marine Life Protection Act

The Marine Life Protection Act (MLPA) was enacted in 1999 and is part of the California Fish and Game Code. The MLPA requires California to reevaluate all existing marine protected areas (MPAs) and potentially design new MPAs that together function as a statewide network. MPAs are developed on a regional basis and are evaluated over time to assess their effectiveness. There are four different types of MPAs including: state marine reserve, state marine park, state marine recreation area (Russian River Estuary mouth to Highway 1 bridge), and state marine conservation area. Each designation provides authority for different levels of restriction on human uses and includes various objectives, as listed in **Section 4.4, Biological Resources**.

Sonoma Coast State Park Final General Plan & Environmental Impact Report

The Sonoma Coast State Park Final General Plan & Environmental Impact Report was certified in May 2007. Every State Park in California must develop a general plan prior to approval of major developments. The general plan provides guidelines for future land use management and designation, including land acquisition and the facilities required to accommodate expected increases in visitation. The general plan also provides a comprehensive framework that guides the Park's developments, ongoing management, and public use for the next 20 years or more. The protection and restoration of natural and cultural resources are key components of the Plan. The Plan also includes goals and guidelines aimed at biological resources and water quality protection, the preservation of scenic and cultural resources, recreation and interpretive opportunities, and facility improvements and potential construction of new developments in response to heavy and growing visitation, environmental constraints, and recent and expected near-term property acquisitions. Sonoma Coast State Park provides opportunities for a wide variety of recreational activities, including camping, hiking, mountain biking, horseback riding,

picnicking, beachcombing, wildlife viewing, and many other activities associated with the beach, riparian and upland habitats.

Local

Local Coastal Programs

Pursuant to the State Coastal Act (Public Resources Code section 30000 et seq.), each local government within the state coastal zone must prepare a Local Coastal Program (LCP) for the portion of the coastal zone within its jurisdiction. The LCP must be certified by the California Coastal Commission. The LCP includes a land use plan and implementing ordinances and actions. The land use plan that is part of the LCP indicates the kinds, location, and intensity of land uses and applicable resource protection and development policies in the coastal zone.

Sonoma County developed a LCP, consistent with the Sonoma County General Plan that was certified by the CCC on December 12, 2001. The LCP covers an area which is 55 miles in length and extends inland generally 1000 yards from the mean tide line. In significant coastal estuarine habitat and recreational areas it extends inland to the first major ridgeline paralleling the sea or five miles from the mean high boundary is generally 3000 to 12,000 feet inland from shoreline, except around Duncans Mills, Willow Creek and Valley Ford, where it extends up to five miles inland.

The LCP consists of six chapters: Historic Resources, Environment, Resources, Recreation, Harbor, and Development. All of the chapters and sections within chapters must be considered together and not as separate, distinct units. Land Use is included as a subsection in the Development Chapter and identifies rural community and urban service boundaries for existing communities and urban subdivisions.

The Land Use section formulates development policies that, together with the Land Use Plan maps, indicate the type, location, and intensity of land uses permitted in the Coastal Zone. Development policies take into account resource and environmental protection issues development constraints, and recreation, access, and housing needs. Lands outside the urban service boundaries are not considered appropriate for urban development. Land inside urban service boundaries is appropriate for urban development consistent with Coastal Act policies. Land inside rural community boundaries is appropriate for development requiring public water but not public sewer, consistent with Coastal Plan policies.

Sonoma County

Local policies established in the *Sonoma County General Plan 2020* that govern geologic resources in the project area are summarized in Section 4.6 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**. The Water Agency has relied on agencies with jurisdiction, including the Sonoma County Permit and Resource Management Department (PRMD), to make consistency determinations of projects with applicable policies. Historically, PRMD has determined artificially breaching activities to be consistent with General Plan and Local Coastal Program policies.

4.6.4 Environmental Impacts and Mitigation Measures

This analysis considers the effect of the proposed project on existing land use planning and agriculture based on review of the *Sonoma County General Plan 2020*, farmland classifications established under the FMMP and proximity to lands enrolled under Williamson Act contracts.

Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, an impact is considered significant if it would:

Land Use

1. Physically divide or disrupt an established community;
2. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, including, but not limited to the general plan, specific plan, local coastal plan, or zoning ordinance adopted for the purpose of avoiding of mitigating an environmental effect;
3. Conflict with any applicable habitat conservation plan or natural community conservation plan.

Agriculture

1. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use;
2. Conflict with existing zoning for agricultural use or a Williamson Act Contract;
3. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g));
4. Result in the loss of forest land or conversion of forest land to non-forest use;
5. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of designated farmland to non-agricultural use or conversion of forest land to non-forest use.
6. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland(as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g)).

Several of the criteria included in Appendix G of the CEQA Guidelines do not apply to this analysis and are not used, as explained below.

Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use. The proposed project would not be located on land used for agricultural activities. The proposed project would

continue current barrier beach breaching practices in addition to maintaining an Estuary management plan, which would not involve changes that would result in the conversion of farmland to non-agricultural use. Therefore, this significance criterion is not applicable to the proposed project.

Approach to Analysis

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment, and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

Land Use

This analysis evaluates short-term impacts on existing land uses resulting from project implementation as well as long-term impacts resulting from the Estuary Management Project activities. Impacts specific to agricultural are discussed separately below.

Generally, creation and implementation of the Estuary Management Project components would occur within the Russian River Estuary and Goat Rock State Beach. Information regarding the proposed facility siting and construction information is described in **Chapter 2.0, Project Description**. Potential physical environmental effects on surrounding land uses resulting from implementation of the Estuary Management Project are also addressed in their respective sections, including **Sections 4.9, Noise; 4.10, Air Quality; 4.11, Transportation and Traffic;** and **Section 4.14, Aesthetic Resources**.

Local planning documents and maps, like those described above in **Section 4.6.3, Regulatory Framework**, were reviewed to characterize existing land uses and agricultural land uses proximate to the phased project components. The evaluation of plan consistency is based on the applicability of relevant land use plans and policies to the implementation of the proposed project. The board or commission that enacted the plan or policy generally determines the meaning of such policies and these interpretations prevail if they are “reasonable”, even though other reasonable interpretations are also possible.

Agricultural Resources

For the purposes of this analysis, each project element was considered in relation to farmland (identified on the FMMP Map) in the immediate site vicinity to identify any potential disruption that might be caused temporarily (during channel creation) or permanently. In addition, each project component was examined for its potential to affect land under a Williamson Act contract.

Impact Analysis

Impacts associated with land use and agriculture are summarized and categorized as either "no impact," "less than significant," "less than significant with mitigation," or "significant and unavoidable."

Impact 4.6.1: Divide an Existing Community. The proposed project would physically divide or temporarily disrupt an established community. (Less than Significant)

The Estuary Management Project would require continued artificial breaching of the barrier beach at the mouth of the Russian River, in addition to creation, and maintenance of an outlet channel during the lagoon management period. The Estuary Management Project's activities would not permanently divide an established community because all actions occur at one location away from most visitor serving facilities at Goat Rock State Beach and away from the community of Jenner. During creation of the outlet channel, excavation would generate similar noise, dust, and utilize the similar construction equipment as is currently used. These activities could temporarily affect adjacent land uses such as recreation depending on the time of day, the season, the weather and Park visitor attendance. As noted in **Chapter 2.0, Project Description**, the frequency of equipment operation to maintain the outlet channel during the lagoon management period may be incrementally increased compared to existing conditions, and could include up to 18 maintenance activities, depending upon the performance of the outlet channel. These activities could temporarily affect adjacent land uses such as recreation and represents a potential increase over existing artificial breaching activities; however, they would not divide surrounding land uses or established communities. Please refer to **Section 4.2, Hydrology and Flooding**, for a discussion of potential impacts to private property surrounding the Estuary.

As stated in **Section 4.11, Transportation and Traffic**, the Estuary Management Project would continue to use heavy equipment, such as a bulldozer or excavator to move sand to create the proposed outlet channel, as well as the use of four to five additional vehicles as are currently used to breach the beach. The same safety protocols would also continue to be used at the excavation site. Safety protocols listed in **Section 4.13, Public Services and Utilities and Public Safety** include: restricted beach access with barricade tape and signage; assigning an onsite contact for emergency response and/or rescue procedures and to perform site control during heavy equipment operation; and posting of warning signs prior to the breaching event 750 feet on each side of the proposed channel location. Hence, there would not be a significant increase in traffic or traffic safety hazards on Goat Rock State Beach near the project site. Access to Goat Rock State Beach and north parking lot would be maintained during construction and all equipment and materials would be removed at the end of daily construction activities.

As described in **Section 4.9, Noise**, construction activities associated with creation of the outlet channel would be short-term and distant relative to surrounding land uses, consistent with existing conditions. Maintenance activities, though distracting, on the beach would not be significantly different from what they are now, nor would noise affect the adjacent land uses. As noted in **Chapter 2.0, Project Description**, the frequency of equipment operation on the barrier during the lagoon management period may be incrementally increased compared to existing conditions,

and could include up to 18 maintenance activities over the course of the lagoon management period, depending upon the performance of the outlet channel. This represents a potential increase over existing artificial breaching activities.

As described in **Section 4.10, Air Quality**, construction activities could generate fugitive dust during ground disturbance activities (though not likely in wet beach sand) and greenhouse gas emissions from vehicle use and impacts would be similar to existing conditions and would not exceed threshold standards. Therefore, air quality impacts would be less than significant impact on the adjacent land uses.

In consideration of the beach environment, the amount and frequency of mechanical intervention would be minimized, thereby reducing disturbances to seals and other wildlife, as well as State Park's visitors on the beach. Therefore, although the construction activities may be inconvenient to adjacent land uses, they would be similar to current activities, would be temporary and would not significantly disrupt established land uses surrounding the project site.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.6.2: Conflict with Applicable Plans and Policies. The proposed project may conflict with applicable state and/or local land use plan, policy, or regulation of an agency with jurisdiction over the project, including, but not limited to the general plan, specific plan, local coastal plan, or zoning ordinance adopted for the purpose of avoiding of mitigating an environmental effect. (Less than Significant)

The Estuary Management Project would require continued artificial breaching of the barrier beach at the mouth of the Russian River, in addition to installation, monitoring, and minor maintenance of lagoon outlet channel. The project area is primarily designated for agricultural land use but also has designations for rural residential, public/quasi-public, limited commercial uses in unincorporated Sonoma County. The proposed outlet channel is located in public/quasi-public land use, which is defined as land that serves the community or public need and are owned or operated by government agencies, non profit entities, or public utilities. The project would not extend the existing footprint of current maintenance practices at the mouth of the Russian River and it would be consistent with existing land uses.

The purpose of *Sonoma County General Plan 2020* is to express policies which guide decisions on future growth, development, and conservation of resources in a manner consistent with the goals and quality of life desired by the county's residents (Sonoma County, 2009). The Estuary Management Project supports the land use objectives and policies of the Sonoma County General Plan. The project does not facilitate growth and is consistent with the existing land uses including maintaining the Estuary as public/quasi-public land use. The proposed project would conform to the broader goals of the General Plan to protect and conserve the quality of ocean, marine, and estuarine environments and maintaining water quality. For the foregoing reasons, the Estuary Management Project is consistent with the Sonoma County General Plan.

The Sonoma County Local Coastal Plan brings local government plans in conformance with the State Coastal Act policies. Therefore if the Estuary Management Project conforms to the Sonoma County Local Coastal Plan, it likewise conforms to the California Coastal Act. The Sonoma County Local Coastal Plan establishes policies to regulate coastal development, protects the overall quality of the coastal zone, and maximizes public access to and along the coast (Sonoma County, 2001). The Sonoma County Local Coastal Plan Land Use Section formulates development policies that indicate the type, location, and intensity of land uses permitted in the Coastal Zone. As stated in **Impact 4.6.1**, the Estuary Management Project site is adjacent to the Goat Rock State Beach and project construction activities could be inconvenient to adjacent land uses; however, it would not significantly disrupt access or use of the existing beach facility. Generally, the Estuary Management Project would not conflict with the Sonoma County Local Coastal Plan because project implementation would not convert any existing land uses or disrupt public access to the coast. The Estuary would not effect development within the coastal area, nor prevent construction of future development.[2]

The Sonoma Coast State Park General Plan provides guidelines for future land use management and designation, including land acquisition and the facilities required to accommodate expected increases in visitation (CSPRC, 2007). As stated in **Section 4.8, Recreation**, the project would not cause an increase in the use of existing recreation facilities nor would it cause any accelerated physical deterioration of existing recreation facilities. Additionally, the Estuary Management Project would not conflict with existing land use management designations of Sonoma Coast State Park. Therefore, the potential impacts would be less than significant.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.6.3: Conflict with any applicable habitat conservation plan or natural community conservation plan. The proposed project may conflict with applicable habitat conservation plan or document which aims to protect threatened or endangered species and/or their critical habitat. (Beneficial Impact)

Although there is no specific habitat conservation plan affecting the project area, the NMFS' Russian River Biological Opinion (Russian River Biological Opinion) has a similar intent to managing the Estuary for the benefit of threatened and endangered species (NMFS, 2008). The Estuary Management Project would include installation, monitoring, and minor maintenance of a lagoon outlet channel on the barrier beach. These actions would implement management strategies listed in Russian River Biological Opinion which would create a brackish/freshwater lagoon environment in the Russian River Estuary to support the development for rearing juvenile steelhead, Chinook salmon, and coho salmon smolts. The Estuary Management Project is consistent with NMFS management strategies and implements requirements of the Russian River Biological Opinion Therefore, project impacts are considered beneficial.

[2] Potential for conflict with Coastal Act policies related specifically to recreational facilities is discussed in **Section 4.7, Recreation**.

Impact Significance: Beneficial Impact.

Impact 4.6.4: Permanent Conversion of Important Farmland. The proposed project could convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use. (No Impact)

The Estuary Study Area is adjacent to approximately 120 acres of farmland of Local Importance, as well as land designated as grazing land; however there are no designations for Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, which are considered "important farmland", near the Estuary. The Estuary Management Project would include installation, monitoring, and minor maintenance of a lagoon outlet channel on the barrier beach. The proposed management activities would not be located on or adjacent to existing farmland (**Figure 4.6.2**), and would not affect directly Prime Farmland, Unique Farmland, or Farmland of Statewide Importance located near the Estuary. Implementation of the Estuary Management Project would not involve changes that would result in conversion of farmland to non-agricultural use; therefore there is no adverse impact to important farmland.

Impact Significance: No Impact.

Impact 4.6.5: Conflict with Williamson Act Contracts. The proposed project would conflict with existing zoning for agricultural use or a Williamson Act Contract. (Less than Significant)

The Estuary Study Area is adjacent to approximately 1.5 miles of Williamson Act Prime Agricultural Land and approximately 3.0 miles of Williamson Act Non-Prime Agricultural Land. However, the Estuary Management Project required implementation and maintenance activities would occur at the mouth of the Russian River, which is not located on or near Williamson Act enrolled agricultural land. Implementation of the Estuary Management Project would not involve changes that would conflict with existing Williamson Act Contracts; therefore the impact to Williamson Act Contracts or existing agricultural uses is less than significant.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.6.6: Loss or conversion of Forestland. The proposed project would result in loss of designated forest land. (Less than Significant)

CA Public Resources Code Section 12220 g: defines "forest land" as land that can support 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and

wildlife, biodiversity, water quality, recreation, and other public benefits.[3] Portions of the Russian River Estuary are adjacent to forest land. In particular, the Willow Creek and Freezeout Creek watersheds, which were newly acquired as part of the Sonoma Coast State Park, and areas between the towns of Jenner and Duncans Mills are considered forest land. The Sonoma Coast State Park lands are protected by the SCAPOSD and the California State Parks. The Estuary Management Project would require implementation and maintenance activities at the mouth of the Russian River, which is not located on or near designated forest land. Implementation of the Estuary Management Project would not result in the loss of existing designated forest land or the conversion of forest land to non-forest use; therefore the impact to forest land is less than significant.

Secondary effects to parcels meeting the definition of forest land under CA Public Resources Code Section 12220 g could occur due to increased duration of inundation at water surface elevations between 7 and 9 feet. As previously described in **Section 4.4, Biological Resources**, this would increase the duration of inundation of approximately 3.6 and 0.4 acres of North Coast Riparian Forest and Mixed Evergreen Forest, respectively, and could potentially result in conversion of these vegetation types to freshwater marsh or other vegetation types over time. However, because of their prevalence within the region relative to available forest lands, the potential conversion of this level of acreage, if it were to occur, would not be considered significant.

Impact Significance: Less than Significant.

4.6.5 References

California Coastal Commission, California Coastal Act, Public Resources Code Division 20, Chapter 3, Section 30200, Coastal Resources Planning and Management Policies, 1976, revised 2010.

California Department of Conservation, Division of Land Resource Protection. *2004-2006 Farmland Conservation Report*, 2008. http://www.conservation.ca.gov/dlrp/fmmp/pubs/2004-2006/Pages/FMMP_2004-2006_FCR.aspx. Accessed July 8, 2010.

California State Lands Commission (CSLC), Regulations, Article 2, Leasing and Permits, 2007, available online http://www.slc.ca.gov/Regulations/Regulations_Home_Page.html, Accessed, October 18, 2010.

California State Park and Recreation Commission (CSPRC), Sonoma Coast State Park Final General Plan and Environmental Impact Report. May 2007.

[3] The Sonoma County General Plan 2020 also protects timber land (classified differently than “forest land”): "For purposes of the above regulations, "timberlands" are generally considered to be those lands that are capable of and available for growing a commercial species of timber such as Redwoods and Douglas Fir”(Sonoma County, 2008). According to the Sonoma County General Plan 2020, in Sonoma County, these lands are predominantly in the northwest part of the County. There are approximately 232,000 acres of timberland in the County. Sonoma County is unique among many counties in California because 94 percent of the timberlands are privately owned (Sonoma County, 2008).

County of Sonoma, *Local Coastal Program*, December 12, 2001.

Sonoma County Permits and Resources Management Department, *Sonoma County General Plan 2020*, adopted September 23, 2008.

Sonoma County Permits and Resources Management Department, *Sonoma County General Plan 2020*, Land Use Element, adopted September 23, 2008, amended March 17, 2009.

Sonoma County Water Agency. Letter to NMFS: Russian River Estuary Flood Risk Management Feasibility Study. March 22, 2010.

Sonoma Land Trust. Acquisition of the Jenner Headlands Press Release December 17, 2009, http://www.sonomalandtrust.org/news_room/press_releases/100424_Jenner_celebration.html Accessed on August 6, 2010

United States Army Corps of Engineers (USACE), Russian River Basin Study Northern California Streams Investigation Final Report, San Francisco District, San Francisco, CA, 1982.

4.7 Recreation

4.7.1 Introduction

This section evaluates potential impacts on recreational resources that could result from implementation of the Russian River Estuary Management Project (Estuary Management Project or proposed project) and identifies mitigation measures to reduce or avoid impacts, as appropriate. The primary information sources include a site visit on Sunday July 25, 2010, the *Sonoma County General Plan* (2008), and information published by California State Parks and Recreation. The analysis addresses publicly accessible recreational resources in the project area, including local roadways used for bicycling, beaches, and designated recreational trails, and describes regulations applicable to the proposed project. This section also draws upon the analyses in **Sections 4.9, Noise**; **4.10, Air Quality**; and **4.11, Transportation and Traffic**, in which those direct impacts are analyzed for their effects on recreation.

4.7.2 Setting

The lower Russian River hosts a wide variety of outdoor and scenic recreational opportunities for locals and visitors where recreation is a major industry. These activities in the area include boating, fishing, surfing, hiking, bicycling, equestrian uses, camping and picnicking opportunities. The Russian River itself is used for "on-stream" water activities such as fishing, canoeing, and swimming.

Communities in the lower Russian River watershed include: Monte Rio, Guerneville, Rio Nido, Duncans Mills, Mirabel Park and Jenner at the mouth of the river. Many resorts and vacation homes are located in these communities along the Russian River especially between Duncans Mills and Mirabel Park. Also, the coastal area along State Route 1 (SR 1) near the Russian River has many popular State Beaches, hiking trails, bicycling and surfing locations in the lower Russian River watershed.

Beach access, and hiking trails are available along the coast at designated recreational areas and State Parks. A variety of recreational opportunities are available within and near the Russian River Estuary (Estuary). Areas adjacent to the Estuary are used at certain locations to access a variety of water-related recreational activities, such as kayaking and boating as well as passive activities including sunbathing and nature watching. Sightseers traveling on SR 1 also enjoy views of the Estuary while traveling along the perimeter.

Recreational Facilities

Russian River Estuary

The Estuary is a state marine recreational management area as defined by the Marine Life Protection Act (MLPA), managed by the California Department of Fish and Game (CDFG). Within the Estuary, the take of living marine resources is prohibited except recreational hunting of waterfowl. Fishing is prohibited in the Estuary. Public access to the Estuary is available at the

Russian River Visitor Center in Jenner and State Parks lands, located in the lower Estuary. Access to the upper Estuary is mainly from private campgrounds and other private lands in the Duncans Mills area.

Sonoma Coast State Park

Sonoma Coast State Park is owned and operated by California State Parks and extends 17 miles along the coast from Bodega Head north to Vista Trail, located north of the of Jenner (California State Parks, 2009). Along the southern shore of the Russian River it extends inland approximately 4 miles to include the new Willow Creek area. At the mouth of the Russian River Estuary is Goat Rock State Beach with beaches accessible from SR 1. The coastal ocean provides habitat to a variety of sport fish including rockfish, perch, salmon, steelhead, smelt, red abalone, mussels, and cockles (Sonoma Coast State Park website, 2010). Generally fishing is permitted in the State Park with a valid California sport fishing license; however, fishing of wild steelhead, Chinook salmon, and coho salmon is prohibited as these species are protected under the Endangered Species Act. Water recreation is not advised due to access limitations and physical hazards, such as strong rip currents, heavy surf, and sudden swells, although surfing is still a popular sport at many of the beaches.

Goat Rock State Beach

Goat Rock State Beach (Goat Rock) is a long sandy stretch of beach located south of the Russian River Estuary Mouth and adjacent to the project site. Goat Rock is accessible from Goat Rock Road off SR 1 and contains two parking lots which provide access to picnic tables, restroom facilities, and the beach. The mouth of the Russian River Estuary is open to the ocean tides for much of the year. Beach areas north and south of the river mouth provide habitat for a variety of wildlife species and recreational viewing opportunities for Goat Rock visitors; however use restrictions for beach access are established to protect sensitive species, such as harbor seals which are known to haulout at the Goat Rock beach area. The coastal area west of the Russian River Mouth is a State Marine Conservation Area as defined by the MLPA. In this area the recreational and commercial take of all species of invertebrates and finfish is permitted with the exception of Chinook and coho salmon and wild steelhead, which are protected under the Endangered Species Act.

During times of the year when the Russian River Estuary is open, Goat Rock is a popular surfing location due to outflow from the Estuary depositing sediment into the ocean which creates a unique wave break. Although multiple factors affect wave profiles including speed, fetch, and direction of ocean swells and wind, sandbar topography is particularly important with the formation of a wave in this location. Surfing waves are formed when river sediment is deposited outside of the river mouth, creating a gradual shore drop-off into the ocean, which in turn forms a gradually breaking wave. Otherwise, when a barrier beach forms naturally between the ocean and the Russian River Estuary, sediment from the Russian River is not introduced near the shoreline, therefore the shore drop off is sharper and the subsequent waves break more quickly and sharply, typically not conductive for surfing.

Willow Creek

Willow Creek is on the south side of the Estuary. The new 3,373 acre addition to Sonoma Coast State Park covers much of the Willow Creek and Freezeout Creek watersheds, which are the westernmost drainages into the Estuary from the south. Hikers, bikers and equestrians have access to a 15 mile network of old logging and ranch roads, which are accessible through a free permit-for-use program administered by LandPaths.[1] Roads and trails connect with adjacent State Park lands, allowing users to hike or ride more than seven miles from Duncans Mills to Shell Beach on State Park lands.

Willow Creek Environmental Camp

Willow Creek Environmental Camp is the only State Park campground on the lower Russian River and includes 11 primitive campsites with fire rings, picnic tables, and pit toilets. Camp sites are shaded by large willow trees and are close to a large beach used for swimming and fishing. To protect the wildlife, no dogs are allowed. The campground periodically closes in the winter because the access road is subject to wash-out during winter storms.

Pomo Canyon Environmental Camp

Pomo Canyon Environmental camp is owned and operated by the State of California and includes 20 campsites with fire rings, picnic tables, pit toilets and running water nearby. Camps are set in a redwood grove. A three-mile trail to Shell Beach crosses streams and rises up into the grassland with marvelous views of the river and finally the ocean. To protect the wildlife, no dogs are allowed.

Private Campgrounds

Three private campgrounds, Rien's Sandy Beach (22900 Sylvan Way Monte Rio) and Casini Ranch (22855 Moscow Road, Duncans Mills), and Duncans Mills Camp Club (25387 Steelhead Boulevard, Duncans Mills) flank the River downstream of Monte Rio and provide river beach access. Casini Ranch has been operated year round since 1965. Casini Ranch guests have access to a one-mile-long beach.

Recreational Access and Beaches

The lower Russian River has limited public access. Within the Estuary Study Area, maximum backwater area, the Jenner Boathouse/Visitor's Center is the only beach with formal public access. In the maximum backwater area, there is formal public access at Monte Rio Community Beach and Vacation Beach. Monte Rio Community Beach is located on a large bend in the river and offers picnic amenities and boat rental facilities. This location is frequently used for community gatherings. Vacation Beach is located at Vacation Beach Road in Guerneville and has a seasonal dam during the summer recreation season that is removed over four days in late

[1] LandPaths, a non-profit environmental education group in Sonoma County. See http://www.landpaths.org

September.[2] Additionally, since the Russian River is a designated "navigable river", the mudflat/gravel bar ("beach") areas along the maximum backwater area are public property up to the high-water mark or treeline[3], and frequently used as stopovers by kayakers and boaters.

Russian River Waterway

The Russian River is a navigable waterway. This waterway extends from Goat Rock State Beach on the coast to the Cloverdale area (SCPRMD, 2009b). Public access to the waterway is protected by Article XV, Section 2 of the California Constitution.

Sonoma Coast Trail

Sonoma Coast Trail is owned and operated by the State of California Coastal Conservancy and is a portion of the California Coastal Trail. This portion of the Coastal Trail, known as the Kortum Trail which begins in the bluffs above Blind Beach with a trailhead just off of Goat Rock Road. Another trailhead is at Goat Rock State Beach southern parking lot that starts out with a climb up the bluff. The Coastal Trail does not currently cross the Russian River. (California State Parks, 2010).

Bicycle Routes

The temperate climate and scenic roads surrounding the Estuary make it a popular bicyclist destination. Throughout Sonoma County a number of designed bicycle routes have been established and are categorized as Class I, II or III, as follows:

1. Class 1: completely separated right-of-way designated for the exclusive use of bicycles;
2. Class II: restricted right-of-way designated for semi exclusive use of bicycles; and
3. Class III: a shared right-of-way designated by signing or stenciling on pavement.

Although there are no existing designated bikeways within the Estuary Management Project area, SR 116 (River Road) is a highlighted bicycle route on Sonoma County's regional bicycle network (SCPRMD, 2008). Additionally, the bicycle system of Sonoma County is not complete and several upgrades are proposed within the project area:

1. Class 1 Bike Path (Proposed) adjacent to SR 116 (River Road) from Duncans Mills west to Jenner, called Willowcreek Trail;
2. Class II Bike Lane (Proposed) SR 116 (River Road);
3. Class II Bike Lane (Proposed) SR 1, south of Goat Rock State Beach; and
4. Class III Bike Route (Proposed) SR 1, north of Goat Rock State Beach.

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[2] Seasonal dams are temporary structures placed across the Russian River mainstem and its tributaries to impound water. The main purpose of these dams is to form pools for recreational use. The Russian River Parks and Recreation District operates the dam for recreation. It has a permanent 8-foot-tall concrete base with collapsible steel support beams. Wooden flashboards are installed during the summer to impound water. The dam includes a portable fish ladder to permit fish passage when the flashboards are in place (CDFG, 2002 in Entrix, 2004). Dam removal dates are set by the California Department of Fish and Game.

[3] Many of the riverfront properties are privately owned, and display "no trespassing" signage; however the beach is public property.

4.7.3 Regulatory Framework

Please refer to the regulatory framework provided in **Section 4.6.3, Land Use and Agriculture**, for a detailed discussion of State and local policies and regulations regarding recreational resources within the project area. The California Coastal Act, administered by the California Coastal Commission (CCC) and MLPA, administered by CDFG, apply to recreational resources within the Estuary Management Project area, and are previously defined in **Section 4.6**. Applicable local plans, including the *Sonoma County General Plan 2020*, Sonoma County Zoning Regulations, Local Coastal Program establish policies and regulatory constraints that apply to the Estuary Management Project. Additional relevant information contained in the Local Coastal Program, as well as a description of policies implemented by the Sonoma County Transportation Agency, is provided below. The goals, policies, and programs were considered in this analysis to define sensitive recreational resources, determine project consistency with policies, and evaluate significant impacts in the following section.

Sonoma Coast State Park Final General Plan & Environmental Impact Report

The Sonoma Coast State Park Final General Plan and the corresponding Environmental Impact Report were approved and certified in May 2007. Every State Park in California must develop a general plan prior to approval of major developments. The general plan defines the purpose, vision, and long-term goals and guidelines for the management of Sonoma Coast State Park. It provides guidelines for future land use management and designation, including land acquisition and the facilities required to accommodate expected increases in visitation. The general plan provides a comprehensive framework that guides the Park's development, ongoing management, and public use for the next 20 years. The protection and restoration of natural and cultural resources are key components of the Plan. The Plan includes goals and guidelines aimed at biological resources and water quality protection, the preservation of scenic and cultural resources, recreation and interpretive opportunities, and facility improvements and potential construction of new developments in response to heavy and growing visitation, environmental constraints, and recent and expected near-term property acquisitions. Sonoma Coast State Park provides opportunities for a wide variety of recreational activities, including camping, hiking, mountain biking, horseback riding, picnicking, beachcombing, wildlife viewing, surfing, and many other activities associated with the beach, riparian and upland habitats.

The following goal identified in the Sonoma Coast State Parks General Plan is intended to provide a variety of quality recreation activities.

Goal REC-1: Provide a variety of day-use and overnight recreational opportunities at Sonoma Coast SP to meet the existing and evolving needs of park visitors.

1. *Guideline REC-1A*: Plan for recreational opportunities within a regional context and in coordination with other plans, (e.g., the Sonoma County Outdoor Recreation Plan, the Californian Coastal Trail), as required or as determined appropriate by the Department.

2. *Guideline REC-1D*: Continue to maintain and enhance safe access to the beaches and other areas within Sonoma Coast SP through appropriate studies and evaluations.

GOAL INLAND-1: Provide for diverse and appropriate access provisions to accommodate recreational opportunities and visitor enjoyment of the distinctive resources of the inland watershed area.

1. *Guideline INLAND-1A*: Establish appropriate access points that best satisfies the site selection criteria for development, trail connectivity, visitor safety, and consistency with resource management objectives.

Sonoma County Local Coastal Program

The Recreation Chapter of the Sonoma County Local Coastal Program includes the California Coastal Act's policies regarding coastal access rights and permitting uses. Pedestrian movement along the shoreline or from the nearest public roadway to the shoreline to the mean high-tide line along a specified route is guaranteed under the Coastal Act. Passive recreational uses permitted include activities normally associated with beach use (walking, swimming, jogging, sunbathing, fishing, surfing, and nature study) but does not include organized sports activities, campfires or vehicular access. Active recreational uses include the full range of beach-oriented activities including those uses not allowed in passive use area. View access refers to opportunities for the public to view the shoreline and should be made available as frequently as possible. All public access ways opened to the public should be clearly signed to indicate location of trail heads, parking, parking capacity, emergency aid information and any other recreational information such as information about natural resources, the need for user cooperation, and possible fires. Specifically related to the project area, the Plan states that the beach at the mouth of the Russian River is accessible from Goat Rock parking area at the Sonoma Coast State Beach.

Sonoma County Transit Authority

Under the *Sonoma County General Plan 2020* and as described by the SCTA Bicycle and Pedestrian Master Plan there are approximately 78 miles of existing Class I bikeways, 122 miles of existing Class II bikeways, and 44 miles of existing Class III bikeways (SCTA, 2008). Despite the existing bicycle facilities, the bicycle network within the County is incomplete and many gaps still exist that break the continuity of bicycle travel. The SCTA Bicycle and Pedestrian Master Plan describes proposed Class I, II, and III facilities that would further connect the bicycling network. Bikeways in the project area are discussed in **Section 4.7.2** above.

4.7.4 Environmental Impacts and Mitigation Measures

Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, a recreation impact is considered significant if it would:

1. Increase the use of existing parks or recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or

2. Include recreational facilities or require construction or expansion or recreational facilities that might have an adverse physical effect on the environment.

Due to the nature of the proposed project, there would be no impacts related to the following CEQA criterion; therefore, no impact discussion is provided in relation to this criterion for the reasons described below:

> *Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.* The project does not propose the construction or expansion of recreation facilities and would not result in the need for new or expanded recreational facilities. Thus, impacts related to the construction or expansion of recreational facilities is not applicable to the project.

Recreation, however, is of particular importance in the Russian River Estuary and the surrounding area and it should be acknowledged that removal or diminished use of a recreational resource would be an impact, particularly to a user of that resource. Therefore additional criteria may be considered significant in this evaluation, if the project were to:

1. Restrict access to or the beneficial use of existing recreational sites or facilities.
2. Eliminate or modify an existing recreational resource so that it no longer satisfies the recreational use for a significant number of the users.

Approach to Analysis

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to existing artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

To determine the potential effects of the lagoon outlet channel activities associated with the proposed Estuary Management Project, areas potentially affected by project actions were compared with the locations of identified recreational resources in the project area that may be directly or indirectly affected by the proposed project, including the beaches, surfbreak, and Willow Creek Environmental Camp.

Impacts Analysis

The following impact analysis focuses on potential impacts of the proposed Estuary Management Project related to recreational resources. The evaluation considered project plans, current conditions at the project site, and applicable regulations and guidelines. Impacts are summarized and categorized as either “no impact,” “less than significant,” “less than significant with mitigation,” or “significant and unavoidable.

Impact 4.7.1: Disruption of Use of Recreational Facilities. The proposed project would temporarily restrict access and beneficial use of recreational sites or facilities. (Significant and Unavoidable)

Localized Impacts at Goat Rock State Beach

During the lagoon management period, the proposed outlet channel would be excavated across the barrier beach at Goat Rock State Beach, part of Sonoma Coast State Park. At the start of the management period, when configuring the outlet channel for the first time that year, the machinery would operate for up to two consecutive working days. The Water Agency assumes weekly maintenance, up to 18 maintenance events during the lagoon management period. Based on historic record, the maximum number of artificial breaches during the lagoon management period was eight, so expected implementation and maintenance trips under the Estuary Management Project represent an incremental increase in Water Agency presence and operation on the beach.

Although the Estuary Management Project could result in an incremental increase in the frequency of beach closure and disruption, the number of consecutive days, and frequency of maintenance activities are limited by conditions specified in permits (mentioned above), and would be temporary. Therefore, implementation and maintenance of the lagoon outlet channel under the Estuary Management Project would not result in substantial disruption to recreational facilities.

On-Stream Recreation

The Estuary Management Project would have no impact to “on-stream” recreational uses, such as kayaking, as the Estuary Management Project would not directly affect flows.

Impacts to Riverfront Beaches

Maintenance of the outlet channel to form a freshwater lagoon during the proposed lagoon management period would sustain elevated water levels in the Estuary between 4.5 and nine feet, with a target elevation of 7 feet, for a longer duration, which could potentially inundate shoreline properties and beach areas. The range of water surface elevations that occur within the Estuary would not change as a result of implementing the project. The 7 foot (average) and nine foot (maximum) water surface elevations targeted by the Estuary Management Project are within the existing range of water surface elevations associated with the current closure and breaching processes within the Estuary. Historically, properties along the Estuary experienced inundation during natural Estuary closures with increases in water elevation equal to that proposed for the project (SCWA, 2010). The lowest recorded water surface elevation upon breaching was 4.3 feet (September 8, 1996) and the highest water surface elevation was 11.1 feet during a natural breach (November 13, 2001). In over half of the artificial breaching events the water surface elevation exceeded 7 feet (and was sometimes as high as eight, nine, and, in a very few cases, greater than 10 feet). The average recorded water surface elevation at the time of breaching was 7.1 feet. During closure events, water surface elevations of 7 feet affect the shoreline frontage parcels along the Russian River. The rising water surface elevations affect primarily shoreline and beach areas.

As described in **Section 3.0, Project Background and Environmental Setting**, the average duration of closure under current conditions is between five to 14 days; under the proposed Estuary Management Project, the average duration of closure may increase to between one and five months, depending upon outlet channel performance. The increased frequency and duration of the closure could result in longer inundation of shoreline properties and riverfront beaches, both relatively large, contiguous areas, as well as smaller, more discrete areas immediately adjacent to the active channel margin (see also **Chapter 3.0, Figures 3-4A through 3-4E**). Recreation facilities adjacent to the Estuary include Willow Creek Open Space, Willow Creek Environmental Camp, and private boat docks, and beaches (i.e. at Rien's Sandy Beach campsite, Casini Ranch, Monte Rio Community Beach, Vacation Beach). Riverfront beaches within the project area are used as stopovers/rest areas, picnicking spaces, and sunbathing areas by recreational users, particularly kayakers and boaters on the River. Reduced beach area could be an inconvenience to recreational users.

The reduction of riverfront beach area within the Estuary Study Area that could occur as a result of the proposed project is estimated based on review of aerial photography and analysis of vegetation and contour data (**Figures 4.4-1** through **4.4-5** in **Section 4.4, Biological Resources**). For the purposes of this analysis, the *gravel/mudflat* "vegetation" type (identified in the Map Legend) consists of shoreline area that is equivalent to "beach" area. "Beach" area is mapped up to the 14-foot contour. Analysis of vegetation and contour data indicates that there are approximately 27.2 acres of "beach" areas existing within the 14-foot contour. **Table 4.7-1** summarizes the reduction of available beach area within the Estuary Study Area resulting from increased inundation during the lagoon management period.[4]

TABLE 4.7-1
EXTENT OF BEACH (MUDFLAT/GRAVEL) WITHIN EXISTING TOPOGRAPHICAL RANGES ADJACENT TO RUSSIAN RIVER ESTUARY – WITHIN 14 FOOT ELEVATION

	4.5-7		7-9		9-14		Total Mapped (acres)
Elevation Range	**acres**	**% of total mapped**	**acres**	**% of total mapped**	**acres**	**% of total mapped**	
Beach (Mudflat/Gravel)	17.9	66%	6.3	23%	3.0	11%	27.2

Many of the beach areas occurring within the Estuary Study Area and maximum backwater area do not have formal public access. Inundation associated with higher water levels would reduce the amount of beach acreage available within the Estuary, and these conditions would occur for a longer duration, depending upon performance of the outlet channel. At nine feet, beach area would remain present at most gravel bar locations, and riverside access to these gravel bars would still be available. Higher water surface elevations within the Estuary may be perceived as a benefit to recreational boaters, and higher water levels may enhance recreational experiences at key

[4] Inundation of mudflat/gravel bar areas upstream of Austin Creek in the Maximum Backwater Area, including Monte Rio Community Beach and Vacation Beach are not quantified due to absence of reliable contour and vegetation mapping data; however the order of magnitude of inundation is expected to be commensurate with that in the Estuary Study Area.

recreational beaches occurring within the maximum inundation area, including Casini Beach, Monte Rio, and Vacation Beach. However, no mitigation measures are available to reduce or avoid the inundation of gravel bar and shoreline beaches to an elevation of up to nine feet along the Estuary shoreline for longer durations during the lagoon management period. Therefore, these impacts are considered significant and unavoidable.

Mitigation Measures

No feasible measures are identified.

Impact Significance: Significant and Unavoidable.

Impact 4.7.2: Eliminate or Modify an Existing Recreational Resource. The proposed project would likely reduce the occurrence of open channel tidal conditions conducive to surfing activities. (Significant and Unavoidable Impact)

During times of the year when the Russian River Estuary is open, Goat Rock is a popular surfing location due to outflow from the Estuary depositing sediment into the ocean which creates a unique wave break. Although multiple factors affect wave profiles including speed, fetch, and direction of ocean swells and wind, sandbar topography is particularly important with the formation of a wave in this location. When the Estuary channel is in a breach condition the strong tidal outflows causes the deposition of large quantities of sediment within the wave zone creating sandbar conditions well suited for surfing waves. Current barrier beach management practices create conditions which promote a tidal Estuary channel making this the dominant condition at the site. In contrast, in order to minimize saline water inflow, the proposed outlet channel is designed minimize scour and sediment flow in the channel and therefore minimize sediment deposition within the wave zone. The reduction or loss of this surf break occurrence during summer months is of particular concern to local surfers (ESA, 2010). Although the project would not directly eliminate this temporarily-occurring recreational resource for the duration of the year, the project would likely reduce the occurrence of the surf break at Goat Rock for current users during the lagoon management period.

Outside the lagoon management period (October 16 through May 14), it is anticipated that ocean topography off-shore of Goat Rock State Beach would return to previous conditions and the surfing location would provide the same recreational experience for users as existing conditions. However, in light of local incidental recreational benefit enjoyed under current management practices, this reduction in the occurrence of surf break conditions is considered a potentially significant impact and is dependent on a surfer’s personal recreational experience.

This potential impact may be inconsistent with the California Coastal Act, which protects water based recreation (Section 30220) and low costs recreational opportunities (Section 30213). The California Coastal Commission has jurisdiction and would be responsible for making a consistency determination of the project with these policies; however it is recognized that alteration of the opportunity for surfing may not be consistent. There are no available/feasible

mitigation measures that would effectively reduce or avoid the impact; therefore it is considered unavoidable.[5]

Mitigation Measures

No feasible measures are identified.

Impact Significance after Mitigation: Significant and Unavoidable.

Impact 4.7.3: Deterioration of Recreational Facilities. Implementation and maintenance associated with the Estuary Management Project could increase the use of existing parks or recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. (Less than Significant)

Creation of the lagoon outlet channel would require limited vehicular and equipment access via State Parks maintained access roads. State Parks Road is a narrow, paved, two-lane road that connects Goat Rock Road to access points for Goat Rock State Beach. The road is not designed for frequent traffic of heavy equipment, and is primarily intended for State Parks personnel and recreational access, and represents a concern for the State Parks Department. This road is described in more detail in **Section 4.11, Transportation and Traffic**.

To implement the lagoon outlet channel, the on-site equipment that would be required for the creation and maintenance of the outlet channel would be up to two pieces of heavy machinery, such as an excavator and/or bulldozer, and approximately four to five staff vehicles (typically small pick up trucks). At the start of the management period, when configuring the outlet channel for the first time that year, the machinery would operate for up to two consecutive working days. The Water Agency assumes weekly maintenance, up to 18 maintenance events during the lagoon management period. This would require vehicular and equipment access via State Parks access roads. Based on historic record, the maximum number of artificial breaches during the lagoon management period was eight, in 1997 and 2008, so expected maintenance trips under the Estuary Management Project represent an incremental increase in short-term truck trips.

Although the Estuary Project could result in an incremental increase in frequency of vehicular use on State Parks roads during the lagoon management period, the trips would be short-term and would not be substantial enough to result in accelerated deterioration of the roadway that could

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5 As recorded in **Appendix 1.2**, participants in the scoping process recommended construction of an artificial reef to reduce adverse impacts to surfing; however construction of a physical structure is anticipated to incur direct, however short-term, adverse environmental effects to marine life, hydrology, and geomorphology during construction. Some case studies demonstrate that artificial reefs can be multi-purpose, designed to improve sediment retention and protect beach from erosion, and constructed of materials that could enhance marine habitat. An artificial reef would function to dissipate swell energy across the entire length of the reef for the primary purpose of protecting beaches from erosion and sediment loss. Cases of successful artificial reefs are most prevalent outside of North America, in locations that are subject to severe weather (i.e. monsoons). Feasibility studies would need to be undertaken to determine if an artificial reef would be feasible or functional in the Russian River area. Additionally, there is no guarantee that construction of an artificial reef would, in fact, improve surfing conditions. It would be entirely dependent on ocean conditions.

impact recreational access. Please refer to **Section 4.11, Transportation and Traffic**, for additional analysis related to general roadway wear and tear.

Impact Significance: Less than Significant; no mitigation required.

4.7.5 References

California Coastal Commission, California Coastal Act, Public Resources Code Division 20, Chapter 3, Section 30200, Article 3, Recreation, 1976, revised 2010.

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Sonoma County Transportation Agency (SCTA) 2008. Countywide Bicycled and Pedestrian Master Plan. May 2008.

4.8 Cultural Resources

4.8.1 Introduction

This section reviews the existing conditions related to cultural resources in the Russian River Estuary (Estuary Management Project or proposed project) area and presents the potential impacts on cultural and paleontological resources. As previously noted in **Chapter 2.0, Project Description**, the Estuary Study Area comprises the Russian River Estuary (Estuary), which extends approximately seven miles from the mouth of the Russian River upstream to Duncans Mills just beyond the confluence of Austin Creek. Under certain closed conditions, the Estuary may backwater to Monte Rio, and as far upstream as Vacation Beach. Where appropriate, discussion of cultural resource impacts within the Estuary Study Area and the larger maximum backwater area, which extends upstream past Austin Creek approximately to Vacation Beach, is provided (Please refer to **Figure 2-3 in Chapter 2.0, Project Description**). Cultural resources include prehistoric and ethnographic Native American archaeological sites, historic-period archaeological sites, historic-period buildings and structures, and elements or areas of the natural landscape that have traditional cultural significance. A paleontological resource is defined as fossilized remains of vertebrate and invertebrate organisms, fossil tracks, and plant fossils. The section also describes the federal, state, and local regulations related to cultural and paleontological resources that would apply to the proposed project.

4.8.2 Setting

Prehistoric Context

Categorizing the prehistoric period into broad cultural stages allows researchers to describe a broad range of archaeological resources with similar cultural patterns and components during a given timeframe, thereby creating a regional chronology. This section provides a brief discussion of the chronology for the Estuary Study Area.

A framework for the interpretation of the region is provided by Milliken et al. (2007), who have divided human history into four broad periods: the *Paleoindian Period* (11,500 to 8000 B.C.), the *Early Period* (8000 to 500 B.C.), the *Middle Period* (500 B.C. to A.D. 1050), and the *Late Period* (A.D. 1050 to 1550). Economic patterns, stylistic aspects, and regional phases further subdivide cultural patterns into shorter phases. This scheme uses economic and technological types, socio-politics, trade networks, population density, and variations of artifact types to differentiate between cultural periods.

The *Paleoindian Period* (11,500 to 8000 B.C.) was characterized by big-game hunters occupying broad geographic areas. Evidence of human habitation during *Paleoindian Period* has not yet been discovered in the San Francisco Bay Area.

The first evidence of human habitation of the San Francisco Bay Area is associated with the *Early Period* (8000 to 500 B.C.). During the *Early Period*, consisting of the *Early Holocene* (8000 to

3500 B.C.) and *Early Period* (3500 to 500 B.C.), in general, geographic mobility continued from the *Paleoindian Period* and is characterized by the millingslab and handstone as well as large wide-stemmed and leaf-shaped projectile points. The first cut shell beads and the mortar and pestle are first documented in burials during this period, indicating the beginning of a shift to sedentism.

During the *Middle Period*, which includes the *Lower Middle Period* (500 B.C. to A.D. 430), and *Upper Middle Period* (A.D. 430 to 1050), geographic mobility may have continued, although groups began to establish longer-term base camps in localities from which a more diverse range of resources could be exploited. The first rich black middens[1] are recorded from this period. By the *Upper Middle Period*, mobility was being replaced by the development of numerous small villages. Around A.D. 430 a "dramatic cultural disruption" occurred evidenced by the sudden collapse of the *Olivella* saucer bead trade network.[2]

With the onset of the *Late Period* (A.D. 1050 to 1550), social complexity developed toward lifeways of large, central villages with resident political leaders and specialized activity sites. Artifacts associated with the period include the bow and arrow, small corner-notched points, and a diversity of beads and ornaments.

Ethnographic Setting

The Estuary Management Project Study Area constitutes the border between the ethnographic territories of two distinct Native American tribes: Coast Miwok and Kashia (Kashaya) Pomo.

Coast Miwok

Coast Miwok territory encompasses all of present-day Marin County and parts of Sonoma County, from Duncan's Point on the coast, east to between the Sonoma and Napa Rivers. (Barrett, 1908; Kelly, 1978; Kroeber, 1925). The Coast Miwok language, a member of the Miwokan subfamily of the Penutian family, is divided into two dialects: Western, or Bodega, and Southern, or Marin, which in turn is subdivided into valley and coast. *Miwok* refers to the entire language family that was spoken by Coast Miwok, as well as Lake, Valley, and Sierra Miwok. Each large village had a tribal leader but there does not appear to have been defined larger organization (Kelly, 1978:414).

Settlements focused on bays and estuaries, or along perennial interior watercourses. The economy was based on fishing, hunting, and gathering, revolving around a seasonal cycle during which people traveled throughout their territory to make use of resources as they became available. Marine foods, including kelp, clams, crabs, and especially fish, were a year-round staple. Acorns were gathered in season and stored for use throughout the year. Tobacco was generously used by most men.

Dwellings were conical in shape and grass-covered. Each large village had a circular, dug-out sweathouse. Basketry techniques included both coiled and twined forms often with the use of multicolored motifs and patterns. Beginning as early as 1600 A.D. the Coast Miwok began to

1 A midden is defined as culturally-darkened soil created from deposited organic materials.
2 The network included wide-ranging changes in Olivella bead forms and distribution patterns.

produce and use clamshell disk beads as money (Stewart and Praetzellis, 2003:177). The obsidian trading network was established in the Early Holocene period. Coast Miwok had a powerful sense for the value of property. Some Coast Miwok villages defended their territory against trespassers. Although land was not considered privately owned, ownership did apply to certain food-producing trees as well as hunting, fishing, and clam-digging locations (Kelly, 1978:418).

By the mid-1800s Spanish missionization, diseases, raids by Mexican slave traders, and dense immigrant settlement had disrupted Coast Miwok culture, dramatically reducing the population, and displacing the native people from their villages and land-based resources. By the time of California's initial integration into the United States in the late 1840s, the Coast Miwok population had dwindled from approximately 2,000 individuals to one-eighth of its size before European contact (Kelly, 1978:414).

In 1920 the Bureau of Indian Affairs purchased a 15.45 acre tract of land in Graton for the Marshall, Bodega, Tomales, and Sebastopol Indians. This land was put into a federal trust and these neighboring peoples that included both Coast Miwok and Southern Pomo were consolidated into one recognized group called the Graton Rancheria. In 1958 the U.S. government enacted the Rancheria Act of 1958, transferring tribal property into private ownership. Forty-four Rancherias in California were affected, including the Graton Rancheria.

Throughout the remaining century, tribal members continued to protect their cultural heritage and identity despite being essentially landless. On December 27, 2000 President Clinton signed into law legislation restoring federal recognition to the Federated Indians of Graton Rancheria. The tribe currently has approximately 1,100 members.

Kashia Pomo

The Kashia (Kashaya), or Southwestern Pomo, territory is along the Pacific Coast from Duncan's Point north to Stewarts Point and inland to the Austin Creek watershed (McLendon and Oswalt, 1976:277). The principle village *Metini* was located near Fort Ross where the main residences of the headmen and women were located. Other large principle villages and smaller subsidiary villages supported an estimated 1,500 people. During the summer, the communities moved to the coast where they gathered abalone, mussels, fish, and marine mammals as well as sea plants and sea salt. In the late fall they journeyed back inland to sheltered village locations. Kashia basketry is a ritual art and incorporates stone, bone, shell, horn, fibers and feathers in unique designs.

The history of the Kashia differs from other Pomo-speaking tribes in that their first direct contact with non-Native peoples was not with Spaniards, Mexicans, or Euroamericans, but rather with Russians. The Russian colony at Fort Ross operated from 1812 to 1842 and as a result many Kashia Pomo escaped missionization. When the Russians left, Mexican and Euroamericans began to settle the coast and forced changes to the Kashia's traditional way of life. Beginning in the 1870s they lived in three villages, two of which were located on property owned by Charles Haupt, who was married to a Kashia woman. In 1914 Haupt petitioned the U.S. government on behalf of the Kashia for a 40-acre parcel near Stewarts Point.

The current population of the Kashia Pomo is approximately 250 and many still live on the reservation; although the majority has moved to larger cities in Sonoma County. Because of the slower assimilation process, many Kashia can still speak their language. A grant from the Administration for Native Americans and the Department of Health and Human Services has helped establish the Kashia Band of Pomo Indians Language Website focused on increasing tribal member's knowledge of their language, history, and culture.

Native American Contact

On November 12, 2009, ESA submitted a sacred lands search request to the Native American Heritage Commission (NAHC) and received a response on November 19, 2009, stating that the NAHC sacred lands file search did not indicate the presence of Native American cultural resources in the immediate Estuary Study Area. On July 26, 2010, a letter was sent to the Federated Indians of Graton Rancheria and the Kashia Band of Pomo Indians, the two federally-recognized tribes with ethnographic territory along the mouth of the Russian River. A letter was also sent to Suki Waters, whose name was provided by the NAHC. The letters included the Notice of Preparation for the proposed project and offered an invitation to meet with the Water Agency and USACE to discuss the project and any related concerns.

Historic Background

The Estuary Management Project area is on the border of historic Rancho Muniz and Rancho Bodega. Rancho Muniz was a 17,761-acre Mexican land grant given by Governor Pio Pico in 1845 to Manuel Torres. The grant extended along the coast from Salt Point State Park to the Russian River and included Fort Ross. The 35,487-acre Rancho Bodega was given by Governor Manuel Micheltorena to Stephen Smith in 1844. The grant extended along the Pacific coast from the Russian River to the north and Estero Americano to the south (Hoover et al., 2002).

The Mexican government had been concerned about the Russian presence at Fort Ross. When the Russians left in 1841 they sold the Fort and lands to John Sutter; however the Mexican government did not believe the land or improvements were the Russian's to sell and offered the land grants to Torres and Smith. Torres sold his land in 1849 to German immigrants William Benitz and Ernest Rufus. Following United States cession of California, Rancho Muniz was patented in 1860 and Rancho Bodega in 1859.

In 1867 John Rule purchased 4,000 acres of Rancho Muniz at the mouth of the Russian River. The following year, Charles Jenner reportedly received permission from Rule to erect a small house on the north side of the Russian River and named the spot Jenner Gulch. In 1905 the Redwood Lumber Company mill was erected on the south side of the river. It was later rebuilt upriver at Duncans Mills. Jenner School opened in 1905 for children of the mill workers. In the 1920s the Penny brothers owned and lived on the 29-acre island in the Russian River (now called Penny Island; Twohy, n.d.).

Background Research and Records Search Results

A records search was conducted for the Estuary Study Area (the stretch of Russian River from the Mouth at the Pacific Ocean to Duncans Mills including the area of greatest water level [13 foot contour]) at the Northwest Information Center (NWIC) of the California Historical Resources Information System at Sonoma State University on July 14, 2009 (File No. 10-00074) and November 29, 2010 (File No. 10-0510). The records were accessed by utilizing the Arched Rock and Duncans Mills, California, U.S. Geological Survey 7.5-minute quadrangle base maps. The records search was conducted to: (1) determine whether known cultural resources had been recorded within or adjacent to the Estuary Study Area; (2) assess the likelihood of unrecorded cultural resources based on historical references and the distribution of nearby sites; and (3) develop a context for the identification and preliminary evaluation of cultural resources.

During the records search, ESA reviewed the following sources: the *California Inventory of Historical Resources* (DPR, 1976), *California Historical Landmarks* (DPR, 1990), *California Points of Historical Interest*, and *Historic Properties Directory Listing* (OHP, 2009). The Historic Properties Directory includes listings of the National Register of Historic Places and the California Register of Historical Resources, and the most recent listings of California Historical Landmarks and California Points of Historical Interest. Historic maps were also reviewed. The records search indicated that 25 cultural resources studies on file at the NWIC have been conducted within and adjacent to the Estuary Study Area (**Table 4.8-1**). The records search also indicated that eight cultural resources have been previously recorded within a half mile of the Estuary Study Area (**Table 4.8-2**). None of these resources are located within the immediate area of the project.

TABLE 4.8-1
CULTURAL RESOURCES STUDIES WITHIN OR ADJACENT TO THE ESTUARY STUDY AREA

Study No.	Title	Author	Survey Area	Findings	Year
S-965	Letter Report to Caltrans re: Russian River Bridge Replacement	Jackson	Vicinity of Russian River Bridge	No cultural resources recorded	1975
S-5010	Archaeological Excavation of a Historical Feature on Penny Island, Sonoma County	Schwaderer and Stradford	Penny Island in Russian River	Coffin (possible 1920s Penny brother burial)	1982
S-6280	A Cultural Resources Assessment of the Proposed Expansion at Duncans Mills Campground, Duncans Mills, Sonoma County	Bard and Findlay	13 acres along north bank of Russian River, south of Duncans Mills	No cultural resources recorded	1982
S-6967	Negative Archaeological Survey Report: Highway 1 in Jenner	Gross	1.35 miles between Jenner and Russian River Bridge	No cultural resources recorded	1984
S-7994	Letter Report to Caltrans re: culvert repair of Sonoma 1	Fitzgerald	South of Duncans Mills between postmile 3.3 and 3.4	No significant cultural resources (one obsidian isolate tool fragment found)	1986
S-9422	Cultural Resources Survey of the Willow Creek Unit, Sonoma Coast State Beach	Stewart	Various units of State Park land along Pacific Coast and Russian River	Numerous archaeological sites found; none in Study Area	1986

TABLE 4.8-1 (Continued)
CULTURAL RESOURCES STUDIES WITHIN OR ADJACENT TO THE ESTUARY STUDY AREA

Study No.	Title	Author	Survey Area	Findings	Year
S-9573	Negative Archaeological Survey Report: Culvert replacement at various locations along Hwy 1 in Marin and Sonoma	Caltrans	Various	No cultural resources recorded	1990
S-10783	Negative Archaeological Survey Report: Hwy 1 drainage system	Hayes	0.2 mile west of Jenner	No cultural resources recorded	1989
S-11049	Cultural Resources Inventory, Sonoma Coast State Beach from Goat Rock to Bodega Head, Sonoma County	Alvarez	Approximately 12 miles of coast from Goat Rock to Bodega Head	Numerous archaeological sites found; none in Study Area	1989
S-12991	An Archaeological Study of a Portion of the Mann Property, Jenner, Sonoma County	Origer	6 acres southeast of Jenner	No cultural resources recorded	1991
S-15638	An Archaeological Investigation for the Proposed Jenner Water System Upgrade, Jenner, Sonoma County	Alvarez	Jenner	No cultural resources recorded	1988
S-21289	Negative Archaeological Survey Report: Repair on Hwy 116	Chavez	150 feet of Hwy 116 west of Duncans Mills	No cultural resources recorded	1998
S-26601	A Cultural Resources Evaluation of the Proposed Improvements to APN 099-110-25, located at 9470 Riverside Drive, Jenner, Sonoma County	Flynn	Small parcel in Jenner	No archaeological resources recorded at the location of two dilapidated cabins (not historically significant)	1995
S-27156	Negative Archaeological Survey Report: Culvert Replacements on Hwy 1 and Hwy 116	Caltrans	Various	No cultural resources recorded	2003
S-29390	A Cultural Resources Evaluation of Four Parcels Located in Jenner, Sonoma County	Evans	77 acres north of Jenner	No cultural resources recorded	2004

SOURCE: NWIC

TABLE 4.8-2
ARCHAEOLOGICAL SITES WITHIN ½-MILE OF THE ESTUARY STUDY AREA

NWIC Designation	Age	Description	In Study Area?
P-49-001802	Historic-period	Historic-period grave, wooden casket	No
CA-SON-355	Prehistoric	Shell scatter, midden, and lithics	No
CA-SON-357	Prehistoric	Possibly Chala'nchawi, an ethnographic and historic-period village site and burial ground	No
CA-SON-520	Prehistoric	Shell scatter and midden	No
CA-SON-1708H	Historic-period	Concrete and wood breakwater	No
CA-SON-1710	Prehistoric	Shell scatter	No
CA-SON-1720	Prehistoric	Obsidian flake scatter	No
CA-SON-1727	Prehistoric	Shell scatter and midden	No

SOURCE: NWIC

Culturally significant plants in the vicinity of the Russian River are listed in **Table 4.8-3** (provided by Nick Tipon, Chairman of the Sacred Sites Protection Committee of the Federated Indians of Graton Rancheria). Traditional use of plants for food, medicine, basketry, and other uses continue to be an integral part of Coast Miwok and Kashia lifeways. **Section 4.4, Biological Resources**, of this EIR discusses the Estuary Management Project in relation to plant species.

4.8.3 Regulatory Framework

Federal

Archaeological and architectural resources (buildings and structures) are protected through the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470f) and its implementing regulations, Protection of Historic Properties (36 CFR Part 800), the Archaeological and Historic Preservation Act of 1974, and the Archaeological Resources Protection Act of 1979.

Prior to implementing an "undertaking" (e.g., issuing a federal permit), Section 106 of the NHPA requires federal agencies (e.g., U.S. Army Corps of Engineers) to consider the effects of the undertaking on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) and the State Historic Preservation Officer (SHPO) a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing on the National Register of Historic Places (National Register). Section 101(d)(6)(A) of the NHPA allows properties of traditional religious and cultural importance to a tribe to be determined eligible for inclusion in the National Register. Under the NHPA, a find is significant if it meets the National Register listing criteria at 36 CFR 60.4, as stated below:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:
>
> a. That are associated with events that have made a significant contribution to the broad patterns of our history, or
>
> b. That are associated with the lives of persons significant in our past, or
>
> c. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or
>
> d. That have yielded, or may be likely to yield, information important in prehistory or history.

Federal review of projects is normally referred to as the Section 106 process. The Section 106 process normally involves step-by-step procedures that are described in detail in the implementing regulations (36 CFR Part 800) and summarized here:

1. Establish a federal undertaking;

2. Delineate the Area of Potential Effects;

TABLE 4.8-3
CULTURALLY-SENSITIVE PLANT SPECIES IN THE VICNINTY OF THE ESTUARY MANAGEMENT STUDY AREA

Common Name	Scientific Name	Coast Miwok Word	Southern Pomo Word	Use
Angelica	*Angelica californica*	Hutuu	ba cowa	Medicinal/Ceremonial/Food
Bay Laurel	*Umbellularia californica*	sow'-las (Tree) sotok (nuts) tcisa	bahsa (tree) beh e (nut)	Food/Medicinal
Black Oak	*Quercus californica*	kotis	yohsiy	Food
Blackberry	*Rubus ursinus*	wate	ti bahqay	Food/Medicinal
Bluedick	*Dichelostemma capitatum*	waila (Tomales) putcu (Bodega)	hi bu la	Food
Buckeye	*Aesculus californica*	yawi (tree) 'ulem (mush)	bah sa	Food/Tool/Ceremonial
Bulrush	*Schoenoplectus californicus*	looko (big) sappa (small)	siw'is	Food/Baskets/Clothing
Buttercup	*Ranunculus californicus*	sitila	qa baja	Food
California Poppy	*Eschscholzia californica*	munkai	si dohcho	Medicinal
Coast Live Oak	*Quercus agrifolia*	saata	sa can	Food/Fuel
Coffeeberry	*Rhamnus californica*	po'-tah (Tomales) ko'-tah (Bodega)	si bas bak le	Medicinal
Coyote Brush	*Baccharis pilularis*	tcu'u	Medicinal / Shelter	
Cudweed	*Gnaphalium canescens*	Medicinal		
Currant	*Ribes victoris Greene*	kawisu	Food	
Dogbane	*Apocynum cannabinum*	tsopogo	Cordage / Medicinal	
Dogwood	*Cornus sericia L. ssp.*	mahsa	Baskets	
Douglas Iris	*Iris douglasiana*	lawik	si wi ta	Cordage/Medicinal
Elderberry	*Sambucus caerulea*	bat ink le	Tool	
Grey Willow	*Salix lasiandra*	luma	k a lan	Food/Baskets/Medicinal
Gumplant	*Grindelia hirsutula*	q aqa we	Tool / Medicinal	
Huckleberry	*Vaccinium ovatum*	po' te	Food	
Ithuriel's spear	*Triteleia laxa Benth.*	putcu	bim'u	Food
Jimson Weed	*Datura stramonium L.*	monoy	qa lqasia	Medicinal
Lupine	*Lupinus chamissonis*	soppoko	galgas'a	Baskets/Tools
Mugwort (sage)	*Artemisia douglasiana*	kicin (Tomales) po'-to-po'-to (Bodega)	qa p ula	Ceremonial/Medicinal
Redbud	*Cercis orbiculata*	ta pa' tapu	'ah ay ta	Crafts/Tool
Redwood	*Sequoia sempervirens*	lume	kas'in	Shelter/Medicinal
Rush	*Juncus textilis Buch.*	katce	ci ba	Baskets/Shelter
Salmonberry	*Rubus spectabilis Pursh*	Food		
Seaweed	*Porphyra abbottae*	haskula	'o t ono	Food
Sedge	*Carex barbarae*	kissi	co sink le	Tools/Baskets
Showy Indian Clover	*Trifolium Amoenum*	kaali	kaali	Food
Silverweed	*Potentilla anserina*	citila	Medicinal / Food	
Soaproot	*Chlorogalum pomeridianum*	hakka	ha 'an	Food/Tool/Ceremonial
Strawberry	*Fragaria chiloensis pacifica*	i'-yum	muhway mi	Food/Medicinal
Sunflower	*Helianthus annuus*	hii pakas	Food	
Tobacco	*Nicotiana bigelovii*	kayaw	ka'wak le	Medicinal
Toyon	*Heteromeles arbutifolia*	puylak (berries) puilak	bu'du	Food
Valley Oak	*Quercus lobata*	hakya	sunk le	Food
Wax Myrtle	*Morella californica*	Food		
Yarrow	*Achillea millefolium L. var.*	kickin	sunam ketey	Medicinal
Yerba Buena	*Satureja douglasii*	yerba beenu	yerba beena	Medicinal

3. Identify and evaluate historic properties in consultation with the SHPO and interested parties;

4. Assess the effects of the undertaking on properties that are eligible for inclusion in the National Register;

5. Consult with the SHPO, other agencies, and interested parties to develop an agreement that addresses the treatment of historic properties and notify the Advisory Council on Historic Preservation; and

6. Proceed with the project according to the conditions of the agreement.

State

The State of California implements the National Historic Preservation Act (NHPA) of 1966, as amended, through its statewide comprehensive cultural resource preservation programs. The California Office of Historic Preservation (OHP), an office of the California Department of Parks and Recreation, implements the policies of the NHPA on a statewide level. The OHP also maintains the California Historical Resources Inventory. The SHPO is an appointed official who implements historic preservation programs within the State's jurisdiction.

California Public Resources Code and Health and Safety Code

Several sections of the California Public Resources Code (PRC) protect cultural resources. Under Section 5097.5, no person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface, any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site (including fossilized footprints), inscriptions made by human agency, rock art, or any other archaeological, paleontological, or historical feature situated on public lands, except with the express permission of the public agency that has jurisdiction over the lands. Violation of this section is a misdemeanor. Section 5097.98 states that if Native American remains are identified within a project area, the lead agency must work with the appropriate Native Americans as identified by the NAHC and develop a plan for the treatment or disposition of, with appropriate dignity, the human remains and any items associated with Native American burials. These procedures are also addressed in Section 15046.5 of the CEQA Guidelines. California Health and Safety Code Section 7050.5 prohibit disinterring, disturbing, or removing human remains from a location other than a dedicated cemetery. Section 30244 of the PRC requires reasonable mitigation for impacts on paleontological and archaeological resources that occur as a result of development on public lands.

PRC Section 5024.1[a] states that the California Register of Historic Resources (California Register) is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change." PRC Section 5024.1[b]) states that the criteria for eligibility to the California Register are based on National Register criteria, and that certain resources are determined by the statute to be automatically included in the California Register, including California properties formally eligible for or listed in the National Register.

Title 14, Section 4307 of the California Code of Regulations also prohibits any person from removing, inuring, defacing or destroying any object of paleontological, archaeological or historical interest or value.

California Environmental Quality Act

CEQA, as codified in PRC Sections 21000 et seq. and implemented via the CEQA Guidelines (14 CCR § 15000 et seq.), is the principal statute governing the environmental review of projects in the State. The CEQA Guidelines define a historical resource as: (1) a resource in the California Register; (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (3) any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

The California Register is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1[a]). The criteria for eligibility to the California Register are based on National Register criteria (PRC Section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the California Register, including California properties formally eligible for or listed in the National Register.

To be eligible for the California Register as a historical resource, a prehistoric or historic-period resource must be significant at the local, State, and/or federal level under one or more of the following criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

2. Is associated with the lives of persons important in our past;

3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or,

4. Has yielded, or may be likely to yield, information important in prehistory or history [14 CCR Section 4852(b)].

For a resource to be eligible for the California Register, it must also retain enough integrity to be recognizable as a historical resource and to convey its significance. A resource that does not retain sufficient integrity to meet the National Register criteria may still be eligible for listing in the California Register.

CEQA requires lead agencies to determine if a proposed project would have a significant effect on important archaeological resources, either historical resources or unique archaeological resources. If a lead agency determines that an archaeological site is a historical resource, the provisions of PRC Section 21084.1 and CEQA Guidelines Section 15064.5 would apply. If an archaeological site does not meet the CEQA Guidelines criteria for a historical resource, then the site may meet the threshold of PRC Section 21083 regarding unique archaeological resources. A unique archaeological resource is "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

2. Has a special and particular quality such as being the oldest of its type or the best available example of its type.

3. Is directly associated with a scientifically recognized important prehistoric or historic event or person [PRC Section 21083.2 (g)]."

The CEQA Guidelines note that if a resource is neither a unique archaeological resource nor a historical resource, the effects of the project on that resource shall not be considered a significant effect on the environment (CEQA Guidelines Section 15064[c][4]).

Local

Local policies established in the *Sonoma County General Plan 2020* that govern geologic resources in the Estuary Study Area are summarized in Section 4.8 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**.

4.8.4 Environmental Impacts and Mitigation Measures

Significance Criteria

Based on the Appendix G of the CEQA Guidelines, project implementation would have significant impacts and environmental consequences on cultural resources if it would result in any of the following:

1. A substantial adverse change in the significance of a historical resource that is either listed or eligible for listing on the National Register of Historic Places, the California Register of Historical Resources, or a local register of historic resources;

2. A substantial adverse change in the significance of a unique archaeological resource;

3. Disturbance or destruction of a unique paleontological resource or site or unique geologic feature; or

4. Disturbance of any human remains, including those interred outside or formal cemeteries.

For the purposes of this analysis, an additional criterion is established to evaluate significant impacts associated with the proposed Estuary Management Project. Project implementation would have a significant impact if it would:

1. Affect the distribution of natural vegetation communities along the Estuary shoreline, such that availability of culturally significant plants is reduced.

Issues Not Discussed Further

The impact analysis for paleontological resources is based on the paleontological potential of the rock units to be disturbed by project-related activities. Impacts to paleontological resources could occur when excavation activities inadvertently disturb or destroy unique or significant fossils. The only excavation activity to occur would be associated with the proposed lagoon outlet channel creation and maintenance. The material excavated would be beach and lagoon sands, which are loose, recently deposited materials that do not contain unique or significant fossils. Organisms are fossilized only after being substantially buried for thousands of years. All other disturbances due to the project would be limited to the surface and would not affect subsurface geologic units. The proposed project is not expected to adversely affect paleontological resources; therefore this issue is not discussed further.

Approach to Analysis

The analysis considers direct and indirect impacts on both known cultural and paleontological resources as well as inadvertent discoveries within the proposed Estuary Study Area. Potential impacts on architectural and structural resources are assessed by identifying the activities that could affect the architectural resources that have been identified as historical resources for the purposes of CEQA. While most historic buildings and many historic-period archaeological properties are generally significant because of their association with important events, people, or styles (under California Register Criteria 1, 2, and 3), the significance of most prehistoric and historic-period archaeological properties is usually assessed under Criterion 4. This criterion stresses the potential for discovering important historical information within the site rather than the resource's significance as a surviving example of a type of construction or its association with an important person or event.

Once a resource has been identified as significant, it must be determined whether the project would "cause a substantial adverse change in the significance" of the resource (CEQA Guidelines 15064.5[b]). A substantial adverse change in the significance of a historical resource or unique archaeological resource means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired" (CEQA Guidelines Section 15064.5[b][1]). A historical resource is materially impaired through the demolition or alteration of the historical resource's physical characteristics that convey its historical significance and that justify its inclusion in the California Register (CEQA Guidelines Section 15064.5[b][2][A]).

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

Impact Analysis

Impacts associated with traffic and transportation are summarized and categorized as either "less than significant," "less than significant with mitigation," or "significant and unavoidable."

Impact 4.8.1: The Estuary Management Project could cause a substantial adverse change in the significance of a historical resource or unique archaeological resource. (Less than Significant with Mitigation)

Ground-disturbing activities associated with the outlet channel creation and maintenance would occur in recently deposited and annually disturbed materials that have a very low potential to contain cultural materials. The variations in the annual water surface elevation on the Russian River would remain within previously recorded levels following project implementation. There is a low potential for archaeological materials to be uncovered from the implementation of the Estuary Management Project.

While unlikely, the possibility of encountering archaeological materials cannot be entirely discounted. In the event that cultural materials are found during project implementation the following mitigation measure would reduce impacts to historical or archaeological resources to less-than-significant.

Mitigation Measures

Mitigation Measure 4.8.1: The Water Agency will implement the following measure:

***Inadvertent Discovery of Historical and Unique Archaeological Resources*.** If discovery is made of items of historical or archaeological interest, the contractor shall immediately cease all work activities in the area (within approximately 100 feet) of discovery. Prehistoric archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-period materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse. After cessation of excavation the contractor shall immediately contact the Water Agency, State Parks, and the U.S. Army Corps of Engineers. The contractor shall not resume work until authorization is received from both agencies.

1. In the event of unanticipated discovery of archaeological materials occurs during construction, the Water Agency shall retain the services of a qualified

professional archaeologist to evaluate the significance of the items prior to resuming any activities that could impact the site.

2. In the case of an unanticipated archaeological discovery, if it is determined that the find is potentially eligible for listing in the California and/or National Registers, and the site cannot be avoided, the Water Agency shall provide a research design and excavation plan, prepared by a qualified archaeologist, outlining recovery of the resource, analysis, and reporting of the find. The research design and excavation plan shall be approved by the Water Agency, State Parks, and U.S. Army Corps of Engineers. Implementation of the research design and excavation plan shall be conducted prior to work being resumed. Upon project approval, the Water Agency will coordinate with State Parks and U.S. Army Corps of Engineers to develop an action plan that can be implemented in the event that flooding is imminent and breaching must occur immediately.

Impact Significance after Mitigation: Less than Significant.

Impact 4.8.2: Human remains. The Estuary Management Project could disturb human remains, including those interred outside of formal cemeteries. (Less than Significant with Mitigation)

Ground-disturbing activities associated with the outlet channel creation and maintenance will occur in recently deposited and annually disturbed materials that have a very low potential to contain human remains. The variations in the annual water surface elevation on the Russian River will remain within previously recorded levels following project implementation. There is a low potential for the discovery of human remains from the implementation of the Estuary Management Project.

Mitigation Measures

In the unlikely event of uncovering human remains during project implementation the following mitigation measure would reduce impacts to less-than-significant.

Mitigation Measure 4.8.2: The Water Agency will implement the following measures:

Discovery of Human Remains. If potential human remains are encountered, the Water Agency shall halt work in the vicinity of the find and contact the Sonoma County coroner in accordance with Public Resources Code Section 5097.98 and Health and Safety Code Section 7050.5. The Water Agency will also notify by telephone the U.S. Army Corps of Engineers archaeologist and permit manager. If the coroner determines the remains are Native American, the coroner will contact the Native American Heritage Commission (NAHC). As provided in Public Resources Code Section 5097.98, the NAHC will identify the person or persons believed to be most likely descended from the deceased Native American. The Most Likely Descendent (MLD) makes recommendations for means of treating the human remains and any associated grave goods as provided in Public Resources Code

Section 5097.98. Work shall cease in the immediate area until the recommendations of the appropriate MLD are concluded.

Impact Significance after Mitigation: Less than Significant.

Impact 4.8.3: Culturally sensitive plants. The Estuary Management Project could adversely affect the distribution of natural vegetation communities along the Estuary shoreline, such that availability of culturally significant plants is reduced. (Less than Significant)

As discussed in **Impact 4.4.6** in **Section 4.4, Biological Resources**, the Estuary Management Project would increase the duration of fresh or brackish water lagoon conditions from the currently experienced duration of five to 14 days to the estimated duration of one to five months. The following discussion provides a general description of the incremental changes that may occur on vegetation communities within the study area with implementation of the proposed Estuary management practices. Plant species identified in **Table 4.8-2** are common species that are known to occur in a variety of habitats. A subset of the plants listed in **Table 4.8-2** are known to occur in Coastal and Valley Freshwater Marsh or North Coast Riparian Forest and North Coast Riparian, including blackberry, buckeye, elderberry, grey willow, huckleberry, rush, and sedge. As previously discussed in **Section 4.4, Biological Resources,** these vegetation types may be affected as a result of increased duration and frequency of higher water levels.

Of the approximately 26.5 acres of Coastal and Valley Freshwater Marsh within the mapped estuary study area within the 14 foot elevation, approximately nine acres (or 36 percent) occur between 4.5 and 7 feet in elevation, and approximately 13 acres (or 48 percent) occur between 7 and 9 feet in elevation. Under current conditions, the nine acres that occur below 7 feet have been inundated 52 of the 101 recorded breaching events occurring over the last 14 years. Inundation has been for a duration of between five to 14 days, before artificial breaching restores water surface elevations. The 13 acres occurring above 7 feet have been inundated 48 times, for a similar duration of between five to 14 days. With increased duration of inundation, these vegetation types may convert or shift towards higher elevations. Under the Estuary Management Project, both the 9.5 acres of freshwater marsh occurring below 7 feet, and the 13 acres of freshwater marsh occurring between 7 and 9 feet, would be inundated for a period of one to five months, depending upon outlet channel performance and resulting water surface elevations. Following this period of inundation, a portion of the marsh vegetation within the 4.5 to 7 foot elevation range may convert to open water or mudflat habitat if vegetation is not able to tolerate prolonged inundation (i.e. a substantial increase in depth and duration), while the marsh vegetation in the higher elevation of 7 and 9 feet may not be substantially affected. The greatest extent of marsh habitat occurs in and around Penny Island and at the confluence of Willow Creek and the Russian River. These areas could potentially see the greatest conversion from a vegetated community to an open water or mudflat habitat.

Riparian communities, such as North Coast Riparian Forest and North Coast Riparian Scrub, may also be impacted by changes in extent and duration of inundation. Of the 26 acres of North Coast

Riparian Forest within the mapped area, 1.8 acres (or 7 percent) occur between 4.5 and 7 feet in elevation and 3.6 acres (or 14 percent) occur between 7 and 9 feet in elevation. Additionally, of the approximately 31 acres of North Coast Riparian Scrub within the mapped 14 foot contour area, approximately 4.5 acres (or 14 percent) lies within 4.5 and 7 feet in elevation and approximately 10.5 acres (or 33 percent) occur between 7 and 9 feet in elevation. These areas may convert to Coastal or Valley Freshwater Marsh, which is dominated by more inundation-tolerant vegetation. However, plant species identified in **Table 4.8-2** are common species with wide distribution; as such, although specific geographic distribution may be altered within the context of changes to vegetative assemblages described above, it is anticipated these plant species would remain available within the Estuary and surrounding area. The Estuary Management Project would have a less than significant effect on culturally significant plants.

Impact Significance: Less than Significant; no mitigation required.

4.8.5 References

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4.9 Noise

4.9.1 Introduction

This section presents the existing noise conditions and evaluates potential impacts associated with noise and vibration levels from construction and maintenance of the Russian River Estuary Management Project (Estuary Management Project or proposed project). The analysis is based on review of the guidance developed by regulatory agencies and local noise ordinances and regulations set by Sonoma County. The Impacts and Mitigation Measures section defines significance criteria used for the impact assessment and presents a discussion of potential project-related impacts and associated mitigation.

4.9.2 Affected Environment/Setting

Noise Background

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. The decibel measurement system is a logarithmic unit of measurement, such that a ten-fold change in sound pressure is represented by an increase of 10 dB.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a result, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).

Noise Exposure and Community Noise

An individual's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. In fact, community noise varies continuously with

time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. Background noise levels change throughout a typical day, but do so gradually, corresponding with the addition and subtraction of distant noise sources and atmospheric conditions. The addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens, etc.) makes community noise constantly variable throughout a day.

These successive additions and deletions of sound to the community noise environment change the community noise level from instant to instant requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

L_{eq}: The equivalent sound level is used to describe noise over a specified period of time, in terms of a single numerical value. The L_{eq} is the constant sound level which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

L_{max}: The instantaneous maximum noise level measured during the measurement period of interest.

L_{dn}: Day-Night Average Sound Level, or the energy average of the A-weighted sound levels occurring during a 24-hour period, and which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises. It should be noted that the L_{dn} is sometimes referred to as the DNL.

CNEL: The Community Noise Equivalent Level (CNEL) adds a 5-dBA *penalty* for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to a 10-dBA penalty for the nighttime hours between 10:00 p.m. and 7:00 a.m.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

1. subjective effects of annoyance, nuisance, and dissatisfaction;
2. interference with activities such as speech, sleep, and learning; and
3. physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers at industrial plants often experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way the new noise compares to the existing noise levels to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur (Caltrans, 1998):

1. Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;

2. Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference when the change in noise is perceived but does not cause a human response;

3. A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and

4. A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. A ruler is a *linear* scale, which has marks corresponding to equal quantities of distance, (i.e., the ratio of successive intervals is equal to one). A *logarithmic* scale is different in that the ratio of successive intervals is not equal to one. Each interval on a logarithmic scale is some common factor larger than the previous interval. A typical ratio is 10, so that the marks on the scale read: 1, 10, 100, 1,000, 10,000, etc., doubling the variable plotted on the x-axis. The human ear perceives sound in a non-linear fashion; hence, the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather they combine logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Point sources of noise, including stationary mobile sources such as idling vehicles or onsite construction equipment, attenuate (lessen) at a rate of 6.0 dBA to 7.5 dBA per doubling of distance from the source, depending upon the type (i.e., rough or smooth) of the ground surface between the source and receptor (Caltrans, 1998).

Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the affect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (VdB) is commonly used to measure root mean square amplitude. The decibel notation acts to compress the range of numbers required to describe

vibration (FTA, 2006). Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration.

Sensitive Receptors

Human response to noise varies considerably from one individual to another. Effects of noise at various levels can include interference with sleep, concentration, and communication, and can cause physiological and psychological stress and hearing loss. Given these effects, some land uses are considered more sensitive to ambient noise levels than others. California Government Code Section 65302 considers residences, schools, churches, libraries, office buildings, hospitals, and nursing homes to be the most sensitive to noise. Recreational areas can also be considered sensitive to noise. Commercial and industrial uses are considered the least noise-sensitive.

The nearest sensitive receptors to the proposed Estuary management area at Goat Rock State Beach are residences associated with the town of Jenner along the north bank of the Russian River. The closest residence is approximately 1,000 feet to the east of the proposed lagoon outlet channel, across the State Route 1 and the closest recreation area is Goat Rock State Beach, approximately 4,000 feet to the south.

Existing Ambient Noise Environment

The main contributors to the noise environment in the area are State Route 1 and wave action of the Pacific Ocean. Additional noise sources may include other man-made localized sources. Much of the study area is typified by relatively low noise levels due to the lack of loud noise sources. Average noise levels in the vicinity of the Estuary Management Project area range from approximately 40 dBA in areas set back from the highway to approximately 55 dBA adjacent to the highway.

4.9.3 Regulatory Framework

Federal, State, and local agencies regulate different aspects of environmental noise. Federal and State agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while local agencies regulate stationary sources. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans tend to identify general principles intended to guide and influence development plans, while local noise ordinances establish standards and procedures for addressing specific noise sources and activities.

Sonoma County General Plan

The Noise Element of the *County of Sonoma General Plan 2020* establishes the following goal, objectives, and policies to reduce existing and future noise impacts and conflicts (Sonoma County, 2008).

> **Goal NE-1:** Protect people from the adverse effects of exposure to excessive noise and to achieve an environment in which people and land uses may function without impairment from noise.

***Objective NE-1.1*:** Provide noise exposure information so that noise impacts may be effectively evaluated in land use planning and project review.

***Objective NE-1.3*:** Protect the present noise environment and prevent intrusion of new noise sources which would substantially alter the noise environment.

Policy NE-1a: Designate areas within Sonoma County as noise impacted if they are exposed to existing or projected exterior noise levels exceeding 60 dB L_{dn}, 60 dB CNEL, or the performance standards of Table NE-2 (presented below as **Table 4.9-1**).

Policy NE-1c: Control non-transportation related noise from new projects. The total noise level resulting from new sources shall not exceed the standards in Table NE-2 (presented below as Table 4.9-1) as measured at the exterior property line of any adjacent noise sensitive land use. Limit exceptions to the following: (4) For short term noise sources which are permitted to operate no more than six days per year, such as concerts or race events, the allowable noise exposures shown in Table NE-2 (presented below as Table 4.9-1) may be increased by 5 dB. These events shall be subject to a noise management plan including provisions for maximum noise level limits, noise monitoring, complaint response and allowable hours of operation. The plan shall address potential cumulative noise impacts from all events in the area.

TABLE 4.9-1
MAXIMUM ALLOWABLE EXTERIOR NOISE EXPOSURES FOR NON-TRANSPORTATION NOISE SOURCES

Hourly Noise Metric[a], dBA	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
L50 (30 minutes in any hour)	50	45
L25 (15 minutes in any hour)	55	50
L08 (5 minutes in any hour)	60	55
L02 (1 minute in any hour)	65	60

[a] The sound level exceeded n% of the time in any hour. For example, the L50 is the value exceeded 50% of the time or 30 minutes in any hour; this is the median noise level. The L02 is the sound level exceeded 1 minute in any hour.

SOURCE: County of Sonoma, 2008.

The *Sonoma County General Plan 2020* Noise Element does not specifically address intermittent or short-term construction noises, such as those that would occur under the Estuary Management Project, and there is currently no adopted noise ordinance in the County of Sonoma Municipal Code. The General Plan calls for the County to adopt a noise ordinance that will include noise performance standards as outlined in Table 4.9-1 as well as exemptions, measurement methods, and procedures for variances. However, a noise ordinance has not been adopted to date.

4.9.4 Environmental Impacts and Mitigation Measures

Significance Criteria

Consistent with the CEQA Guidelines Appendix G, the proposed Estuary Management Project would result in a significant impact on the environment if it would result in:

1. Exposure of persons to or generation of noise levels in excess of standards established in any applicable plan or noise ordinance, or applicable standards of other agencies.

2. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels

3. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above existing levels existing without the project.

5. Exposure of people residing or working in the project area to excessive noise levels, for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport.

6. Expose people residing or working in the project area to excessive noise levels if the project is located in the vicinity of a private airstrip.

Periodic short-term construction noise, such as that that would occur under the Estuary Management Project, is not addressed in the County of Sonoma General Plan 2020 Noise Element and County of Sonoma does not have an adopted noise ordinance. In addition, there are no noise standards of other agencies that would be applicable to the Estuary Management Project. Therefore, there is no potential that the Estuary Management Project would expose persons to or generate noise levels in excess of standards established in an applicable plan or noise ordinance, or applicable standards of other agencies, and no impact would occur. This issue is not addressed further in this EIR.

The Estuary Management Project would result in noise levels associated with the creation and periodic maintenance of the lagoon outlet channel and would not result in a permanent increase in ambient levels above levels existing without the Estuary Management Project. Therefore, there would be no impact associated with a permanent increase in noise levels and this issue is not addressed further in this EIR.

Implementation of the Estuary Management Project would not expose people residing or working in the area to excessive aircraft noise impacts. Therefore, no airport or airstrip related impacts would occur under the Estuary Management Project and this issue is not addressed further in this EIR.

Approach to Analysis

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

For the purposes of this EIR, temporary impacts during lagoon outlet channel creation and maintenance activities under the Estuary Management Project would be considered significant if they would substantially interfere with sensitive land uses, such as residences. Substantial interference could result from a combination of factors, including: exposing sensitive receptors to the generation of substantial (i.e., equal to or greater than 80 dBA) noise levels at sensitive receptor locations lasting long periods of time at any one location (i.e., more than one week); and/or construction activities that would affect noise-sensitive uses during the nighttime.

A numerical threshold to identify the point at which a vibration impact occurs has not been identified by Sonoma County standards or municipal codes. In the absence of local regulatory significance thresholds for vibration from construction equipment, it is appropriate to use a California Department of Transportation (Caltrans) identified PPV thresholds for adverse human reaction and risk of architectural damage to buildings, which are 0.010 inches per second and 0.20 inches per second, respectively (Caltrans, 2002).

Impact Analysis

Impacts associated with noise are summarized and categorized as either “less than significant,” “less than significant with mitigation,” or “significant and unavoidable.”

Impact 4.9.1: Ambient Noise Levels. The Estuary Management Project would result in periodic noise levels above existing ambient conditions. (Less than Significant with Mitigation)

Implementation of the Estuary Management Project would require the use of up to two pieces of heavy equipment, such as an excavator and/or bulldozer. At the start of the management period, when configuring the proposed lagoon outlet channel for the first time that year, it is anticipated that the machinery would operate for up to two consecutive working days in the vicinity of the lagoon outlet channel. As noted in **Chapter 2.0, Project Description**, the frequency of equipment operation on the barrier during the lagoon management period may be incrementally increased compared to existing conditions, and could include up to 18 additional maintenance activities over the course of the lagoon management period, depending upon the performance of the outlet channel. This represents a potential incremental increase in temporary noise impacts.

Table 4.9-2 presents the noise levels associated with a bulldozer and an excavator, and the combined noise level that would occur if the equipment would operate simultaneously. As indicated in the

TABLE 4.9-2
NOISE LEVELS ASSOCIATED WITH CONSTRUCTION EQUIPMENT

Equipment Description	Noise Level at 50 feet (dBA)
Bulldozer	85
Excavator	85
Combine Sound Level	88

SOURCE: FTA, 2006.

table, the combined equipment noise level would be up to 88 dBA at a distance of 50 feet from the proposed lagoon outlet channel.

For the purposes of this analysis, it is assumed that noise from a point source attenuates at a rate of 6.0 dBA per doubling of distance to account for the smooth sand and water surfaces at the Estuary Management Project site. At the closest sensitive receptor location approximately 1,000 feet from the proposed lagoon outlet channel site, the combined equipment noise level would be up to 62 dBA. This noise level may be perceived as a nuisance to the closest residences to the site. However, implementation of **Mitigation Measure 4.9-1** would require that activities at the lagoon outlet channel site that would involve the use of heavy equipment, be conducted during daytime hours. Implementation of this mitigation measure would insure that the periodic noise level increases in the vicinity of the proposed lagoon outlet channel site would be less than significant.

In addition to activities at the proposed lagoon outlet channel site, it is assumed that the Estuary Management Project would require approximately five small pickup truck trips to transport Water Agency staff to the project site (only a single vehicle drives on the beach) and up to two semi-tractor vehicle trips to transport the heavy equipment to the staging area at the Goat Rock State Beach north parking lot. Noise levels that would occur along the vehicle routes associated with a passing vehicle would range from a high 60-dBA to high 80-dBA range, depending on the type of vehicle and distance to the vehicle. Given the limited amount of vehicles that would be associated with operations of the Estuary Management Project and the limited amount of days per year that trips would occur, noise levels associated with off-site vehicle trips would be negligible and would result in a less than significant impact.

Mitigation Measures

Mitigation Measure 4.9.1: Time of Day Limits and Notice to Residents. The Water Agency shall limit activities at the lagoon outlet channel that involve the use of heavy equipment to between local sunrise to local sunset.

Impact Significance after Mitigation: Less than Significant.

Impact 4.9.2: Ground-borne Vibration. Estuary Management Project activities would generate ground-borne vibration levels. (Less than Significant)

Some types of construction equipment can produce vibration levels that can cause architectural damage to structures and be annoying to nearby sensitive receptors. Vibration levels generated by the Estuary Management Project would vary. Typical vibration levels for the equipment type that would generally result in the highest vibration levels associated with the Estuary Management Project (i.e., a large bulldozer) are presented in **Table 4.9-3**.

TABLE 4.9-3
VIBRATION SOURCE LEVELS FROM CONSTRUCTION EQUIPMENT

	Peak Particle Velocity (in/sec)
Distance (feet)	**Large Bulldozer**
75	0.017
100	0.011
150	0.006

SOURCE: FTA, 2006.

A numerical threshold to identify the point at which a vibration impact occurs has not been identified by County standards or municipal codes. Therefore, a PPV threshold identified by Caltrans is used in this analysis to determine the significance of vibration impacts related to adverse human reaction and risk of architectural damage to normal buildings. The PPV thresholds for adverse human reaction and risk of architectural damage to buildings are 0.010 inches per second and 0.20 inches per second, respectively (Caltrans, 2002). These respective PPV levels have been found to be annoying to people in buildings and can pose a risk of architectural damage to buildings.

The nearest residences would be approximately 1,000 feet to active Estuary Management Project construction equipment. At this distance, construction equipment PPV levels would be negligible and would be substantially less than the identified significance thresholds. Therefore, short-term vibration impacts would be less than significant and no mitigation would be required.

Impact Significance: Less than Significant; no mitigation measures are required.

4.9.5 References

California Department of Transportation (Caltrans), *Technical Noise Supplement*, October 1998. http://www.dot.ca.gov/hq/env/noise/pub/Technical%20Noise%20Supplement.pdf, Accessed September 26, 2008.

Caltrans, *Transportation Related Earthborne Vibrations (Caltrans Experiences):* Technical Advisory, Vibration TAV-02-01-R9601, February 20, 2002.

County of Sonoma, Permits and Resources Management Department, *County of Sonoma General Plan 2020*, Noise Element, adopted September 23, 2008.

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4.10 Air Quality

4.10.1 Introduction

This section describes the existing air quality conditions in the Russian River Estuary Management Project (Estuary Management Project or proposed project) area and evaluates potential impacts associated with air quality and greenhouse gas (GHG) emissions as a result of Estuary Management Project implementation. The Setting includes a discussion of the regional geography, climate and meteorology, and sensitive receptors. The Regulatory Framework describes pertinent state and local laws related to air quality and GHG emission considerations of the Estuary Management Project. The Impacts and Mitigation Measures section defines significance criteria used for the impact assessment and presents a discussion of potential project-related impacts.

4.10.2 Setting

The primary factors that determine air quality and GHG impacts are the locations of air pollutant sources and the amounts of pollutants emitted. Other important factors, which are discussed below, include regional geography, existing air quality, attainment status, climate and meteorology, sensitive receptors, and background on GHG emission and climate change.

Regional Geography

The Estuary Management Project Area includes the land surrounding the Russian River from the Pacific Ocean upstream to Duncans Mills in Sonoma County. This location is within the North Coast Air Basin (NCAB), which encompasses Del Norte, Humboldt, Trinity, Mendocino, and the northern portion of Sonoma counties. The NCAB is comprised of three air districts, the North Coast Unified Air Quality Management District, the Mendocino County Air Quality Management District, and the Northern Sonoma County Air Pollution Control District (NSCAPCD). The Estuary Management Project Area is under the jurisdiction of the NSCAPCD, which comprises the northern portion of Sonoma County.[1] The NSCAPCD regulates air quality within the portion of Sonoma County that falls within the NCAB (CARB, 2010a).

Existing Air Quality

The NSCAPCD operates a regional monitoring network that measures the ambient concentrations of criteria pollutants. Existing levels of air quality of concern in the study area can generally be inferred from ambient air quality measurements conducted by NSCAPCD at its closest stations, the Guerneville and Healdsburg monitoring stations located approximately eight miles and nineteen miles to the northeast of the Estuary Management Project Area, respectively. The Guerneville monitoring station measures concentrations of particulate matter equal to or less than 10 microns in diameter (PM10) and the Healdsburg station measures concentration of ozone (CARB, 2010b).

[1] The southern boundary of the NSCAPCD excludes approximately the southern one third of the County. The southern third of Sonoma County air is regulated by the Bay Area Air Quality Management District (BAAQMD) (NSCAPCD, 2010a).

Background ambient concentrations of pollutants are determined by pollutant emissions in a given area as well as wind patterns and meteorological conditions for that area. As a result, background concentrations can vary among different locations within an area. However, areas located close together and exposed to similar wind conditions can be expected to have similar background pollutant concentrations. **Table 4.10-1** shows a five-year (2005–2009) summary of PM10 monitoring data collected at the Guerneville station and ozone monitoring data collected at the Healdsburg station. The data are compared with the California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS). As indicated in the table, there have been no exceedances of the standards between 2005 and 2009. Following the table are summary descriptions of these criteria pollutants.

TABLE 4.10-1
AIR QUALITY DATA SUMMARY (2005–2009) FOR THE RUSSIAN RIVER ESTUARY MANAGEMENT AREA

Pollutant	Standard	Monitoring Data by Year				
		2005	2006	2007	2008	2009
Ozone (ppm)						
Highest 1 Hour Average		0.08	0.07	0.07	0.08	0.07
Days over 1 Hour State Standard	0.09	0	0	0	0	0
Highest 8 Hour Average		0.060	0.060	0.067	0.065	0.064
Days over 8 Hour National Standard	0.075	0	0	0	0	0
Days over 8 Hour State Standard	0.070	0	0	0	0	0
Particulate Matter (PM10) (µg/m^3)						
Highest 24 Hour Average		32	30	31	41	28
Days over State Standard	50	0	0	0	0	0
Days over National Standard	150	0	0	0	0	0
Annual Average		11.8	14.5	13.8	13.3	ND
Exceed State Standard?	20	No	No	No	No	ND

ppm = parts per million
µg/m^3 = micrograms per cubic meter; ND = No data available

Measurements are usually collected every six days. Days over the standard represent the estimated number of days that the standard would have been exceeded if sampling was conducted every day.

SOURCE: CARB 2010c.

Ozone

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and that can cause substantial damage to vegetation and other materials. Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and oxides of nitrogen (NOx). ROG and NOx are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours.

Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and NOx under the influence of wind and sunlight. Ozone concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds, like ozone.

Particulate Matter

PM10 and particulate matter equal to or less than 2.5 microns in diameter (PM2.5) represent fractions of particulate matter that can be inhaled into air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain absorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates can also damage materials and reduce visibility.

Attainment Status

The Sonoma County portion of the NCAB is considered in attainment[2] or unclassified for all of the State and federal standards (NSCAPCD, 2010b). Under the California Clean Air Act (CCAA), areas not in compliance with a State or federal standard must prepare an air pollution reduction plan. Since the northern Sonoma County portion of the NCAB is in attainment status for all criteria pollutants; it is not required to have an air pollution reduction plan.

Climate and Meteorology

Air quality is affected by the location, quantity, source, and the duration of pollutant emissions, and by meteorological conditions that influence movement and dispersal of pollutants. The degree of air pollution is dependent on the ability of the atmosphere to disperse the contaminated air. Atmospheric conditions, such as wind speed and direction, and topographic and climatologic factors also greatly determine the amount of pollution that concentrates in an area (BAAQMD, 1999).

Wind circulation, inversion, air stability, solar radiation, and topography all play a role in air pollution by reducing the amount of pollutants dispersed by and allowed to concentrate in the atmosphere. Higher wind speeds allow for more circulation and greater dispersion of pollutions, while lower wind speeds result in more stable air and allow for greater concentrations of pollutants. Inversions tend to cap the mixing of air to each layer and increase air stability, consequently limiting the amount of air circulation. The more stable the air, the slower the mixing, resulting in an increased probability for air pollutants to build up and exceed ambient air quality standards. The stability of the atmosphere is highly dependent upon the vertical distribution of temperature with height. Solar radiation increases

[2] Attainment is a term that applies to a geographical area identified to have air quality as good as, or better than, the national and/or California ambient air quality standards (NAAQS/CAAQS). An area may be an attainment area for one pollutant and a nonattainment area for others.

the potential for higher ozone levels. In the presence of ultraviolet sunlight and warm temperatures, ROG and NOx react to form secondary photochemical pollutants, including ozone. Surrounding topography, such as mountains, hills and valleys, affects wind patterns and wind speeds that play a role in the dispersal and concentration of air pollutants (BAAQMD, 1999).

The coastal regions of Sonoma County are influenced by marine winds and coastal fog that moderate temperature. Subsidence inversions, occurring when a warm air layer acts as a cap on an underlying cooler air layer, occur frequently, particularly during the fall and winter. These inversions trap pollutants released at ground level in the valleys (BAAQMD, 2007). This is especially true throughout the summer and during cold winter nights. Because of this cap effect, inland valleys are particularly susceptible to pollution problems. The topographical features that contour Sonoma County serve to channel surface flow, but also inhibit dispersion of pollutant emissions (USACE, 1982).

Predominant winds are typically out of the south during spring, summer, and fall and out of the northwest during the winter. Winds are most variable during winter and most persistent during summer. Wind speeds are highest during spring and lowest in fall. In coastal areas such as the Estuary Management Project Area, northwest (off-shore) winds are common in spring and summer. Calm conditions occur frequently during nighttime hours during all seasons, and during winter into the late morning hours (USACE, 1982).

Sensitive Receptors

For the purposes of air quality and public health and safety, sensitive receptors are generally defined as land uses with population concentrations that would be particularly susceptible to disturbance from dust and air pollutant concentrations, or other disruptions associated with project construction and/or operation. Sensitive receptor land uses generally include schools, day care centers, hospitals, residential areas, and parks. Some sensitive receptors are considered to be more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emissions sources, or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirmed are more susceptible to respiratory distress and other air quality-related health problems than the general public. Residential areas are considered sensitive to poor air quality because people usually stay home for extended periods of time, with associated greater exposure to ambient air quality. Recreational uses are also considered sensitive due to the greater exposure to ambient air quality conditions because vigorous exercise associated with recreation places a high demand on the human respiratory system.

With regard to the Project Area, the primary area of concern is Jenner, a small coastal community, near the mouth of the Russian River. The estimated population of Jenner ranges between 167 and 424 depending on the season (Zip Code Database, 2000). The closest residence to the proposed lagoon outlet channel is approximately 1,000 feet to the east, across the lagoon along State Route 1 (Coast Highway) and the closest recreation area is Goat Rock Beach.

Greenhouse Gas Emissions and Climate Change

Some gases in the atmosphere affect the Earth's heat balance by absorbing infrared radiation. These gases can prevent the escape of heat in much the same way as glass in a greenhouse. This is often referred to as the "greenhouse effect," and it is responsible for maintaining a habitable climate. On Earth, the gases believed to be most responsible for climate change are water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF_6). Enhancement of the greenhouse effect can occur when concentrations of these gases exceed the natural concentrations in the atmosphere. Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 primarily results from off-gassing associated with agricultural practices and landfills. SF_6 is a GHG commonly used in the utility industry as an insulating gas in transformers and other electronic equipment. SF_6, while comprising a small fraction of the total GHGs emitted annually world-wide, is a very potent GHG with 23,900 times the climate change potential as CO_2.[3] There is widespread international scientific agreement that human-caused increases in GHGs has and will continue to contribute to climate change, although there is much uncertainty concerning the magnitude and rate of the warming.

Some of the potential resulting effects in California of climate change may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, larger forest fires, and more drought years (CARB, 2008a). Globally, climate change has the potential to impact numerous environmental resources through potential, though uncertain, impacts related to future air temperatures and precipitation patterns. The projected effects of climate change on weather and climate are likely to vary regionally, but according to a report published by the Intergovernmental Panel on Climate Change (IPCC), effects are expected to include the following (IPCC, 2001):

1. Higher maximum temperatures and more hot days over nearly all land areas;
2. Higher minimum temperatures, fewer cold days and frost days over nearly all land areas;
3. Reduced diurnal temperature range over most land areas;
4. Increase of heat index over land areas; and
5. More intense precipitation events.

In addition, there are several secondary effects that are projected to result from climate change, including global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity. While the possible outcomes and the feedback mechanisms involved are not fully understood, and much research remains to be done, the potential for substantial environmental, social, and economic consequences over the long term may be high.

[3] Climate change potential is the potential of a gas or aerosol to trap heat in the atmosphere. CO_2 is assigned a climate change potential of 1.

4.10.3 Regulatory Framework

Air Pollutants of Concern

Criteria Air Pollutants

Regulation of air pollution is achieved through both national and State ambient air quality standards and emission limits for individual sources of air pollutants. As required by the federal Clean Air Act, the United States Environmental Protection Agency (USEPA) has identified criteria pollutants and has established national ambient air quality standards (NAAQS) to protect public health and welfare. The NAAQS are defined as the maximum acceptable concentration that may be reached, but not exceeded more than once per year. The USEPA has established the NAAQS for ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (i.e., PM10, PM2.5), and lead. These pollutants are called "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria.

To protect human health and the environment, the USEPA has set "primary" and "secondary" maximum ambient thresholds for all criteria pollutants. Primary thresholds are set to protect human health, particularly sensitive receptors such as children, the elderly, and individuals suffering from chronic lung conditions such as asthma and emphysema. Secondary standards are set to protect the natural environment and prevent further deterioration of animals, crops, vegetation, and buildings.

California has adopted more stringent ambient air quality standards (i.e., CAAQS) for most of the criteria air pollutants. **Table 4.10-2** presents the national and State ambient air quality standards and provides a brief discussion of the related health effects and principal sources for each pollutant. California has also established ambient air quality standards for sulfates, hydrogen sulfide, and vinyl chloride; however, air emissions of these pollutants are not expected to occur under the Estuary Management Project, therefore are not discussed further in the section.

Federal

Clean Air Act

The federal Clean Air Act (CAA) is a comprehensive federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes the USEPA to establish NAAQS to protect public health and the environment. The CAA specifies future dates for achieving compliance with the NAAQS and mandates that states submit and implement a State Implementation Plan (SIP) for local areas that do not meet the standards. The SIPs must include pollution control measures that demonstrate how the standards would be met.

State

The California Air Resources Board (CARB) is responsible for establishing and reviewing the State standards, compiling the California SIP and securing approval of the plan from the USEPA, conducting research and planning, and identifying toxic air contaminants. CARB also regulates mobile sources of emissions in California, such as construction equipment, trucks, and automobiles,

TABLE 4.10-2
AMBIENT AIR QUALITY STANDARDS FOR CRITERIA POLLUTANTS

Pollutant	Averaging Time	State Standard	National Standard	Health Effects	Pollutant Characteristics and Major Sources
Ozone	1 Hour 8 Hour	0.090 ppm 0.070 ppm	– 0.075 ppm	Short term exposures to high concentrations can irritate eyes and lungs. Long-term exposure may cause permanent damage to lung tissue.	Ozone is a secondary pollutant that is formed in the atmosphere through reactions between reactive organic gases (ROGs) and nitrogen oxides (NOx) in the presence of sunlight. Major sources of ROGs and NOx include combustion processes (including motor vehicle engines) and evaporative solvents, paints and fuels.
Carbon Monoxide (CO)	1 Hour 8 Hour	20 ppm 9.0 ppm	35 ppm 9 ppm	Classified as a chemical asphyxiant, CO interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen. Exposure to high CO concentrations can cause headaches, dizziness, fatigue, unconsciousness, and even death.	CO is an odorless, colorless gas that is formed by incomplete combustion of fuels. The primarily source of CO is the internal combustion engine, primarily gasoline-powered motor vehicles.
Nitrogen Dioxide (NO_2)	1 Hour Annual	0.18 ppm 0.030 ppm	– 0.053 ppm	Irritating to eyes and respiratory tract.	NO_2 is a reddish brown gas that is a by-product of combustion. Motor vehicles and industrial operations are the main sources of NO_2.
Sulfur Dioxide (SO_2)	1 Hour 3 Hour 24 Hour Annual	0.25 ppm – 0.04 ppm –	– 0.5 ppm 0.14 ppm 0.03 ppm	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	SO_2 is a colorless acid gas with a strong odor. Fuel combustion, chemical plants, sulfur recovery plants, and metal processing are the main sources of this pollutant.
Respirable Particulate Matter (PM_{10})	24 Hour Annual	50 µg/m^3 20 µg/m^3	150 µg/m^3 50 µg/m^3	May irritate eyes and respiratory tract, decreases in lung capacity, cancer and increased mortality. Produces haze and limits visibility.	Solid or liquid particles in the atmosphere. Sources include dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
Fine Particulate Matter ($PM_{2.5}$)	24 Hour Annual	– 12 µg/m^3	35 µg/m^3 15.0 µg/m^3	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Solid or liquid particles in the atmosphere. Major sources include fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning. PM2.5 may also be formed from photochemical reactions of other pollutants, including NOx, SO_2, and organics.
Lead	Monthly Quarterly	1.5 µg/m^3 –	– 1.5 µg/m^3	Disturbs the nervous system, kidney function, immune system, reproductive and developmental systems and the cardio vascular system.	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.

ppm = parts per million
µg/m^3 = micrograms per cubic meter

SOURCE: BAAQMD, 1999; CARB, 2008b.

and oversees the activities of California's air quality management districts, which are organized at the county or regional level. County or regional air quality management districts, such as the NSCAPCD, are primarily responsible for regulating stationary sources at industrial and commercial facilities within their geographic areas and for preparing the air quality plans that are required under the federal CAA and the California CAA.

Assembly Bill 32 – California Climate Change Solutions Act

In 2005, Executive Order S-3-05 was established, which set forth a series of target dates (listed below) by which statewide emissions of GHG would be progressively reduced:

1. By 2010, reduce emissions to 2000 levels;
2. By 2020, reduce GHG emissions to 1990 levels; and
3. By 2050, reduce GHG emissions to 80 percent below 1990 levels.

In 2006, California passed the California Climate change Solutions Act of 2006 (Assembly Bill [AB] No. 32; California Health and Safety Code Division 25.5, Sections 38500, et seq., or AB 32), which requires CARB to design and implement emission limits, regulations, and other measures, such that statewide GHG emissions are reduced to 1990 levels by 2020 (representing an approximate 30 percent reduction in emissions from "business as usual").

In June 2007, CARB directed staff to pursue 37 early actions for reducing GHG emissions under AB 32. The broad spectrum of strategies to be developed includes a Low Carbon Fuel Standard, regulations for refrigerants with high climate change potentials, guidance and protocols for local governments to facilitate GHG reductions, and green ports (CARB, 2007).

The CARB staff evaluated all the recommendations submitted on the GHG reduction strategies and published the *Expanded List of Early Action Measures To Reduce Greenhouse Gas Emissions In California* (CARB, 2007). Based on its additional analysis, CARB staff recommended the expansion of the early action list to a total of 44 measures. Nine of the strategies meet the AB 32 definition of discrete early action measures. Discrete early action measures are measures that became enforceable by January 1, 2010. The discrete early action items include: low carbon fuel standards for ethanol, biodiesel, hydrogen, electricity, compressed natural gas, liquefied petroleum gas and biogas; restrictions on high climate change potential refrigerants; landfill methane capture, smartway truck efficiency; port electrification; reduction of perfluorocarbons from the semiconductor industry; reduction of propellants in consumer products; a tire inflation program; and SF_6 reductions from non-electricity sector.

The 2020 target reductions are currently estimated to be 174 million metric tons of CO_2 equivalent (CO_2e). In total, the 44 recommended early actions have the potential to reduce GHG emissions by at least 42 million metric tons of CO_2e emissions by 2020, representing about 25 percent of the estimated reductions needed by 2020. CARB staff has developed 1990 and 2020 GHG emission inventories in order to refine the projected reductions needed by 2020. The 44 measures are presented in **Table 4.10-3** and are in the sectors of fuels, transportation, forestry, agriculture, education, energy efficiency, commercial, solid waste, cement, oil and gas, electricity, and fire suppression.

TABLE 4.10-3
RECOMMENDED AB32 GREENHOUSE GAS MEASURES TO BE INITIATED BY CARB BY 2012

ID #	Sector	Strategy Name	ID #	Sector	Strategy Name
1	Fuels	Above Ground Storage Tanks	23	Commercial	SF_6 reductions from the non-electric sector
2	Transportation	Diesel – Off-road equipment (non-agricultural)	24	Transportation	Tire inflation program
3	Forestry	Forestry protocol endorsement	25	Transportation	Cool automobile paints
4	Transportation	Diesel – Port trucks	26	Cement	Cement (A): Blended cements
5	Transportation	Diesel – Vessel main engine fuel specifications	27	Cement	Cement (B): Energy efficiency of California cement facilities
6	Transportation	Diesel – Commercial harbor craft	28	Transportation	Ban on HFC release from Motor Vehicle AC service/ dismantling
7	Transportation	Green ports	29	Transportation	Diesel – off-road equipment (agricultural)
8	Agriculture	Manure management (methane digester protocol)	30	Transportation	Add AC leak tightness test and repair to Smog Check
9	Education	Local gov. Greenhouse Gas (GHG) reduction guidance / protocols	31	Agriculture	Research on GHG reductions from nitrogen land applications
10	Education	Business GHG reduction guidance/protocols	32	Commercial	Specifications for commercial refrigeration
11	Energy Efficiency	Cool communities program	33	Oil and Gas	Reduction in venting/ leaks from oil and gas systems
12	Commercial	Reduce high Climate change Potential (GWP) GHGs in products	34	Transportation	Requirement of low-GWP GHGs for new Motor Vehicle ACs
13	Commercial	Reduction of perfluorocarbons (PFCs) from semiconductor industry	35	Transportation	Hybridization of medium and heavy-duty diesel vehicles
14	Transportation	SmartWay truck efficiency	36	Electricity	Reduction of SF_6 in electricity generation
15	Transportation	Low Carbon Fuel Standard (LCFS)	37	Commercial	High GWP refrigerant tracking, reporting and recovery program
16	Transportation	Reduction of HFC-134a from DIY Motor Vehicle AC servicing	38	Commercial	Foam recovery/ destruction program
17	Waste	Improved landfill gas capture	39	Fire Suppression	Alternative suppressants in fire protection systems
18	Fuels	Gasoline disperser hose replacement	40	Transportation	Strengthen light-duty vehicle standards
19	Fuels	Portable outboard marine tanks	41	Transportation	Truck stop electrification with incentives for truckers
20	Transportation	Standards for off-cycle driving conditions	42	Transportation	Diesel – Vessel speed reductions
21	Transportation	Diesel – Privately owned on-road trucks	43	Transportation	Transportation refrigeration – electric standby
22	Transportation	Anti-idling enforcement	44	Agriculture	Electrification of stationary agricultural engines

SOURCE: CARB, 2008d.

State Office of Planning and Research

Senate Bill (SB) 97 "2007 Statutes, Ch. 185" acknowledges that local agencies must analyze the environmental impact of GHG under the California Environmental Quality Act (CEQA). Furthermore, the bill requires the State Office of Planning and Research (OPR) to develop CEQA guidelines for analyzing and mitigating GHG emissions. To comply with requirements set forth in SB 97, OPR published a technical advisory titled *CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review*. This advisory acknowledges the need for a threshold for GHG emissions and notes that OPR has asked CARB to recommend a method for setting thresholds to encourage consistency and uniformity in GHG analyses in CEQA documents throughout the State (OPR, 2004).

In response to OPR's request, CARB has recommended that industrial projects that meet interim CARB performance standards for construction and transportation emissions, and emit no more than 7,000 metric tons of CO_2e per year from non-transportation related GHG sources, should be presumed to have a less than significant impact related to climate change. Non-transportation sources include combustion related components/equipment, process losses, purchased electricity, and water usage and wastewater discharge (CARB, 2008c).

Local

Northern Sonoma County Air Pollution Control District (NSCAPCD)

The air quality rules and regulations applicable to the North Coast Air Basin are set forth to achieve and maintain such levels of air quality as will protect human health and safety; prevent injury to plant and animal life; avoid damage to property; and preserve the comfort, convenience and enjoyment of the natural attractions of the North Coast Air Basin. It is the intent of all air districts in the North Coast Air Basin to adopt and enforce rules and regulations which assure that reasonable provision is made to achieve and maintain State and federal ambient air quality standards for the area under their jurisdiction and to enforce all applicable provisions of State law (NSCAPCD, 2010a).

Sonoma County Community Climate Plan

The Sonoma County Community Climate Plan was prepared to identify potential solutions to help the nine cities in Sonoma County achieve greenhouse gas reduction goals. The plan established greenhouse gas reduction targets and goals for major sectors including commercial, residential, transportation, and land use planning (Climate Protection Campaign, 2008).

Sonoma County

Local policies established in the *Sonoma County General Plan 2020* that govern air resources in the Project Area are summarized in Section 4.10 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**.

4.10.4 Environmental Impacts and Mitigation Measures

Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, implementation of the Estuary Management Project would have significant impacts on air quality or related to GHG emissions if it would:

1. Conflict with or obstruct implementation of the applicable air quality plan;
2. Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
3. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under a federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
4. Expose sensitive receptors to substantial pollutant concentrations;
5. Create objectionable odors affecting a substantial number of people;
6. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
7. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

There is no applicable air quality plan for the Estuary Management Project Area and the area is in attainment of all State and federal standards. There would be no potential that the Estuary Management Project would obstruct implementation of an applicable air quality plan, contribute to an existing air quality violation, or result in a cumulatively considerable net increase of a criteria pollutant that the area is in non-attainment of air quality standards. Therefore, there would be no impact associated with these issues and these issues are not addressed further in this EIR.

Approach to Analysis

The NSCAPCD recommends that CEQA documents for projects within the district boundaries use specific thresholds to determine significance for NOx, ROG, CO, and PM10. The significance threshold for NOx and ROG is 40 tons per year, the significance threshold for CO is 100 tons per year, and the threshold for PM10 is 15 tons per year (NSCAPCD, 2010b).

The NSCAPCD currently does not have adopted GHG thresholds of significance for CEQA review projects (NSCAPCD, 2010b). Therefore, to determine impacts associated with GHG emissions, the NSCAPCD recommends use of the Bay Area Air Quality Management District's approach to the determination of significance of GHG emissions based on the GHG significance threshold of 1,100 metric tons CO_2e per year for projects that are not stationary sources, such as the Estuary Management Project.

To determine the criteria pollutant and GHG emission levels that would be associated with the Estuary Management Project, emission factors were derived using CARB's Offroad2007 and EMFAC2007 emissions software (ESA, 2010). Once the emission factors were determined, they were compared to the significance thresholds mentioned above.

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment, and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

Impact Analysis

The following impact analysis focuses on potential impacts of the proposed Estuary Management Project related to air quality. The evaluation considered project plans, current conditions at the project site, and applicable regulations and guidelines. Impacts are summarized and categorized as either "no impact," "less than significant," "less than significant with mitigation," or "significant and unavoidable."

Impact 4.10.1: Criteria Pollutants. The Estuary Management Project would result in periodic emissions of criteria pollutants. (Less than Significant)

The on-site equipment that would be required for the creation and maintenance of the outlet channel would be up to two pieces of heavy machinery on the beach, such as an excavator and/or bulldozer, and approximately four to five staff vehicles (typically small pick up trucks) to transport staff to the Goat Rock State Beach parking lot.

At the start of the lagoon management period, when configuring the outlet channel for the first time that year, the machinery would operate for up to two consecutive working days. As noted in **Chapter 2.0, Project Description**, the frequency of equipment operation on the barrier during the lagoon management period may be incrementally increased compared to existing conditions, and could include up to 18 maintenance activities over the course of the lagoon management period, depending upon the performance of the outlet channel. This represents a potential increase over existing artificial breaching activities.

To yield a conservative estimate of emissions on an annual basis for the Estuary Management Project, it was assumed that one excavator or bulldozer, each with a maximum horsepower of 500, would be used for eight hours a day[4], 30 days a year. This represents a maximum conservative assumption; comprised of the maximum number of Agency breaching events that have occurred outside the lagoon management period (nine in 2009) plus initial outlet channel establishment, 18 maintenance events, and two contingency to account for emergency artificial breaches allowed under the Russian River Biological Opinion for imminent flood danger. Note

[4] The Water Agency has not, and does not anticipate work days of this length; however eight hours is a common and conservative assumption.

that if the outlet channel functions as designed, less maintenance may be necessary, but 18 represents the maximum allowed under permit conditions. With regard to off-site emission sources, it is assumed that five small pickup truck trips would be required to transport Agency staff to the Project site up to 30 days a year. In addition, up to two semi-tractor vehicle trips would be needed for each outlet channel established, for a total of 60 trips per year. Vehicles and equipment would be staged at the Goat Rock State Beach north parking lot. For a conservative analysis, it is assumed that the approximate distance driven per round trip would be 64 miles, representing the round trip distance to the Estuary Management Project site from Santa Rosa.

Table 4.10-4 presents the estimated criteria pollutant emissions that would be generated by on-site equipment and off-site vehicles that would be associated with the Estuary Management Project. Refer to **Appendix 2** for the emission factors and all other assumptions used to estimate the emissions. As indicated in the table, emissions of each of the criteria pollutants would be well under one ton and would be substantially less than the NSCAPCD significance criteria. Therefore, impacts associated with generation of criteria pollutants would be less than significant. It should be noted that the emissions presented in the table do not include those that would be associated with fugitive dust. Given the coarse and wet nature of the sediment that would be handled it is anticipated that fugitive dust emissions that would be associated with the Estuary Management Project would be negligible.

TABLE 4.10-4
ESTIMATED PROJECT-GENERATED CRITERIA POLLUTANTS (tons per year)

Source	ROG	CO	NO_X	PM10	PM2.5
On-Site Equipment	0.02	0.10	0.23	0.01	0.01
Off-Site Vehicles	<0.01	0.02	0.02	<0.01	<0.01
Total (tons per year)	***0.02***	***0.12***	***0.25***	***0.01***	***0.01***
Significance Threshold	40	100	40	15	---
Significant Impact?	No	No	No	No	No

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.10.2: Toxic Air Contaminants (TACs). The Estuary Management Project would result in emissions of TACs that could pose a health risk to sensitive receptors located in the project vicinity. (Less than Significant)

The primary TAC of concern that would be associated with the Estuary Management Project would be diesel particulate matter (DPM) from the combustion of diesel fuel associated with operations of heavy equipment. Health risk associated with exposure to DPM is typically associated with chronic exposure, in which 70-year exposure duration is often assumed. It is anticipated that the proposed Estuary Management Project would consist of periodic activities for up to 11 days per year for artificial breachings and 18 days for outlet channel maintenance and the closest sensitive receptor (i.e., a residential property in Jenner) to the proposed Estuary Management Project would be

approximately 1,000 feet from barrier beach work area. At this distance and proposed level of project activities, DPM concentrations associated with Estuary Management Project would be negligible. Since health risks associated with DPM are generally associated with chronic exposure, it can be assumed that Estuary Management Project-related emissions would cause a negligible net increase in health risk, and impacts on nearby sensitive receptors would be less than significant.

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.10.3: Objectionable Odors. The Estuary Management Project could create objectionable odors. (Less than Significant)

Typical odor sources of concern include wastewater treatment plants, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, auto body shops, rendering plants, and coffee roasting facilities. Given that Estuary Management Project would involve the periodic construction creation of a lagoon outlet channel at Estuary, the most prominent odor concern would be associated with diesel exhaust from heavy equipment activities. However, these odors would be temporary in nature and would not affect a substantial number of people given the long distance from the project site to the nearest sensitive receptors. The proposed project would not generate other odors, and odor-related impacts would be less than significant.

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.10.4: Greenhouse Gas Emissions. The Estuary Management Project would result in the generation of GHG emissions. (Less than Significant)

The NSCAPCD currently does not have adopted GHG thresholds of significance for CEQA review projects (NSCAPCD, 2010b). Therefore, as the lead agency for this project, the Water Agency has elected to use an approach for the determination of significance of GHG emissions based on the GHG significance thresholds adopted by the BAAQMD, which is 1,100 metric tons CO_2e per year for projects that are not stationary sources. Given that the Estuary Management Project would result exclusively in construction equipment and vehicle-related emissions that are not stationary sources, the Water Agency believes that the BAAQMD's significance threshold for non-stationary source projects is the most applicable air district-adopted GHG significance threshold available.

Table 4.10-5 presents the estimated GHG emissions that would be generated by on-site equipment and off-site vehicles that would be associated with the Estuary Management Project. The same project-related assumptions that were used to estimate the criteria pollutant emissions were used to estimate the GHG emissions. Refer to **Appendix 2** for the emission factors and all other assumptions used to estimate the GHG emissions. As indicated in the table, emissions of CO_2e

would be well under the BAAQMD significance criterion. Therefore, impacts associated with generation of GHG emissions would be less than significant.

TABLE 4.10-5
ESTIMATED PROJECT-GENERATED GREENHOUSE GAS EMISSIONS
(metric tons per year)

Source	CO_2	CH_4	NO_2	CO_2e
On-Site Equipment	19.89	<0.01	<0.01	20.09
Off-Site Vehicles	7.85	<0.01	<0.01	7.92
Total (metric tons per year)				***28.01***
Significance Threshed				1,100
Significant Impact?				No

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.10.5: Conflict with Climate Action Plan. The Estuary Management Project could conflict with a plan designed to reduce GHG emissions. (Less than Significant)

The Estuary Management Project would not conflict with the Sonoma County Community Climate Action Plan; therefore, the Estuary Management Project would not interfere with its implementation. Furthermore, it is assumed that the Estuary Management Project would not interfere with implementation of AB 32 because it would not conflict with the 44 Recommended Actions designed to achieve the 2020 GHG emissions limit required by AB 32 identified in CARB's Climate Scoping Plan. Impacts would be less than significant.

Impact Significance: Less than Significant; no mitigation measures are required.

4.10.5 References

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4.11 Transportation and Traffic

4.11.1 Introduction

This section evaluates whether implementation of the Russian River Estuary Management Project (Estuary Management Project) would result in potential adverse impacts related to transportation and traffic. The Setting describes regional and local access to the project area. The Regulatory Framework describes pertinent state, and local laws related to traffic considerations of the proposed project. The Impacts and Mitigation Measures section defines significance criteria used for the impact assessment and presents a discussion of potential project-related impacts. The evaluation and analysis are based, in part, on review of various maps, aerial imagery, and reports. The primary sources include available resources from the *Sonoma County General Plan 2020* (2008), Sonoma County Transportation Authority (SCTA), and California Department of Transportation (Caltrans).

4.11.2 Setting

The Estuary Management Project area is located within unincorporated Sonoma County. Under the *Sonoma County General Plan 2020*, circulation and transit planning are organized by specific planning areas. The Estuary Management Project is within the Sonoma Coast/Gualala Basin and the Russian River Planning Areas. The roadway network that would be used for access for construction workers and construction vehicles consists of regional highways and local roadways.

Regional and Local Roads

The Sonoma Coast/Gualala Basin region has a limited roadway network due to its remote location and low population density. The major highways are State Route 1 (SR 1) and SR 116. These roadways provide the primary means of travel throughout the study area. All highways in the region are two-lane rural roadways. The Russian River Area has a relatively extensive road network in the Russian River resort corridor. Many local roads are very narrow and do not meet modern standards. Traffic patterns in the Sonoma Coast/Gualala and Russian River Areas are affected primarily by recreational travel, particularly on weekends (Sonoma County, 2008).

SR 1, often called Highway 1, is a state highway that runs along much of the Pacific coast of California. SR 1 varies from a two-lane surface state highway (with at-grade intersections) to a multi-lane freeway (with ramp interchanges). The portion of SR 1 within the project area is a two-lane surface state highway and is classified as a “Rural Minor Arterial” under the Sonoma County General Plan. Traffic on SR 1 connects to Goat Rock Road, which leads to the project site. The most recent data published by Caltrans indicates the average daily traffic volume on SR 1 is about 2,650 vehicles between SR 116 and Jenner (Caltrans, 2009).

SR 116 is a two-lane surface highway connecting SR1 to SR 12, proceeding east along the north bank of the Russian River, from SR 1 to Guerneville, passing through Duncans Mills, Monte Rio, and Guernewood Park. In this section, it is generally called River Road. At Guerneville, the route

turns south-east and passes through Forestville, Graton, and Sebastopol (where it intersects SR 12) to join U.S. Highway 101 in Cotati. The portion of SR 116 through Duncans Mills and near the project area is classified as a "Rural Principal Arterial" under the Sonoma County General Plan. The most recent data published by Caltrans indicates the average daily traffic volume on SR 116 ranges from 2,400 to 8,400 vehicles between SR 1 and Guerneville (Caltrans, 2009).

Local Roads

Goat Rock Road is a paved narrow two-lane road that runs west from SR 1 to State Parks Road and provides access to the entrance of Goat Rock State Beach. This road is typically used by Goat Rock State Beach staff and visitors. Water Agency staff currently uses Goat Rock Road for access to breach the barrier beach that forms at the mouth of the Russian River, between one and thirteen times annually. This road would be used by project vehicles to access the proposed outlet channel site.

State Parks Road is a paved narrow two-lane road that connects Goat Rock Road to access points for Goat Rock State Beach. State Parks Road terminates at two parking lot facilities, one for north access to Goat Rock State Beach and one for south access. The south parking provides approximately 100 parking spaces and access to Goat Rock and south Goat Rock State Beach. The north parking lot provides approximately 35 parking spots and access to north Goat Rock State Beach and views of the mouth of the Russian River. This latter parking lot is currently used by Water Agency staff as a staging site for mechanically breaching the barrier beach at the mouth of the Russian River. Typically four to five staff vehicles caravan to the project area, and one staff vehicle and a bulldozer or similar equipment is offloaded in the parking lot during the breaching between one and thirteen times annually. Approximately two or three parking spaces are used for vehicle and equipment staging, however equipment or vehicle are removed daily and not stored overnight.

Transit

Sonoma County Transportation Authority (SCTA) provides access to the Russian River from Santa Rosa via Sebastopol. Sonoma County Transit also provides intercity transit service for the Russian River, serving the Jenner and Duncans Mills areas (SCTA, 2006 and Sonoma County, 2008). Route 28 serves the Russian River area and provides access between Guerneville, Villa Grande, Sheridan, Duncans Mills, Monte Rio, Camp Meeker, and Occidental. Route 28 operates Monday through Friday from 6:30 a.m. to 6:30 p.m.

Mendocino Transit Agency provides access to northern Mendocino County communities from Santa Rosa. Route 95 is routed on SR 1 and SR 12 and provides access to coastal communities from Santa Rosa north to Fort Bragg. Route 95 operates Monday through Saturday from 8:00 a.m. to 11:00 a.m. (southbound) and in the afternoon from 3:45 p.m. to 7:05 p.m. (northbound) (MTA, 2008).

Bicycle and Pedestrian Facilities

Under the *Sonoma County General Plan 2020,* bikeways are classified into three types denoting a degree of separation from traffic on the roadway, as follows:

1. Class 1: completely separated right-of-way designated for the exclusive use of bicycles;
2. Class II: a striped lane (right-of-way) on the roadways, designated for use by bicyclists; and
3. Class III: a shared right-of-way within the road width, designated as a bicycle route by signing or stenciling on pavement.

Although there are no existing designated bikeways within the Estuary Management Project area, SR 116 (River Road) is a highlighted bicycle route on Sonoma County's regional bicycle network (Sonoma County, 2008). Additionally, the bicycle system of Sonoma County is not complete and several upgrades are proposed within the project area:

1. Class 1 Bike Path (Proposed) adjacent to SR 116 (River Road) from Duncans Mills west to Jenner, called Willowcreek Trail;
2. Class II Bike Lane (Proposed) SR 116 (River Road);
3. Class II Bike Lane (Proposed) SR 1, south of the Russian River crossing and Goat Rock State Beach ; and
4. Class III Bike Route (Proposed) SR 1, north of the Russian River crossing and Goat Rock State Beach.

Pedestrian facilities provide safety to pedestrians against vehicular traffic and generally include sidewalks, crosswalks, and pedestrian signals. Sonoma County Transportation Authority distinguishes Pedestrian Districts for planning purposes (SCTA, 2008). Jenner is in the County of Sonoma Pedestrian District "T". Duncans Mills is in County of Sonoma Pedestrian District "K" (SCTA, 2008). Pedestrian facilities are very limited in Jenner. SR 1, which runs through Jenner, does not have sidewalks, stop signs, crosswalks or traffic lights. Likewise, Duncans Mills also has very limited pedestrian facilities, including limited sidewalk and no crosswalks, or pedestrian signals. However, Duncans Mills has sidewalk over the Moscow Road crossing of the Russian River.

4.11.3 Regulatory Framework

Federal

There are no federal regulations for transportation and traffic related to the proposed project.

State

Caltrans manages interregional transportation, including management and construction of the California highway system. In addition, Caltrans is responsible for permitting and regulation of the use of state roadways. The action areas include several roadways that fall under Caltrans' jurisdiction including SR 1 and SR 116.

Caltrans' construction practices require temporary traffic control planning during any time the normal function of a roadway is suspended (Caltrans, 2006). In addition, Caltrans requires that permits be obtained for transportation of oversized loads and transportation of certain materials, and for construction-related traffic disturbance. Caltrans regulations would apply to the transportation of construction crews and construction equipment through the project area (Caltrans, 2007).

Local

Sonoma County Transportation Authority (SCTA)

The SCTA was formed as a result of legislation passed in 1990. The SCTA serves as the coordinating and advocacy agency for transportation funding for Sonoma County. The SCTA acts as the countywide planning and programming agency for transportation related issues: securing funds, project oversight and long term planning.

Sonoma County Road Maintenance Districts

The road maintenance districts provide maintenance services on non-County roads in private subdivisions. The permanent road districts were established prior to the passage of Proposition 13. Road maintenance work within these districts is done on an as-needed basis, subject to the availability of funds which are collected through property assessment fees.

Sonoma County General Plan

Local policies established in the *Sonoma County General Plan 2020* that govern geologic resources in the project area are summarized in Section 4.11 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**.

4.11.4 Environmental Impacts and Mitigation Measures

Significance Criteria

The thresholds for determining the significance of impacts for this transportation and circulation analysis are based on the environmental checklist in Appendix G of the CEQA Guidelines. For this analysis, the project would be considered to have a significant impact on transportation and circulation if it would:

1. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;

2. Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;

3. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;

4. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);

5. Result in inadequate emergency access;

6. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

In addition to the above-listed criteria, the following criteria are derived from common engineering practice to apply to the project-specific analysis presented herein:

1. Substantially increase traffic safety hazards due to increased traffic volumes; or

2. Cause substantial damage or wear of public roadways by increased movement of heavy vehicles;

3. Cause substantial loss of parking facilities or inadequate parking capacity.

This analysis relies upon available information and field reconnaissance of roadway characteristics (e.g., pavement widths). Impacts to traffic and circulation that would result from increases in traffic volumes, loss of travel lanes and/or parking areas, and potential safety effects associated with construction were evaluated. Construction characteristics, including proposed manpower and equipment, location of construction, and rate of construction were used to conservatively determine the potential number of vehicles that could be required for the Estuary Management Project.

Several of the criteria included in Appendix G of the CEQA Guidelines do not apply to this analysis and are not used, as explained below.

Conflict with an Applicable Congestion Management Program and Exceedance of LOS Standards Established by the County Congestion Management Agency. During installation and maintenance of the outlet channel, traffic is anticipated to be similar to the existing traffic and circulation conditions within the action area, with the addition of a minimal increase in maintenance worker trips. Increases in traffic volumes generated by construction projects end when construction activities end. As such, county LOS standards are not used to judge potential project impacts presented herein.

Air Traffic Patterns. There are no airports within 10 miles of the project area; therefore the Estuary Management Project would not result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.

Increased Hazards Due to a Design Feature or Incompatible Uses. The Estuary Management Project would not include new design features within public roadways (e.g., new facilities or obstructions) or alterations of existing features (e.g., road realignment). In addition, traffic generated by the Estuary Management Project would be compatible with the mix of vehicle types (autos and trucks) currently using project area roads. Therefore, the Estuary Management Project would not result in hazards caused by a design feature or incompatible use.

Conflicts with Adopted Policies, Plans, or Programs Supporting Alternative Transportation. The Estuary Management Project would not directly or indirectly eliminate alternative transportation corridors or facilities (e.g., bike paths, lanes, bus turnouts, etc.). In addition, the Estuary Management Project would not include changes in policies or programs that support alternative transportation. Therefore, the Estuary Management Project would not conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Approach to Analysis

This analysis focuses on the potential for project implementation to affect roadways and traffic within the project area, defined above. It considers the proximity to the project and level of exposure to potential impacts. As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment, and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

Impact Analysis

Impacts associated with traffic and transportation are summarized and categorized as either "less than significant," "less than significant with mitigation," or "significant and unavoidable."

Impact 4.11.1: Conflict with Transportation Policies. The Estuary Management Project could conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit. (Less than Significant)

The Estuary Management Project would require limited vehicle and equipment use during the installation and maintenance of the proposed outlet channel. The vehicles would use SR 1, Goat Hill Road, Goat Rock Road, and State Parks Road to access the beach management area (proposed outlet channel site). Channel creation and maintenance related vehicle trips would include transportation of equipment and approximately four to five Water Agency vehicles traveling to and from the project area. Construction would be temporary, and vehicle use would be limited to one or two pieces of heavy equipment (e.g. excavator or bulldozer) and approximately four or five staff vehicles (typically small pickup trucks). The number of construction-related vehicles traveling to and from the project construction area would vary depending on the maintenance need, but would typically be four to five vehicles for the initial installation of the outlet channel, and fewer than that depending on the extent of the subsequent channel maintenance. At the start of the management period, when installing the outlet channel for the first time each year, construction vehicles may be in use up to two consecutive days. As noted in **Chapter 2.0, Project Description**, the frequency of equipment operation on the barrier during the lagoon management period may be incrementally increased compared to existing conditions, and could

include up to 18 maintenance activities over the course of the lagoon management period, depending upon the performance of the outlet channel. This represents an incremental increase in short-term truck trips.

Channel creation and maintenance traffic associated with the Estuary Management Project would be temporary and not result in significant increases in traffic volumes on roadways in the immediate vicinity of the proposed outlet channel at Goat Rock State Beach or along intended transportation routes. The installation and maintenance-related traffic would not interrupt intersections, streets, highways, mass transit service, or bicycle or pedestrian paths in the project area and would not significantly affect the effectiveness of the circulation system in the project area. Therefore, the Estuary Management Project would not conflict with applicable transportation policies in the project area, and the impact would be less than significant.

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.11.2: Emergency Access. The Estuary Management Project could substantially impede access to local streets or adjacent uses, including access for emergency vehicles. (Less than Significant)

The Estuary Management Project would require one or two pieces of heavy equipment (e.g. excavator or bulldozer) and approximately four or five staff vehicles (typically small pickup trucks) for installation and maintenance of the proposed outlet channel. Although vehicles and equipment would be staged in the Goat Rock State Beach north parking lot, they would be located adjacent to beach access and would not interrupt local access to the beach entrance or to State Parks Road. Additionally, all construction equipment and vehicles would be removed from the project site at the end of daily construction activities. Access to the parking lot and transportation routes, including Goat Rock Road and State Parks Road, would be maintained at all times during construction and maintenance of the proposed outlet channel, and therefore, impacts to emergency access would be less than significant.

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.11.3: Increased Traffic Safety Hazards. The Estuary Management Project could substantially increase traffic safety hazards due to increased traffic volumes. (Less than Significant)

As described for **Impact 4.11.1**, the Estuary Management Project would require limited equipment and vehicle use including one or two pieces of heavy equipment (e.g. excavator or bulldozer) and approximately four to five Water Agency vehicles for transporting staff to and from the project site. Equipment transportation and vehicle use would be temporary and short in duration

including one of two consecutive days for the initial installation of the outlet channel, and approximately once every weeks for maintenance during the lagoon management period.

As stated previously, there would not be a significant increase in traffic volumes on SR 1, Goat Hill Road, or State Parks Road resulting from construction traffic, nor would the project traffic substantially disrupt traffic flows on the local roadways or exceed the capacity of the street system. The traffic volumes associated with the Estuary Management Project would not substantially increase traffic safety hazards along transportation routes. The Estuary Management Project would have a less than significant traffic safety hazards impact.

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.11.4: Roadway Wear. The Estuary Management Project could cause substantial damage or wear of roadways by increased movement of heavy vehicles. (Less than Significant)

The equipment and vehicle use associated with the Estuary Management Project could cause damage and wear to roadway pavements. The degree to which this impact would occur depends on the existing roadway design (pavement type and thickness), and how many (and over what period of time) heavy vehicles would be generated by Project activities. State highways such as SR 1 and SR 116 are designed to accommodate a mix of vehicle types, including heavy trucks. The Project's impact would be negligible on those roads. Goat Rock Road and State Parks Road would be used by Project vehicles to access the proposed outlet channel site. However, as described for **Impact 4.11.1**, the Estuary Management Project would require only one or two pieces of heavy equipment and up to five Water Agency vehicles for transporting staff to and from the project site. The implementation and maintenance activities would be short-term and not substantial enough to cause accelerated degradation to the roadway, and therefore, the Estuary Management Project would have a less than significant impact on roadway pavements.

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.11.5: Parking. The Estuary Management Project could result in inadequate parking capacity. (Less than Significant)

The Estuary Management Project would require one or two pieces of heavy equipment (e.g. excavator or bulldozer) and approximately four or five staff vehicles (typically small pickup trucks) for installation of the proposed outlet channel. The Goat Rock State Beach north parking lot, located at the termination of State Parks Road, has approximately 35 existing parking spaces available for visitor use and provides access to Goat Rock State Beach. The Estuary Management Project would require use of the parking lot for staging of construction vehicles and equipment during

construction activities and for access to the channel outlet site. However, all construction equipment and vehicles would be removed from the project site at the end of daily construction activities.

The staging area would not impede local access to the beach entrance or to State Parks Road; however, it would require the use of approximately two or three parking spaces for equipment and four or five spaces for Water Agency vehicles, i.e., six to eight spaces in total. This would reduce the number of parking spaces available, which could inconvenience State Beach visitors; however, it would not result in inadequate parking for State Beach visitors, and the impact would be less than significant.

Impact Significance: Less than Significant; no mitigation measures are required.

4.11.5 References

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Sonoma County Permits and Resources Management Department (Sonoma County), *Sonoma County General Plan 2020*, Circulation Element, adopted September 23, 2008.

Sonoma County Transportation Authority (SCTA), Proposed and Existing City and County Bicycle and Pedestrian Facilities, in *SCTA Countywide Bicycle and Pedestrian Master Plan*, May 2008.

Sonoma County Transportation Authority (SCTA), Sonoma County Bus Routes Map, August 8, 2006, revised, August 22, 2006.

4.12 Hazards and Hazardous Materials

4.12.1 Introduction

This section presents the existing hazards conditions and hazardous materials and evaluates potential impacts associated with hazards and hazardous materials from implementation of the Russian River Estuary Management Project (Estuary Management Project or proposed project). This section includes the existing setting, a regulatory database search for the action area, and the federal, state, and local regulations related to hazardous materials that would apply to the Russian River Estuary Management Project. The Impacts and Mitigation Measures section defines significance criteria used for the impact assessment and presents a discussion of potential project-related impacts, and associated mitigation, where feasible.

4.12.2 Setting

According the U.S. Environmental Protection Agency (USEPA), materials and waste are considered hazardous based on four characteristics:

1. *Ignitability* – Ignitable wastes can create fires under certain conditions, are spontaneously combustible, or have a flash point less than 60 °C (140 °F). Examples include waste oils and used solvents.

2. *Corrosivity* – Corrosive wastes are acids or bases (pH less than or equal to 2, or greater than or equal to 12.5) that are capable of corroding metal containers, such as storage tanks, drums, and barrels. Battery acid is an example.

3. *Reactivity* – Reactive wastes are unstable under "normal" conditions. They can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or mixed with water. Examples include lithium-sulfur batteries and explosives.

4. *Toxicity* – Toxic wastes are harmful or fatal when ingested or absorbed (e.g., containing mercury, lead, etc.).

According to the California Health and Safety Code (Section 25501), “hazardous material” means any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. Hazardous materials released from historical land uses could be encountered within the footprint of the proposed project (i.e. the outlet channel and the Estuary to be maintained behind the barrier of the outlet channel).

Potential Presence of Hazardous Materials in Soil and Groundwater

Land use adjacent to the project area is primarily open space and recreation, agricultural, residential, and commercial. Agricultural operations may involve the use of fuels, oils and greases, pesticides and herbicides, and fertilizers. Pesticides, herbicides, and fertilizers are applied directly to the soil or the crops in soil, and potential releases of fuels, oils, and greases can occur through spills and leaks from equipment or storage tanks. In addition, there is potential for release of hazardous

materials from unregulated, private refuse dumps in remote areas. Commercial and industrial operations, such as gasoline service stations, have the potential to release hazardous materials to soil and groundwater. Residential land use can also result in the release of hazardous materials from heating oil tanks or other equipment.

The potential to encounter hazardous materials in soil or groundwater as a result of the project is based upon review of the regulatory agency database search on the State Water Resources Control Board Geotracker website. The Geotracker website identifies the following types of environmental cases: leaking underground storage tank (LUST) sites; land disposal sites; military sites; California Department of Toxic Substances Control (DTSC) cleanup sites; other cleanup sites; permitted underground storage tank (UST) facilities; and permitted hazardous waste generators. A total of four cases were identified within one mile of the lagoon outlet channel, of which two are open cleanup sites. These facilities, the Jenner Shell at 10444 Highway One and the Jenner Bombing Target UST, are located across Highway 1 bordering the Estuary and approximately a mile from Goat Rock State Beach.

Wildfire Hazards

The California Department of Forestry and Fire Protection (CAL FIRE) fire hazard severity zone map (CAL FIRE, 2007) identifies the project area as moderate fire hazard zone, the lowest of its three categories.

Airports

There are no airports in the project vicinity. The nearest public airports and private airstrips are located approximately 15 miles east of the project area.

4.12.3 Regulatory Framework

Federal

The USEPA is the lead federal agency responsible for enforcing federal regulations regarding hazardous materials and hazardous waste. The primary legislation governing hazardous materials and hazardous waste are the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Superfund Amendments and Reauthorization Act (SARA).

RCRA

RCRA regulates the generation, transportation, treatment, storage and disposal of hazardous waste by “large-quantity generators” (1,000 kilograms per month or more) through comprehensive life cycle or “cradle to grave” tracking requirements. The requirements include maintaining inspection logs of hazardous waste storage locations, records of quantities being generated and stored, and manifests of pick-ups and deliveries to licensed treatment/storage/disposal facilities. RCRA also identifies standards for treatment, storage, and disposal.

CERCLA

CERCLA, also known as Superfund, created a tax on the chemical and petroleum industries to provide for response and cleanup of hazardous substances that may endanger public health or the environment. CERCLA established requirements for abandoned hazardous waste sites and provided for liability of persons responsible for releases of hazardous waste at these sites.

SARA

SARA amended CERCLA to increase state involvement and required Superfund actions to consider state environmental laws and regulations. SARA also established a regulatory program for USTs and the Emergency Planning and Community Right-to-Know Act.

Toxic Substances Control Act (TSCA)

TSCA established the mechanisms by which the USEPA tracks, screens, and tests industrial chemicals that are currently produced or imported into the United States that may pose an environmental or human-health hazard.

Occupational Safety and Health Act

The Occupational Safety and Health Administration (OSHA) administers the Occupational Safety and Health Act, which requires special training of handlers of hazardous materials, notification to employees who work in the vicinity of hazardous materials, and acquisition from the manufacturer of material safety data sheets (MSDS). An MSDS describes the proper use of hazardous materials. The Act also requires and training of employees to remediate any hazardous material accidental releases.

State

The California Department of Toxic Substances Control (DTSC) is primarily responsible for the regulation of hazardous materials in California. DTSC is responsible for the management of hazardous substances and oversees the investigation and remediation of contaminated sites. The North Coast Regional Water Quality Control Board (RWQCB) is primarily responsible for the protection of groundwater and surface water resources from hazardous materials.

California Hazardous Waste Control Law, California Health and Safety Code, Division 20, Chapter 6.5

The California Hazardous Waste Control Law is the basic hazardous waste statute in California and is administered by DTSC. This law is similar to, but more stringent than RCRA and applies to a broader range of hazardous wastes and requires recycling and waste reduction programs.

Carpenter-Presley-Tanner Hazardous Substances Account Act, California Health and Safety Code, Division 20, Chapter 6.8

The Carpenter-Presley-Tanner Hazardous Substances Account Act authorizes DTSC and the RWQCB to require, oversee, and recover costs for the remediation of sites where contamination of soil and water present a hazard to human health or the environment.

California Occupational Safety and Health Act

The California Occupational Safety and Health Administration (Cal OSHA) regulates worker safety similar to federal OSHA but also requires preparation of an Injury and Illness Prevention Program, an employee safety program of inspections, procedures to correct unsafe conditions, employee training, and occupational safety communication. In addition, Cal OSHA regulations indirectly protect the general public by requiring construction managers to post warnings signs, limit public access to construction areas, and obtain permits for work considered to present a significant risk of injury, such as excavations greater than five feet.

Unified Hazardous Waste and Hazardous Materials Management Regulatory Program

Cal EPA adopted regulations in 1996 to establish a Unified Hazardous Waste and Hazardous Materials Management Regulatory Program and designated local agencies called Certified Unified Program Agencies (CUPA). The local agencies regulate hazardous substances management with respect to the following areas:

1. Hazardous waste generators and hazardous waste onsite treatment;
2. USTs;
3. Aboveground storage tanks;
4. Hazardous materials release response plans and inventories (business plans), including Unified Fire Code hazardous materials management plans and inventories; and
5. Risk management and accidental release prevention programs.

The CUPA in the project area is the County of Sonoma Department of Emergency Services, Hazardous Materials Division.

Waters Bill of 1985 (Business Emergency Plan/Hazardous Materials Business Plan)

Administered by the CUPA, the Waters Bill requires facilities, which meet minimum hazardous materials use/storage thresholds to file a Business Emergency Plan (BEP), or a Hazardous Materials Business Plan (HMBP). A BEP or HMBP includes a complete inventory of the hazardous materials being used and stored on a site. Employee training and emergency response plans and procedures for the accidental release of hazardous materials are also included in a BEP.

Safe Drinking Water and Toxics Enforcement Act (Proposition 65)

Administered by the CUPA, the Safe Drinking Water and Toxics Enforcement Act requires businesses, which use hazardous materials to post public notice of release of any accidental

hazardous materials, or other potential exposure to materials known to the State of California to cause cancer or reproductive toxicity. The Act prohibits such businesses from releases of hazardous materials into the environment at levels above identified risk levels.

La Follette Bill of 1986 (Risk Management Plan)

Administered by the CUPA, the La Follete Bill requires preparation of a Risk Management Plan (RMP) for commercial operations, which use hazardous materials at defined thresholds. The RMP includes management, engineering and safety studies, and plans for physical improvements to minimize accidental hazardous materials releases. Implementation of the RMP occurs via fire inspections, plan checking, BEP/HMBP disclosure requirements, and filing of the RMP (updated every three years).

Uniform Fire Code

The Uniform Fire Code is administered by the CUPA via regular site inspections. The code regulates the type, configuration, and quantity of hazardous materials that may be stored within structures or in outdoor areas.

Local

Sonoma County Municipal Code

Hazardous Materials Management Ordinance of Sonoma County (Ord. No. 5015 § 1, 1997.) Chapter 29 was established to regulate the storage, handling, and management of hazardous materials, and grants authority to the County or CUPA with jurisdiction to administer and enforce applicable laws and regulations governing hazardous materials.

Sonoma County Fire and Emergency Services Department

The Hazardous Materials (HazMat) Division is the CUPA that enforces the regulatory-based Hazardous Materials Business Plan Program, Hazardous Waste Program, Underground Storage Tank Program, Aboveground Petroleum Storage Act, Accidental Release Program, and portions of the Uniform Fire Code that address hazardous materials. The HazMat Division prepares the Sonoma County Hazardous Materials Area Plan and the Offshore Oil Spill Plan for the County.

Sonoma County General Plan

The *Sonoma County General Plan 2020* (2008) contains various policies that encourage fire safe practices and implementation of federal, state and county hazardous materials laws and regulations.

4.12.4 Environmental Impacts and Mitigation Measures

Significance Criteria

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the CEQA Guidelines. For this analysis, the project would be considered to have a significant impact associated with hazards and hazardous materials if it would:

1. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;

2. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;

3. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

Several of the criteria included in Appendix G of the CEQA Guidelines do not apply to this analysis and are not used, as explained below.

1. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;

2. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment; and

3. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area; and

4. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area.

5. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

The Estuary Management Project area is not located on an agency-listed hazardous materials site, nor is it located within a high fire hazard zone area. The project area is not located within one quarter mile of any schools. Additionally, there are no airports within 15 miles of the project area. Therefore, impacts associated with hazardous materials sites, wildland fire hazards and aviation/airstrip safety are not addressed further.

Approach to Analysis

This analysis considers the proximity and status of hazardous sites relative to the Estuary, and the potential for project implementation to introduce new hazards to the environment. As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of

artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

Impact Analysis

Impacts associated with hazards and hazardous materials are summarized and categorized as either "no impact," "less than significant," "less than significant with mitigation," or "significant and unavoidable."

Impact 4.12.1: Use of Hazardous Materials. The Estuary Management Project could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. (Less than Significant)

The Estuary Management Project includes the use of equipment to create a lagoon outlet channel and to conduct artificial breaching. The fuels, oils, and lubricants used in the equipment can be considered hazardous. However, the fuels, oils, and lubricants would not be placed on or in the outlet channel, nor in the Estuary as a part of the normal routine operations. Accidental releases of hazardous materials are addressed in the next potential impact below. Therefore, the potential hazard to the public or the environment would be less than significant.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.12.2: Accidental Releases of Hazardous Materials. The Estuary Management Project could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. (Less than Significant with Mitigation)

Project activities include the use of earth-moving equipment, such as an excavator, or bulldozer, and trucks to transport work crews and equipment. These activities are similar to existing operations to breach the barrier beach. Maintenance and fueling of vehicles and equipment would occur outside of the project area. As discussed above, hazardous materials would not be used as a part of the project activities. However, equipment and trucks would contain fuels, oils, and lubricants and an accidental release of small quantities of these materials could occur. The occurrence of this type of spill can be minimized through the use of best management practices. In addition, this type of spill could be cleaned up according to regulations and would not create a significant hazard to the public or the environment. Therefore, there would be a less than significant impact associated with the proposed project after implementation of **Mitigation Measure 4.12-2**.

Mitigation Measures

Mitigation Measure 4.12-2: To minimize the potential for accidental spills from equipment and to provide for a planned response in the event that an accidental spill does occur, the Water Agency shall implement the following construction best management practices:

1. Prohibit on-site fueling of vehicles and construction equipment;
2. Maintain spill containment and clean up equipment onsite; and,
3. Ensure that construction personnel are trained in proper material handling, cleanup, and disposal procedures.

Impact Significance after Mitigation: Less than Significant.

Impact 4.12.3: Emergency Access. The Estuary Management Project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. (Less than Significant)

Project activities could interfere with an adopted emergency response plan or emergency evacuation plan if activities involved the complete or partial closure of roadways, interfered with identified evacuation routes, otherwise restricted access for emergency response vehicles, or restricted access to critical facilities such as hospitals or fire stations. Project activities would occur within Goat Rock State Beach north of the beach parking lot at the end of Goat Rock Road. These activities will not close any roadways, affect identified evacuation routes, or restrict access for emergency vehicles. There would be a less than significant impact on emergency response and evacuation plans.

Impact Significance: Less than Significant; no mitigation measures are required.

4.12.5 References

Sonoma County Permits and Resources Management Department, *Sonoma County General Plan 2020*, adopted September 23, 2008.

State Water Resources Control Board (SWRCB), Geotracker, Sites within 5 miles of Jenner CA, available online: http://geotracker.waterboards.ca.gov/, accessed on April 20, 2010.

CAL FIRE, Fire Hazard Severity Zone Map in State Responsibility areas, November 7, 2007. Available online: http://frap.cdf.ca.gov/webdata/maps/sonoma/fhszs_map.49.pdf, accessed on July 29, 2007.

4.13 Public Services and Utilities and Public Safety

4.13.1 Introduction

This section describes the existing public services and utilities within the Russian River Estuary Management Project (Estuary Management Project or proposed project) area and evaluates potential impacts associated with disruption of services that could result from implementation of the Estuary Management Project. This section also addresses public safety concerns associated with creation of the outlet channel. The analysis is based on review of the guidance developed by regulatory agencies and local ordinances, and regulations set by the cities and counties in the action area. The Impacts and Mitigation Measures section defines significance criteria used for the impact assessment and presents a discussion of potential project-related impacts.

4.13.2 Setting

The following discussion provides the setting for the Estuary Project Area. As previously noted in **Chapter 2.0**, **Project Description**, under certain closed conditions, the Estuary may backwater to Monte Rio, and as far upstream as Vacation Beach. Although this condition may periodically occur, potential impacts related to public services and utilities are generally thought to be limited to the seven mile area downstream of Austin Creek, which is typically defined as the Russian River Estuary. Where appropriate, the public services and utilities within the maximum backwater area are characterized for context.

Public Services

Police Protection

The Sonoma County Sheriff's Office provides law enforcement, security services, and detention services for cities and unincorporated areas in Sonoma County. Headquartered in the City of Santa Rosa, the Sheriff's Office is divided into seven zones. The Estuary Management Project area is located within the 557-square mile River Zone (Zone 1). The River Zone is staffed from the Guerneville Substation, located at 1st & Church Streets in Guerneville, and encompasses 63 miles of the Sonoma coastline and unincorporated areas surrounding Guerneville. The substation is staffed with two sergeants and sixteen deputy sheriffs. In addition to the deputies from the Guerneville substation, there are three resident deputies and one community services officer who patrol the coastal areas (Sonoma County Sherriff's Office, 2009).

Fire Protection

Fire protection services are provided by the Sonoma County Fire and Emergency Services Department. The Department is comprised of four divisions: administration, fire services, hazardous materials[1], and emergency management. The Emergency Management Division of the Department of Emergency Services is responsible for the planning, coordination of response, recovery, and

[1] The Hazardous Materials Division is discussed in more detail in Section 3.12, Hazards and Hazardous Materials.

mitigation activities related to county-wide emergencies and disasters. There are several fire departments serving the project area and surrounding jurisdictions.

Russian River Fire Protection District (FPD), located at 14100 Armstrong Woods Road in Guerneville, serves communities along 18 miles of Russian River and is comprised of nine full-time employees, a Battalion Chief, two captains, three engineer/Emergency Medical Technicians (EMTs), and three Firefighter/Paramedics, and a shared Fire Chief. The primary station operates 24/7/365, while a secondary station located in Rio Nido provides equipment storage and meeting facilities. The Russian River FPD serves approximately 5,000 residents and 10,000 seasonal visitors (RR FDP, 2010).

Neighboring fire departments include Monte Rio Volunteer Fire Department (stations located on Highway 116 in Jenner, Duncans Mills, and Monte Rio) and Bodega Bay FPD, located at 510 Highway 1 in Bodega Bay. There are also a series of volunteer fire departments in the vicinity: Bodega Volunteer Fire Department (17184 Bodega Hwy, Bodega); Camp Meeker Volunteer Fire Department (Bohemian Highway, Camp Meeker); Valley Ford Volunteer Fire Department (14445 Highway 1, Jenner), and Occidental Volunteer Fire Department (Bohemian Highway, Occidental).

Emergency Medical Services and Facilities

The Coastal Valleys Emergency Medical Services (EMS) Agency[2], provides administrative and regulatory oversight responsibilities for the local EMS system within Sonoma County. The primary function of the EMS Agency is to plan, implement, and evaluate the local EMS system, which includes the licensing/permitting of ambulance provider companies, hospitals, coordination and monitoring of air and ground ambulances, certification/accreditation of pre-hospital care personnel such as EMTs and paramedics, policy development and implementation, medical control, quality improvement, and disaster medical response preparedness.

Pursuant to the California Health and Safety Code, Sonoma County designated the Sonoma County Department of Health Services as the Local Emergency Medical Services Agency. In Sonoma County all ambulances are staffed at an advanced life support (ALS) level while most first responder services are at the basic life support (BLS) level. Nine ground ambulance provider agencies and two helicopter providers (1 air ambulance & 1 ALS Rescue) provide emergency medical transportation in Sonoma County. In July 1999, Sonoma County entered into an exclusive franchise contract with Sonoma Life Support (SLS) to provide emergency ambulance and advanced life support services to a specified portion of the county. A mix of fire department based and private ambulance providers service the remainder of the County.

2 The EMS Agency operates under State authority established in Division 2.5 of the California Health and Safety Code, and Title 22, Division 9 of the California Code of Regulations. Local regulation of the EMS system is effected through the County Emergency and Pre-Hospital Medical Services System Ordinances, and EMS Agency policies and procedures.

There are seven hospitals in Sonoma County. There are no medical facilities within the seven-mile Estuary Project Area. The area is served by Santa Rosa Memorial Hospital, a St. John Healthcare affiliate, located at 1165 Montgomery Drive in Santa Rosa, which has 19 EMS stations and has been designated as a Level II trauma center (on site specialists) (Sonoma County, Department of Health Services, 2010).

Schools

In Sonoma County, there are 40-kindergarten through grade 12 school districts, 31 elementary school districts, and 6 unified districts. The project area is served by the Harmony and Monte Rio Elementary School Districts. Students attending elementary schools in the Harmony and Monte Rio Union districts transition into secondary schools in the West Sonoma County Union High School District.

There are no schools within the immediate seven-mile Estuary Project Area. The nearest schools are Harmony Elementary School and Salmon Creek Middle School located at 1935 Bohemian Highway, Occidental; Monte Rio Union Elementary School (K-8) located at 20700 Foothill Drive, Monte Rio (Sonoma County Office of Education, 2010).

Libraries

Sonoma County library system, comprised of 13 participating library branches, serves unincorporated areas in Sonoma County and participating cities. The nearest libraries to the project area are the Guerneville Regional Library (14107 Armstrong Woods Road, Guerneville) and the Occidental Library (73 Main Street, Occidental).

Postal Service

United States Postal Service receives and delivers mail at the United States Post Office, located at 10439 Highway 1, Jenner California, within the project area.

Utilities

Water and Sewer

Potable, commercial, industrial and agricultural water supplies in Sonoma County are derived from a number of sources, including surface water, groundwater, and recycled water. Residences and businesses in the Jenner and Duncans Mills rely heavily on groundwater wells. Additional water service and sewer service providers in the vicinity are described below.

Sweetwater Springs Water District

Sweetwater Springs Water District (SSWD) serves Guerneville, Monte Rio, Rio Nido and Ville Grande. SSWD was formed in 1988 after a public vote under Sonoma County Water District Law. SSWD acquired an existing water supply system from Citizens Utilities Company. SSWD serves approximately 3,800 accounts, primarily residential, for about 9,000 persons (SSWD, 2008).

Russian River Utility

The Russian River Utility (RRU) is a water and sewer management company that provides water and wastewater treatment, water distribution and water reclamation services. RRU manages the Jenner Water System, a "County Service Area Water System". County Service Area Water Systems are public municipal water systems which are under the water quality and reporting requirements of the California Department of Health Services. The fiscal budget and water rates are approved by the Sonoma County Board of Supervisors. The Jenner Water System serves 123 customers with surface water pumped from Jenner Creek. Raw water is treated in a multimedia gravity filter treatment plant and stored in a 100,000-gallon tank (RRU, 2010).

Cal Water Redwood Valley District

Cal Water's Redwood Valley District formed in 2000 with the purchase of the Redwood Valley Water Company and serves Lucerne, Duncans Mills, Guerneville, Dillon Beach and a portion of Santa Rosa (Cal Water 2010).

Russian River County Sanitation District (RRCSD)

The Water Agency operates the Russian River County Sanitation District (RRCSD)[3], which provides wastewater treatment, reclamation, and disposal services for a 2,700-acre service area that includes the unincorporated areas of Rio Nido, Guerneville, Guernewood Park, and Vacation Beach. RRCSD operates under an individual permit from the California Regional Water Quality Control Board North Coast Region that sets the requirements for operation. The RRCSD treatment plant provides service to approximately 3,300 customers using a gravity collection system and treats wastewater from approximately 3,200 equivalent single-family dwellings (SCWA, 2010a).

There are also residences and other buildings in Jenner and Duncans Mills within the Estuary Project Area operating on septic systems.

Solid Waste Processing and Disposal Facilities

Sonoma County Waste Management Agency (SCWMA) provides recycling, garbage, and yard waste collection services in the project area. The nearest designated disposal sites to the project area are the Guerneville Transfer Station (13450 Pocket Road/Highway. 116) (SCWMA, 2010).

Hazardous Waste Facilities

SCWMA provides household and business hazardous waste collection services on Tuesdays and Wednesdays, 7:30 a.m. to 2:30 p.m. at the Central Disposal Site, located at 500 Mecham Rd., Petaluma. Appointments and fees are required for business materials disposal. SCWMA also sponsors a "Community Toxics Collection" which allows scheduled pick-ups in locations proximate to the project area, such as Guerneville and Monte Rio (SCWMA, 2010).

[3] RRCSD began operating in 1983, and during a 1995 restructuring of the county government, the Water Agency began managing the RRCSD.

Electricity

Pacific Gas and Electric (PG&E) is the primary electric service provider for businesses and residences in Jenner and Duncans Mills.

Mosquito Abatement

The Marin/Sonoma Mosquito and Vector Control District (MSMVCD) was the first mosquito abatement district to be established. MSMVCD includes an area of 2,300 square miles, with a human population of 715,000 (MSMVCD, 2007). The mission of the MSMVCD is to protect the comfort and health of the public through the abatement of mosquitoes and other vectors. In July 2004, the MSMVCD adopted an Integrated Vector Management Program and expanded the area of coverage to include all of Marin and Sonoma Counties. The MSMVCD's Integrated Vector Management Program (IVMP) establishes guidelines for incorporating six types of activities to facilitate an effective mosquito and vector control program. These activities include: 1) Surveillance, 2) Communication, 3) Education, 4) Physical Control, 5) Biological Control, and 6) Chemical Control (MSMVCD, 2004).

There are more than fifty species of mosquitoes in California, of which twenty-two are in Marin and Sonoma Counties (MSMVCD, 2008). The most common mosquito species in wetlands of Marin and Sonoma Counties are the *Anopheles freeborni* (Aitken), *Aedes dorsalis* (Meigen), *Aedes squamiger* (Coquillett), and *Culex tarsalis* (Coquillet) (MSMVCD, 2000).

4.13.3 Regulatory Framework

General Local Policies

Local policies established in the *Sonoma County General Plan 2020* that govern geologic resources in the project area are summarized in Section 4.13 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**.

Public Safety

Sonoma County Water Agency Standard Operating Procedures for Breaching

During breaching, public access to the beach is restricted using barricade tape and signage, and assigning an onsite contact for emergency response and/or rescue procedures and to perform site control during heavy equipment operation. Warning signs are posted prior to the breaching event 750 feet on each side of the proposed channel location. Stop work orders may be issued when work conditions are hazardous, including storms and high surf. The Water Agency notifies safety and other agencies with jurisdiction, including Sonoma Coast State Parks lifeguards and Monte Rio Fire Department, and posts notifications near the barrier beach 24 hours before to 24 hours after breaching. Some of the protocols are required by the State Parks temporary use permit (SCWA, 1999).

Prior to operation, employees and contractors are required to verify all heavy equipment is in good working order (track alignment, lubrication, hydraulics). Experienced and qualified heavy equipment operators will be used (Journeyman[4] level is preferred). Pre-excavation, on-site safety briefings (employees and contractors) will occur daily or as needed to discuss and review the work plan, personal protective equipment, communications, emergency procedures, etc. Safety equipment for all staff includes life jackets, throw ring and rope, air horns, and hand held radios. Onsite staff carries a list of emergency contacts. Radio personnel with active radio communication are strategically stationed, including one on an adjacent cliff, to observe overall safety parameters.

If emergency response is required, observation staff would contact dispatch 9-1-1 by radio and notify State Parks at Duncans Mills, the local fire department and the US Coast Guard. If drowning or engulfment were to occur, the standby person would immediately notify the observation staff of the emergency and proceed to dispatch the rescue throw bag (life ring) and retract lifeline to save the victim.

4.13.4 Environmental Impacts and Mitigation Measures

Significance Criteria

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the CEQA Guidelines. For this analysis, the project would be considered to have a significant impact on public services and utilities if it would:

1. Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services: fire protection, police protection, schools, parks, other public facilities;

2. Conflict with wastewater treatment requirements of the applicable Regional Water Quality Control Board;

3. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;

4. Require or result in the construction of new storm water drainage facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects;

5. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed;

6. Result in a determination by the wastewater treatment provider that would serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments;

7. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs; and

[4] "Journeyman" refers to a skill level required for a specific trade (above novice, below master).

8. Comply with federal, state, and local statutes and regulations related to solid waste.

Additional significance criteria are considered in this analysis to determine potential effects to public safety. For this analysis, the project would be considered to have a significant impact on public services and utilities if it would:

1. Substantially affect public safety; and

2. Affect the use of septic tanks or alternative waste water disposal systems where sewers are not available for wastewater disposal.

Based on the nature and function of the Estuary Management Project, several of the criteria included in Appendix G of the CEQA Guidelines do not apply to this analysis and are not used, as explained below.

Impacts from New Water/Wastewater Facilities. The project involves continued artificial breaching, consistent with existing practices, and grading on the barrier beach to create an outlet channel to enhance fish habitat; the project would not require additional public services. The Estuary Management Project would not require or result in direct construction of water or wastewater facilities; therefore there would be no environmental effects associated with creation of new water or wastewater facilities.

Impacts from New Stormwater Facilities. The project involves continued artificial breaching, consistent with existing practices, and grading on the barrier beach to create an outlet channel to enhance fish habitat; the project would not require additional public services. The project is proposed to moderate water levels in the Estuary and would not affect stormwater retention or drainage such that existing facilities would need to be upgraded or new facilities would be required; therefore there would be no environmental effects associated with construction of new stormwater facilities. Refer to **Section 4.3, Water Quality**, for a discussion of drainage systems and potential impacts to permeability and infiltration.

Water Supply. The Estuary Management Project would not demand water supplies in excess existing entitlements and resources available to serve the project from, or require new or expanded entitlements. The project involves continued artificial breaching, consistent with existing practices, and grading on the barrier beach to create an outlet channel to enhance fish habitat; the project would not require additional water supplies. The project does not require water supply from existing entitlements, nor would it require new entitlements or resources; therefore there is no impact to water supply.

Solid Waste. The Estuary Management Project would not be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs. The project involves continued artificial breaching, consistent with existing practices, and grading on the barrier beach to create an outlet channel to enhance fish habitat; the project would not generate solid waste, demand waste disposal services, or contribute materials to a landfill with limited capacity. The quantity of sand moved to create the outlet channel would depend on beach topography at the time of project implementation, and would not exceed 2,000 cubic yards. Any sand excavated from the channel would be placed on the adjacent beach within the wave wash zone to promote natural removal to minimize changes to beach topography outside the outlet channel; it would not be transported or disposed of

offsite. Therefore, the proposed project has no impact on landfill capacity and would not violate solid waste regulations.

Approach to Analysis

This analysis considers the potential for implementation of the Estuary Project to exceed regulatory thresholds defied above, or interfere with provision and/or use of public services. Services and service providers within the project area, defined above, and considered in the analysis.

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

Impact Analysis

Impacts associated with public services and utilities and public safety are summarized and categorized as either “no impact,” “less than significant,” “less than significant with mitigation,” or “significant and unavoidable.”

Impact 4.13.1: Emergency Response Times and Public Facilities. The Estuary Management Project could result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services: fire protection, police protection, schools, parks, other public facilities. (Less than Significant)

The project involves continued artificial breaching, consistent with existing practices, and grading on the barrier beach to create an outlet channel to enhance fish habitat; the project would not require additional public services. The project does not include alternation of existing governmental facilities, nor would it increase the demand for emergency or public services such that additional facilities would be required to meet acceptable service ratios, response times, or other performance objectives. Creating and maintaining the outlet channel would require one or two pieces of heavy equipment (e.g. excavator or bulldozer) to move sand on the beach. Presence and activity of construction equipment would not occur within emergency access routes and would not affect response times for emergency service providers. There are no schools within the project area; therefore there would be no affect to performance of school facilities. Please refer to **Section 4.7, Recreation**, for a discussion of impacts to parks.

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.13.2: Conflict with regulatory requirements. The Estuary Management Project could conflict with wastewater treatment requirements of the applicable Regional Water Quality Control Board. (Less than Significant).

The project involves artificial breaching, consistent with existing practices, and grading on the barrier beach to create an outlet channel to enhance fish habitat; the project would not require additional public services. The project would not generate wastewater that would be processed at a wastewater treatment regulated by the North Coast Regional Water Quality Control Board; therefore there is no conflict with wastewater treatment requirements.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.13.3: Public Safety. The Estuary Management Project could substantially affect public safety at the outlet channel location during channel creation. (Less than Significant with Mitigation)

During continued artificial breaching and outlet channel creation, the Water Agency will deploy and operate heavy machinery on the beach. This activity is consistent with existing artificial breaching practices, which are currently implemented in accordance with the Water Agency's Standard Operational Procedures. To minimize hazards to beach visitors, the Water Agency will contact California State Parks lifeguards, post advanced signage, and restrict beach access. Additionally, as part of project implementation, the Water Agency will continue to implement and comply with their Standard Operational Procedures, discussed in detail in **Section 4.13.3, Regulatory Framework**. After outlet channel establishment, construction vehicles will be removed and beach access will be restored. While public citizens are responsible for safe enjoyment of the beach, the Water Agency will implement **Mitigation Measure 4.13.1**, which requires installation of signage at key locations to notify the public of potential safety hazards associated with beach erosion and hydrologic action at the outlet channel or artificial breaching location.

Mitigation Measures

Mitigation Measure 4.13.1: Following outlet channel creation or artificial breaching, the Water Agency will install semi-permanent signage notifying beach users of channel conditions, potential for safety hazards from beach erosion or hydrologic action, and emergency contact information. Signage should be posted and maintained at key locations, such as the parking lot at Goat Rock State Beach Parking lot, the unofficial beach access trail located on the north side of the beach off Highway 1, and 100 feet on either side of the outlet channel.

Impact Significance after Mitigation: Less than Significant.

Impact 4.13.4: Septic Tanks. The Estuary Management Project could substantially affect the function of septic tanks or other alternative waste water disposal systems. (Less than Significant)

During the lagoon management period, Estuary water level is anticipated to be maintained between seven and 9 feet for duration of as long as five months. As required under the NMFS Russian River Biological Opinion, the Water Agency evaluated the types of properties, structures, and associated infrastructure that would potentially be inundated under altered water levels. As described earlier (**Chapter 3.0, Project Background and Environmental Setting**), portions of approximately 78 parcels would be inundated at a water surface elevation of 9 feet within the Estuary Study Area. Additional parcels may be affected within the maximum backwater area. In most cases, the area of inundation would comprise channel margin ("shoreline") and beach areas only, and no structures (e.g., homes, sheds, septic tanks, boat docks, etc.) would be directly affected. However, in a few cases, a preliminary analysis using elevation data, and parcel information (SCWA, 2010b) suggests that existing septic systems that serve several of the parcels could be affected if Estuary water levels rise to 10- to 12-feet. Direct effects to septic systems would be low. However, increased water levels over a longer duration could result in secondary effects from increased groundwater seepage and corresponding increased groundwater levels that could inundate septic leach fields, curtailing processing function and potentially pushing sewage upward. Two parcels with septic leach fields, indentified by their Assessor's Parcel Number (APN), would potentially be affected at the 10- to 12-foot level:

1. ***APN 099-140-089*:** Parcel consists of four rental houses on the west side of Highway, south of Rivers End; at least one of which still operated on redwood box cesspools. Existing site constraints indicate that likely none of the units currently have adequate leach fields. Water Agency consultation with the landowner determined septic systems are generally considered to be at risk at higher water elevations (10- to 12-feet).

2. ***APN 099-150-012*:** Parcel does not contain structures; however consists of a septic system that serves five adjacent private residences and four cabins. Based on consultation with the landowner, it was determined that the leach fields serving these residences may be at risk at higher water elevations (10- to 12-feet).

The increase in the duration over which these septic leach fields could be annually inundated by increased groundwater levels could result in potentially more damage than that which is sustained under existing conditions and Estuary management activities. However, several factors render this potential impact to less than significant. First, the current operating condition of the leach fields suggests that the function is already compromised, and Estuary Management Project contribution would only be incremental compared to the current condition. Second, as discussed in **Chapter 2.0, Project Description**, target water level is seven feet; impacts to septic leach fields are not expected to occur until water level increases to higher 10- to 12-foot levels. Historically, Estuary water levels have reached 10- to 12- feet, particularly during high flow years or during winter storm events when artificial breaching was not executed. Based on consideration of the risk, and additional consideration factors, potential impact to the septic leach fields serving structures on two parcels would be less than significant.

Impact Significance: Less than Significant; no mitigation required.

Impact 4.13.5: Mosquito Abatement. The Estuary Management Project could increase the frequency and duration of water levels in the Estuary during the lagoon management period, and would inundate vegetated areas adjacent to the existing shoreline. Increased inundation area could increase potential mosquito breeding habitat adjacent to the Estuary. (Less than Significant)

During the lagoon management period, Estuary water level is anticipated to be maintained between 7 and 9 feet for duration of as long as five months. As previously noted in Section 4.4, Biological Resources, water surface elevations of between 7 and 9 feet would inundate approximately 45 acres, consisting primarily of gravel bar/mudflat, freshwater marsh, and riparian scrub vegetation. These areas have been episodically inundated approximately 52 times since 1996. With increased duration of inundation, mudflat, Coastal and Valley Freshwater Marsh, and northern riparian/coastal scrub assemblages may convert or shift towards higher elevations (i.e., some additional wetland and riparian vegetation may grow above the managed surface water elevation because increasing groundwater levels would induce suitable conditions for the establishment of such vegetation, such as prolonged inundation or soil saturation during the growing season).

Mosquito breeding habitat is common to Estuary areas, and exists within the Estuary itself, along the shoreline at fluctuating water levels, within its tributaries, and on lands adjacent to the Estuary where standing water and vegetation provide breeding, egg laying, and larval development opportunities for mosquitoes. Although water surface elevations would be increased, conditions for mosquito breeding are not anticipated to be substantially altered from existing conditions within the Estuary as whole.

The Water Agency, in implementing the Estuary Management Project as required by NMFS, has in place both short-term measures to avoid impacts associated with creation and maintenance of the freshwater lagoon, as well as long-term monitoring programs that will allow for the review and determination of potential adverse effects associated with implementation of the Estuary Management Plan. It is anticipated that conditions resulting from the Estuary Management Plan would be consistent with the range of conditions currently experienced in the Estuary, and that its implementation would result in conditions that are more natural relative to observed conditions in other estuary systems on the West Coast. Therefore, potential impacts to mosquito control and abatement would be less than significant.

Impact Significance: Less than Significant; no mitigation required.

4.13.5 References

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4.14 Aesthetics

4.14.1 Introduction

This section describes the existing aesthetic resources in the Russian River Estuary Management Project (Estuary Management Project or proposed project) area and evaluates potential impacts on aesthetic resources as a result of Estuary Management Project implementation. Aesthetic resources, commonly referred to as visual resources, are defined as the visible natural and built environment. Aesthetic resources provide visual enhancement and have often been acknowledged as worthy of preservation for purely aesthetic reasons. Scenic vistas, roadways, and corridors are documented in general plans and resource management plans for the purpose of protecting or preserving aesthetic resources. This analysis evaluates potential impacts of the Estuary Management Project on views from designated scenic roads, scenic areas, and/or public view corridors.

4.14.2 Setting

The visual setting for the Estuary Management Project includes the Russian River Estuary itself and the surrounding viewshed, from the Pacific Ocean up River Road to Duncans Mills and Austin Creek.[1] The Goat Rock and Willow Creek areas of the Sonoma Coast State Beaches are part of the visual setting. Current visible activities in these areas include the continual management of the Russian River through current breaching activities along the beach. Other recreational activities are nearly always evident; from sightseers on the roads and in Jenner, to hikers, bikers, and campers in the State Park lands.

The Open Space and Resource Conservation Element of the S*onoma County General Plan 2020* (2008) identifies two designated scenic resources in the area: scenic highway corridors, and scenic landscape units. Those designated scenic resources within the project area are discussed below.

Designated Scenic Landscape Units

Landscape units are based on combinations of physical and cultural features that result in similar visual quality. A landscape unit is a geographically distinct portion of an area that has a particular visual character or set of topographic features. These units are strictly aesthetic delineations based on multiple factors including land use and degree of urbanization[2], position in the landscape, topography, and vegetation, among others. The following major landscape units designated in the Sonoma County General Plan occur within the project area:

1 As previously noted in **Chapter 2.0**, **Project Description**, under certain closed conditions, the Estuary may backwater to Monte Rio, and as far upstream as Vacation Beach. Although this condition may periodically occur, potential impacts related to aesthetics are generally thought to be limited to the seven mile area downstream of Austin Creek, which is typically defined as the Russian River Estuary.

2 Please refer to Section 3.6 for a detailed description of land use within the project area.

1. Sonoma Coast along State Route 1, overlooking the Pacific Ocean from hilly terraces north of the Russian River, flat terraces south of the Russian River, and from cliffs and landslide areas in between. The rocky coastline draws world travelers year-round.

2. State Route 116/River Road follows the Russian River and is comprised of a variety of landscapes, including the open Santa Rosa Plain planted with vineyards, orchard-covered hillsides, and open agricultural lands. The lower Russian River corridor narrows from broad agricultural valleys to dense forests with steep slopes and redwood groves. The towns of Forestville, Guerneville, and Monte Rio are located next to the Russian River and comprised of small commercial areas and rural residential development. Below the historic area of Duncans Mills, the scenic river corridor becomes less populated until it intersects State Route 1.

Designated Scenic Highways and Corridors

Scenic corridors are lands comprised of scenic and natural features visible from designated highway rights-of-way. Boundaries of a scenic corridor are determined by the visible landscape as defined by topography, vegetation, viewing distance, or jurisdictional lines. Duration of exposure is proportionate to the distance traveled, speed and the extent of the scenic corridor.

Roadways throughout the project area are designated as “scenic” by the California Department of Transportation (Caltrans) and Sonoma County. State Route 116/River Road is an officially designated Caltrans State scenic highway from the intersection with State Route 1 to Sebastopol (Caltrans, 2005). State Route 1 from the northern county line to Bodega Bay is considered “eligible” classification as a Caltrans State scenic highway, but has not been officially designated. Similarly, State Route 116/River Road and State Route 1 are designated scenic corridors under the Sonoma County General Plan (Sonoma County, 2008).

Factors in Assessing Aesthetic Resources

Aesthetic resources consist of landforms, vegetation, water features, and cultural modifications that impart an overall visual impression of an area’s landscape. Factors important in describing the aesthetic resources of an area include visual character, visual quality, and visual sensitivity. These factors together describe both the aesthetic appeal of an area, and communicate how much value is placed upon a landscape or scene by the general public. Scenic areas include designated and eligible scenic highways, protected open spaces and parks, and designated viewsheds.[3]

Visual Character

Visual character is the unique combination of landscape features that combine to make a view, including native landforms, water, and vegetation patterns as well as built features such as buildings, roads, and other structures. Landscape and built features combine to form unique perspectives

[3] A view corridor is as the line of sight of an observer, looking toward an object of significance to the community (e.g., ridgeline, river, historic building, etc.), or as the route that directs the viewers attention. A viewshed shall be defined as the area within view from a defined observation point. A scenic highway corridor shall be defined as the area outside a highway right-of-way that is generally visible to motorists traveling on the highway.

with varying degrees of visual quality. In the seven-mile long Russian River Estuary Project Area there are three primary types of characteristic views as can be seen in **Figure 4.14-1**;

1. Views of the Russian River, the surrounding valleys and vegetation often surrounded by rural ranching and cattle;

2. Views of the Estuary from Jenner, Highway 1 and portions of the coast;

3. Views of the coastal jetty and Goat Rock State Beach from Highway 1 (naturally open beach in the lower right photo, 8/4/10).

Visual Quality

Visual quality describes the intrinsic aesthetic appeal of a landscape or scene due to a combination of physiographic characteristics (such as landform, water and vegetation) and cultural modifications (physical change to a landscape caused by human activity). Visual Quality is rated low, moderate or high, based on the arrangement of landscape and cultural attributes. In the Russian River Estuary the visual quality is consistently high.

Landscape Exposure

Landscape exposure is a component of visual sensitivity and is a measure of the duration, frequency and distance from which viewers see a particular landscape. The frequency refers to the number of observers that typically view the landscape. Duration is the amount of time the view is actually visible. For example, a rural landscape may be seen by only by a few residents, but for very long durations, whereas an uninhabited landscape crossed by an interstate might be seen by high numbers of travelers but for brief periods of time. Both the number of viewers and the duration of view are equally important in determining landscape exposure. The distance of a view helps to determine the clarity of a view. For example, if an area of interest is in the foreground of an observer's view, it would obviously be more visible than if it were in the background. Distance zones are typically divided into "foreground," "middleground," and "background" zones.

Landscape exposure is moderately high in the Russian River Estuary high because viewers:

1. Live there (few numbers, long duration),

2. Travel on Highway 116 (long duration with seven miles of exposure and occasions to stop),

3. Travel on Highway 1 (moderately high numbers) with an overview of the Estuary (moderate clarity) though details are passing

4. Visit the State Beaches (long exposure, moderate clarity of distant views).

Visual Sensitivity

Visual sensitivity refers to the level of interest or concern that the public has for a particular aesthetic resource. Visual sensitivity is a measure of how noticeable proposed changes might be in a particular scene and is determined based on the overall visual quality of the scene, the potential clarity and relative dominance of the proposed changes, and the degree of landscape

Upper Reach above Duncans Mill Bridge

Penny Island and Jenner housing from Goat Rock State Beach

View of Goat Rock State Beach from Highway 1 in Jenner

SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 4.14-1a

Characteristic Views of the Russian River Estuary

Highway 1 Bridge over Middle Reach looking up Estuary

Lower Estuary from Highway 1 in Jenner

Naturally Open Beach (all photos 8/4/10)

SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 4.14-1b

Characteristic Views of the Russian River Estuary

exposure a view may have. Visual Sensitivity is rated as high, medium or low. For example, parks, trails, or scenic highways, where expectations for aesthetically-pleasing views are high, will have high visual sensitivity to noticeable or contrasting changes in the existing views.

Overall, visual sensitivity in the Russian River Estuary is generally high when considering noticeable change because the entire area is a set of designated scenic roadways and parklands. The primary question in this analysis is: *how noticeable or dominant will the proposed changes in water elevation be as compared to current Estuary management activities?*

Existing Visible Effects of Estuary Management

Currently the most visible activity associated with Estuary management is artificial breaching of the beach just north of the jetty in Goat Rock State Beach. Visible aspects of breaching include:

1. Equipment loading in the parking lot of Goat Rock State Beach
2. Movement of equipment to and from the excavation site
3. The excavation work
4. Public access to the beach is restricted using barricade tape and signage
5. Warning signs are posted prior to the breaching event 750 feet on each side of the proposed channel location.

Water levels currently rise and fall within the Estuary and during the management period. The rate at which the water rises depends on the amount of water flowing into the Estuary, the amount of water that seeps through the beach to the ocean, overall tidal conditions and artificial breaching activities. **Section 4.2, Hydrology and Flooding**, describes the process in more complete detail. Ordinarily, a casual observer would not visually discern changes in water levels since they fluctuate over periods of days, weeks and months. Informed observers would expect water levels to rise and fall because the Russian River/Estuary is a dynamic system.

4.14.3 Regulatory Framework

State

Caltrans administers the State Scenic Highways Program, established through the State Legislature in 1963 under Senate Bill 1467, to preserve and protect scenic highway corridors from projects that would diminish the aesthetic value of lands adjacent to highways (Sections 260 *et seq*. of the California Streets and Highways Code). Scenic highway corridors are defined as the land generally adjacent to and visible by motorists from a scenic highway, and are generally comprised of scenic and natural features. Scenic corridor boundaries are defined by topography, vegetation, and/or jurisdictional lines (Caltrans, [no date]). The State Scenic Highway System includes a list of highways that are either eligible for designation as scenic highways or have been so designated. These highways are identified in Section 263 of the Streets and Highways Code.

The State Scenic Highway Advisory Committee defines characteristics of scenic highways to include landforms, the dominant physical characteristics of the natural corridor, such as gently

rolling hills or rugged cliffs, streams, geologic formations, and distant ridges; vegetation, distinctive vegetation within view, such as row crops, orchards, chaparral, or woodlands; structures, buildings may be included in scenic corridors and may add to scenic quality; and panoramas, scenic overlooks with panoramic views of urban, rural, or natural areas should be included when available.

Local

Local policies established in the *Sonoma County General Plan 2020* that govern visual resources in the project area are summarized in Section 4.14 in **Appendix 4.0, Local Regulatory Framework Governing Environmental Resources**.

4.14.4 Environmental Impacts and Mitigation Measures

Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, implementation of the Estuary Management Project would have significant impacts on aesthetic resources if it would:

1. Have a substantial adverse effect on a scenic vista
2. Substantially degrade the existing visual character of the site and its surroundings
3. Substantially damage scenic resources, such as scenic highway corridors and scenic landscape units
4. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area, or
5. Conflict with adopted environmental plans.

Impairment of existing aesthetic resources may result from the degradation of a visual feature that has aesthetic significance, or from the introduction of objects or patterns that exhibit a relatively high degree of visual contrast with the existing objects and patterns on the site. Physical changes that may impair the quality of important views include changes in scale, form, color and texture of natural features existing on the site. Such changes could result from grading and excavation, or elimination of existing vegetation.

Based on the nature and function of the Estuary Management Project, several of the criteria included in Appendix G of the CEQA Guidelines do not apply to this analysis and are not used, as explained below.

> *New sources of light and glare which would adversely affect day or nighttime views in the area.* The current breaching activities and proposed lagoon outlet channel would not require any new lighting features or cause substantial light or glare and does that would adversely affect day or nighttime views of the area. Modifying the schedule when breaching is performed would not produce a new source of substantial light or glare that would adversely affect day or nighttime views of the area and therefore there is no impact.

Conflict with adopted environmental plans. The project is mandated by the National Marine Fisheries Service. It would not conflict with implementation of adopted environmental plans.

Approach to Analysis

As noted in **Chapter 2.0, Project Description**, the Water Agency would continue its current practice of artificial breaching outside of the lagoon management period of May 15 through October 15. Timing, implementation, access, sensitivity to pinniped haulout, personnel, equipment, and general procedures would be equivalent to current practices, as described in **Section 2.2.2**. No change to artificial breaching outside of the lagoon management period would occur under the Estuary Management Project.

The aesthetic setting and visual character, quality and sensitivity are all consistently rated high and landscape exposure is also rated relatively high, based on the scale described above. The variation of project conditions from baseline conditions reveals two primary aspects of the project which might produce a visually significant effect.

1. The creation and maintenance of a new outlet channel through the beach in Goat Rock State Beach, and
2. The potential for noticeable variation from current water levels within the Estuary.

Creation and Maintenance of a New Outlet Channel

Visible activities related to creation of the new outlet channel would be similar to the current artificial breaching activities that occur now on Goat Rock State Beach. **Figure 4.14-2** shows a natural barrier beach closure and subsequent creation of an outlet channel in July 2010, executed under existing permit authorization. During the lagoon management period, the Water Agency would establish an outlet channel, and conduct periodic channel maintenance (i.e. minor modifications) to maintain a freshwater lagoon. The orientation of the lagoon outlet channel would be toward the northwest; however it would be established within the historic beach management zone, and consistent with the general location and orientation of past artificial breaching channels and natural openings.

Potential for Noticeable Variation from Current Water Levels

Baseline of operations for the Russian River Estuary includes variations of water levels associated with different river flows, breaching, tidal influence, and wave conditions. Breaching activities are currently initiated in response to rising water in the Estuary to protect low lying structures from flooding. When artificial breaching occurs, water levels drop rapidly. During the proposed lagoon management period, water levels in the Estuary would still fluctuate, however the intent is to establish a freshwater lagoon to enhance steelhead habitat and the outlet channel created on the barrier beach would control the rate of outflow, resulting in elevated water levels in the Estuary.

July 1, 2010 Natural Open Channel. Photo from Highway 1 Overlook.

July 7, 2010 Channel Closed by Tidal Action. Photo from Highway 1 Overlook.

July 8, 2010 Created Outlet Channel. Photo from Highway 1 Overlook.

July 9, 2010 Created Outlet Channel Reclosed by Tidal Action. Photo from Highway 1 Overlook.

SOURCE: SCWA, 2010

Russian River Estuary Management Project . 207734.01

Figure 4.14-2
Photos of Russian River Estuary:
Natural Closure and Outlet Channel Creation
July 2010

Impact Analysis

Impacts associated with aesthetic resources are summarized and categorized as either "no impact," "less than significant," "less than significant with mitigation," or "significant and unavoidable."

Impact 4.14.1: Scenic Vistas. The Project may have a substantial adverse effect on a scenic vista. (Less than Significant)

Potentially affected scenic vistas include views of the Russian River Estuary from State Route 1 and State Route 116, as well as views of Goat Rock and Willow Creek areas of Sonoma Coast State Beaches. Creation and maintenance of the new lagoon outlet channel on Goat Rock State Beach would be visible activities and are located in a sensitive location. Outlet channel creation requires similar procedures to current artificial breaching. The dimensions and orientation of the outlet channel on the barrier beach are variable, but would be located within the general historic beach management zone. The project would not alter or degrade the visual quality of these designated scenic vistas.

Extended duration of high water levels during the management period would generally not be perceivable. Most viewers would not notice the visual effect of subtle changes in water elevation, especially since proposed water elevations would be within the range of historic water levels. There is no adverse effect on a scenic vista and therefore there is no impact.

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.14.2: Visual Character. Implementation of the Estuary Management Project may degrade the existing visual character of the area. (Less than Significant)

As described above in **Section 4.14.1, Setting**, the project area is generally characterized as designated scenic coastal and river corridor areas. Urban areas are concentrated in communities like Duncans Mills and Jenner, however most of the bordering area along the Estuary is open private land. The visual character of the coast, the Russian River corridor and the Goat Rock State Beach would remain the same after the project. The location, orientation, and design of the outlet channel would be within the existing beach management zone. The visual character of the area would not change as a result of the project and therefore there is no impact.

Increased frequency and duration of inundation during the lagoon management could slightly alter the visual character of recognizable areas, such as Penny Island; however inundation at these locations would be within the historic range of water levels and is therefore not considered a significant effect to visual character.

Impact Significance: Less than Significant; no mitigation measures are required.

Impact 4.14.3: Scenic Resources. Implementation of the Estuary Management Project may substantially damage scenic resources, such as scenic highway corridors and scenic landscape units. (Less than Significant)

The visual character of the coast, the Russian River corridor and the Goat Rock State Beach would remain the same after the project. The project allows Estuary higher water levels for a longer duration, but not to an extent that could affect visual resources within the scenic highway corridors along State Routes 1 and 116, nor any portion the adjacent scenic landscape units, therefore the impact is less than significant.

Impact Significance: Less than Significant; no mitigation measures are required.

4.14.5 References

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CHAPTER 5.0
Cumulative Analysis

5.1 CEQA Analysis Requirements

The CEQA Guidelines require that EIRs discuss the cumulative impacts of a project when the project's incremental effect is "cumulatively considerable," meaning that the project's incremental effects are considerable when viewed in combination with the effects of past, current, and probable future projects.[1] The purpose of this analysis is to disclose significant cumulative impacts resulting from the Russian River Estuary Management Project (Estuary Management Project) in combination with other projects or conditions, and to indicate the severity of the impacts and the likelihood of occurrence (CEQA Guidelines Sections 15130 (a) and (b)). The CEQA Guidelines indicate that the discussion of cumulative impacts should include:

(1) Either: (A), a list of past, present, and probable future projects producing related or cumulative impacts; or (B), a summary of projections contained in an adopted general plan or similar document, or in an adopted or certified environmental document, which described or evaluated conditions contributing to a cumulative impact;

(2) A discussion of the geographic scope of the area affected by the cumulative effect;

(3) A summary of expected environmental effects to be produced by these projects; and,

(4) Reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

The analysis of cumulative impacts in this chapter focuses on the impacts of implementation of the Estuary Management Project concurrent with past, present, and probable future projects producing related impacts. The projects include pending and/or approved projects as part of the Sonoma County Water Agency's (Water Agency) Russian River Instream Flow and Restoration (RRIFR) Program (see also **Chapter 2.0, Project Description** for details on the RRIFR Program elements) and other types of projects in the project area. This analysis will rely on a list of projects that have the potential to contribute to potential cumulative impacts in the project area. The Impacts and Mitigation Measures section defines significance criteria used for the impact assessment and presents a discussion of potential project-related impacts.

[1] CEQA Guidelines Section 15130, 15065, as amended January 1, 2010. As defined in Section 15355, a cumulative impact is an impact that is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts. An EIR should not discuss impacts which do not result in part from the project evaluated in the EIR.

5.2 Related Projects

5.2.1 Geographic Scope

The potential for project-generated impacts to contribute to a significant cumulative impact would arise if they are located within the same geographic area. This geographic area may vary, depending upon the issue area discussed and the geographic extent of the potential impact. For example the geographic area associated with noise impacts would be limited to areas directly affected by noise, whereas the geographic area that could be affected by hydrologic or water quality conditions may include a larger area. Thus, when considered cumulatively with other projects that may occur in the same geographic vicinity, the scope of analysis is defined by the physical boundaries for each issue. Impacts associated with lagoon outlet channel creation and maintenance activities, such as aesthetics, noise, traffic, erosion, and access limitations tend to be localized and could be exacerbated if other projects are occurring within the immediate vicinity of proposed activities. Impacts associated with long-term implementation of the Estuary Management Project may encompass a different geographic scope that extends to the greater watershed. For example, cumulative impacts to hydrology and water quality would occur within the watershed. For this cumulative analysis, the two primary geographic boundaries that capture the majority of these impacts are the six-mile reach of the Estuary (lower Russian River) and the greater Russian River Watershed. Air quality impacts will be considered in the context of conditions in the North Coast Air Basin. Where appropriate, other jurisdictional boundaries are applied for individual issue area analysis.

5.2.2 Project Timing

In addition to the geographic scope, cumulative impacts are determined by timing of the other projects relative to the proposed project. Schedule is particularly important for construction-related impacts; for example, for a group of projects to generate cumulative construction impacts, they must be temporally as well as spatially proximate. The schedules for the projects described in **Section 5.2.4** are likely to fluctuate; therefore this analysis assumes that the projects would be implemented concurrently with implementation of the Estuary Management Project.

5.2.3 Future Conditions – Climate Change and Sea Level Rise

Due to the Estuary's connectivity with the Pacific Ocean, the potential for climate change, and subsequent sea level rise, this is considered as a future conditions scenario. In recent years, the scientific community has generally reached consensus that climate change and sea level rise are likely to occur. California's position on climate change was formalized in Assembly Bill (AB 32), the California Global Warming Solutions Act of 2006, which states that: "Global warming poses a potential threat to the economic well-being, public health, natural resources, and the environment of California."While scientists agree that sea level rise is likely to occur in the future, the rate of sea level rise is uncertain. Several different estimates have been proposed for planning purposes. For example, the CALFED Independent Science Panel used empirical models

based on historic sea level rise to estimate a sea level rise ranging from 20 to 55 inches by 2100 (CALFED Independent Science Board, 2007). The San Francisco Bay Conservation and Development Commission (BCDC) is in the process of developing a strategy to address sea level rise in the future (San Francisco BCDC, 2008).

Because of its location at the ocean's edge, the proposed project is likely to be affected by future sea level rise. A recent study (Largier, 2010) prepared by a joint working group of the Gulf of the Farrallones and Cordell Bank National Marine Sanctuary Advisory Councils identifies and synthesizes potential climate change impacts to habitats and biological communities along the north-central California Coast, located 10 miles south of the project site. The report presents scientific observations and expectations to identify potential issues related to changing climate. Surface ocean temperatures have increased in the North Pacific, offshore of the north-central California continental shelf. This increase in temperature has significant effects on water column structure (i.e., stratification), sea level rise, and ocean circulation patterns. While sea temperature also appears to have increased in shallow bays, estuaries and sheltered nearshore locations, waters over the north-central California continental shelf have cooled over the last 30 years (by as much as 1°C in some locations) due to stronger and/or more persistent upwelling winds during spring, summer and fall (Largier, 2010).

According to the report, estuary habitats in the study region may be most affected by changes in the timing and persistence of seasonal mouth closure and the intensity and timing of seasonal runoff, as well as the continued rise in sea level. Sediment delivery and availability are projected to strongly influence the ability of estuary morphology to adjust to rising sea level and maintain intertidal estuarine habitat. Also, water properties such as temperature, salinity, dissolved oxygen, and pH can be expected to change significantly, as well as patterns of primary production (Largier, 2010). While it is unlikely to predict future states of a system as complex as the coastal ecosystem within the study region, the report recommends developing an action plan for the study region, which includes monitoring and adaptive management approaches that can be implemented as the environment continues to change, seeking to maximize benefits of change while mitigating the negative impacts (Largier, 2010).

In response to concerns about climate change and sea level rise, the University of Arizona Department of Geosciences conducted research on factors that determine the degree to which a coastal area is susceptible to sea level rise. This analysis assumes a one meter rise in sea level by 2100 as the worst-case-scenario, and identifies potential impacts to the future projects. The Estuary Management Project location was included in the sea level rise inundation maps. Some portions of the Estuary Management Plan could be impacted in the future, which could reduce the functionality and effectiveness of the proposed outlet channel and lagoon management strategy. Implementation of the Estuary Management Plan within the context of this potential future condition is further discussed in **Impact 5.2.4** at the end of this section.

5.2.4 Type of Projects Considered

As described in **Chapter 4.0, Environmental Setting, Impacts, and Mitigation Measures**, of this EIR, impacts associated with implementation of the proposed Estuary Management Project include short-term impacts related to lagoon outlet channel creation, as well as potential significant long-term impacts associated with increased duration and higher frequency of increased water levels in the Estuary. Therefore, cumulative effects would be the Estuary Management Project's impacts combined with the impacts of other projects in the Russian River watershed within Sonoma County. For this analysis, other past, present, and reasonably-foreseeable future construction projects in the area have been identified (see **Table 5-1**).

A brief overview of relevant projects, specifically water and/or flood control projects, habitat enhancement projects, and some large capital improvement projects, planned by public agencies is provided below. In addition to these specific projects, it is recognized that additional development could occur within the project area and may contribute to cumulative impacts. Such planned and approved projects, as listed in **Table 5-1**, are in accordance with the General Plan for Sonoma County.

Russian River Instream Flow and Restoration Program (RRIFR)

Over the last 15 years, the Water Agency has been working with regulatory agencies, primarily the National Marine Fisheries Service (NMFS) to address fisheries issues in the Russian River watershed. Two salmonid species inhabiting the Russian River watershed, Chinook salmon and steelhead, have been listed as threatened under the federal Endangered Species Act (ESA), and one species, coho salmon, has been listed as endangered under the federal ESA and California ESA.[2]

Because the Water Agency's water supply facilities and operations have the potential to adversely affect the three listed species, the Water Agency entered into a Memorandum of Understanding (MOU) in December 1997 to participate in a consultation under Section 7 of the ESA. The other signatories of the MOU include the U.S. Army Corps of Engineers (USACE), NMFS, and Mendocino County Flood Control and Water Conservation Improvement Project. In September 2008, NMFS issued a Biological Opinion (Russian River Biological Opinion)evaluating the impact of the Water Agency's and the USACE's operations on the listed species and identifying Reasonable and Prudent Alternatives (RPAs) and Recommended and Prudent Measures (RPMs) to be implemented by the Water Agency and USACE to address impacts and potential impacts on listed salmonids. The Russian River Biological Opinion concluded that some elements of the USACE and Water Agency activities in the Russian River watershed could result in an adverse modification of critical habitat and jeopardize the continued existence of coho salmon and steelhead in this evolutionary significant unit (NMFS, 2008).

[2] Protective regulations of the ESA prohibit the "take" of these species. "Take" is broadly defined in the ESA and its implementing regulations; it includes not only intentionally killing a protected species, but also actions that unintentionally result in actual harm to an individual of a protected species, including adverse modification of habitat.

TABLE 5-1
PLANNED AND APPROVED PROJECTS IN THE ESTUARY MANAGEMENT PROJECT AREA AND VICINITY

Jurisdiction	Project	Area Affected	Status
CURRENT AND ONGOING PROJECTS			
Sonoma County Water Agency	Dry Creek Tributary Restoration Projects (i.e. Grape Creek Habitat Improvement Project)[1]	Various tributaries; Russian River Watershed	2008-2011 (Grape Creek Completed September 2010)
Jenner Community Club	Bridge Replacement Project	Jenner Creek at Jenner Community Club, 10432 Highway 1, Jenner	Ongoing 2010
North Coast Integrated Regional Water Management Plan Projects			
Sotoyome Resource Conservation District	Arundo Removal and Habitat Restoration Project	Russian River and tributaries	2000 - Ongoing
RECENTLY COMPLETED PROJECTS[2]			
Sonoma County Water Agency	Stream Maintenance Program[1]	Russian River, Sonoma County	2009
	Temporary Urgency Change Petition[1]	Russian River, Sonoma County	2009 and 2010
	Upper Austin Creek Restoration Project	Tyrell Property adjacent to Austin Creek, north of Cazadero	1998 through 2008
North Coast Integrated Regional Water Management Plan			
California Land Stewardship, Sonoma and Mendocino Counties	Sediment Reduction and Habitat Improvements	Russian River tributaries	n/a
Laguna de Santa Rosa Foundation	Riparian Restoration	Laguna de Santa Rosa (5 miles)	Completed September 2009
Sonoma County Permit and Resource Management Department (PRMD)	Recycling and Habitat Preservation Program	City of Santa Rosa	Completed July 2010
FORESEEABLE FUTURE PROJECTS			
Russian River Instream Flow and Restoration Program (RRIFR)			
Sonoma County Water Agency	Modification of D1610[1]	Upper, Middle, and Lower Reaches, Russian River, Sonoma County	Environmental Review; Completion Anticipated 2016
	Willow Creek Fish Passage Enhancement Project (partnership with Stewards and State Parks and Trout Unlimited)	Willow Creek, tributary to Russian River (7.3 mile portion and 4.7 mile portion)	Pending Approval
	Fish Passage Projects	Grape, Mill, and Wallace Creeks	Awaiting final CDFG permit; Feasibility Study and Engineering Designs complete: Construction to begin summer and fall 2011
	Dry Creek Demonstration Project[1]	1 mile of Dry Creek	2013-2015
	Dry Creek Enhancements (Phase 1)[1]	2 additional miles of Dry Creek	2015-2017
	Dry Creek Enhancements (Phase 2)[1]	Enhance additional 3 miles of Dry Creek	2018-2020
	Coho Broodstock Program (US Army Corps of Engineers)1	Russian River, Sonoma County tributaries	Continue through 2020

TABLE 5-1
PLANNED AND APPROVED PROJECTS IN THE ESTUARY MANAGEMENT PROJECT AREA AND VICINITY

Jurisdiction	Project	Area Affected	Status
FORESEEABLE FUTURE PROJECTS (cont.)			
Russian River Instream Flow and Restoration Program (RRIFR) (cont.)			
	Water Diversion Infrastructure[1]	Decommission Infiltration Ponds at Wohler Fish screen replacement at Mirabel	2011 and 2015
	2011 Urban Water Management Plan	Russian River Watershed	Under Development
RELEVANT PLANS AND POLICIES[3]			
North Coast Regional Water Quality Control Board Basin Plan/303(d) List			
Sonoma County General Plan			
Sonoma County Local Coastal Program			
Sonoma County Aggregate and Mining Resources Plan			
Assembly Bill 2121			

1 Element of the Sonoma County Water Agency Russian River Instream Flow and Restoration (RRIFR) Program.
2 Consideration of the proposed project's incremental contribution to effects associated with past projects must be analyzed under CEQA, in accordance with CEQA Guidelines Section 15064 (h)(1). The purpose of this type of analysis is to determine whether impacts associated with the proposed project, when considered with recently incurred impacts, would occur above the significance threshold.
3 CEQA Statutory Section 21100(e) provides for use of previously approved land use documents, including but not limited to general plans and local coastal plans in a cumulative impact analysis,

SOURCE: Compiled by ESA, 2010 via Sonoma County PRMD, 2010; Sonoma County Transportation and Public Works, 2010; SCWA, 2009; SCWA, 2010; NMFS, 2008.

The Russian River Biological Opinion involves both immediate and long-term actions to improve habitat and fish populations that will guide operations to protect threatened or endangered salmonids in the Russian River watershed through the year 2023. The Water Agency has developed the Russian River Instream Flow and Restoration (RRFIR) Program to implement the mandates under the BO. In addition to Estuary Management, the following actions are mandated by the BO:

1. Permanent Modifications to the State Water Resources Control Board's (SWRCB) Decision 1610 to reduce instream flow requirements in the mainstem Russian River and Dry Creek and Temporary Modifications to the SWRCB's Decision 1610 instream flow requirements in the mainstem Russian River;

2. Continue support of the Coho Broodstock Program[3];

3. Water Diversion Infrastructure improvements: including replacement of the Mirabel fish screens and decommissioning the Wohler infiltration ponds;

4. Flood Control: Stream Maintenance Program; and

5. Dry Creek Habitat Enhancement.

[3] Note that the Water Agency assists with funding of this program; however it is administered and implemented by the U.S. Army Corps of Engineers.

Relationship to Estuary Management Project

As presented in **Chapter 1.0, Introduction**, the RRIFR Program has been developed pursuant to the Russian River Biological Opinion. Many of the actions mandated by the Biological Opinion require additional review under CEQA, as well as compliance with other state and federal regulations. The Russian River Biological Opinion and the corresponding RRIFR Program include a series of actions to be taken by the Water Agency, in coordination with NMFS and CDFG, to provide benefit to listed salmonids. The Estuary Management Project is one of a series of actions to be undertaken by the Water Agency to meet the requirements of the Russian River Biological Opinion. The effects of the Estuary Management Project must be considered in conjunction with impacts associated with other RRIFR Program elements in a cumulative analysis. The RRIFR Program elements are described in more detail below.

The objectives of the Estuary Management Project are identified in **Chapter 2.0, Project Description**. The Estuary Management Project would enhance freshwater lagoon conditions from May 15 to October 15 to enhance rearing habitat for juvenile salmonids, particularly steelhead, while minimizing the potential for flooding low-lying properties. The Estuary Management Project project provides independent utility (i.e. must be implemented to achieve a purpose irrespective of other RRIFR elements) in achieving these goals and necessitates implementation separately from other RRIFR Program elements in order to meet the objectives and schedule in the Russian River Biological Opinion. The lagoon outlet channel will be designed to increase the extent of freshwater retention in the Estuary under the range of inflow conditions that have been historically recorded. As identified in the Russian River Biological Opinion, the Water Agency is preparing a separate CEQA analysis of proposed modifications to D1610 and potential enhancements to Dry Creek. The Estuary Management Project will function under a range of flow conditions, irrespective of the other elements identified in the Russian River Biological Opinion, and is federally mandated to be implemented as the first in a series of actions. The Estuary Management Project's potential contribution to these cumulative impacts is further discussed in **Section 5.3** below.

Modification of Decision 1610 – Fish Habitat Flows and Water Rights Project

The Water Agency is preparing an Environmental Impact Report (EIR) for the proposed *Fish Habitat Flows and Water Rights Project* (Fish Flow Project). The Water Agency released the Notice of Preparation in September 2010. The Water Agency holds water-right permits[4] issued by the SWRCB that authorize the Water Agency to divert[5] Russian River and Dry Creek flows and to re-divert[6] water stored and released from Lake Mendocino and Lake Sonoma. The Water Agency releases water from storage in these lakes for delivery to municipalities, where the water is used primarily for residential, governmental, commercial, and industrial purposes. The primary points of diversion include the Water Agency's facilities at Wohler and Mirabel Park (near Forestville). The Water Agency also releases water to satisfy the needs of other water users and to contribute to the maintenance of minimum instream flow requirements in the Russian River and

4 SWRCB water-right permits 12947A, 12949, 12950 and 16596.

5 Divert – refers to water diverted directly from streamflows into distribution systems for beneficial uses or into storage in reservoirs.

6 Re-divert – refers to water that has been diverted to storage in a reservoir, then is released and diverted again at a point downstream.

Dry Creek established in 1986 by the SWRCB's Decision 1610 (D1610). These minimum instream flow requirements vary based on defined hydrologic conditions (normal, dry, and critical) that are based on cumulative inflows into Lake Pillsbury in the Eel River watershed.

During the rainy season (October through May), natural streamflow, rather than reservoir releases, accounts for most of the flow in the Russian River. From June through September, some of the flow in the Russian River is composed of water released from storage in Lake Mendocino (which includes water imported from the Eel River via PG&E's Potter Valley Project) and Lake Sonoma.

D1610 was adopted before the listings of three salmonid species under the federal Endangered Species Act, and did not specifically address the importance of fall storage in Lake Mendocino to the Chinook salmon migration. Although D1610 assumed that higher instream flows were better for fishery resources, information developed in the last decade indicates this may not be so for salmonid species in Dry Creek, the Russian River, and the Russian River estuary. D1610 expressly recognized that later fishery studies might identify a need to change the minimum flow requirements. Decision 1610 also expressly contemplated that such changes might be needed if PG&E's Potter Valley Project imports changed, as they did in 2006.

Russian River Biological Opinion concludes that reducing D1610 minimum instream flow requirements will enable alternative flow management scenarios that will increase available rearing habitat in Dry Creek and the upper Russian River, and provide a lower, closer-to-natural inflow to the estuary between late spring and early fall. According to NMFS, enhancing the potential for maintaining a seasonal freshwater lagoon that would likely support increased production of juvenile steelhead and salmon can and must occur irrespective of D1610 (NMFS, 2008).

As required by Russian River Biological Opinion, in September 2009 the Water Agency filed a petition with the SWRCB to permanently change the D1610 minimum instream flow requirements, in order to improve habitat for endangered Central California Coast coho salmon and threatened Central California Coast steelhead. This petition presently is pending before the SWRCB. The SWRCB will act on this petition after the EIR for the Fish Flow Project is completed.

Until the SWRCB issues an order on this petition, the minimum instream flow requirements specified in D1610 (with the resulting adverse impacts to listed salmonids) will remain in effect, unless temporary changes to these requirements are made by the SWRCB. Russian River Biological Opinion requires that the Water Agency petition the SWRCB for temporary changes to the D1610 minimum instream flow requirements each year until the SWRCB issues an order on the Water Agency's petition for the permanent changes to these requirements. Russian River Biological Opinion only requires petitions for temporary changes to minimum streamflow requirements for the mainstem Russian River, and not to the requirements for Dry Creek. The Water Agency petitioned the SWRCB for the Biological Opinion-specified temporary changes for the first time in 2010, and the SWRCB made a temporary urgency change in its Order WR 2010-0018-DWR.[7]

[7] The Water Agency has also petitioned the SWRCB for temporary changes in mainstem Russian River minimum flow requirements in earlier years because weather conditions warranted such changes to preserve water storage in Lake Mendocino. The SWRCB approved such temporary changes in prior years.

On April 6, 2010, the Water Agency filed a petition with the SWRCB requesting approval of a Temporary Urgency Change (TUC) to the Water Agency's water rights permits pursuant to California Water Code Section 1435. The petition requested the following temporary modifications to the Russian River instream flow requirements as mandated by the Russian River Biological Opinion: 1) from May 1 through August 31, 2010, instream flow requirements for the upper Russian River (from its confluence with the East Fork of the Russian River to its confluence with Dry Creek) were reduced from 185 cubic feet per second (cfs) to 125 cfs and from September 1st to October 15 instream flow requirements for the upper Russian River were reduced from 150 cubic feet per second (cfs) to 125 cfs; and 2) from May 1 through October 15, 2010, instream flow requirements for the lower Russian River (downstream of its confluence with Dry Creek) be reduced from 125 cfs to 70 cfs, with the understanding that the Water Agency will maintain approximately 85 cfs at the Hacienda gage as practicably feasible. On May 25, 2010, the SWRCB approved its Order Approving Temporary Urgency Change.

The process for the SWRCB to permanently change D1610 is anticipated to take seven or eight years, including time for CEQA documentation and a public hearing process. During the periods that the temporary changes are in effect, the Water Agency will monitor water quality and fish, and collect and report monitoring information as required by Russian River Biological Opinion.

The objective of the Fish Flow Project is to manage Russian River Project releases to provide instream flows that improve habitat for threatened and endangered fish, while updating the Water Agency's existing water rights to reflect current conditions. The Fish Flow Project would generally be located in the Russian River watershed in Mendocino County and Sonoma County. Environmental impacts of the Fish Flow Project would potentially occur at Lake Mendocino, Lake Sonoma, in and along the Russian River downstream of Lake Mendocino/Coyote Valley Dam to Jenner, and in and along Dry Creek downstream of Lake Sonoma/Warm Springs Dam. The following is a discussion of the key components of the Fish Flow Project.

Minimum Instream Flows for Coho Salmon and Steelhead[8]: To comply with the requirements of Russian River Biological Opinion, the Water Agency has filed a petition with the SWRCB that asks the SWRCB to make the following permanent changes in the instream flow requirements that are specified in D1610 and the Water Agency's water-right permits:

1. between June 1 and August 31 of each year the existing minimum instream flow requirement of 185 cfs is proposed to change to 125 cfs for the upper Russian River (upstream of the confluence with Dry Creek and downstream of the confluence of the East and West Forks)

2. between September 1 and October 31 of each year the existing minimum instream flow requirement of 150 cfs is proposed to change to 125 cfs for the upper Russian River (upstream of the confluence with Dry Creek and downstream of the confluence of the East and West Forks)

[8] The proposed changes to the minimum instream flow requirements and the criteria used to determine the hydrologic index, and the proposed requests for water-right permit updates may change as the Fish Flow Project description and alternatives are further developed.

3. between January 1 and December 31 of each year the existing minimum instream flow requirement of 125 cfs is proposed to change to 70 cfs for the lower Russian River (downstream of its confluence with Dry Creek)

4. between May 1 and October 31 of each year the existing minimum instream flow requirement of 80 cfs is proposed to change to 40 cfs for Dry Creek from Warm Springs Dam to the Russian River.

Minimum Instream Flows for Chinook Salmon: Operating water supply releases from Lake Mendocino to preserve or increase the pool of cold water available in Lake Mendocino to support the fall Chinook salmon migration runs is also desirable, and may aid in the conservation and recovery of these threatened species. Although the proposed lower minimum instream flow requirements in Russian River Biological Opinion will help to achieve this goal, the Water Agency may request that the modifications to minimum instream flow requirements be extended beyond the months required by Russian River Biological Opinion for the upper Russian River (upstream of the confluence of Dry Creek and downstream of the confluence of the East and West Forks). These additional months could include those earlier or later in the year, or could be extended to be in effect year-round.

Hydrologic Index: The Water Agency will file another petition with the SWRCB, seeking to change the methodology used to establish the water-year type classifications that determine minimum instream flow requirements for the Russian River, to reflect actual conditions within the Russian River watershed rather than conditions in the Eel River watershed.

Water-Right Permit Updates: The Water Agency will also file petitions as needed to update its water-right permits to reflect current conditions and to resolve the time extension petitions that are pending before the SWRCB. These actions are not required to implement the proposed new minimum instream flow requirements or to change the hydrologic index, but will ask the SWRCB to consolidate the process to modify and update the Water Agency's water-right permits so that the SWRCB may make all necessary changes to the Water Agency's water-right permits at one time. These actions will include the pending petitions to extend time to complete use of water to December 1, 2020, and also may include new petitions to amend the place-of-use maps for the Water Agency's water-right permits, so that they are based on current and expected uses, and to make other updates or clarifications.

Impacts Identified

Environmental documentation for permanent modification of flows under D1610 is pending;[9] however, the types of impacts anticipated to be considered include changes in hydrology, water quality, biological resources, fisheries (beneficial), and recreation. As stated in the Russian River Biological Opinion, the current flow regime results in excessive flows in some portions of the Russian River and Dry Creek, reducing the amount of productive rearing habitat for fisheries, particularly steelhead and coho salmon. Therefore, implementation of the Fish Flow project is anticipated to enhance habitat for these species.

[9] The NMFS Biological Opinion requires that the Water Agency certify its EIR for the Fish Flow Project within four years of filing the petition to change D1610.

With respect to the 2010 Order approving Temporary Urgency Changes, the SWRCB found that the Temporary Urgency Changes described in the Water Agency's petition qualified for a series of categorical exemptions under CEQA, including a Class 7 exemption which consists of "actions taken by agencies to assure the maintenance, restoration, or enhancement of a natural resource where the regulatory process involves procedures for protection of the environment" (California Code of Regulations Title 14, Section 15307).

Relationship to Estuary Management Project

The Fish Flow Project proposes to modify D1610 flows, and is one of the series of actions to be taken by the Water Agency as part of the RRIFR Program in order to maintain compliance with the Russian River Biological Opinion. The Fish Flow Project would alter summer time flows within the Russian River Watershed. As described in **Chapter 3.0, Project Background and Environmental Setting**, the Estuary Management Project is required to accommodate the observed range of inflows to the Estuary following natural closures that occur during the May 15 to October 15 lagoon management period. As noted in **Section 3.1**, these observed flow conditions range from a low of 71 cfs to a high of 1,200 cfs at the Guerneville gage. As such, the Estuary Management Project would accommodate the range of flows under current and future D1610 conditions. Therefore, from a hydrologic standpoint, the Estuary Management Project is D1610 neutral, and not reliant on the implementation of either temporary or permanent changes to D1610. As such, the Estuary Management Project is consistent with current and future potential regulatory minimum instream flow requirements for the lower Russian River.

Potential for Contribution to Cumulative Impacts

The Fish Flow Project proposes alternative minimum instream flows to provide improved summer rearing habitat for steelhead in the mainstem Russian River and Dry Creek. One of the primary goals of the Estuary Management Project is to improve rearing habitat for juvenile salmon and steelhead by increasing the frequency and duration of freshwater lagoon conditions. In general, these two projects would have the potential to contribute to cumulative impacts in the issue areas of hydrology, water quality, biological resources, fisheries, and recreation. A discussion of the potential for these two projects to contribute to cumulative impacts is provided below.

Hydrology. Permanent modification of D1610 flows to the reduced seasonal flows proposed for the Russian River could increase the number of barrier beach closures in a given year, depending upon the hydrologic year type and wave conditions during summer months. As previously noted, the frequency of barrier beach formation and subsequent mouth closure is subject to several factors, the largest of which, during the lagoon management period, appears to be wave activity. However, Russian River flow level is also a contributing factor, and reduction in summer flows would likely increase the number of closure events occurring during the lagoon management period. Depending upon hydrologic year type, reduced summer flows would also assist in the management of outlet channel, as less discharge via the outlet channel would be anticipated. This would reduce the potential for the outlet channel to erode open and re-establish tidal conditions in the Estuary. Considered cumulatively, this would have a beneficial effect on meeting the objectives of the Estuary Management Project, which are to enhance rearing habitat for juvenile

salmonids, particularly steelhead, and to manage Estuary water levels to minimize flood hazard. Rearing habitat may be enhanced by reducing tidal influence on the Russian River Estuary from May 15 to October 15 ("lagoon management period") to increase freshwater habitat available for rearing salmon and steelhead. In considering this cumulative effect, it should be noted that the Estuary Management Project would accommodate the observed range of inflows to the Estuary following natural closures that occur during the May 15 to October 15 lagoon management period.

Water Quality. Reduced inflows into the Estuary could adversely affect water quality conditions, particularly with respect to bacteria and nutrient levels within the Estuary during freshwater lagoon conditions. Reduced flows may reduce the assimilative dilution capacity of Russian River flows upstream of the Estuary, and assuming inputs within the watershed remain constant, could result in increased concentrations of nutrients and indicator bacteria. Diminished water quality would have the greatest potential to occur during dry hydrologic years. As previously discussed in **Section 4.2, Water Quality**, areas upstream of the Estuary (upstream of Austin Creek) are identified by the NCRWQCB as impaired for bacteria. Water quality sampling by various entities, including SCWA have not identified bacterial levels that warrant listing the Estuary as impaired, and the 303(d) listing for bacteria is limited to areas upstream of Austin Creek.

Sampling events in 2009 and 2010 indicate there is a large variation in indicator bacteria levels observed through the different sections of the Estuary. These variations were observed to occur under both open and closed mouth conditions and may be seasonal as well. Although there was no clear pattern of potential lagoon management influences on indicator bacteria levels early in the season, as there were elevated levels observed at various stations during both open and closed conditions, indicator bacteria levels were observed to increase and exceed the recommended guidance values at all stations during and following increased freshwater inflows at the end of September, and during the repeated barrier beach closures in early October. At this time, it is not known what role increased freshwater inflows have on the elevated indicator bacteria levels observed during these closures and whether or not these increases would occur, or persist, without these inflows.

As identified in **Section 4.3, Water Quality**, implementation of the Estuary Management Project would not alter water quality inputs for nutrients or indicator bacteria into the Estuary, and Estuary conditions with the outlet channel established would still include flow through processes. As discussed in **Section 4.2, Hydrology and Flooding**, residence time within the Estuary at inflows of 75 cfs is estimated at approximately 22 days, or approximately one week longer than is experienced under the current practice of artificial breaching. However, because of the lack of nutrient and bacteria data collection during closure conditions, there is insufficient information to definitively conclude whether the Estuary Management Project would result in an increase, decrease, or no substantial adverse effect on nutrient or bacteria levels within the Estuary. Therefore, in the absence of technical certainty, the Water Agency recognizes that the Estuary Management Plan could have the potential to contribute to significant and unavoidable secondary impacts to public health related to nutrient or bacterial levels in the Estuary. When considered cumulatively with the Fish Flow Project, the potential for this occurrence may be increased,

primarily in dry years, when inflow to the Estuary is reduced. The occurrence, nature and timing of potential impacts related to the Fish Flow Project will be confirmed during the environmental review process for that project. These impacts are considered cumulatively considerable.

It should be noted that the conditions of the Russian River Biological Opinion, and the Estuary Management Project's Adaptive Management Plan, include provision for breaching in the event that flooding conditions, water quality conditions, or biological resource conditions warrant. Therefore, no additional mitigation measures are required or available relative to the occurrence of this impact.

Fisheries and Biological Resources. Permanent modification of D1610 flows is intended to improve rearing conditions for juvenile salmonids, and is anticipated to have a beneficial effect on salmonid habitat within the watershed. The Estuary Management Project would contribute cumulatively to enhancement of salmonid habitat within the Russian River system, by improving rearing habitat for juvenile salmon and steelhead within the Estuary by increasing the frequency and duration of freshwater lagoon conditions. Considered cumulatively, these projects would provide cumulative beneficial impacts for juvenile salmon and steelhead, and would contribute to restoration efforts for these species within the Russian River Watershed.

Permanent modification of D1610 flow could result in adverse effects to other non-listed species, due to changes in the summertime flow regime of the Russian River. These effects would be primarily associated with incremental reductions in freshwater habitat availability within the Russian River channel, and would vary depending upon hydrologic year. The Estuary Management Project would also result in changes in non-listed species distribution; however, this change would primarily affect particular marine fish species that currently use the Estuary under open tidal conditions. Although these conditions will continue to exist outside of the lagoon management period, marine species distribution would be altered as the frequency and duration of freshwater lagoon conditions are increased during summer months. This change represents a more natural Estuary condition; therefore, potential impacts to non-listed marine fish species are not considered significant. When considered cumulatively with the Fish Flow Project, the Estuary Management Project would not contribute significantly to adverse effects to other non-listed species.

Harbor seals use regular haulouts located within the Estuary Study Area, including the Jenner (Penny) logs, Paddy's Rock, and Chalanchawi. Under the proposed project, water levels would be increased up to 7 to 9 feet for a longer duration, which could inundate the mudflat/gravel bar areas that provide suitable haulout sites within the river, reducing their availability of haulout locations within the Estuary itself. Such modification of suitable habitat would be a potentially significant impact, as it could affect pinniped resting, foraging, and movement patterns, and rearing activities. Reduced summer flows associated with the Fish Flow Project would not be anticipated to alter this effect, although it may take slightly longer for the Estuary to reach target water elevations, depending upon water year type. When considered cumulatively with the Fish Flow Project, the Estuary Management Project's contribution to impacts to marine mammals would be cumulatively considerable.

Recreation. The Fish Flow Project would reduce summer flows, with potential impacts to recreation, primarily on-stream beneficial uses, such as boating. Reduced flows would have the potential to adversely affect recreational opportunities, although it is anticipated that recreational boating opportunities would be maintained through the lower reach of the Russian River at the flow levels proposed under the Fish Flow Project.

As discussed in **Section 4.7, Recreation**, implementation of the Estuary Management Project would increase water surface elevations within Estuary, resulting in inundation of beach areas and gravel bars used as recreational haulout sites. This could be considered a beneficial effect to recreational boating, and may offset perceived impacts associated with lower flow volumes. Although recreational sites would remain available, their reduction within the Estuary may be perceived as a substantial change in access conditions. Therefore, this impact is considered significant and unavoidable.

Additionally, creation and maintenance of freshwater lagoon conditions could reduce the frequency of favorable sandbar conditions for surfing associated with artificial breaching and tidal estuarine conditions during the lagoon management period. As discussed in **Section 4.7, Recreation**, feasible mitigation measures are not available to reduce these impacts to less than significant levels and meet the project objectives; therefore, these impacts are considered significant and unavoidable. As such, the Estuary Management Project's contribution to cumulative recreational effects would be considered cumulatively considerable.

Coho Broodstock Program

To aid in the recovery effort for state- and federally-endangered Central Coast Coho Salmon, California Department of Fish and Game (CDFG), NMFS, and the USACE initiated the Russian River Coho Salmon Captive Broodstock Program (RRCSCBP) in 2001 with the goal of reestablishing self-sustaining runs of coho salmon in tributary streams within the Russian River basin. Under this program, offspring of wild, captive-reared coho are stocked as juveniles into tributaries within their historic range. The fish are then released during spring and fall and into multiple historic tributaries within the Russian River drainage. Private landowners, government agencies such as Resource Conservation Districts, and other organizations have responded to a decline in coho salmon by conserving and restoring critical habitat within the Russian River Watershed. CDFG, NMFS, and USACE have partnered with University of California Cooperative Extension, Sonoma County Water Agency, Trout Unlimited, and Bodega Marine Lab, to carefully capture, rear, and spawn coho broodstock at the Don Clausen Warm Springs Hatchery. They then release the off-spring as young fish in select tributary streams and monitor their growth and survival until the migration downstream and into the Pacific Ocean. This cycle will be repeated annually, along with the monitoring of adult coho returning three years after their release to tributary streams (Regents of University of California, 2010).

The University of California Cooperative Extension (UCCE) and California Sea Grant Extension Program have worked with agency partners to develop and implement a monitoring and evaluation component for the RRCSCBP. The overall monitoring goal is to evaluate the effectiveness of the RRCSCBP by documenting whether released program fish return to their

streams of release as adults and successfully complete their life cycles. Different hatchery release protocols and stocking environments are assessed to determine the optimal stocking strategies for successfully restoring coho to the Russian River system. Specific monitoring objectives for each release stream include: estimating seasonal instream abundance, comparing seasonal survival rates of spring and fall-released coho, estimating the number of returning adults, estimating juvenile to adult survival rates, measuring coho size and condition, estimating food availability, and documenting baseline flow and temperature regimes. All of these biotic and abiotic metrics are compared among the different program streams. This information will allow agencies to make informed decisions about the future direction of the program and adaptively manage release strategies for optimal survival. Population estimates are determined through habitat surveys (counts of pools and riffles), snorkel counts, and electrofishing surveys (Obedzinski et al., 2009).

Impacts Identified

The RRCSCBP establishes a baseline data set and records results of fish releases. In addition to the RRCSCBP, coho young of the year, other fish and non-fish species are captured during the electrofishing portion of the surveys. The intent of the RRCSCBP is enhancement of the fishery populations and developing an understanding of trends and fish population dynamics. Overall, this is considered a beneficial project for fisheries restoration.

Relationship to Estuary Management Project

The continued participation in the RRCSCBP is one of the series of actions to be taken by the Water Agency and USACE as part of the RRIFR Program in order to maintain compliance with the Russian River Biological Opinion. Both the RRCSCBP and the proposed Estuary Management Project are components of the RRIFR Program, located in the Russian River watershed, and would be implemented pursuant to objectives that focus on fisheries enhancement.

Potential for Contribution to Cumulative Impacts

The RRCSCBP would continue the current Coho broodstock program to aid in the recovery effort for state- and federally-endangered Central Coast Coho Salmon. One of the primary goals of the Estuary Management Project is to improve rearing habitat for juvenile salmon and steelhead by increasing the frequency and duration of freshwater lagoon conditions. The Estuary Management Project would minimize flood potential and enhance summer rearing habitat in the Estuary for rearing juvenile salmonids. As such, it would have a beneficial effect by reducing tidal influence and providing a freshwater lagoon condition of salmonid rearing, which, considered concurrently with the beneficial effects to fisheries provided by the RRCSCBP, would be cumulatively beneficial.

Water Diversion Infrastructure

The Water Agency diverts water from the Russian River to meet residential and municipal demands. Water diverted from the underground aquifer is a combination of releases from upstream storage reservoirs and instream flow. The Water Agency's water diversion facilities are located near Mirabel and Wohler Road near the community of Forestville. To provide the primary water supply for its transmission system, the Water Agency operates six radial horizontal

collector wells and seven vertical wells adjacent to the Russian River near Wohler Road and Mirabel, which extract water from the aquifer beneath, and adjacent to, the streambed. The Water Diversion Infrastructure Project consists of replacement of the fish screen at Mirabel Dam and decommission or modification of the infiltration ponds on the East side of the Russian River at the Mirabel/Wohler facility. The fish screen and infiltration ponds are discussed below.

The ability of the Russian River aquifer to produce water is generally limited by the rate of recharge to the aquifer through the streambed. To augment this rate of recharge, the Water Agency utilizes a series of infiltration ponds and an inflatable dam. The inflatable dam is located in the Mirabel area, raises the water level and submerges the intakes to a series of canals that feed infiltration ponds located at Mirabel. The backwater created by the Inflatable Dam also raises the upstream water level and submerges a larger streambed area along the Russian River. This increased depth and wetted surface of the submerged area significantly increases infiltration to the aquifer.

The Russian River in the Mirabel Reach serves primarily as a migration corridor for adult and juvenile salmon and steelhead. Thus, the Inflatable Dam has the potential to impact salmon and steelhead primarily during their upstream and downstream migrations through; 1) altering habitat composition, 2) altering water temperature and water quality in the lower river, 3) impeding downstream migration of juveniles, 4) impeding upstream migration of adults, and 5) altering habitat to favor predatory fish (SCWA, 2000). The Inflatable Dam impounds water over an approximate 3.0 mile (4.8-kilometer) reach of the river. Within the impounded reach, riverine habitat is altered from its natural composition of pool/riffle/run habitats to solely pool habitat (the pool formed behind the Inflatable Dam is referred to as the Wohler Pool. Impounding water behind a dam can lead to an increase in water temperature (SCWA, 2000). Additionally, emigrating smolts drift downstream with the current. A decrease in stream current within the impounded reach may adversely delay smolts emigrating from the river (SCWA, 2000).

The purpose of the existing fish screen is to ensure the safety of the fish in the river and permanent fish ladders provide fish passage when the dam is raised. However, NMFS determined that the existing fish screening facilities performed less than adequately for full protection of fish and downstream migration. Pursuant to the Russian River Biological Opinion, the Water Agency will complete design of a new fish screen at Mirabel by 2011 and will replace the rotary drum fish screens at Mirabel within the next ten years (SCWA, 2009). Replacement will require diversion of the Russian River around the site using coffer dams. The Water Agency anticipates it will require 5 to 7 years to design and construct this project element in coordination with NMFS.[10] A conceptual design includes a new intake with an inclined flat plate fish screen

[10] National Marine Fisheries Service (NMFS, 2008), Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation Improvement District in the Russian River Watershed, September 24, 2008, page 44.

system, an oversized screen for increased bypass flow control and capacity, and a bypass fishway in the form of a vertical slot fish ladder.[11]

The Water Agency is decommissioning the infiltration ponds on the East side of the Russian River at the Wohler facility. The ponds are used to increase the infiltration area to the collector wells which allows higher rates of pumping. In September 2009, the Water Agency submitted a preliminary plan for the pond decommissioning to NMFS and CFDG for review and comment. This design has been approved and permitted.

Impacts Identified

Construction and installation of the fish screen may result in temporary impacts to water quality, hydrology, recreation, and biological and fisheries resources. Dewatering the work area will require diverting streamflow via coffer dams around the work area and relocating fish from the site. Based on the project's anticipated timing, NMFS expects only juvenile steelhead are likely to be present; coho and Chinook salmon would have likely migrated from the area (NMFS, 2008). The Water Agency will relocate any juvenile steelhead or other sensitive species found in aquatic habitat in work sites. However, the project will result in a long-term benefit to fisheries by reducing potential for entrainment in the water infrastructure. Some limited injury or mortality of juvenile steelhead may also occur as the result of new fish screen installation; however this would be a temporary impact limited to the short-term construction period.[12] Decommissioning of the infiltration ponds would reduce recharge for the Russian River aquifer. As directed in the Russian River Biological Opinion, Water Agency biologists would need to inspect the gravel bars before beginning work to identify environmentally sensitive areas. Permanent vegetation on the riverbanks may be temporarily disturbed but would not be completely removed. Operation of heavy equipment in the active stream channel would be limited to moving equipment to and from the mid-channel gravel bars and breaching cofferdams when needed, and will be very short in duration. No fueling or equipment service would be performed on the gravel bars or within the active floodplain. After gravel bar grading operations are completed, gravel bars would be contoured to at least a 2 percent grade to reduce the potential for stranding fish. Continuously recording turbidity meters would be installed upstream and downstream of gravel bar grading operations to document turbidity levels associated with this action. Breaching of the lower berm for the Mirabel Bar would be conducted late in the evening or early in the morning to reduce visual effects to recreational visitors at Steelhead Beach (NMFS, 2008).[13]

Relationship to Estuary Management Project

The Water Diversion Infrastructure Project is one of the series of actions to be taken by the Water Agency as part of the RRIFR Program in order to maintain compliance with the Russian River Biological Opinion. Both the Water Diversion Infrastructure Project and the proposed Estuary Management Project are components of the RRIFR Program, located in the Russian River watershed, and would be implemented pursuant to objectives that focus on fisheries enhancement.

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11 Although not a mandated requirement and dependent on grant funding, the design may also include a fish viewing chamber with a window which will allow for real-time monitoring along with education and outreach opportunities.

12 NMFS, 2008, page xiv.

13 NMFS, 2008, page 47. The Water Agency is not currently pursuing permits for these activities.

Potential for Contribution to Cumulative Impacts

Construction effects associated with the Water Diversion Infrastructure projects are anticipated to be short-term and temporary, and would not directly overlap geographically or spatially with implementation of the Estuary Management Project; therefore these impacts are not cumulatively considerable. Modification of water diversion infrastructure is intended to minimize adverse impacts to designated critical habitat for steelhead; similarly, the Estuary will be managed to enhance the rearing habitat for steelhead. Therefore the long-term benefit to fisheries associated with the proposed Estuary Management Project considered concurrently with the long-term benefit to fisheries associated with the Water Diversion Infrastructure projects, would be cumulatively beneficial to fisheries.

Flood Control: Stream Maintenance Program

The Stream Maintenance Program (SMP) is a component of the RRIFR Program that was developed by the Water Agency to improve the management of streams and channels in the Water Agency's maintenance authority through establishing programmatic guidance for implementing this program. The majority of SMP activities would occur in the Laguna de Santa Rosa, Petaluma River, and Sonoma Creek watersheds. Cities within the Program Area which contain Water Agency-owned or maintained channels include: Cotati, Healdsburg, Petaluma, Rohnert Park, Santa Rosa, Sebastopol, Sonoma, and the Town of Windsor. The SMP was designed to provide flood protection and channel conveyance capacity for channels under Water Agency authority, and obtain and maintain 10-year programmatic permits that regulate program activities. The SMP has three primary activities: sediment management, vegetation management, and bank stabilization. These core maintenance activities occur mainly in engineered flood control channels, but may also occur in other facilities including other in-channel engineered structures, and sediment basins on an as-needed basis. The SMP also involves other smaller and infrequent maintenance activities such as road maintenance, sediment removal around reservoir inlet structures, and debris removal, as described below. The SMP also includes the transport and disposal of collected sediment and vegetation. Activities not covered under the SMP include maintenance activities on the main stems of the Russian River and Dry Creek (Horizon, 2009).

Impacts Identified

The primary adverse impacts of SMP activities identified in the SMP EIR (2009) were short-term, occurring during maintenance, and the period immediately following maintenance. Temporary impacts included adverse effects on aesthetics, dust and emissions from maintenance vehicles, degradation of riparian habitat and associated species, potential exposure to sites of existing chemical contamination, potential for accidental releases of hazardous materials associated with maintenance vehicles and herbicide use, releases of sediment and related effects on water quality, interference with emergency access and response, reduced recreational opportunities during or after maintenance, and effects on local traffic from maintenance vehicles and hauling of sediment and other debris. Over the long term, SMP activities would involve channel maintenance and establishment of a riparian corridor along the maintained channels, which will result in enhanced habitat values, improved water quality, and better aesthetic quality and recreational value (Horizon, 2009).

The SMP EIR identified several significant and unavoidable impacts associated with the SMP. Overall, the long-term effect of maintenance activities would result in a beneficial impact on the aesthetic conditions in the Program Area. However, temporary degradation of visual quality due to site disturbance from maintenance activities could affect sensitive viewer groups. Although best management practices and revegetation activities would be implemented, these short-term adverse impacts would still be considered to be significant. Noise impacts associated with maintenance activities would be significant and unavoidable in the City of Santa Rosa. Channel maintenance activities would involve ground disturbance and vehicle usage that would emit both particulates and ozone precursors. Given the non-attainment status for these pollutants in the San Francisco Bay Air Basin, the project contribution to these significant cumulative impacts would be considerable (Horizon, 2009).

Relationship to Estuary Management Project

The SMP is one of the series of actions to be taken by the Water Agency as part of the RRIFR Program in order to maintain compliance with the Russian River Biological Opinion. Both the SMP and the proposed Estuary Management Project are components of the RRIFR Program, located in the Russian River watershed, and would be implemented pursuant to objectives that focus on fisheries enhancement.

Potential for Contribution to Cumulative Impacts

The Estuary Management Project would minimize flood potential and enhance fisheries habitat for rearing juvenile salmonids. The project would reduce tidal influence and provide a freshwater lagoon condition of salmonid rearing, which, considered concurrently with the beneficial effects to fisheries provided by the SMP, would be cumulatively beneficial. Creation and maintenance of the lagoon outlet channel under the proposed project would have the potential to contribute to cumulative short-term impacts associated with erosion and hydrologic conditions at the mouth of the Russian River. Initial construction of flood control channels under the SMP is complete, so the timing of major impacts would not overlap; however, ongoing maintenance efforts under the SMP would occur within flood control zones throughout Sonoma County. In channels in the vicinity of the Estuary Management Project area, the only work that may occur concurrently with the Estuary Management Project is debris removal, therefore, concurrent implementation of the Estuary Management Project would not result in cumulatively considerable short-term or long-term impacts.

Dry Creek Habitat Enhancement

NMFS biologists have determined that cold water released from Lake Sonoma into Dry Creek is ideal for coho salmon and steelhead, but the current flow velocities of the water released from Lake Sonoma, which range from 110 to 175 cfs, are not optimal for young coho and steelhead survival (NMFS, 2008). The Russian River Biological Opinion addresses this problem by mandating the creation of pools, backwaters and side channels on six miles of the 15-mile creek over a 12-year period. The Russian River Biological Opinion also requires the Water Agency to construct five projects on tributaries which serve as the rearing habitat for many of the yearlings raised by the coho broodstock program at the Don Clausen Fish Hatchery. The initial implementation phase includes a 1,250-foot habitat restoration project on the Grape Creek (also known as Wine Creek).

The Water Agency, in partnership with Sotoyome Resource Conservation District and landowners, enhanced pools, shade, and shelter for young salmon and steelhead to grow during the critical first year or two in freshwater before migrating to the ocean. California Department of Fish and Game and NMFS were involved in permitting for the project. The second phase of the Grape Creek project, which involves the stabilization of eroding stream banks, additional log structures, and riparian planting along 750 feet of stream, is slated to begin fall 2010. In coming years, additional Dry Creek tributary enhancement projects will improve the ability of adult salmon and steelhead to migrate upstream by modifying bridges, culverts, and difficult to ascend areas in Grape, Wallace, Crane, and Mill Creeks, as summarized below in **Table 5-2**.

Dry Creek habitat enhancement is scheduled to begin implementation in 2013 (five years after completion of the Russian River Biological Opinion), however the Water Agency is implementing interim actions to promote recovery and survival of salmonids in the Dry Creek area. If habitat enhancement does not result in significant improvements by 2018, the Water Agency would pursue alternative methods, such as construction of a bypass pipeline that would convey water from the dam to the Russian River so that instream flows in Dry Creek could be reduced.

The Water Agency is moving forward with the Willow Creek Fish Passage Enhancement Project. Willow Creek is a tributary to the lower Russian River that once supported an abundant subpopulation of coho salmon. While Willow Creek continues to support significant potential spawning and rearing habitat, access to habitat is blocked by impassable road culverts and a shallow braided channel that passes through a forested wetland. CDFG has identified artificial structures that are passage barriers for one or more life stages of anadromous salmonids within Willow Creek. The project will include restoration of 7.3 and 4.7 miles of salmonid spawning and rearing habitat, respectively, for all life stages by replacing culverts and a bermed roadway with a 43-foot single span bridge. The Water Agency will fund pile installation and rough grading and culvert removal.

Impacts Identified

Environmental documentation for Dry Creek Habitat Enhancements is being prepared, but pending completion; however the types of impacts anticipated include short-term construction-related impacts, such as sedimentation and siltation, vegetation removal, hydrology, and water quality. Over the long-term, Dry Creek Habitat Enhancements are expected to provide benefits to fisheries, riparian corridors, and water quality. Instream work would include dewatering activities, which could temporarily impact fish and would require diverting streamflow around the work area and relocating fish from the site. Implementation of habitat enhancement in Dry Creek would potentially affect cultural resources, vegetation, and recreational uses. The Willow Creek Fish Passage Restoration Project has undergone CEQA review and would result in short-term construction related effects associated with culvert replacement and bridge installation, and would provide long-term benefits to fisheries.

Relationship to Estuary Management Project

The Dry Creek Enhancement Project is one of the series of actions to be taken by the Water Agency as part of the RRIFR Program in order to maintain compliance with the Russian River Biological Opinion. Both the Dry Creek Enhancement Project and the proposed Estuary

TABLE 5-2
PROPOSED INTERIM RESTORATION PROJECTS

Project Name	Impacts	Restoration Action	Increased Area of Fish Production
Crane Creek Fish Passage Access Project	Impacted by previous gravel mining and channelization; severe downcutting obstructs salmonid passage	Removal of barrier	5,021 m^2
Crane Creek Instream Habitat Improvement Project	Although pool frequency is high, pool shelter is low ; Areas are incised and highly erosive	Bio-engineered bank stabilization, increased riparian setbacks, streambed toe stabilization; large woody debris/ boulder structures (plunge weir, boulder/log weirs, digger logs, covers); native revegetation	655 m^2
Grape Creek Fish Passage Enhancement Project	Artificial structures, grade control structures, culverts during certain flow levels at West Dry Creek Road stream crossing is passage barrier	Modify hydraulics through culverts; arched culvert with natural channel bottom	1,977 m^2
Grape Creek Instream Habitat Improvement Project	Low pool shelter	Installation of cover structures in existing pools; bio-engineered bank stabilization, increased riparian setbacks, streambed toe stabilization; large woody debris/ boulder structures (plunge weir, boulder/log weirs, digger logs, covers); native revegetation	730 m^2
Wine Creek Instream Habitat Improvement Project	Low pool shelter; low pool-to-riffle ratios	Riparian zone improvements to reduce sedimentations, stream temperatures, urban and agricultural runoff, increase pool-to-riffle rations. Planting native low canopy species and overstory tree species	390 m^2
Wallace Creek Fish Passage Enhancement Project	Passage barrier at Wallace Creek/ Mill Creek Road stream crossing	Modify hydraulics within culvert at certain flow levels to prolong amount of time culvert it passable; arched culvert with natural channel bottom	5,990 m^2
Purrington Creek Fish Passage Enhancement Project	Passage barrier to adult and juvenile coho and steelhead at Sonoma County road crossing culvert	Culvert removal and restoration of natural channel bottom; or culvert retrofit (i.e. curbing, baffles)	2,650 m^2
Willow Creek Fish Passage Enhancement Project	Spawning and rearing habitat blocked by road culverts and shallow braided channel in forested wetland.	CDFG funding for road projects to reduce non-point source sedimentation; California State Parks projects	9,580 m^2
Mill Creek Fish Passage Improvement	Undermined flashboard dam on private property obstructs passage of adult and juvenile coho and steelhead	Seek landowner permission to design and implement a step pool fishway	23,760 m^2
Redwood Creek Fish Passage Improvement Design	Undermined Arizona concrete structure obstructs passage of adult and juvenile coho and steelhead	Design and implement a step pool fishway	3,950 m^2

NOTE: highlighted cells indicate projects the Water Agency will consider for implementation.

SOURCE: NMFS, 2008.

Management Project are components of the RRIFR Program, located in the Russian River watershed, and would be implemented pursuant to objectives that focus on fisheries enhancement.

Potential for Contribution to Cumulative Impacts

The Estuary Management Project would have a long-term beneficial effect by reducing tidal influence and providing a freshwater lagoon conditions for salmonid rearing, which, considered concurrently with the beneficial effects to fisheries provided by the habitat enhancements along Dry Creek, would be cumulatively beneficial. Creation and maintenance of the outlet channel would have the potential to contribute to cumulative impacts associated with short-term erosion and hydrology conditions at the mouth of the Russian River. However, concurrent implementation of the Estuary Management Project would not result in cumulatively considerable short-term impacts, and would contribute to a beneficial cumulative effect on fish habitat.

Other Local Projects

Jenner Creek Bridge Replacement

The Jenner Community Club is replaced a damaged bridge that provides access across Jenner Creek (Jenner Gulch) to the Jenner Community Center, located at 10432 Highway 1 in Jenner. Jenner Creek perennial stream is a north-bank tributary to the Russian River near its confluence with the Pacific Ocean. During winter storms in 2006, heavy rainfall increased water velocity and volume in Jenner Creek, increasing flood waters to an elevation that damaged the bridge abutments, rendering the bridge unsafe for vehicular use. This bridge was the primary access to the Monte Rio Fire Protection District firehouse for emergency vehicles. The project included removal of existing bridge and reconstructing and replacing it with a longer (45 feet), wider (12 feet), and more structurally sound bridge engineered to pass larger flood events. Jenner Creek provides moderate to high quality spawning habitat for steelhead and coho (NMFS, 2008b). The project includes a revegetation plan, vegetated boulder treatment, root wad placement, and coir log installation to provide aquatic habitat and slope stability. The project, except for final revegetation work, is complete.

Impacts Identified

This site is considered an environmentally sensitive area. Construction activities included but are not limited to clearing, grading, excavation, stockpiling, and reconstruction of existing facilities involving removal and replacement. Work also involved dewatering activities using a coffer dam, and subsequent fish relocation. Dewatering was conducted in accordance with a Dewatering Plan prepared by the project engineers, Prunuske Chatham, Inc. Construction-related impacts include short-term erosion, noise, disturbance of existing vegetation, increased truck trips and construction vehicle access, instream impacts associated with dewatering, and potential release of hazardous materials or fuels. There was an active water line attached to the bridge, so the project proponent coordinated with Sonoma County Department of Public Works to maintain water service. Avoidance measures are being implemented to protect California red-legged frog, Approximately 0.52 acres of riparian habitat would be affected (USFWS, 2008). The project will be completed in accordance with all permits, including but not limited to permits from USFWS,

NMFS, a CDFG Streambed Alteration Agreement and a SWRCB National Pollutant Discharge Elimination System (NPDES) general construction permit. Best management practices, including tree protection, erosion control via proper soil stockpiling, covering, and silt fencing, litter removal, and hazardous material spill prevention, and access are being implemented to minimize impacts.

Relationship to Estuary Management Project

The Jenner Creek Bridge Replacement Project is located adjacent to the Estuary, and is therefore within the geographic scope that could contribute to cumulative impacts during its implementation.

Potential for Contribution to Cumulative Impacts

Impacts associated with the Jenner Creek Bridge Replacement Project, considered concurrently with the proposed Estuary Management Project, could be cumulatively considerable. However, construction is not expected to directly overlap, and the nature of impacts differs between the projects. Adverse impacts associated with the Bridge Replacement Project are primarily temporary, construction-related impacts and long-term impacts are expected to restore spawning habitat in the disturbed area; whereas adverse effects associated with the Estuary Management Project expected over the long-term to affect recreation, vegetation, and hydrology.

North Coast Integrated Regional Water Management Plan

The North Coast Integrated Regional Water Management Plan (IRWMP) was adopted in 2007 to coordinate seven counties and 70 partnering entities to implement basin scale water management strategies. The North Coast Region covers Del Norte, Humboldt, Trinity and Mendocino counties; major portions of Siskiyou and Sonoma Counties; and small portions of Glenn, Lake, Modoc and Marin. The IRWMP provides guidance for future planning and management of North Coast waterways. The IRWMP is implemented through a variety of restoration, facility improvement, and erosion control projects, including the following currently funded restoration projects located in Sonoma County (North Coast Regional Partnership, 2007):

1. **Sonoma County Water Recycling and Habitat Preservation Program (Phase 2a).** Santa Rosa Urban Reuse Pilot Project, located in the City of Santa Rosa, Sonoma County, involves the construction of pipelines, pump stations and filtration. The benefits of the Santa Rosa Urban Reuse Project include improved water supply reliability; reduced conflicts; enhanced salmonid habitat because of reduced diversions from the Russian River; and water quality improvements because of reduced recycled water discharges to the Laguna de Santa Rosa and Russian River.

   The project goals are to: 1) restore and enhance habitat for environmental benefit in general and for the following protected species, including salmonids (Coho and Chinook salmon and steelhead) in the Russian River; California tiger salamander; and plants (Sonoma sunshine, Sebastopol meadowfoam, Burke's goldfields); 2) expand the use of recycled water for agricultural and urban irrigation to add water supply diversity and reliability to the region; 3) improve water quality in the Russian River and its tributaries; 5) reduce agricultural diversions in sensitive areas of the Russian River and its tributaries by supplying recycled

water for irrigation in the Alexander Valley area; 5) reduce reliance on water supply diversions from the Russian River and diversify urban supplies by providing recycled water to urban sites currently supplied from the Russian River system; and 6) contribute to the achievement of total maximum daily loads (TMDLs) for the Laguna de Santa Rosa. CEQA was completed in June 2006 and the project was subject to local grading and building permits, waste discharge requirements, and Clean Water Act Section 505.

2. **Sediment Reduction and Habitat Improvements in Four Russian River Tributaries.** This project, sponsored by California Land Stewardship Institute, involved removal of invasive non-native plants, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands, non point source pollution reduction, management, and monitoring, and watershed management planning and implementation. The project was implemented July 2006 through July 2010 to provide detailed technical information specific to the fine sediment TMDLs on four major tributaries to the Russian River and prioritize implementation of sediment reduction and riparian and aquatic habitat enhancement projects. The Russian River is not scheduled for completion of its TMDL for fine sediment until at least 2011. However, there are few evaluations of streams in the basin detailed enough to be used in preparation of a TMDL. Watershed assessments were completed to assist in identification of historic and current sediment sources, information needed for the fine sediment TMDL for the Russian River. This approach also supplied a baseline from which to demonstrate quantitative improvements. The four selected sub-basins represent a variety of land uses, including forestry, grazing, rural residential housing and vineyards, and support steelhead trout and Coho salmon.

3. **Russian River Arundo Removal and Habitat Restoration Project.** The Sotoyome Resource Conservation District (RCD) removed invasive Arundo donax from the riparian corridors of the Russian River and its tributaries to restore riparian habitat and native plant diversity in an effort to enhance fisheries habitat, wildlife habitat, improve water quantity & quality, and reduce fire danger. In 2000 Circuit Rider Productions, documented the extent of Arundo donax in the Russian River in the report *Invasion Status, Impacts and Effective Control of Arundo donax in the Russian River Watershed.* At that time there was documentation of 236 acres of Arundo donax within the watershed, involving 53 tributaries and hundreds of private landowners. The Sotoyome RCD in collaboration with Mendocino RCD, Circuit Rider Productions, and the California Conservation Corps developed a program for removal and restoration of the riparian corridors affected by this invasive species. This project is already underway in both Mendocino and Sonoma counties. CEQA documentation, DFG and NPDES permits are completed or pending and a majority of landowners have committed to project implementation.

4. **Laguna de Santa Rosa Restoration.** Laguna de Santa Rosa Foundation recently sponsored and completed (September 2009) restoration of riparian corridor along 5 miles of the Laguna de Santa Rosa, protection and stabilization of channel banks through fencing and re-vegetation, and invasive species control. A three- to five- acre vernal pool complex, and, in a site overgrown by invasive Ludwigia, a 15-acre wetland were designed. Altogether this project consists of 6 components which produce synergistic improvements on a broad spatial scale. (1) Barlow/Balletto and Wetlands Park: Riparian restoration and weed control. (2) Kelly Farm: Oak savannah restoration. (3) Dei and Aggio channel enhancement: Riparian restoration and bank protection, cattle fencing and off-stream cattle watering area. (5) Stone Farm and CDFG Wildlife Area: Riparian restoration and weed

control in area impacted by Ludwigia. (5) Balletto Vernal Pool Project: Planning for restoration of three to five acres of degraded seasonal wetlands and for public access components, linking with existing trail plans. (6) George Town Hummock and Swale Project: Planning for wetland restoration of 15 acres impacted by invasive Ludwigia.

Impacts Identified

Many of the IRWMP projects listed above, at various stages of completion; associated impacts included effects to local land uses, water quality, vegetation and sensitive species, and erosion. Over the long-term, the projects improved riparian areas and fisheries habitat.

Relationship to Estuary Management Project

The projects listed above are located within the Russian River Watershed; however, they are located within the upper reaches of the Russian River, and are not located within the geographic scope of the proposed Estuary Management Project.

Potential for Contribution to Cumulative Impacts

These projects have been implemented and therefore short-term effects to local land uses, water quality, vegetation and sensitive species, and erosion have already occurred and would not be cumulatively considerable. The above-mentioned projects include a variety of habitat enhancing techniques designed to improve the area and connectivity of fisheries habitat. One of the primary goals of the Estuary Management Project is to improve rearing habitat for salmonids; therefore, the Estuary Management Project, when considered concurrently with the beneficial impact to fisheries under habitat restoration projects, would be considered cumulatively beneficial. The goals of the North Coast IRWMP are closely aligned with the habitat objective of the Estuary Management Plan, and on the whole, contribute to cumulative improvements in habitat and water quality in the Russian River watershed.

Regulatory and Other Cumulative Projects

303 (d) Listing of impaired waterways in Marin, Sonoma, and Napa Counties

As described in **Section 4.3, Water Quality**, the U.S. Environmental Protection Agency (USEPA) is responsible for water quality management under the Clean Water Act and has delegated this authority in California to the SWRCB. Section 303(d) of the Clean Water Act requires SWRCB to identify water bodies that do not meet water quality objectives. Each state submits an updated 303(d) list biannually. The list identifies impaired water bodies, the pollutant or stressor causing the impairment, and establishes a priority for developing a control plan, or a TMDL. TMDL is a program that has been developed to recover 303(d) list water bodies, and defines the total amount of material a water body can regularly assimilate and still maintain water quality at levels that protects beneficial uses designated for that water body. SWRCB delegates this responsibility in part to the Regional Water Quality Control Boards. A water quality control plan and an implementation plan are developed for each water body and pollutant/stressor.

Impacts Identified

Waterways in northern Sonoma County, including the Russian River, are regulated by the North Coast RWQCB. The Russian River is widely impaired by sedimentation and siltation, among other pollutants as a result of agricultural practices, channel erosion, highway, road, or bridge construction, hydromodification[14], and a range of other potential sources (NRWQCB, 2007a). Affected reaches in the Lower Russian River include Austin Creek (81 miles affected) and the Monte Rio area of Guerneville from the confluence of Dutch Bill Creek to the confluence of Fife Creek. Affected reaches in the Middle Russian River include Sulphur Creek (85 miles affected), Geyserville, Mark West Creek (99 miles affected), Santa Rosa Creek (87 miles affected), Warms Springs (255 miles affected), and Lake Sonoma reservoir. Reaches of the Upper Russian River, including Coyote Valley, are also listed (NCRWQCB, 2007a).

Several projects are underway to recover 303(d) listed waterbodies via the establishment of Total Maximum Daily Loads (TMDLs). The TMDL process is a tool for implementing water quality standards and is based on the relationship between pollutant sources and in-stream water quality conditions. The TMDL establishes the maximum allowable loadings of a pollutant that can be discharged to a water body while still meeting applicable water quality standards. The TMDLs allocation calculation for each water body must include a margin of safety to ensure that the water body can be utilized for its State–designated uses (USEPA, 2002). TMDLs are intended to address all significant stressors which cause or threaten to cause impairments to beneficial uses, including point sources (e.g., urban water discharges), nonpoint sources (e.g., runoff from fields, streets, range, or forest land), and naturally occurring sources (e.g., runoff from undisturbed lands). Within California, TMDLs are implemented through RWQCB Basin Plans (RWQCB, 2007b).

Relationship to Estuary Management Project

The 303(d) list applies to impacted areas within the geographic scope of the Estuary Management Project. The status of the majority of the Russian River as impaired is important in consideration of the cumulative contribution of the Estuary Management Project.

Potential for Contribution to Cumulative Impacts

As discussed in **Section 4.3**, **Water Quality**, key parameters, including salinity, dissolved oxygen, and temperature, were analyzed to determine whether the longer duration of a freshwater lagoon under the lagoon management period would have a significant effect on water quality. The Estuary Management Project would not result in increased contribution to existing pollutant levels or sources that would exacerbate existing exceedances of thresholds or result in the listing of new reaches of the Russian River on the 303(d) list. The cumulative analysis for this potential impact is discussed in more detail in **Section 5.3** below.

[14] Hydromodification is defined by the U.S. Environmental Protection Agency as alteration of the hydrologic characteristics of coastal and noncoastal waters, which in turn could cause degradation of water resources.

Gravel Mining and the Aggregate Resources Mining Plan

Gravel mining was a common practice along the middle reach of the Russian River. The Aggregate Resources Mining (ARM) Plan includes policies on phasing out terrace pit mining and not permitting new terrace pit mining proposals after 2006, but still allowing instream mining. There are several remaining terrace sites; however implementation of the ARM Plan limits extraction to a sustainable level. The Sonoma County ARM Plan, adopted in 1981 and updated in 1995 provides the regulatory guidelines for management of aggregate mining and includes:

1. the Aggregate Mining Plan: lands available for future supplies of aggregate material
2. Managed Resources/ Open Space Plan: protection of riparian habitats, reclamation, and agricultural land preservation
3. Identification of mining operations, including terrace mining, carried out in flood plain

Impacts Identified

Gravel mining typically causes environmental impacts such as erosion, incision of tributaries, and channelization.

Relationship to Estuary Management Project

The mining operations governed by the ARM Plan are located within the Russian River Watershed, and have historically occurred within the geographic scope of the Estuary Management Project.

Potential for Contribution to Cumulative Impacts

As discussed in **Sections 4.1, Geology and Soils,** and **4.3**, **Water Quality**, the Estuary Management Project would not be contribute to erosion/sedimentation, channel incision, or resource extraction impacts generally associated with mining operations, and therefore would not be cumulatively considerable when implemented in conjunction with gravel mining operations. The Estuary Management Project is intended to enhance fisheries habitat; it does not involve any mineral or aggregate mining, and short-term effects to water quality associated with sedimentation would be reduced to a less than significant level. Therefore, the Estuary Management Project's contribution to these types of impacts would be less than cumulatively considerable.

Implementation of AB 2121 – Policy for Maintaining Instream Flows

To protect flows that support threatened and endangered anadromous fish, NMFS and CDFG jointly developed "Guidelines for Maintaining Instream Flows to Protect Fisheries Resources Downstream of Water Diversions in Mid-California Coastal Streams" for new water rights applications in 2002. On September 30, 2005, the California State Legislature enacted Water Code section 1259.5 [Assembly Bill (AB) 2121 (Stats. 2005, Ch. 953, §§1-3)], which required the SWRCB to adopt a policy for principles and guidelines to maintain instream flows in coastal streams within the counties of Marin, Sonoma, Napa, Mendocino and Humboldt by January 2008. Shortly after AB 2121 was signed, two conservation groups, Trout Unlimited and Peregrine Audubon Society filed a petition to assist the SWRCB in implementation of the policy. To satisfy AB 2121 commitments, SWRCB developed Resolution 2005-0070, and drafted the "Policy for

Maintaining Instream Flows" (2010). The purpose of the instream flow requirements established under AB 2121 is to protect native fish populations and fishery resources. By implementing seasonal limits on diversions, minimum bypass flow requirements, and limits on maximum cumulative diversions rights within a watershed, the policy encourages more natural hydrograph responses, or streamflows that would more closely mimic natural or unimpaired streamflow, which would be more conducive to the survival of anadromous fish. Enforcement provisions are also included in the AB 2121 streamflow protection policy.

Identified Impacts

The Substitute Environmental Document prepared for the North Coast Instream Flow Policy (SWRCB, 2007) concluded that the adoption of the policy would not result in any direct environmental impacts. It is anticipated that the policy would increase wintertime flow and duration in local streams by requiring a minimum bypass flow at local diversion points. This would have beneficial impacts on biological resources, riparian habitat, fisheries, water quality and water resources.

Relationship to Estuary Management Project

AB 2121 applies to diversions within the geographic scope of the Estuary Management Project. It is anticipated effect would be to increase in-stream flows over time as the policy is implemented on a case by case basis, likely reducing the level of local diversions.

Potential for Contribution to Cumulative Impacts

The primary objectives of the Estuary Management Project are to minimize flood potential and enhance fisheries habitat for rearing juvenile salmonids. As such, it would have a beneficial effect to fisheries, consistent with the goal of the Instream Flow Policy, which, considered cumulatively, would provide beneficial effects to fisheries.

5.3 Description of Cumulative Effects

5.3.1 Approach to Analysis

This section reviews the potential cumulative effects of creating and maintaining the outlet channel and lagoon management period as part of the Estuary Management Project concurrently with other Sonoma County projects, specifically within the Russian River Watershed listed in **Tables 5-1** and **5-2**.

Pursuant to CEQA Section 15130(a) (1), the discussion below provides rationale to explain why cumulative impacts are not considered significant when the combined cumulative impact associated with the project's incremental effect and the effects of other projects is not significant. Furthermore, the discussion below explains if the Estuary Management Project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project's contribution is less than cumulatively considerable if the project is

required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact [CEQA Section 15130(a) (3)].

This discussion reflects the severity of the impacts and their likelihood of occurrence, but is developed at a lesser level of detail that the impact discussion provided in **Chapter 4.0, Environmental Setting, Impacts, and Mitigation Measures** [CEQA Guidelines Section 15130(b)].The discussion is guided by standards of practicality and reasonableness, and focuses on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.

The following impact discussions generally follow the issue areas and impact statements analyzed in **Chapter 4.0, Environmental Setting, Impacts, and Mitigation Measures**, but focus primarily on the resources that may be adversely affected by either the Estuary Management Project or the projects listed in **Section 5.2** that, when considered concurrently, may result in a cumulatively considerable impact.

Table 5-3 provides a summary of water resource projects, their geographic relationship to the Estuary Management Project area, the types of impacts anticipated for their implementation, and the potential for the Estuary Management Project to contribute to cumulative impacts associated with these projects.

5.3.2 Construction Related Impacts

Impact 5.1: Short-term (Construction-related) Cumulative Impacts. Concurrent construction of the projects within the Russian River Watershed in northern Sonoma County could result in cumulative short-term impacts associated with construction activities. (Less than Significant with Mitigation)

The Estuary Management Project would not involve typical construction activities, but rather it would include short-term activities associated with the outlet channel creation or artificial breaching activities as required. Long-term operational activities associated with the Estuary Management Project are partly a continuation of existing practices. These activities would potentially coincide with implementation of the projects described in Table 5-1. As described in Chapter 4.0, the short-term impacts associated with the proposed Estuary Management Project include temporary generation of noise, traffic and access disruptions that could affect adjacent land uses, wildlife, aesthetics, public services and utilities, or recreational visitors. These impacts could contribute to a cumulatively significant effect if incurred in conjunction with impacts from other related projects (Table 5-1). However, Estuary Management Project impacts could be mitigated to less than significant levels identified in Chapter 4.0. Furthermore, these impacts would be localized to the outlet channel location at Goat Rock State Beach, and do not directly overlap geographically with any other recent, planned or ongoing, or foreseeable future project identified in Table 5-1; therefore the cumulative impact is equivalent to the impacts described n Chapter 4.0. Due to their short-term nature, and the inclusion of appropriate mitigation measures as established in Chapter 4.0, the Estuary Management Project’s contribution to short-term impacts is not cumulatively considerable.

TABLE 5-3
SUMMARY OF OTHER PLANS, POLICIES, PROGRAMS, AND HABITAT RESTORATION PROJECTS AND RELATIONSHIP TO ESTUARY MANAGEMENT PROJECT

Project Name	Project Impacts	Located in Russian River Watershed?	Located in Bay Area Airshed?[1]	Estuary Management Project Contribution?	Estuary Management Project Contribution Type	Estuary Management Project Contribution Significant?	Estuary Management Project Contribution Cumulatively Considerable?
WATER RESOURCE AND HABITAT ENHANCEMENT PROJECTS							
Russian River Instream Flow and Restoration Program (RRIFR)							
Temporary Urgency Change Petition	• Short-term Flow Changes • Hydrology • Water Quality • Recreation • Fisheries	Yes	Yes	Yes	• Flow Changes • Hydrology • Water Quality • Fisheries • Recreation	No Yes Yes Beneficial Yes	No Yes Yes Beneficial Yes
Modifications to D1610	• Long-term Flow Changes • Hydrology • Water Quality • Fisheries • Recreation	Yes	Yes	Yes	• Flow Changes • Hydrology • Water Quality • Fisheries • Recreation	No Yes Yes Beneficial Yes	No Yes Yes Beneficial Yes
Dry Creek Habitat Enhancements	• Construction • Water Quality • Fisheries	Yes	Yes	Yes	Hydrology Water Quality Fisheries	No No Beneficial	No No Beneficial
Coho Broodstock Program (US Army Corps of Engineers)	• Fisheries	Yes	Yes	Yes	Fisheries	Beneficial	Beneficial
Water Diversion Infrastructure	• Construction • Operations • Fisheries	Yes	Yes	Yes	Fisheries	Beneficial	Beneficial
LAND USE AND POLICY							
North Coast Regional Water Quality Control Board Basin Plan/303(d) List	• Water Quality	Yes	Yes	No	None	No	No
General Plan Development/ Infrastructure	• Construction • Operations • Growth	Yes	Yes	No	None	No	No
Local Coastal Program	• Long-term Implementation • Recreation • Aesthetics • Coastal Resources	Yes	Yes	Yes	Recreation/ Access Beneficial Uses Aesthetics Coastal Resources	Yes No No No No	Yes No No No No

TABLE 5-3 (Continued)
SUMMARY OF OTHER PLANS, POLICIES, PROGRAMS, AND HABITAT RESTORATION PROJECTS AND RELATIONSHIP TO ESTUARY MANAGEMENT PROJECT

Project Name	Project Impacts	Located in Russian River Watershed?	Located in Bay Area Airshed?[1]	Estuary Management Project Contribution?	Estuary Management Project Contribution Type	Estuary Management Project Contribution Significant?	Estuary Management Project Contribution Cumulatively Considerable?
LAND USE AND POLICY (cont.)							
Sonoma County Aggregate and Mining Resources Plan	• Erosion • Water Quality • Mineral Resources	Yes	Yes	No	None	No	No
Assembly Bill 2121	• Hydrology • Water Quality • Fisheries	Yes	Yes	No	None	No	No
North Coast Integrated Regional Water Management Plan	• Construction • Operations • Hydrology • Fisheries • Vegetation • Recreation	Yes	Yes	Yes	Fisheries Hydrology Water Quality	Beneficial No No	Beneficial No No

[1] The term "airshed" is defined by the Bay Area Air Quality Management District (BAAQMD) as a geographical area of which, because of topography, meteorology, and climate, shares the same air. For analysis of the Estuary Management Project, airshed refers to all areas that share the same air within the action area. This term is an applicable in the analysis of cumulative impacts on air quality as a result of concurrent construction or operation of projects within the same spatial and temporal locations.

Mitigation Measures

Mitigation Measures in **Chapter 4.0, Environmental Setting, Impacts, and Mitigation Measures**.

Impact Significance: Less than Significant.

5.3.3 Long-Term Impacts

Impact 5.2.1: Cumulative Long-term Geologic Impacts (Seismic Events and/or Beach Erosion). Concurrent creation of the outlet channel and continued artificial breaching with other projects proposed in the Russian River Watershed and other habitat enhancement projects could result in cumulative long-term risk of impacts related to groundshaking and surface fault rupture during major earthquakes, or lead to erosion of beach sands or river bank. (Less than Significant)

Components of the Estuary Management Project could be exposed to damage from earthquakes and geologic hazards. Seismic events could cause failure of the lagoon outlet channel. However this would not expose people or habitable structures to increased risk; therefore this impact is considered less than significant. As such, failure of facilities that are created as part of the Estuary Management Project, in conjunction with seismically-induced failure of other projects in the area, would not result in potential incremental increased risk of disruptions to water supplies, or damage to other infrastructure, or public safety, and is therefore not considered cumulatively considerable. Considering that geohazards are unavoidable and unpredictable, Estuary Management Project facilities would be exposed to damage from earthquakes and geologic hazards. Implementation of standard design criteria and appropriate design measures would reduce this impact to less than significant. Therefore, the Estuary Management Project's contribution to this seismic risk impact would not be cumulatively considerable.

Creation of the outlet channel could result in short-term erosion on the barrier beach. However, the beach is a dynamic system that is already subject to erosive forces of tidal action; therefore the level of erosion on the barrier beach potentially associated with the proposed project would not be considered significant. The projects identified in Table 5-1 are not anticipated to directly result in beach erosion, therefore, the cumulative impact would be equivalent to the impact identified in Chapter 4.0, and as such, the Estuary Project would not have a cumulatively considerable contribution.

Mitigation Measures

Mitigation Measures in **Chapter 4.0, Environmental Setting, Impacts, and Mitigation Measures**.

Impact Significance: Less than Significant.

Impact 5.2.2: Cumulative Long-term Hydrologic Impacts. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, would alter the existing drainage pattern at the Estuary mouth, which could result in increased potential for inundation of parcels adjacent to the Estuary. (Cumulatively Significant and Unavoidable)

Implementation of projects identified in **Section 5.2**, as well as general development within the Russian River Watershed, would have the potential to increase flood flows during runoff events, and may increase the 100-year floodplain elevations in the vicinity of the Estuary. Implementation of the Estuary Management Project would not be expected to contribute to potential increase in 100-floodplain elevations, or increases in stormwater runoff or peak velocities.

However, during the lagoon management period, implementation of the Estuary Management Project would increase water surface elevations within the maximum backwater area, as well as the duration over which the target water surface elevations (e.g., 4.5 feet to 9 feet, with an average of 7 feet) would be maintained, depending upon the performance of the outlet channel. Within the Estuary Study Area, portions of approximately 78 parcels would be inundated at a water surface elevation of 9 feet. In most cases, the area of inundation would comprise channel margin ("shoreline") and beach areas only, and no structures (e.g., homes, sheds, septic tanks, boat docks, etc.) would be directly affected. However, in a few cases, a preliminary analysis using aerial photographs, elevation data, and parcel information (SCWA, 2010) suggests that existing structures, primarily boat docks, would be inundated at a water surface elevation between 7 and 9 feet. Similar effects may occur to additional properties within the maximum backwater area between Austin Creek and Vacation Beach.

The increase in the elevation and duration over which these structures would be annually inundated, could result in potentially more damage than that which is sustained under existing conditions. With respect to these parcels and structures, this would be a potentially significant impact resulting from implementation of the project; **Mitigation Measure 4.2.2** would reduce this impact to the degree feasible relative to structures that may be inundated for a longer duration. However, no mitigation measures are available to reduce or avoid the inundation of private parcels to an elevation of up to 9 feet along the shoreline within the maximum backwater area for longer durations during the lagoon management period. Therefore, the Estuary Management Projects contribution to impacts related to inundation of properties along the Estuary shoreline during the lagoon management period would be cumulatively considerable, and would therefore be cumulatively significant and unavoidable.

Mitigation Measures

No mitigation measures are available to reduce this impact and meet the project objectives.

Impact Significance: Cumulatively Significant and Unavoidable.

Impact 5.2.3: Cumulative Long-term Tsunami Effect. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could increase the risk to people or structures within this area to loss, injury, or death involving flooding in the unlikely event of a tsunami. (Cumulatively Significant and Unavoidable)

Projects identified in **Section 5.2**, are generally outside of the Estuary, and would not be anticipated to affect tsunami response. General development within and adjacent to the mapped tsunami flood zone along the Russian River Estuary would have the potential to increase the risk of inundation in the unlikely event of a tsunami.

Though tsunamis are extremely rare events, and the specific effect of elevated Estuary water levels upon the tsunami flood risk cannot be reliably quantified at this point, the increase in the duration of target Estuary water levels would, nonetheless, likely increase the overall risk of flooding associated with a tsunami. Since the duration of elevated Estuary water levels would be increased as a result of the project (e.g., from less than a few days, on average, to approximately one to five months, on average, where the Estuary water levels would be at or near 7 feet), the subsequent probability of a tsunami (of sufficient magnitude to cause damage) occurring concurrently with elevated Estuary water levels would also be increased. It should be noted that increased storage conditions currently occur episodically, but their duration is limited by artificial breaching practices currently implemented by the Water Agency.

In considering the increased duration of higher water surface elevations, and the increase in risk with respect to people, adequate warning would likely be given in the event of a potential tsunami generating event. This would not necessarily mitigate or alleviate the increased risk of loss as it pertains to existing structures or property (i.e. equipment, cattle, etc.). Given the uncertainty of the magnitude of this potential impact, and lacking more Estuary-specific information concerning tsunami effects, the following conclusion regarding significance is made: in the unlikely event that a tsunami of sufficient magnitude occurs within the Jenner area during the 5 month lagoon management period, the project would result in an increased risk of structural damage or loss for properties just outside of the areas that would currently be inundated by tsunami-related flooding. There is no feasible mitigation for this potential impact. Therefore, the Estuary Management Project's contribution to this impact would be considerable, and as such, is considered cumulatively significant and unavoidable.

Mitigation Measures

No mitigation measures are available to reduce this impact and meet the project objectives.

Impact Significance: Cumulatively Significant and Unavoidable.

Impact 5.2.4: Sea Level Rise. The Estuary Management Project could be affected by an increase in sea level rise. (Less than Significant)

As previously discussed in the **Section 4.2, Hydrology and Flooding**, climate change is likely to occur, but its timing and magnitude are uncertain. When it occurs, it could alter the hydrologic setting of the Estuary. The aspects of climate change which are likely to alter the proposed project and its impacts are increased sea level rise and wave energy. Other aspects of climate change which may alter the proposed project and its impacts are riverine discharge and wind-forced currents.[15] This analysis assumes a one meter rise in sea level as the worst-case-scenario, and identifies potential impacts to the proposed project. It should be noted that implementation of the proposed project would not affect or alter the occurrence or timing of climate change or sea level rise; rather, this discussion reviews potential future scenarios, and their potential effect on the successful implementation of the Estuary Management Plan Project.

Beach Morphology

Climate change, in the form of sea level rise and increased wave energy, is likely to alter the beach morphology at the mouth of the Russian River by increasing coastal erosion, thereby forcing the beach berm barrier in front of the estuary to transgress landward (PWA, 2010). This transgression will occur so that the beach berm is in equilibrium with the higher wave runup caused by both an increase in sea level rise and wave energy.

While the jetty and its remnant infrastructure (roadway, seawall, and railroad) are in place, the increase in sea level rise and wave energy will remove sand from in front of the jetty structures, but may be hindered from building the berm beach barrier further inland by the structures. Once sand is removed from in front of the structures, they will be exposed to the full force of the wave energy. This wave energy will probably damage and remove the structures, much as it has already done at the end of the concrete jetty which protrudes into the ocean and at the locations where overwash has breached the structures. Once the jetty structures deteriorate, transgression of the beach berm barrier is likely to continue landward at a pace unhindered by any remnant structures.

In response to a changing tidal prism, waves, and riverine discharge, the timing and/or frequency of the estuarine inlet closure may change (Largier et al., 2010). The manner in which the closures may change is difficult to assess at this time because closure occurs as a result of interactions between the timing and magnitude of tides, waves, and riverine discharge. Changes to these factors in response to climate change are not known at sufficient level of detail to predict how their interaction may affect closure.

Operations of the Proposed Outlet Channel - Outlet Channel Morphology

As described above in the section of beach morphology impacts, climate change may alter the timing and/or frequency of estuarine inlet closures. Since outlet channel operations are initiated in response to inlet closure, changes to the timing and frequency of inlet closures would have a

[15] It should be noted that this project would not contribute to sea level rise; therefore the analysis and mitigation do not include any reduction or prevention measures; rather this discussion focuses on potential effects of sea level rise on the project.

corresponding effect on outlet channel operations. As noted above, the potential change to closures is difficult to predict with the current level of understanding. If closures are more frequent during the management period, outlet channel implementation and maintenance may need to occur more frequently. Similarly, less frequent closures may reduce outlet channel implementation and maintenance.[16] Closure timing is particularly significant for the outlet channel since there may be a relative narrow window in the late spring and early summer, the start of the management season, when river flows are low enough and wave energy is high enough to cause closure. If climate change alters this balance, for instance, by increasing the duration of high riverine flows in the late spring and early summer, the Estuary may not close at the start of the management period as frequently as it has in the past, thereby limiting the likelihood of implementation of the outlet channel until wave energy increases in magnitude in the fall at the end of the management period.

Changes to sea level rise, wave direction, and wave energy, as well as the resulting change to overall beach morphology, may alter the manner in which the outlet channel migrates across the beach berm barrier (Behrens and Largier, 2010). In turn, these changes may affect the habitat objectives of the outlet channel, e.g. its ability to create a non-tidal, freshwater lagoon.

Operations of the Proposed Outlet Channel - Seepage through the Beach Berm Barrier

Increased sea level rise could reduce the difference in water level between the lagoon and the ocean.[17] This water level difference, along with the hydrogeologic properties of the beach sand, determines the seepage rate through the beach berm barrier. Seepage through the beach berm barrier may be an important factor in maintaining the water level inside the lagoon. If seepage is reduced by higher sea level, the outlet channel may need to convey additional water to maintain lagoon water levels and prevent flooding. If the outlet channel is operating close to the threshold for sand transport (PWA, 2010), the increased conveyance demands caused by reduced seepage may make it more difficult to maintain the outlet channel without it scouring and breaching the barrier beach.

Flooding of Property Adjacent to Estuary

One mechanism for flooding of property adjacent to the Estuary is closure followed by increasing water levels. Climate change may alter the timing and frequency of inlet closures, but current understanding does not indicate how closure may be altered. Since the proposed project continues to include artificial breaching as a flood hazard mitigation measure, the proposed outlet channel will not affect the flood hazard of properties adjacent to the estuary. If sea level rise and increased wave energy contribute to more frequent closures, the Water Agency may be called on to send construction equipment onto the beach more frequently. The increase in closure events is likely to be similar for no project, proposed project, and project alternatives since these alternatives do not affect either ocean water levels or waves.

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16 As noted in **Chapter 2.0, Project Description**, the frequency of equipment operation on the barrier beach during the lagoon management period may be incrementally increased compared to existing conditions, and could include up to 18 maintenance activities over the course of the lagoon management period, depending upon the performance of the outlet channel. This represents a potential increase over existing artificial breaching activities.

17 Unless the beach berm height increased commensurately with sea level rise.

Mitigation Measures

Mitigation Measure 5.2.4: The Water Agency shall monitor occurrence of sea level rise and implement adaptive management strategies to manipulate outlet channel elevation, alignment, and width; or implement more frequent outlet channel maintenance.

Impact Significance: Although the effects of sea level rise on the proposed project are not fully known, implementation of the above mitigation measure would ensure that the Water Agency and other regulatory agencies incorporate sea level rise into the adaptive management plan for the Estuary to continue to meet project objectives. The project itself would not have any direct effect on sea level rise. Therefore, potential impacts associated with the proposed Estuary Management Project are not considered to be cumulatively considerable.

Impact 5.2.5: Cumulative Long-term Impacts on Water Resources. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to water quality related to nutrient and indicator bacteria levels. (Cumulatively Significant and Unavoidable)

Reduced inflows into the Estuary could reduce water quality conditions, particularly with respect to bacteria and nutrient levels within the Estuary during freshwater lagoon conditions. Reduced flows may reduce the assimilative dilution capacity of Russian River flows upstream of the Estuary, and assuming inputs within the watershed remain constant, could result in increased concentrations of nutrients and indicator bacteria. Reduced water quality would have the greatest potential to occur during dry hydrologic years. As previously discussed in **Section 4.3, Water Quality**, areas upstream of the Estuary (upstream of Austin Creek) are identified by the NCRWQCB as impaired for bacteria. Water quality sampling by various entities, including SCWA 2004, have not identified bacterial levels that warrant listing the Estuary as impaired, and the 303(d) listing for bacteria is limited to areas upstream of Austin Creek. Sampling events in 2009 and 2010 indicate there is a large variation in indicator bacteria levels observed through the different sections of the Estuary. These variations were observed to occur under both open and closed mouth conditions and may be seasonal as well.

As identified in **Section 4.3, Water Quality**, implementation of the Estuary Management Project would not alter water quality inputs for nutrients or indicator bacteria into the Estuary, and closed Estuary conditions with the outlet channel established would still include flow through processes, although residence time within the Estuary would be increased by approximately one week compared to existing artificial breaching conditions. However, because of the limited nature of nutrient and indicator bacteria data collection during closure conditions, there is insufficient information to definitively conclude whether the adaptive management program would result in an increase, decrease, or no substantial adverse effect on nutrient or bacteria levels within the Estuary. Therefore, in the absence of technical certainty, the Estuary Management Plan would have the potential to contribute to significant and unavoidable secondary impacts to public health related to nutrient and bacterial levels in the Estuary. When considered cumulatively with the

Fish Flow Project, the potential for this occurrence may be increased, primarily in dry years, when inflow to the Estuary is reduced. The occurrence, nature and timing of potential impacts related to the Fish Flow Project will be confirmed during the environmental review process for that project. However, these impacts are considered cumulatively considerable.

It should be noted that the conditions of the Russian River Biological Opinion, and the Estuary Management Project's Adaptive Management Plan, include provision for breaching in the event that flooding conditions, water quality conditions, or biological resource conditions warrant. Therefore, no additional mitigation measures are required or available relative to the occurrence of this impact.

Mitigation Measures

No mitigation measures are available to reduce this impact and meet the project objectives.

Impact Significance: Cumulatively Significant and Unavoidable.

Impact 5.2.6: Cumulative Long-term Groundwater Impacts. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could change the duration and/or geographic extent of saline conditions in the Estuary. This could extend the period of time groundwater wells experience brackish water intrusion. (Cumulatively Significant and Unavoidable)

Projects identified in **Section 5.2** are generally outside of the Estuary and corresponding groundwater basin, and would not be anticipated to affect groundwater conditions. General development within and adjacent to along the Russian River Estuary that relies on groundwater use would have the potential to alter groundwater conditions. Additionally, implementation of the Fish Flow Project would reduce summer instream flows; this reduction could alter water quality within the Estuary, and could contribute to secondary effects to groundwater quality identified for the Estuary Management Project.

As noted in **Section 4.2**, the project could possibly extend the amount of time that some groundwater wells experience higher salinity during certain times of the year. The existence of salinity in groundwater wells, itself, is not a significant effect of the project because salt water influence has reportedly already been a recurring condition in wells located along the Estuary since at least the 1950s. However, there is insufficient information to conclude whether the adaptive management program would result in an increase, decrease, or no substantial adverse effect on the background or current brackish groundwater conditions in and adjacent to the Estuary.

Reduced instream flows related to the Fish Flow Project could also have the potential to contribute to secondary water quality effects along the Estuary. Anecdotal information indicates that brackish water conditions within the groundwater may be related to overall freshwater flows

within the Estuary, and that freshwater conditions within wells are improved with the onset of increased flows in the river following storm events. However, because of the lack of groundwater data along the Estuary, there is insufficient information to definitively conclude whether the adaptive management program would result in an increase, decrease, or no substantial adverse effect on groundwater quality within the Estuary. Therefore, in light of the existing, although limited, data and in the absence of technical certainty, the Estuary Management Plan would have the potential to contribute to significant and unavoidable secondary impacts to groundwater quality in the Estuary. When considered cumulatively with the Fish Flow Project, the potential for this occurrence may be increased, primarily in dry years, when inflow to the Estuary is reduced. The occurrence, nature and timing of potential impacts related to the Fish Flow Project will be confirmed during the environmental review process for that project. However, these impacts are considered cumulatively considerable.

Mitigation Measures

No mitigation measures are available to reduce this impact and meet the project objectives.

Impact Significance: Cumulatively Significant and Unavoidable.

Impact 5.2.7: Cumulative Long-term Impacts on Biological Resources. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to biological resources. (Cumulatively Significant and Unavoidable)

Artificial breaching or lagoon outlet channel creation and maintenance under the Estuary Management Project could have a short-term effect on sensitive plant species (i.e. Tidestrom's lupine in dune habitat) that have a high potential to be located within the project area; however the impact would be reduced through pre-construction survey and avoidance measures **(Mitigation Measure 4.4.1)** established in **Section 4.4, Biological Resources**. Harbor seals disturbance during outlet channel creation and maintenance may be a nuisance and constitute take under the Endangered Species Act; however the project incorporates measures required under the Incidental Harassment Authorization, and therefore the project's take would be less than significant. No other projects listed in **Table 5-1** are anticipated to have a direct adverse effect on dune habitats or pinnipeds. Therefore, the Estuary Management Project's potential impacts during artificial breaching and creation of the outlet channel, in combination with projects described in **Section 5.2**, would not contribute to a cumulatively significant impact to these biological resources; the project contribution would be less than cumulatively considerable.

Long-term implementation and increased duration of the freshwater lagoon may have significant adverse effects that, considered concurrently with other projects in the Russian River Watershed, may be cumulatively considerable. The projects considered in **Table 5-1** are anticipated to have adverse impacts on biological resources. Potential contribution to impacts to species types are summarized below.

Natural Communities

As discussed in the analysis provided in **Section 4.4, Biological Resources**, increased duration of inundation anticipated during the lagoon management period may result in loss and/or conversion of sensitive plant communities. The change in the hydrologic regime may result in the change of the location, extent, and composition of the vegetation communities within the Estuary. Affected natural vegetation communities include, but are not limited to, Coastal and Valley Freshwater Marsh and North Coastal Riparian Scrub. Based on the affected acreages and anticipated transitions, this impact is considered less than significant. Other projects within the Russian River Watershed could also contribute to disruption or loss of rare plant habitat, if implemented. These projects have completed or will be required to complete the appropriate level of CEQA compliance and permitting, including the establishment of mitigation measures to minimize or offset loss of habitat.

As noted in **Section 4.0**, the adaptation of vegetative communities along the shoreline fringe of the Estuary is difficult to predict, as it is subject to several factors. It is anticipated that conditions resulting from the Estuary Management Plan would be consistent with the range of conditions currently experienced in the Estuary, and that its implementation would result in conditions that are more natural relative to observed conditions in other estuary systems on the West Coast.

Plants, Amphibians, Reptiles, and Birds

Although the change in duration of inundation could affect freshwater marsh and riparian communities, it is anticipated that while some freshwater marsh and riparian habitat may be lost in the lower elevations of the Estuary, some may be gained in the upper elevations (i.e., some additional wetland and riparian vegetation may grow above the managed surface water elevation because increasing groundwater levels would induce suitable conditions for the establishment of such vegetation, such as prolonged inundation or soil saturation during the growing season. Therefore, effects on specials-status plant and animals species potentially occurring in these habitats could be offset by the habitat gains. Additionally, estuaries are complex, dynamic ecosystems, normally experiencing changes between seasons, between years, and between different places in the same estuary. Plant and animal species within these systems are adapted to fluctuating environmental conditions. For these reasons, the loss or modifications of the freshwater marsh and riparian habitats is not expected to result in a substantial adverse effect on specials-status plants and animals potentially occurring within these communities. Therefore, the impacts of the Estuary Management Project, considered concurrently with other projects, are not cumulatively considerable.

Special-status birds, such as various wading birds, shorebirds, seabirds, and water birds, using the open water habitat and beaches, gravel bars, and mudflats of the Russian River for roosting and/or foraging could be adversely affected by lagoon adaptive management. Beaches, gravel bars, and mudflats may become submerged, and depths of the open water habitat may become less suitable for foraging by some species, while favored by others. Although the loss or modifications of these habitats could result in concentration of birds in fewer locations, it is not expected to result in a substantial adverse effect on any special-status birds potentially using the open water habitat and beaches, gravel bars, and mudflats of the Russian River. As discussed

above, estuary species are adapted to fluctuating environmental conditions. Additionally, suitable roosting and foraging habitat is present along the northern California coast. Therefore, the impacts of the Estuary Management Project, considered concurrently with other projects, are not cumulatively considerable.

Marine Mammals

Lagoon adaptive management could adversely affect harbor seals, as well as California sea lions and northern elephant seals (collectively referred to as pinnipeds), through habitat loss or modification during the one to five month lagoon management period. This potential habitat modification would include impeded access into the Estuary due to barrier beach closure and establishment of an outlet channel; and inundation of interior river haulouts. Based upon observation of use during shallow outlet channel conditions, effects related to impeded access are not considered significant with mitigation identified in **Section 4.4.** However, harbor seals use regular haulouts located within the Estuary, including the Jenner (Penny) logs, Paddy's Rock, and Chalanchawi. Under the proposed project, water levels would be increased up to 7 to 9 feet for a longer duration, which could inundate the mudflat/gravel bar areas that provide suitable haulout sites within the river, reducing their availability of haulout locations within the Estuary itself. Such modification of suitable habitat would be a potentially significant impact, as it could affect pinniped resting, foraging, and movement patterns, and rearing activities. Therefore, the impacts of the Estuary Management Project, considered concurrently with other projects, would be cumulatively considerable.

Jurisdictional Waters and Wetland Habitat

The Estuary Management Project could result in extended duration of higher water levels, which would become the new "ordinary high water" thereby adjusting the extent of jurisdictional waters. However, if water surface elevations do not establish the elevation of 7 feet as the ordinary high water, there would not be a net change in the extent of federal and state jurisdictional waters. Therefore, no significant impact (i.e. net loss of waters) is anticipated. Implementation of other projects within the Russian River Watershed would have the potential to impact wetland features. These projects have completed or will be required to complete the appropriate level of CEQA compliance and permitting, including the establishment of mitigation measures to minimize or offset loss of wetlands and sensitive habitats. As necessary, mitigation would be established as part of the USACE 404 Permit and CDFG 1602 permitting processes. In general, the character of the potential impact associated with the proposed Estuary Management Project is different than the impacts (i.e. conversion, removal, fill of wetland areas as a result of development) generally associated with other permanent conversion impacts to wetlands; therefore, the impacts of the Estuary Management Project, considered concurrently with other projects, is not cumulatively considerable.

Nursery Sites and Migratory Corridors

As discussed in the analysis provided in **Section 4.4, Biological Resources**, there would be no significant impact on the movement of wildlife along the Russian River corridor. There could be some adverse change in the availability of riverine marsh, tributary streams, or back-channel

ponds for amphibian breeding (nursery) sites. In the wetland communities where these sites occur, the discussion under Impact 4.4.6 (Natural Communities) predicts a combination of offsetting increases or losses as the water is retained for longer periods. Impacts to harbor seal pupping would be addressed through mitigation measures incorporated under the IHA. Projects identified in Table 5-1 are not anticipated to incur direct results to nursery sites or migratory corridors. The Estuary Management Project is determined to have a less than significant effect, and therefore, considered concurrently with other project impacts, represents a less than significant contribution to cumulative effects on nursery and migration sites.

Mitigation Measures

Mitigation Measures in **Section 4.4, Biological Resources**.

Impact Significance: Impacts related to inundation of pinniped river haulout sites would be Cumulatively Significant and Unavoidable.

Impact 5.2.8: Cumulative Long-term Impacts on Fisheries. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to fisheries. (Cumulatively Beneficial)

As discussed in **Section 4.5, Fisheries**, all potential impacts related to CEQA criteria were evaluated and found to be less than significant and beneficial to fisheries resources in the Estuary. Management of a freshwater lagoon is expected to result in greater estuarine habitat productivity, increased juvenile growth, and potential subsequent adult recruitment. The adaptive management element of the Estuary Management Project is designed to reduce the likelihood of additional impacts to fish species through a range of monitoring, assessment, agency consultation, and management actions. The effects to fisheries from the Estuary Management Project, considered concurrently with the beneficial fisheries effects from other habitat restoration projects in the Russian River Watershed (Section 5.2), would contribute to a cumulatively beneficial effect.

Mitigation Measures

No Mitigation Measures are required.

Impact Significance: Cumulatively Beneficial.

Impact 5.2.9: Cumulative Long-term Impacts on Land Use. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to land use and agricultural resources. (Less than Cumulatively Considerable)

Water levels resulting from increased duration of the freshwater lagoon under the Estuary Management Project have the potential to temporarily inundate locally-important farmland and grazing land within the Estuary Management Project area. As discussed in **Section 4.6, Land Use and Agricultural Resources**, it is anticipated that these impacts would not result in permanent conversion of agriculture land. Other projects described in **Section 5.2** are not anticipated to contribute to disruption or loss of farmlands, if implemented. These projects have been completed or would be required to complete the appropriate level of CEQA compliance and permitting, including the establishment of mitigation measures to minimize or offset loss of farmlands, as necessary. In combination with other projects described in **Section 5.2**, the Estuary Management Project would not have a cumulatively considerable contribution to the loss of farmlands.

Mitigation Measures

No mitigation measures are required.

Impact Significance: Less than Significant.

Impact 5.2.10: Cumulative Impacts to Recreation. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to recreation and recreational facilities. (Cumulatively Significant and Unavoidable)

As discussed in **Section 4.7, Recreation**, the Estuary Management Project has the potential to modify or eliminate the surf break during the lagoon management period. The surf break is associated with open tidal conditions, either occurring naturally or immediately following artificial breaching activities. Other projects in the Russian River Watershed, Sonoma's coastal area, or other habitat restoration projects would not directly result in degradation of the surf break at this location. However, as previously noted, reduced summer flows associated with the Fish Flow Project would likely increase the number of closure events occurring during the lagoon management period. Depending upon hydrologic year type, reduced summer flows would also assist in the management of the outlet channel, as less discharge via the outlet channel would be anticipated. This would reduce the potential for the outlet channel to erode open and re-establish tidal conditions in the Estuary. Considered cumulatively, it should be noted that the Estuary Management Project is designed to accommodate the observed range of inflows to the Estuary following natural closures that occur during the May 15 to October 15 lagoon management period.

Surf swells in the Sonoma Coast region are typically smaller during summer months; and anecdotal information asserts that, during summer months, the wave break elsewhere in the region is not comparable to the wave break at the Russian River mouth that is supported by open, tidal conditions at the Russian River mouth. The reduction or loss of this surf break occurrence during summer months is of particular concern to local surfers (ESA, 2010). Although the project would not directly eliminate this temporarily-occurring recreational resource for the duration of the year, the project would likely reduce the occurrence of the surf break at Goat Rock for current users during the lagoon management period.

During the non-management period from October 16 through May 14, it is anticipated that ocean topography off-shore of Goat Rock State Beach would return to previous conditions and the surfing location would provide the same recreational experience for users as existing conditions. However, in light of local incidental recreational benefit enjoyed under current management practices, this reduction in the occurrence of surf break conditions is considered a significant impact. There are no available/ feasible mitigation measures that would effectively reduce or avoid the impact; therefore it is considered unavoidable.[18]

In addition to effects to surfing conditions, the increased frequency and duration of closures could result in longer inundation of shoreline properties and riverfront beaches, both relatively large, contiguous areas, as well as smaller, more discrete areas immediately adjacent to the active channel margin. Recreation facilities adjacent to the Estuary include Willow Creek Open Space, Willow Creek Environmental Camp, and private boat docks, and beaches (i.e. at Rien's Sandy Beach campsite and Casini Ranch). Riverfront beaches within the project area are used as stopovers/rest areas, picnicking spaces, and sunbathing areas by recreational users, particularly kayakers and boaters on the River. Reduced beach area could be an inconvenience to recreational users. When considered cumulatively with lower flow conditions associated with the Fish Flow Project, the quality of recreational boating experience in the lower Russian River and Estuary could be adversely affected during dry hydrologic years.

Within the Estuary, at water surface elevations of 9 feet, beach area would remain present at most gravel bar locations, and riverside access to these gravel bars would still be available. Higher water surface elevations within the Estuary may be perceived as a benefit to recreational boaters within the lower 10 miles of the Russian River, and could offset lower flows. However, no mitigation measures are available to reduce or avoid the inundation of gravel bar and shoreline beaches to an elevation of up to 9 feet along the Estuary shoreline for longer durations that could occur during the lagoon management period. Therefore, these impacts are considered significant and unavoidable.

[18] As recorded in **Appendix 1.2**, participants in the scoping process recommended construction of an artificial reef to reduce adverse impacts to surfing; however construction of a physical structure is anticipated to incur direct, however short-term, adverse environmental effects to marine life, hydrology, and geomorphology during construction. Some case studies demonstrate that artificial reefs can be multi-purpose, designed to improve sediment retention and protect beach from erosion, and constructed of materials that could enhance marine habitat. The artificial reef would function to dissipate swell energy across the entire length of the reef for the primary purpose of protecting beaches from erosion and sediment loss. Cases of successful artificial reefs are most prevalent outside of North America, in locations that are subject to severe weather (i.e. monsoons). Feasibility studies would need to be undertaken to determine if an artificial reef would be appropriate or functional in the Russian River area. Additionally, there is no guarantee that construction of an artificial reef would, in fact, improve surfing conditions; it would be entirely dependent on ocean conditions.

Mitigation Measures

No mitigation measures are available to reduce this impact and meet the project objectives.

Impact Significance: Cumulatively Significant and Unavoidable.

Impact 5.2.11: Cumulative Long-term Impacts on Cultural and Historic Resources. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in cumulative long-term impacts to cultural resources. (Less than Significant)

Although no adverse impacts to archaeological or paleontological resources or human remains are anticipated, water levels associated with increased duration of the freshwater lagoon have the potential to result in long-term impacts related to the conversion natural vegetation communities that support culturally significant plants. It is likely these vegetation communities would adapt to a new hydrologic regime and re-establish new communities; however for the purposes of this cumulative analysis, a conservative approach is warranted. Other projects within the Russian River Watershed could contribute to disruption or loss of cultural sites, areas that support culturally significant plants, or archaeological remains, if implemented. These other projects have completed or will be required to complete the appropriate level of CEQA compliance and permitting, including the establishment of mitigation measures to minimize or avoid impacts to cultural resources. Therefore, the Estuary Project's cumulative contribution to permanent impacts to culturally significant plants, would not be cumulatively considerable.

Impact Significance: Less than significant.

Impact 5.2.12: Cumulative Long-term Noise Impacts. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in a cumulatively considerable net increase in ambient noise. (Less than Cumulatively Considerable)

The Estuary Management Project would not result in long-term noise impacts. Therefore in combination with the projects described in Section 5.2, the Estuary Management Project would not have a cumulatively considerable contribution to long-term ambient noise levels.

Mitigation Measures

Mitigation Measures in **Section 4.9, Noise**.

Impact Significance: Less than significant with mitigation.

Impact 5.2.13: Cumulative Impacts from Greenhouse Gas Emissions. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in a cumulatively considerable net increase in GHG emissions or criteria pollutants for which the region is in non-attainment under applicable standards. (Less than Cumulatively Considerable)

The Estuary Management Project would contribute negligible amounts of greenhouse gas emissions (GHG) associated with operation of mechanical equipment during lagoon outlet channel creation and maintenance. Concurrent implementation of projects described in **Section 5.2** would also contribute to GHG emissions. These projects have completed or will be required to complete the appropriate level of CEQA compliance and permitting, including the establishment of mitigation measures to minimize or offset GHG emissions. Due to the limited nature of the Estuary Management Project's GHG emissions, and the mitigation measures established in **Section 4.10, Air Quality**, the Estuary Management Project impact would be less than significant and would not have a cumulatively considerable contribution.

Criteria Pollutants. As demonstrated in **Table 5-1,** there are a number of projects in the area that would overlap with implementation of the Estuary Management Project. However, according to the *BAAQMD CEQA Guidelines*, a project's cumulative impact on air quality is considered less than significant if it does not have an individually significant operational air quality impact and it is consistent with the local general plans as well as the regional air quality plan (BAAQMD, 1999). As demonstrated in **Section 4.10, Air Quality**, the Estuary Management Project would not result in significant increases in long-term emissions of criteria pollutants. As such, the proposed project would not conflict with an applicable local or regional air quality plan and would not be cumulatively considerable. The contribution of the Estuary Management Project to air quality impacts within the airshed would be less than cumulatively considerable.

Mitigation Measures

No mitigation measures are required.

Impact Significance: Less than Significant.

Impact 5.2.14: Cumulative Long-term Traffic Impacts. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in a cumulatively considerable net increase in traffic congestion or exceedance of applicable road standards. (Less than Cumulatively Considerable)

Traffic impacts associated with the Estuary Management Project would be less than significant and limited to four to five vehicles during lagoon outletchannel creation and maintenance. The Estuary Management Project would not result in long-term traffic impacts and projects identified in Table 5-1 are not anticipated to incur impacts on roadways to be affected by the proposed Estuary Management Project; therefore the Estuary Management Project's contribution to long-term increased roadway conditions or traffic congestion would be less than cumulatively considerable.

Mitigation Measures

No mitigation measures are required.

Impact Significance: Less than Significant.

Impact 5.2.15: Cumulative Long-term Visual Impacts. Implementation of the Estuary Management Project, in combination with other identified cumulative projects within the Russian River Watershed and habitat enhancement projects, could result in a cumulatively considerable visual impacts or permanent change in aesthetic characteristics. (Less than Cumulatively Considerable)

Creation of the outlet channel would be generally consistent with existing aesthetic conditions and would not change the visual character of the area. Furthermore, the projects included in **Table 5-1** are not anticipated to impact scenic resources in the Estuary Management Project area. The cumulative impact from the proposed project and the projects described above in **Section 5.2** would be less than significant.

Mitigation Measures

No mitigation measures are required.

Impact Significance: Less than Significant.

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CHAPTER 6.0
Alternatives Analysis

6.1 Introduction

The California Environmental Quality Act (CEQA) requires that an Environmental Impact Report (EIR) describe and evaluate a range of reasonable alternatives to a project or to the location of a project, which would feasibly attain most of the basic project objectives and avoid or substantially lessen significant project impacts. This chapter describes the development of the project alternatives, presents the project alternatives, evaluates the alternatives for consistency with stated project objectives, and summarizes and compares the environmental impacts and economic feasibility of the alternatives, in order to make recommendations on the environmentally superior alternative.

The CEQA Guidelines set forth the following criteria for selecting alternatives:

1. ". . . [T]he discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly." §15126.6(b))

2. "The range of potential alternatives shall include those that could feasibly accomplish most of the basic purposes of the project and could avoid or substantially lessen one or more of the significant effects." §15126.6(c)

3. "The specific alternative of 'no project' shall also be evaluated along with its impacts." §15126.6(e)(1)

4. "The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could meet most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision making." §15126.6(f)

In general, there are two types of alternatives that may be reviewed in an EIR: (1) alternatives *to* the project that are other projects entirely, or other approaches to achieving the project objectives rather than the project or modified project; and (2) alternatives *of* the project that include modified project components, such as alternative project sites or processes and/or modified facilities, layout, size, and scale. This chapter evaluates both types of alternatives in order to develop a reasonable range of alternatives for evaluation in this EIR and describes the alternatives

of the project that were carried forward for further analysis. This chapter also describes alternatives to the project that were not discussed further and the reasons for which they were not carried forward for analysis.

6.2 Alternatives Development

This Draft EIR describes and evaluates a reasonable range of alternatives to the Estuary Management Project, in accordance with CEQA Guidelines Section 15126(a). Alternatives to the Estuary Management Project were presented in the NMFS' Russian River Biological Opinion (Russian River Biological Opinion), as part of the adaptive management program, and identified through the public scoping process. Particular emphasis was placed on developing feasible alternatives which would reduce impacts to water quality, biological resources, and recreational resources.

In total, the alternatives screening process has culminated in the identification and screening approximately 10 potential alternatives for the Estuary Management Project. These alternatives range from no management in the estuary, to increased artificial breaching, and from passive versus active management techniques, as well as structural alternatives.

Alternatives to the Estuary Management Project were screened according to CEQA Guidelines to determine those alternatives to carry forward for analysis in the EIR and alternatives to eliminate from detailed consideration. The alternatives were primarily evaluated according to: (1) whether they would meet most of the basic project objectives; (2) whether they would be feasible considering legal, regulatory and technical constraints; and (3) whether they have the potential to substantially lessen any of the significant effects of the Estuary Management Project.[1] Other factors considered, in accordance with CEQA Guidelines (CEQA Guidelines Section 15126.6(f)), were feasibility[2], economic viability, and other regulatory limitations. Economic factors or costs of the alternatives (beyond economic feasibility) were not considered in the screening of alternatives since CEQA Guidelines require consideration of alternatives capable of eliminating or reducing significant environmental effects even though they may "impede to some degree the attainment of project objectives or would be more costly" (CEQA Guidelines Section 16126.6(b)).

The detailed results of the alternatives screening analysis are contained in this chapter. Provided below are summary descriptions of the alternatives which meet the basic project objectives, lessen significant impacts, and are feasible, and were therefore carried forward for further analysis. **Section 6.3.1**, Alternatives Identified but Not Considered Further, provides information related to other alternatives considered and the rationale for eliminating them from further consideration.

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1 At the screening stage, it is neither possible nor legally required to evaluate all of the impacts of the alternatives in comparison to the Estuary Management Project with absolute certainty, nor is it possible to quantify impacts. However, it is possible to identify elements of an alternative that are likely to be the sources of impact and to relate them, to the extent possible, to general conditions in the subject area.

2 CEQA Guidelines (Section 15364) define feasible as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors".

6.3 NMFS' Russian River Biological Opinion

Implementation of alternatives may be necessary to achieve performance criteria through the 15-year Biological Opinion. After evaluating the results of implementation of the proposed Estuary Project, the Water Agency, in consultation with the National Marine Fisheries Service (NMFS) and California Department of Fish and Game (CDFG), will monitor and evaluate the outlet channel to determine effectiveness in achieving habitat, water quality, recreational, and flood control objectives. Refinement of activities, as identified in an adaptive management plan, may redirect Water Agency efforts such that target conditions may be achieved. The Russian River Biological Opinion identifies a series of future potential actions that could be considered in the event that management of a lagoon outlet channel is not successful in increasing rearing habitat for listed salmonids. The EIR will consider these as alternatives to the proposed action.

Elements described below comprise alternate management practices that may be determined feasible and necessary to achieve project objectives. Implementation of alternative activities is contingent upon review of monitoring results (i.e. engineering feasibility).

6.3.1 Alternatives Identified but Not Considered Further

According to CEQA Section 15126.6(f)(3), an EIR need not consider alternatives for which the effects cannot be reasonably determined and for which implementation is remote and speculative. This sections describes several projects that were discussed as potential alternatives to the proposed Estuary Management Project; however based on preliminary review, these potential alternatives were found to be not feasible, would not achieve the project objectives, would not substantially reduce impacts, or could incur new or more severe impacts than those associated with the proposed project. Therefore, these alternatives are not considered further.

No Future Estuary Management

Prior to the 1950s, in an effort to avoid flooding, private citizens breached the barrier beach, enabling the river to flow into the ocean, in an effort to avoid flooding. In the 1950s, the Sonoma County Public Works Department initiated activities related to breaching (SCWA, 2009). The Water Agency began carrying out these activities in the mid-1990s as a result of a county reorganization. Under this "No Future Estuary Management " alternative, the Water Agency would cease artificial breaching of the barrier beach to maintain water levels in the Estuary for flood management purposes. This alternative would allow more natural hydrologic processes in the Estuary. Similarly, this alternative may occur as a result from failure to obtain necessary permits to continue artificial breaching. Implementation of the No Future Estuary Management alternative may result in water levels that could affect private properties along the Russian River Estuary because the Water Agency would not breach the barrier beach when natural closures occur. Under such a scenario, unless private property owners initiated breaching, water levels would rise until natural breaching occurs, and may exceed 11 feet, as observed during a natural breaching event in 2001. If flooding occurred, implementation of this alternative would not meet the objectives of the proposed project, which include flood management and maintenance and protection of public health and safety as it pertains to floodplain property owners, visitors and

employees of the State Beach. Natural breach conditions have a greater potential to create hazardous conditions for State Beach visitors as breaches would be uncontrolled, unpredictable and unsupervised. Additionally, if the Water Agency does not continue to breach the Estuary, private parties might take it upon themselves to breach the Estuary. Private party breaching could result in adverse environmental effects because their breaching activities would likely involve a level of harassment to sensitive species (i.e. harbor seals), would establish tidal conditions that have been determined by NMFS to be detrimental to habitat for listed salmonids, and would pose a threat to the public safety of the acting party or others. The No Future Estuary Management Alternative would not involve active management of the Estuary to achieve the desired condition of a freshwater lagoon for rearing salmonid habitat, and would not be consistent with the terms and conditions identified in the Russian River Biological Opinion. Based on the potential adverse impacts and its inability to achieve the stated project objectives, the No Future Estuary Management Alternative was not carried forward for further consideration.

Permanent Outlet Channel Structure

Project objectives might be met through the installation of a permanent outlet channel structure at the mouth of the Russian River, which would be engineered to allow for outflow at a certain elevation to maintain a perched lagoon. This would be a permanent structure as an alternative to the proposed temporary outlet channel. However, substantial engineering, environmental, permitting, and other constraints would be associated with development and implementation of an alternative that would include installation of permanent structures within the barrier beach at Jenner. Outflow discharged via a permanent outflow structure could be regulated by a weir overflow spillway or pipe or box culvert, screened to prevent fish entrapment. It is anticipated that the outfall for a pipe culvert structure would need to extend past the wave break, as far as two miles into the ocean to avoid backwashing and sediment accumulation in the pipe. Without formal engineering feasibility and design review, it is speculative to determine whether a permanent structure would function as intended. The Russian River mouth is a highly dynamic coastal environment, subject to both high flows from river discharge and continual exposure to wave energy from the Pacific Ocean. Long-term maintenance of a permanent structure on an annual basis would be required by the Water Agency, due to sediment loads and barrier beach formation. Construction and maintenance of a permanent structure would have substantial environmental effects, many of which would likely be significant and unavoidable. These would include the excavation and placement of cement or riprap structures within the barrier beach and marine environment, with resulting impacts to sediment and littoral transport, barrier beach formation, biological resources, fisheries habitat and migration, recreational resources, public safety, and aesthetics. Additionally, a permanent outlet channel structure could interfere with natural migration of listed salmonids, and other species at the Russian River mouth. Implementation of this alternative would require regulatory permits from the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), CDFG, North Coast Regional Water Quality Control Board (RWQCB), California Coastal Commission, and State Parks. Although a permanent outlet channel structure could meet some of the project objectives, it would not be consistent with restoration efforts for listed salmonids on the Russian River. Due to

the anticipated level of short and long-term impacts, and economic and engineering infeasibility, this alternative was not carried forward for further consideration.

Increased Artificial Breaching (Open Estuary Alternative)

An increased artificial breaching alternative would focus on flood management through artificial breaching of the barrier beach to maintain water levels in the Estuary to protect private property. Under an increased artificial breaching alternative, the Water Agency would continue to implement artificial breaching, consistent with current practices, on a more frequent basis to prevent and/or avoid barrier beach closures and maintain tidal conditions within the Estuary. A modified approach to artificial breaching could also be conditioned by specific water quality criteria or a specified duration of closure.

With respect to the impacts identified for the proposed project, this alternative would have the potential to avoid impacts associated with the maintenance of increased water surface elevations for a longer duration during the lagoon management period. These include changes in vegetation assemblages associated with vegetation inundation, as it would not increase the elevation and duration of water levels over sensitive vegetative communities. Implementation of the increased artificial breaching alternative would avoid significant and unavoidable effects to recreation (surfing), as it would not require prolonged closure of the barrier beach, which precludes the formation of wave break conducive for surfing. It is uncertain if this alternative could reduce the potential groundwater impact; however it is not anticipated to contribute to the effect. The increased artificial breaching alternative would substantially increase the disturbance to the harbor seal haulout; it would increase frequency of activities on the beach. The increased artificial breaching alternative would maintain saline water quality, but avoid any potential water quality impacts to parameters such as dissolved oxygen or temperature associated with prolonged closure of the barrier beach, as tidal mixing would continue to occur. However, as determined by NMFS, tidal conditions maintained by artificial breaching practices have significant, adverse effects on the Russian River's estuarine rearing habitat for juvenile salmonids, particularly steelhead. Although implementation of this alternative could meet some of the project objectives, primarily related to protection of private property, and would have the potential to avoid some of the impacts identified for the proposed project, it would not be consistent with restoration efforts for listed salmonids on the Russian River as identified in the Biological Opinion, and therefore, would not meet the project objectives. As such, the increased artificial breaching alternative would not be an environmentally superior alternative and was not carried forward for further consideration.

6.4 Alternatives of the Project Analyzed in the EIR

The discussion of alternatives does not need to be exhaustive. The key issue is whether a reasonable range of alternatives is considered that could feasibly accomplish the basic objectives of the project and could avoid or substantially reduce its significant environmental impacts. Thus, the EIR provides decision-makers and the public with the mitigation measures and the feasible alternatives available to reduce or avoid those substantial adverse effects that would result from

the proposed project. Based upon their ability to meet the project objectives, the alternatives that were carried forward and analyzed in this EIR are described below.

6.4.1 No Project Alternative

The No Project Alternative assumes that the lagoon outlet channel portion of the proposed project would not be implemented, and includes two scenarios: 1) consideration of existing conditions without the project; and 2) consideration of "reasonably foreseeable" future conditions without the proposed project.

Under the No Project Alternative, the Water Agency would continue artificial breaching activities during the lagoon management period, consistent with current practices. In considering existing conditions under a "no project scenario", this would result in periodic breaching of the barrier beach when it becomes established. It is not possible to ascertain how many artificial breaching events would be required each year, but there have been an average of six artificial breaching events annually over the last 14 years. Of the years when artificial breaching was implemented, the maximum was 15 artificial breaches in 2009, and the minimum was one artificial breaches occurring in 2004. It is anticipated that the number of breaching events would continue to be consistent with historical variation, depending upon hydrologic year type and Pacific Ocean wave patterns. This alternative assumes that the Water Agency could acquire the necessary permits for breaching activities. [3]

In considering a "reasonably foreseeable future conditions" scenario, the same scenario would apply; the Water Agency would continue artificial breaching activities during the lagoon management period, consistent with current practices. This scenario also assumes that the agencies with legal jurisdiction will continue to issue/extend necessary permits for the Water Agency to continue to carry out breaching activities. Although not legally required to manage water surface elevations with the Estuary to protect private property, the Water Agency has provided these services since the 1990s, and it is reasonable to assume that the Water Agency would continue to do so and would continue to obtain and operate under necessary permits, assuming the Water Agency has adequate staff and financial resources.

6.4.2 Habitat Restoration Alternative

In California coastal lagoons, productive juvenile steelhead rearing habitat is available in freshwater and brackish water quality conditions. Under current management when the Estuary channel is tidal, freshwater habitat is primarily available in the upper Estuary (from Sheephouse Creek to Austin Creek) and at confluences with tributaries (Jenner Creek, Willow Creek, Sheephouse Creek, Freezeout Creek, and Austin Creek), with brackish water quality in the middle Estuary (from Bridgehaven to Sheephouse Creek). In addition, a productive invertebrate prey community is necessary to provide a food base for rearing juvenile steelhead. Improving habitat

[3] The Water Agency currently operates under a set of regulatory permits and a categorical exemption to conduct artificial breaching. These permits will expire in January 2010, and the Water Agency is currently pursuing renewal and/or re-issuance of these permits to include both artificial breaching and the proposed Estuary Management Plan. It is reasonable to assume that the Water Agency will secure these permits related to artificial breaching activities, and is therefore included as an assumption for the No Project Alternative.

diversity and structure complexity in locations of optimal water quality that currently exist in the Estuary could improve rearing conditions for juvenile steelhead, thereby achieving the Russian River Biological Opinion mandate to improve freshwater habitat for juvenile steelhead. Under a Habitat Restoration Alternative, the Water Agency would identify areas in the Russian River or other tributaries that, if restored, could provide salmonid rearing habitat. Under this alternative, it is assumed that the Water Agency would continue to artificially breach the barrier beach when water levels approach 4.5 to 7 feet to provide flood management, consistent with existing practices. This alternative would provide rearing habitat for salmonids using alternate techniques, but still of equivalent quality and quantity of habitat. This type of habitat restoration is common in other coastal lagoons. The Water Agency would identify potential areas, such as sloughs and backwater areas along the upper Estuary, Willow or Austin Creeks in which the following strategies could be implemented:

1. *Vegetation Restoration.* Riparian corridor enhancement, involving planting of willow trees along streambanks, would increase overhanging canopy cover, reduce erosion and sedimentation, improve bank stability, and improve stream temperatures. Other types of vegetation restoration could include planting pickleweed, bulrush, and other emergent vegetation.

2. *Structural Instream Cover*: Presence of cover, any material or condition that provides protection from predators, competitors, or variations in streamflow, is important for fish habitat. The Water Agency would implement instream restoration to provide additional cover in the upper and middle reaches (i.e. woody debris, logs, coir logs, overhanging vegetation) where it is limited or absent, particularly in the upper reach. Improving habitat diversity and structural complexity would also provide opportunities for improving the food base for rearing steelhead.

3. *Enhance backwater sloughs.* A backwater slough is defined as a floodplain depression adjacent to the river mainstem that was formerly an active stream channel but is not hydraulically disconnected. The mouth at the slough is usually pinched off by stands of emergent vegetation. Creation or reconnection of side channels and backwater sloughs in the lower floodplain, in the vicinity of Bridgehaven, in the middle reach, or reconnection and restoration of emergent marsh habitat in Willow Creek, with the Estuary would provide lagoon-like, off-channel rearing and refuge areas.

The habitat restoration alternative may require land acquisition or temporary property access. The costs of this alternative have not been evaluated, but are assumed to be financially feasible. A method for evaluating effectiveness of habitat enhancements would need to be developed to determine if the quality and quantity of habitat would be equivalent to the area and quality of the freshwater lagoon. Moreover, implementation of this alternative would require re-initiation of Section 7 consultation with NMFS and re-issuance of an amended Biological Opinion.

6.4.3 Temporary Outlet Standpipe Alternative

An Outlet Standpipe alternative would involve a temporary structure that would be installed during the lagoon management period to allow for outflow from the River to maintain a perched lagoon. The standpipe would be designed to operate to achieve a water surface elevation of 7 to

9 feet in the lagoon. The standpipe would be a passive system, installed as an inclined, closed pipe, tilted a few degrees to the horizontal to transfer Russian River outflow to the ocean via gravity. The standpipe would need to be surge protected and inclined to a degree to prevent backflow of ocean water into the Estuary. The temporary outlet standpipe could be anchored to the jetty or installed in a northwest orientation across the barrier beach and attached to the rip rap along the cliffs to the northwest of the beach management area. This structure would require periodic maintenance throughout the lagoon management period to correct for damage from tidal action and sediment accumulation in the standpipe. This temporary structure would be removed at the end of the lagoon management period.

Substantial engineering, environmental, permitting, and other constraints would be associated with development and implementation of an alternative that included installation of a temporary standpipe to convey outflow from the Estuary, and to ensure performance that would maintain protection of private property from flooding. Additionally, it could require frequent maintenance and clearing of sediment from the standpipe opening. Without formal engineering feasibility and design review, it is speculative to determine whether a temporary structure would function as intended, and with less environmental impacts than those identified for the proposed project. Some engineering constraints include beach morphology and sand erosion: sands around the standpipe could erode an ultimately breach the barrier beach. The pipe would need to be sized for maximum outflow, and the discharge point, like the permanent structure described above, would need to extend out past the wave break. There are also public and worker safety concerns associated with implementation and maintenance of this type of structure.

6.4.4 Reduced Project Alternative

A “reduced project” alternative is a commonly analyzed type of project alternative that is intended to achieve project objectives while simultaneously avoiding or incrementally reducing the severity of significant impacts associated with a proposed project. A Reduced Project Alternative would involve all of the elements of the proposed Estuary Management Project, including artificial breaching outside of a lagoon management period, and creation of an outlet channel following a natural closure to support freshwater conditions during the lagoon management period. However it represents an incremental decrease such that the maximum target water level would be reduced to an eight feet maximum (instead of 9 foot maximum). This would be accomplished through management of the outlet channel bed elevation to maintain a lower water level.

6.4.5 Jetty Modification Alternative

In the late 1920s, the sand and gravel deposits of the lower Russian River were recognized as potential sources for commercial development. However, to make this economically feasible, navigation was required to transport the materials to the San Francisco Bay area. The Russian River Improvement Company began designing a jetty on the southern side of the mouth that would create a permanent opening to the ocean (**Figure 6-1**). Local citizens also hypothesized that the jetty had potential for recreational activities, as it would allow fish to migrate to and from the ocean (Johnson 1959).

SOURCE: PWA, 2010

Figure 6-1
Jenner Jetty from the North, c. 1929

In 1929, construction of the jetty began with a mound of rubble (Johnson 1959) which later developed into a timber trestle 1,000 feet long, which created a trench that could be filled with stones (Rice 1974; Magoon and Treadwell et al. 2008). A stone quarry on Goat Rock was developed for this purpose along with a road and railroad to transport the material. To build the foundation of the road and railroad, fill material was placed to create the roadbed on top of an intertidal sandbar that extended from the river mouth towards Goat Rock. In 1930, the original funds for the project ran out and the jetty was abandoned. The rocks in the structure began to settle which exposed the piling to the ocean waves and the jetty was mostly destroyed by 1931 (Johnson 1959). Other companies worked on the jetty from 1931 to 1934, but mostly in the form of maintenance. The timber trestle was replaced for a steel one, but this caused more settling of the structure (Magoon and Treadwell et al. 2008).

A sea wall was built between 1938-1939 in an attempt to catch sand moving along the coast and further protect the jetty from wave action. **Figure 6-2**, a map from 1953, shows the wall running along the coast, the road, and a portion of the railroad. In 1941, the structure was extended and capped with concrete (Johnson 1959). The plan called for a trapezoidal cross-section, with a 12-foot wide top flaring out to an approximately 80-foot wide base (**Figure 6-2**). By 1948, 4,280 tons of rock from the quarry was added to the structure and capped with concrete (Magoon and Treadwell et al. 2008). However, financial causes again forced the project to be abandoned.

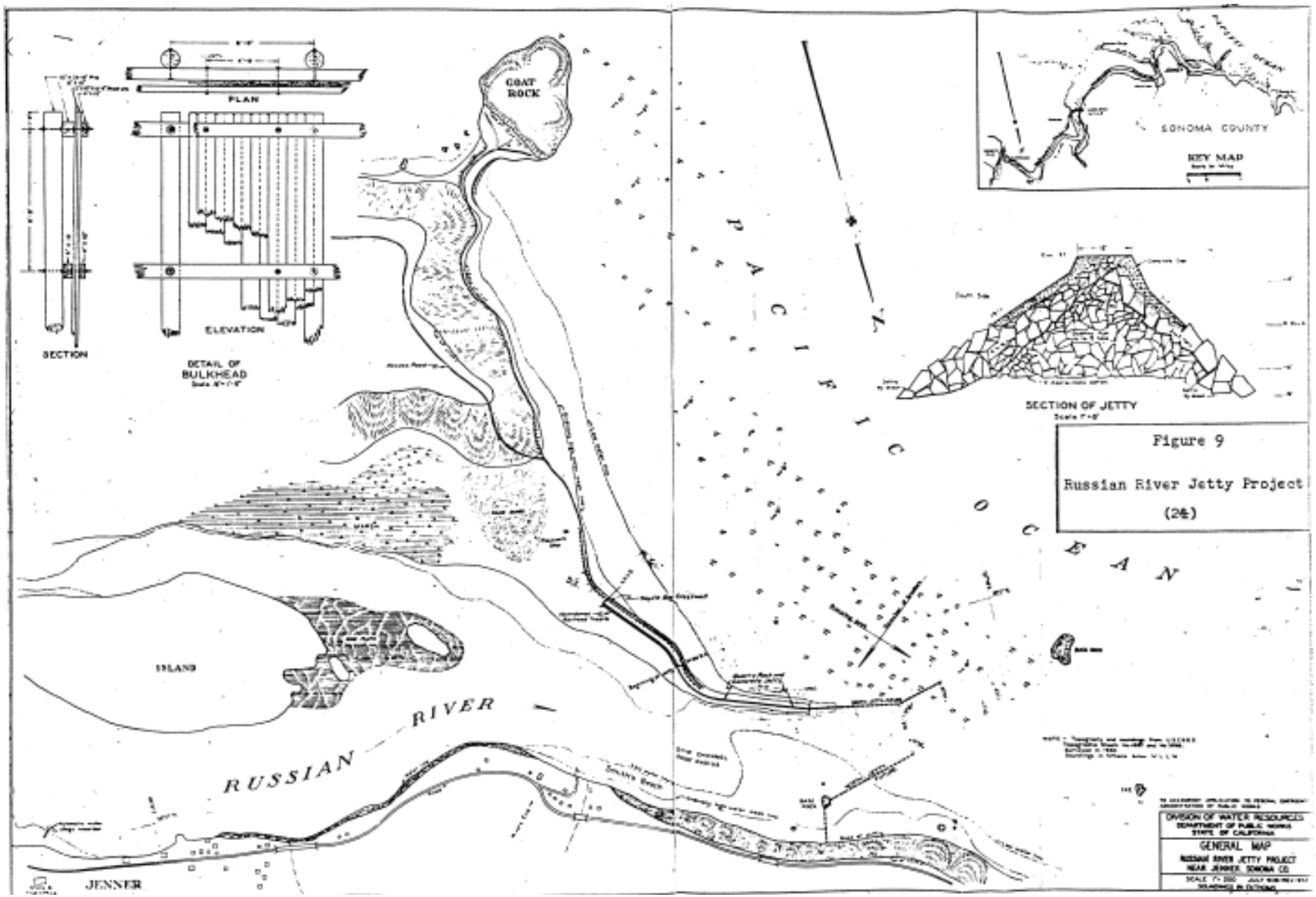
In the 1960s, the idea of capitalizing on the gravel and sand deposits was again considered and so plans for improving the jetty were put into motion once again. Local citizens and scientists in the area began to question the environmental impacts of commercially developing the deposits and so plans for the jetty were never executed.

Current Conditions

Figures 6-3, 6-4, and 6-5 show the current condition of the jetty. The roadway, seawall and railroad have deteriorated significantly. Only portions of these components are visible, with the remainder encased in the sand dunes. Because known historic documentation is limited and the jetty's remaining components are obscured by sand, little is known of the jetty's effect on seepage through the beach berm. The effect of the jetty on sand transport and river mouth morphology is also not clear. Approximately 200 feet of the jetty protrudes from the beach into the ocean. While the landward half of the jetty protruding into the ocean retains most of its original concrete cap, the seaward half has deteriorated considerably, with a 50-foot notch incised into the jetty. Removal of the jetty and its base material would require excavation along the jetty alignment and demolition and excavation of the base structure. It is anticipated that removal would require approximately one summer season (to avoid winter storm events) for complete removal and re-establishment of the beach.

Jetty Removal or Modification

As required under the Russian River Biological Opinion, the Water Agency is developing a study plan for analyzing the effects and role of the existing jetty at Goat Rock State Beach on beach permeability, sand storage and transport, flood risk, and water surface elevations in the Estuary.



SOURCE: PWA, 2010

Figure 6-2

Drawing of Jenner Jetty, Road and Sea Wall

SOURCE: PWA, 2010

Figure 6-3
Approach to the Jenner Jetty from the South, 2010

SOURCE: PWA, 2010

Russian River Estuary Management Project . 207734.01

Figure 6-4

Jenner Jetty from the South, 2010

SOURCE: PWA, 2010

Russian River Estuary Management Project . 207734.01

Figure 6-5

Jenner Jetty from the Northeast, 2010

Although the Water Agency does not own, maintain, operate, or have jurisdiction over the jetty structure, it is mandate by NMFS in the Russian River Biological Opinion to develop a jetty study plan to analyze the effects of the Russian River Estuary jetty on Estuary water levels and on beach morphology, as well as for evaluating alternatives that modify the jetty to achieve target estuarine water levels.

Development of the study plan will include the following subtasks:

1. Describe the mechanisms through which the jetty may affect estuary water levels

2. Assess the relative importance of these mechanisms on estuarine water levels, using readily available observations and analysis

3. Outline geotechnical and groundwater investigations needed to determine the subsurface characteristics of the jetty and whether the jetty tends to increase or decrease seepage through the berm

4. Plan a geomorphic study to better quantify the beach berm geometry in relation to ocean waves and water levels, jetty geometry, and the Estuary's mouth condition. This study is likely to integrate wave observations and runup estimates, observations of beach berm geometry, and littoral sand transport modeling

5. Describe the opportunities and constraints of modifying the jetty (including permit approvals, costs, potential funding sources)

6. Recommend a process for developing and evaluating management alternatives that modify the jetty.

Through the study, the Water Agency will identify alternative management actions to achieve targeted water surface elevations, such as full or partial jetty removal, jetty notching, or other potential uses of the jetty as a mechanism for water surface elevation control. This element would require coordination with California State Parks and USACE[4]. Under the Russian River Biological Opinion, implementation of jetty removal is conditional upon the results of the study. The study plan is anticipated to be developed by 2011.

Jetty Alteration to Improve Subsurface Outflow

As noted in **Chapter 3.0**, NMFS hypothesizes that substantial outflow from the Estuary occurs subsurface through the barrier beach. This hypothesis is supported by mass balance calculations of inflow from the Russian River and resulting water levels (Behrens, 2006). However, little is known about the permeability of the subsurface component of the jetty, and it is thought that the jetty substructure could either be impeding or enhancing the outflow of water from the lower elevations of the Estuary. Because known historic documentation is limited and the components obscured by sand, additional characterization of the jetty is required. Observations in 2009 (Behrens and Largier, 2010) indicate increased seepage rates through the barrier beach when

[4] Under the Russian River Biological Opinion, implementation of jetty removal is conditional upon the results of the study. The study plan is anticipated to be developed by 2011. The Russian River Biological Opinion directs responsibility for removal or modification of the jetty, dependent on the results of the jetty study, to the USACE.

Estuary water surface elevations are between two and four feet, which may indicate a horizon of increased permeability at different elevations in the jetty structure.

If future monitoring determines that the jetty impedes seepage, alteration of the jetty to improve subsurface outflow could be implemented though directional drilling or exposure and excavation of specific locations along the jetty structure to increase subsurface outflow through the base of the jetty structure along its approximately 1,600 linear feet. This type of modification would result in similar single season construction activities along the jetty structure.

6.4.6 Alternative Flood Control Measures

As stipulated by NMFS in the Russian River Biological Opinion, if creation of the lagoon outlet channel does not reliably achieve the targeted annual and seasonal Estuary water surface elevations prescribed by the Russian River Biological Opinion, the Water Agency may also evaluate the feasibility of actions to avoid or mitigate potential damage to low-lying structures or properties adjacent to the estuary that are currently threatened with flooding and inundation when the barrier beach closes and the estuary water surface elevation rises above 9 feet. Pursuant to conditions in the Russian River Biological Opinion, the Water Agency developed and submitted to NMFS a preliminary list of structures, properties, or infrastructure that are susceptible to flooding and inundation as a result of sandbar formation and Estuary closure. The Water Agency would identify possible funding mechanisms to provide grants or loans to property owners to assist them in protecting their property from natural unbreached Estuary conditions, such as assisting them in raising structures. Potential alternative flood control actions, including private property owners making physical modification to or raising their structures to avoid flooding or inundation damage associated with restoration of estuarine functions, would only be pursued as required in the Russian River Biological Opinion Biological Opinion if the following conditions exist:

1. It must be determined that adaptive management of the outlet channel, as defined as part of Phase 1, is not able to reliably achieve the targeted annual and seasonal estuary water surface elevations by the end of 2013;

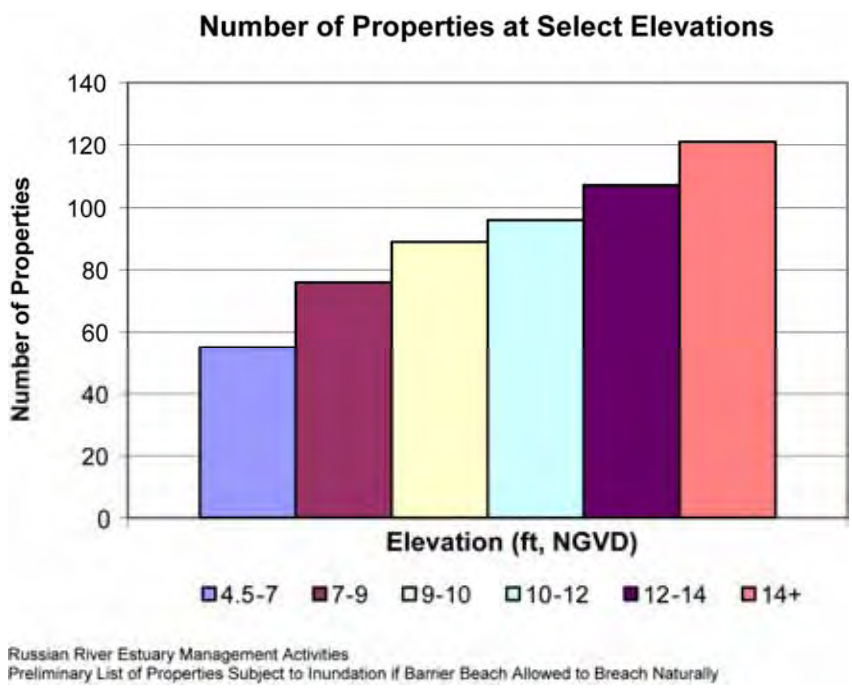
2. Estuary monitoring results indicate that freshwater habitats, or temporary closure of the estuary provide substantial benefit to rearing juvenile steelhead; and

3. Monitoring results indicate that no adverse effects to other populations of Russian River salmonids are occurring from raised lagoon water surface elevations.

4. The Agency, in coordination with NMFS and other appropriate public and nonprofit agencies, shall, not later than May 1, 2014, attempt to negotiate agreements with property owners to avoid or mitigate potential damages to the structures identified in list to NMFS from flooding, either by elevating the structures or other methods. Such agreements will include identification of funding sources and initial schedule for initiation and completion of avoidance and mitigation work.

5. The Water Agency may, alternatively, pursue other actions that will result in the mitigation or avoidance of flood damage to the structures identified in list to NMFS.

As previously noted in **Chapter 3.0, Project Background and Exiting Setting**, water levels within the Estuary exceeded 9 feet on an annual basis, with a high of 11.1 feet experienced during a natural breaching event in November 2001. The average recorded water surface elevation at the time of breaching was 7.1 feet. During closure events, water surface elevations of 7 feet affect the shoreline frontage of 46 parcels within the Estuary Study Area along the Russian River. The rising water surface elevations affect primarily shoreline and beach areas, and no structures are directly affected. Water surface elevations of 7 to 9 feet affect approximately 78 parcels within the Estuary Study Area (SCWA, 2010). The number of parcels affected by specific water level ranges is provided in **Figure 6-6**.



Russian River Estuary Management Project ▪ 207734

SOURCE: SCWA, 2010.

Figure 6-6
Number of Parcels Affected by
Water Surface Elevation Ranges within the Estuary Study Area

6.5 Alternatives Analysis

In accordance with the CEQA Guidelines, the alternatives considered in this EIR include those that: 1) could feasibly accomplish most of the basic objectives of the project, and; 2) could avoid or substantially lessen one or more of the significant effects of the project. To provide the appropriate context for this alternatives analysis, the project objectives and key significant effects are summarized below.

6.5.1 Project Purpose and Objectives

In order to comply with the requirements of the NMFS' Russian River Biological Opinion, the Water Agency will implement adaptive management of the Estuary with the primary dual objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard. Rearing habitat may be enhanced by reducing tidal influence on the Russian River Estuary from May 15 to October 15 (referred to hereafter as the "lagoon management period") to increase freshwater habitat available for rearing salmon and steelhead. Adaptive management requires 1) monitoring of biological productivity, water quality, and physical processes in the Estuary in response to the changes in management actions that control water surface elevations in the estuary-lagoon system; and 2) refinement of management actions to achieve desired water levels to support biological productivity, while simultaneously providing flood control for properties adjacent to the Estuary. In addition to the primary objectives, the Estuary Management Project is intended to maintain and protect public health and safety as it pertains to floodplain property owners, and implement management activities in a safe manner to protect visitors and employees of the State Beach, and Water Agency staff. Additionally, it is intended to implement, operate, and maintain management techniques in a technically and economically feasible manner.

6.5.2 Significant Effects

Chapter 4.0, Environmental Setting, Impacts, and Mitigation Measures, presents the impact analysis for the Estuary Management Project. Based on the analysis presented in Chapter 4.0, implementation of the proposed project would result in the following beneficial and significant, unavoidable impacts:

Beneficial

1. Habitat Availability. Maintenance of water surface elevations of 7 to 9 feet would increase the storage volume in the Estuary by approximately 2,771 acre feet (7 feet) and up to 4,565 acre feet (9 feet), thereby increasing potential habitat availability for juvenile salmonids.

Significant and Unavoidable

As summarized in Table **ES-1**, environmental impacts would be significant and unavoidable, even with implementation of feasible mitigation measures, in the following areas:

2. Private Property Inundation. Maintenance of water surface elevations of 7 to 9 feet would inundate the shoreline portions of properties adjacent to the Estuary for a longer duration, depending upon outlet channel performance. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

3. Risk of Inundation Due to Tsunami. In the very unlikely event of a tsunami of sufficient magnitude, the project may result in increased risk of structural damage or loss for properties just outside of the areas that would currently be inundated by tsunami-related flooding. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

4. Water Quality. Project implementation could seasonally increase nutrient and pathogen levels as a result of changes in residence time. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

5. Groundwater Quality. Project implementation could result in secondary effects to groundwater quality due to increased duration of saline groundwater conditions over the saline conditions that are currently experienced. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

6. Inundation of Estuary Haul Out Locations. Increased water levels would seasonally inundate pinniped haul out locations, reducing the potential haul out area within the Estuary. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

7. Elimination or modification or recreational resources. Implementation of the proposed project would reduce the occurrence of tidal channel conditions during summer months, thereby reducing the occurrence of resulting sandbar conditions desirable for surfing. Additionally, inundation would seasonally reduce recreational beach area within the Estuary. There is no feasible mitigation for this potential impact and, therefore, it is considered significant and unavoidable.

Based on the analysis presented in **Chapter 4.0**, implementation of the proposed project could result in potentially significant short-term construction-related impacts associated with construction and maintenance of the outlet channel during the lagoon management period, and potentially significant long-term impacts related to increasing the frequency and duration of freshwater lagoon conditions in the following issue areas: aesthetics, air quality, biological resources, hazards and hazardous materials, water quality, land use, noise, public services and utilities, and traffic. These impacts would be reduced to a less-than-significant level by mitigation measures listed in **Chapter 4.0**. Provided below is a summary of the significant, but mitigable, environmental impacts identified by resource area that are considered in the evaluation of the alternatives to identify alternative(s) that can avoid or reduce the environmental effects and still meet the basic project objectives.

Table 6-1 summarizes the potentially significant, but mitigable impacts identified. A summary of individual issue areas is provided below.

TABLE 6-1
SIGNIFICANT BUT MITIGABLE IMPACTS ASSOCIATED WITH THE PROPOSED PROJECT

Temporary Impacts
• Erosion-related water quality impacts • Disturbance of cultural resources • Increased noise levels • Potential for release of hazardous materials
Long-Term Impacts
• Effects on harbor seal haulout use • Conversion or re-distribution of culturally sensitive plants

SOURCE: ESA, 2010.

6.6 Summary of Comparison of Project Alternatives

The following analysis examines each of the proposed alternatives (i.e., No Project Alternative, Jetty Modification, and Alternative Flood Management for their ability to meet the stated project objectives (see summary in **Table 6-2**) and their ability to reduce or avoid potential impacts. Section 6.7, below, provides a summary of the various advantages and disadvantages associated with each Alternative.

6.6.1 Comparison of Alternatives

Table 6-2 describes the ability of the project alternatives to meet each objective listed above.

6.6.2 No Project Alternative

Under the No Project Alternative, the Water Agency would continue artificial breaching activities during the lagoon management period, consistent with current practices and permits. In considering existing conditions under a "no project scenario", this would result in periodic breaching of the barrier beach when it becomes established. Artificial breaching occurred every year between 1996 and 2009, except 2006 (when only a natural breach occurred). Monthly artificial breaching activities varied from year to year; but the majority of the breaching events occurred in the April through June and September through November. Of the years artificial breaching was implemented, the lowest number of artificial breaching events was one in 2004 and the highest number was 15 attempted breaches with 13 successful breaches in 2009 (**Chapter 3.0, Table 2-1** and **Figure 2-4**). It is not possible to ascertain how many artificial breaching events would occur each year, but there have been an average of six artificial breaching events annually over the last 14 years.

Assuming the Water Agency could obtain necessary permits, continuation of existing breaching practices during the lagoon management period would continue the Water Agency's current practice of breaching the barrier beach when the Estuary water levels are between 4.5 feet and 7 feet, as determined by the gage at the Jenner Visitor's Center. This would require mobilization of equipment and breaching of the barrier beach consistent with the limitations established in the *Russian River Estuary Water Level Management Activities Incidental Harassment Authorization (IHA).* Therefore, construction activities on the barrier beach would be anticipated to be consistent with those identified for the proposed Estuary Management Project. As such, implementation of the No Project Alternative would not reduce or avoid the need for mechanical breaching activities to occur on the barrier beach, although activities on the beach may be incrementally reduced compared to the proposed project, which assumes weekly maintenance during the lagoon management period. The number of times mechanical breaching is required under a No Project Alternative would depend upon natural conditions in a given hydrologic year.

Continuation of existing breaching practices during the lagoon management period would also continue the current pattern of water levels within the Estuary during May 15 to October 15. As described in Section 3.0, Existing Conditions, since June of 1996 the Water Agency has recorded information pertaining to Estuary closure events, including the date on which the barrier beach

TABLE 6-2
ABILITY OF PROJECT ALTERNATIVES TO MEET PROJECT OBJECTIVES

	Project Alternatives						
Project Objectives	**Proposed Project**	**No Project Alternative**	**Habitat Restoration**	**Temporary Standpipe**	**Reduced Alternative 8 Foot Maximum**	**Jetty Modification**	**Alternative Flood Management**
Enhancing Rearing Habitat for Juvenile Salmonids, Particularly Steelhead.	**Yes.** Would use outlet channel creation to maintain perched freshwater lagoon conditions during May 15 to October 15. Would provide 4,565 af of storage volume at 9 feet.	**No.** Would continue current artificial breaching activities during summer months, resulting in saline conditions within estuary and precluding formation of perched freshwater lagoon conditions.	**Partially.** Would establish instream habitat; however would not result in freshwater lagoon habitat conditions.	**Yes.** Would use standpipe creation to maintain perched freshwater lagoon conditions during May 15 to October 15. Would provide 4,565 af of storage volume at 9 feet.	**Yes.** Would use outlet channel creation to maintain perched freshwater lagoon conditions during May 15 to October 15. Would provide 3,599 af of storage volume at 8 feet.	**Unknown.** It is unknown whether removal or modification of the jetty would result in the freshwater lagoon conditions envisioned under the Russian River Biological Opinion.	**Yes.** Would result in establishment of perched freshwater lagoon conditions during May 15 to October 15.
Manage Estuary Water levels to minimize flood hazard.	**Yes.** Would target an average water level of 7 feet, with a high of 9 feet.	**Yes.** Would continue current artificial breaching activities to minimize flood hazard.	**Yes.** Would continue current artificial breaching activities to minimize flood hazard. Would target an average water level of 7 feet, with a high of 9 feet.	**Yes.** Would target an average water level of 7 feet, with a high of 9 feet. Challenges with technical and economic feasibility; and ability to meet objectives	**Yes.** Would target an average water level with a high of 8 feet.	**Unknown.** It is unknown whether removal or modification of the jetty would maintain flood protection.	**No**. Would allow Estuary water levels to potentially exceed elevations that would affect private properties. Could necessitate modification/elevation of structures or easement or purchase of private properties affected.
Maintain and protect public health and safety as it pertains to property owners, visitors and State Beach employees and Water Agency Staff.	**Yes.** Would implement outlet channel creation during lagoon management period consistent with current Standard Operational Procedures.	**Yes.** Would continue artificial breaching during lagoon management period consistent with current Standard Operational Procedures.	**Yes.** Would not require equipment/ activity on beach.	**Unknown.** Installation and presence on the beach could incur public safety issues.	**Yes.** Would implement outlet channel creation during lagoon management period consistent with current Standard Operational Procedures.	**Unknown.** Jetty currently functions to direct outlet channel formation to the north during high and low flow conditions. Removal of the jetty could result in channel migration to the south, potentially impacting State Beach facilities.	**Maybe**. Would discontinue practice of artificial breaching in a controlled manner. Would rely on natural breaching events to control water levels in Estuary.
Implement, operate and maintain management techniques in technically and economically feasible manner.	**Yes.** Would continue outlet channel creation during lagoon management period consistent with current practices.	**Yes.** Would implement artificial breaching during lagoon management period consistent with current practices.	**Unknown.** Costs and funding mechanism have not been identified.	**Unknown.** Challenges associated with technical and engineering feasibility. Costs and funding mechanism have not been identified. Engineering design and feasibility.	**Yes.** Would implement outlet channel creation during lagoon management period consistent with current practices.	**No.** Would require substantial economic investment to complete feasibility study, design, environmental documentation, permitting and construction for jetty removal. Costs and funding mechanism have not been identified.	**No.** Would require substantial economic investment to acquire easement or property at approximately 120 parcels in Estuary Study Area. Costs and funding mechanism have not been identified.

TABLE 6-3
IMPACT COMPARISON OF PROJECT ALTERNATIVES

	Project Alternatives						
Key Impacts	**Proposed Project**	**No Project Alternative**	**Habitat Restoration**	**Temporary Standpipe**	**Reduced Alternative 8 Foot Maximum**	**Jetty Modification**	**Alternative Flood Management**
Water Surface Elevations	SU. Would increase duration of inundation at WSEs 7-9, with average of 7. Would affect properties.	SU. Would continue current artificial breaching activities and current average WSE, with periodic WSE increases.	SU. Would continue current artificial breaching activities and current average WSE, with periodic WSE increases.	SU. Would increase duration of inundation at WSEs 7-9, with average of 7. Would affect properties.	SU. Would increase duration of inundation, with maximum of 8 feet; but would affect fewer parcels.	Would continue current artificial breaching activities and current average WSE, with periodic WSE increases.	Would increase average WSEs; would fluctuate with natural breaching, probably less than proposed project. Would require property acquisition to avoid flooding.
Tsunami Risk	SU. Would increase the number of days that WSEs are higher in the estuary.	Would continue current artificial breaching activities and current average WSE, with periodic WSE increases.	Would continue current artificial breaching activities and current average WSE, with periodic WSE increases.	SU. Would increase the number of days that WSEs are higher in the estuary.	SU. Would increase the number of days that WSEs are higher in the estuary. Risk would be reduced compared to project.	Jetty removal would still likely require one of the other alternatives to meet project objectives.	SU. Would increase the number of days that WSEs are higher in the estuary.
Water Quality	SU. Could increase nutrient and pathogen levels as a result of residence time.	Would avoid nutrient and pathogen concentration, but would result in more tidal (saline) conditions, which is adverse for salmonids.	Would avoid nutrient and pathogen concentration, but would result in more tidal (saline) conditions, which is adverse for salmonids.	SU. Could increase nutrient and pathogen levels as a result of residence time.	SU. Could increase nutrient and pathogen levels as a result of residence time. Would be reduced compared to project.	Unknown. The effects on water quality are unknown.	Could increase nutrient and pathogen levels as a result of residence time.
Groundwater Impacts	SU. Would increase duration of saline conditions in the deeper parts of the estuary, potentially affected groundwater wells.	Would continue current artificial breaching activities and current average WSE, with periodic WSE increases. Saline conditions currently exist in groundwater wells, but duration unknown.	Would continue current artificial breaching activities and current average WSE, with periodic WSE increases. Saline conditions currently exist in groundwater wells, but duration unknown.	SU. Would increase duration of saline conditions in the deeper parts of the estuary, potentially affecting groundwater wells.	SU. Would increase duration of saline conditions in the deeper parts of the estuary, potentially affecting groundwater wells. Would be reduced compared to project.	Unknown. Jetty's effect on flow through the barrier beach is unknown.	SU. Would increase duration of saline conditions in the deeper parts of the estuary, potentially affecting groundwater.
Benefits to Listed Salmonids	Beneficial. Would increase duration of perched lagoon conditions, providing up to 4,565 AF of additional storage volume at 9 feet.	SU. Would continue current artificial breaching activities and would result in tidal conditions.	Beneficial. Would provide instream habitat in adjacent tributaries, but would not increase freshwater lagoon conditions.	Beneficial. Would increase duration of perched lagoon conditions, providing up to 4,565 AF of additional storage volume at 9 feet.	Beneficial. Would increase duration of perched lagoon conditions, maximum 8 feet, providing 3,599 AF of storage volume	SU. Jetty modification would not result in perched lagoon conditions.	Would increase average WSEs; would fluctuate with natural breaching, probably less than proposed project.
Vegetation Change	Would potentially result in 82 acres of vegetation inundation and potential change within Estuary Study Area.	Would continue current artificial breaching activities and current average WSE, with periodic WSE increases. Would not result in vegetation change.	Would continue current artificial breaching activities and current average WSE, with periodic WSE increases. Would not result in vegetation change.	Project would potentially result in 82 acres of vegetation inundation and potential change within Estuary Study Area.	Project would potentially result in 58 acres of vegetation inundation and potential change within Estuary Study Area.	Jetty removal would still likely require one of the other alternatives to meet project objectives.	Would increase average WSEs, which would fluctuate with natural breaching. Duration of inundation may be less.
Pinniped Haulout	SU. Would potentially result in inundation of 27 acres of interior river beach and haulout locations, effectively eliminating the Penny logs, Chalanchawi, and Patty's rock haulouts.	Would continue current artificial breaching activities and current average WSE, with periodic WSE increases. Would not result in change.	Would continue current artificial breaching activities and current average WSE, with periodic WSE increases. Would not result in change.	SU. Would potentially result in inundation of 27 acres of interior river beach and haulout locations, effectively eliminating the Penny logs, Chalanchawi, and Patty's rock haulouts.	Would potentially result in inundation of 22 acres of interior river beach and haulout locations.	Unknown. Jetty's effect on flow through the barrier beach is unknown.	SU. Would potentially result in inundation of interior river beach and haulout locations, effectively eliminating the Penny logs, Chalanchawi, and Patty's rock haulouts.
Recreational Surfing	SU. Would reduce number of artificial breaching events in summer.	Would continue current artificial breaching activities.	Would continue current artificial breaching activities.	SU. Project would reduce number of artificial breaching events in summer.	SU. Would reduce number of artificial breaching events in summer.	Jetty removal would still likely require one of the other alternatives to meet project objectives.	SU. Would reduce number of artificial breaching events in summer.

SU = Significant and Unavoidable

was breached (by any means, natural or mechanical) and the Estuary water surface elevation at the time of breaching. Of the 119 documented Estuary closure events between June 1996 and September 2009, an Estuary water surface elevation at the time of breaching was recorded in 101 instances. **Figure 3-2 in Chapter 3.0, Existing Conditions** depicts the recorded water levels upon breaching over time. The lowest recorded water level upon breaching was 4.3 feet (September 8, 1996); the highest water level was 11.1 feet during a natural breaching event (November 13, 2001). Under the No Project Alternative, this pattern would be expected to continue.

Using this same information, **Figure 3-3** in **Chapter 3.0, Existing Conditions**, shows the frequency with which given Estuary water surface elevations were exceeded (at the time of breaching). For example, of the 101 breaching events for which a water surface elevation was subsequently recorded, in over half of the events (i.e., 52 percent) the water surface elevation exceeded 7 feet (and was sometimes as high as 8, 9 and, in a very few cases, greater than 10 feet). The average recorded water surface elevation at the time of breaching was 7.1 feet. During closure events, water surface elevations of 7 feet affect the shoreline frontage of 46 parcels within the Estuary Study Area. The rising water surface elevations affect primary shoreline and beach areas, and no structures are directly affected. Under the No Project Alternative, this variation in water levels would be expected to continue.

Under the No Project Alternative, the duration of the water levels elevations experienced within the Estuary from May 15 to October 15 would also be expected to be consistent with historical patterns. As discussed in **Chapter 3.0, Existing Conditions**, during a given year, the water levels of the Estuary are well below the elevations typically associated with breaching events and concerns over flooding most of the time. For example, based upon data from the Water Agency's Jenner gage,[5] the average water surface elevation in the Estuary, from May 2000 through December 2009, was approximately 2.23 feet. Over this same time period, within the lagoon management period, the average Estuary water surface elevation was approximately 1.86 feet. Over 99 percent of the time, the Estuary water surface elevation was below approximately 7 feet. An example of the range and seasonal distribution of Estuary water levels, for the year 2003, is show in **Figure 3-5**. This variation of water levels resulting in episodic increases in water levels relating to formation of the barrier beach, buildup of water levels, would continue under the No Project Alternative. However, the maintenance of perched lagoon conditions associated with maintaining Estuary water levels at 7 feet on average, for a longer duration during the lagoon management period, would not occur under the No Project Alternative. As such, the potential beneficial effects to salmonid habitat associated with providing up to 4,565 acre-feet of additional storage within the maximum backwater area (9 feet) would not occur under the No Project Alternative.

[5] The Agency maintains a recording, water level gage just upstream of the Estuary mouth, at Jenner, on the right bank of the Russian River. The gage records water surface elevations in 0.5-hour increments (some of the earlier data was recorded in 1-hour increments). Data from this gage, for the period 2000-2009, was provided by the Agency (Delaney, 2010).

Ability to Meet Project Objectives

As noted in **Table 6-2**, the No Project Alternative would partially achieve the project objectives, which are directed at improving salmonid habitat, especially for juvenile steelhead, while maintaining Estuary water levels to minimize flood hazards. This alternative would maintain current conditions in the Estuary, which include the Water Agency's current artificial breaching activities to minimize flood hazards, thereby creating an open barrier beach with tidal conditions. As such, the No Project Alternative would not meet the project objective of enhancing salmonid habitat by minimizing tidal influence into the Estuary, or encouraging the formation of perched freshwater lagoon conditions.

Continuation of existing breaching practices during the lagoon management period would not be consistent with the NMFS' Russian River Biological Opinion, which mandates that the Water Agency change its breaching activities to reduce marine influence (high salinity and tidal inflow) and promote a higher water level in the Estuary to form a fresh or brackish water lagoon from May 15 to October 15. Continuing current practices could result in the Water Agency becoming out of compliance with the Russian River Biological Opinion Biological Opinion. Such non-compliance could result in the loss of the incidental take authority granted to the Water Agency by the BO, potentially exposing the Water Agency to significant liability in the event its activities resulted in a "take" of listed species.

The No Project Alternative would meet project objectives regarding minimization of flood hazards, as it would continue the Water Agency's historical practice of artificial breaching, which is done in response to rising water levels behind the barrier beach. However, as concluded by NMFS in its Russian River Biological Opinion, this practice adversely affects the Estuary's water quality and depths by creating a tidal marine environment with shallow depths and high salinity. NMFS' Russian River Biological Opinion concludes that the combination of high inflows and breaching practices impact rearing habitat because they interfere with natural processes that would otherwise cause a freshwater lagoon to form behind the barrier beach. According to NMFS, fresh or brackish water lagoons at the mouths of many streams in central and southern California often provide depths and water quality that are highly favorable to the survival of rearing salmon and steelhead.[6] The NMFS' Russian River Biological Opinion requires the Water Agency to collaborate with NMFS and CDFG and to modify Estuary management in order to reduce marine influence and promote a higher water level in the Estuary from May 15 to October 15.

The No Project Alternative would meet the Project Objectives relating to maintaining and protecting public health and safety as it pertains to property owners, visitors and State Beach employees and Water Agency staff, as the No Project Alternative would continue artificial breaching during lagoon management period. Similarly, the No Project Alternative would meet the Project Objectives relating to implementing, operating and maintaining management techniques in a technically and economically feasible manner.

[6] National Marine Fisheries Service. Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation District in the Russian River Watershed. p. 243. September 2008.

Environmental Effects

Short-term Effects

Implementation of the No Project Alternative would avoid construction-related impacts associated with creation of the outlet channel during the lagoon management period. These impacts during an individual outlet channel creation event would be equivalent to the construction-related impacts currently associated with artificial breaching activities. As noted above, the Water Agency would continue to implement artificial breaching activities under the No Project Alternative to maintain water levels to minimize flood risk, and the frequency of these activities are highly variable, depending upon hydrologic year type and Pacific Ocean condition. The lowest number of artificial breaching events was one event in 2004 and the highest number was 15 attempted breaches, with 13 successful, in 2009 (**Table 2-1** and **Figure 2-4b**). It is difficult to anticipate how many artificial breaching events are required each year, but there have been an average of 6 artificial breaching events annually over the last 14 years. It is possible that the number of artificial breaching events in a given year would be less than the number of times that maintenance of the outlet channel under the proposed Estuary Management Project would be necessary; however, given the number of natural variables that contribute to the occurrence of both artificial breaching and outlet channel creation, the frequency of equipment use is not quantifiable.

Equipment use under this scenario would be implemented in conformance with limitations established in the *Russian River Estuary Water Level Management Activities Incidental Harassment Authorization (IHA)* and the State Parks use permit condition. Analysis in Section 4.0 did not identify any potentially significant impacts related to equipment use, due to its short-term duration of 1-2 days. Therefore, implementation of the No Project Alternative would not result in substantial reductions in short-term construction impacts, although implementation could alter, by increasing or decreasing, the total number of equipment events that occur in a given year. As such, potential direct and secondary effects to other resource areas associated with construction equipment operation to establish and maintain the outlet channel, including short-term impact to biological resources and recreational opportunities, would not be substantially reduced under the No Project Alternative.

Long-Term Effects

Implementation of the No Project Alternative would continue historical conditions within the Russian River Estuary during the lagoon management period of May 15 through October 15. NMFS' Russian River Biological Opinion found that historic artificial breaching practices have significant, adverse effects on the Russian River's estuarine rearing habitat for juvenile salmonids, particularly steelhead. The historic method of artificial breaching, which is done in response to rising water levels behind the barrier beach, adversely affects the Estuary's water quality and depths by creating a tidal marine environment with shallow depths and high salinity. These conditions would continue under the No Project Alternative. NMFS' Russian River Biological Opinion concludes that the combination of high inflows and breaching practices impact rearing habitat because they interfere with natural processes that would otherwise cause a

freshwater lagoon to form behind the barrier beach. According to NMFS, fresh or brackish water lagoons at the mouths of many streams in central and southern California often provide depths and water quality that are highly favorable to the survival of rearing salmon and steelhead.[7]

Implementation of the No Project Alternative would avoid significant and unavoidable impacts related to increased water levels in the Estuary for a longer duration. These include potential water quality impacts associated with prolonged closure of the barrier beach, as tidal mixing would continue to occur. Additional impacts that would be avoided include inundation of properties, increased risk of flooding in the event of a tsunami, changes in the distribution of both natural vegetation communities, effects to harbor seal haulout, and modification of recreation opportunities, including both surfing opportunities and recreational haul-out opportunities in the Estuary. It is uncertain if the No Project Alternative would reduce or avoid secondary effects to groundwater impact, or if existing conditions would persist. However, implementation of the No Project Alternative would result in the continuation of current conditions within the Estuary, which have been found to be detrimental to federally listed salmonids, and could result in the Water Agency being out of compliance with the Russian River Biological Opinion. Implementation of the No Project Alternative would not provide habitat opportunity for rearing juvenile salmonids associated with the provision freshwater lagoon conditions, including the provision of up to 4,565 acre feet of storage within the maximum backwater area (9 feet) for a longer duration during the lagoon management period. As such, implementation of the No Project Alternative would not meet project objectives related to the enhancement of salmonid habitat within the Estuary. Therefore, based on the inability to achieve the project objectives, the No Project Alternative is not considered environmentally superior.

6.6.3 Habitat Restoration Alternative

Under the Habitat Restoration Alternative, the Water Agency would identify suitable locations and implement habitat restoration to provide rearing habitat within tributaries along the Russian River mainstem instead of enhancing habitat in the Estuary, as proposed under the Estuary Management Project.

Continuation of existing breaching practices during the lagoon management period would continue the Water Agency's current practice of breaching the barrier beach when the Estuary water levels are between 4.5 feet and 7 feet, as determined by the gage at the Jenner Visitor's Center. This would require mobilization of equipment and breaching of the barrier beach consistent with the limitations established in the *Russian River Estuary Water Level Management Activities Incidental Harassment Authorization (IHA).* Implementation of the Habitat Restoration Alternative would not reduce or avoid the need for mechanical breaching activities to occur on the barrier beach. The number of times mechanical breaching is required under a Habitat Restoration Alternative would depend upon natural conditions in a given hydrologic year.

[7] National Marine Fisheries Service. Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation District in the Russian River Watershed. p. 243. September 2008.

Under the Habitat Restoration Alternative, the duration of the water levels elevations experienced within the Estuary would also be expected to be consistent with historical patterns. Maintenance of perched lagoon conditions associated with maintaining Estuary water levels at 7 feet on average, for a longer duration during the lagoon management period, would not occur under the Habitat Restoration Alternative. As such, potential effects related to inundation of properties, water quality impacts associated with increased storage duration, including potential impacts related to nutrients and bacteria levels, and secondary effects to groundwater quality associated with increased salinity could be avoided. Potential impacts related to vegetation change, pinnipeds, and recreational uses would also be reduced or avoid. However, beneficial effects associated with establishment of freshwater lagoon conditions, including provision of up to 4,565 af of additional storage volume (9 feet) would not occur under the Habitat Restoration Alternative.

Habitat Restoration Alternative implementation would result in enhanced habitat for rearing and refuge in the Estuary, including Willow or Austin Creeks and in areas such as Bridgehaven, which are currently not functioning as high-quality rearing habitat. Reconnecting backwater sloughs in the Bridgehaven area (in the lower Estuary) would result in lagoon-like ponded areas off the mainstem conductive for rearing. Additionally, vegetation enhancement would provide overhanging protective cover, and other secondary benefits such as slope stability and reduced sedimentation.

Ability to Meet Project Objectives

As noted in **Table 6-2**, the Habitat Restoration Alternative would achieve the objective directed at improving salmonid habitat, especially for juvenile steelhead. However, this alternative would maintain current conditions in the Estuary, which include the Water Agency's current artificial breaching activities to minimize flood risk. As such, the Habitat Restoration Alternative would not meet the project objective of enhancing salmonid habitat by minimizing tidal influence into the Estuary, or encourage the formation of perched freshwater lagoon conditions.

Continuation of existing breaching practices during the lagoon management period would not be consistent with the NMFS' Russian River Biological Opinion, which mandates that the Water Agency changes its breaching activities to reduce marine influence (high salinity and tidal inflow) and promote a higher water level in the Estuary to form a fresh or brackish water lagoon from May 15 to October 15. However, this alternative is intended to provide similar quality and quantity of rearing habitat, albeit in different locations and types. Implementation of this alternative would require re-initiation of Section 7 consultation with NMFS and re-issuance of an amended Biological Opinion.

The Habitat Restoration Alternative would be neutral with regard to the project objective for minimization of flood hazards, as it would continue the Water Agency's historical practice of artificial breaching, which is done in response to rising water levels behind the barrier beach. However, as concluded by NMFS' in its Russian River Biological Opinion, this practice adversely affects the Estuary's water quality and depths by creating a tidal marine environment with shallow depths and high salinity.

Although the Habitat Restoration Alternative would not improve habitat conditions in the Estuary, it would provide habitat enhancements in other locations that would be suitable for salmonid rearing. Consistent with the discussion in **Chapter 2.0, Project Description** and **Section 4.13, Public Services and Utilities, and Public Safety**, the Habitat Restoration Alternative would meet the Project Objectives relating to maintaining and protecting public health and safety as it pertains to property owners, visitors and State Beach employees and Water Agency staff, as the Water Agency would continue artificial breaching during lagoon management period consistent with current Standard Operational Procedures. The Habitat Restoration Alternative would likely be operated and implemented in a technically and economically feasible manner, however costs have not been estimated and a funding mechanism is not identified.

Environmental Effects

Short-term Effects

Short-term effects associated with a Habitat Restoration Alternative would include temporary and localized sedimentation or water quality issues associated with vegetation removal or turbidity during installation of fish passage structures or woody debris for cover. Implementation of the Habitat Restoration Alternative would avoid construction-related impacts associated with creation and maintenance of the outlet channel during the lagoon management period. These impacts during an individual outlet channel creation event would be comparable to the construction-related impacts currently associated with artificial breaching activities.

Long-Term Effects

The Habitat Restoration Alternative would benefit fisheries and fish habitat by increasing suitable areas and providing vegetative cover and rearing areas. Implementation of the Habitat Restoration Alternative would avoid significant and unavoidable impacts related to increased water levels in the Estuary for a longer duration. These include potential water quality impacts[8] associated with prolonged closure of the barrier beach, as tidal mixing would continue to occur. Additional impacts that would be avoided include increased risk of inundation of properties, increased risk of flooding in the event of a tsunami, changes in the distribution of both natural vegetation communities, modification of recreation opportunities, including both surfing opportunities and recreational haul-out opportunities in the Estuary. It is uncertain if the Habitat Restoration Alternative would reduce or avoid secondary effects to groundwater impact, or if existing conditions would persist. The Habitat Restoration Alternative would not increase the frequency of equipment use beyond current practices.

Implementation of the Habitat Restoration Alternative would not provide habitat opportunity for rearing juvenile salmonids associated with the provision freshwater lagoon conditions, including the provision of up to 4,565 acre feet of storage within the maximum backwater area (9 feet) for a longer duration during the lagoon management period. As such, implementation of the No Project Alternative would not meet project objectives related to the enhancement of salmonid habitat

[8] It is uncertain if this alternative could reduce the groundwater impact or if existing conditions would persist.

within the Estuary. Therefore, based on the inability to achieve the project objectives, the Habitat Restoration Alternative, in and of itself, is not considered environmentally superior.

6.6.4 Temporary Outlet Standpipe Alternative

The Temporary Outlet Standpipe Alternative involves installation and maintenance of a temporary physical structure, in place of an outlet channel to allow outflow through a perched lagoon. Location and orientation of the standpipe is variable, but would be physically attached to a stable surface (i.e. jetty or cliff rip-rap). The standpipe would be a passive system that would outflow via gravity and outflow into the ocean.

Ability to Meet Project Objectives

As noted in **Table 6-2**, it is not known whether the Temporary Outlet Standpipe Alternative could potentially achieve the project objectives, which are directed at improving salmonid habitat, especially for juvenile steelhead, while maintaining Estuary water levels to minimize flood hazards. It would essentially function as a physical structure outlet channel. However, as noted above in Section 6.4.2, substantial engineering, environmental, permitting, and other constraints would be associated with development and implementation of an alternative that included installation of a temporary standpipe within the barrier beach at Jenner. Without formal engineering feasibility and design review, it is speculative to determine whether a structure would function as intended, and with less environmental impacts. Some engineering constraints include beach morphology and sand erosion: sands around the standpipe could erode an ultimately breach the barrier beach. The pipe would need to be sized for maximum outflow, and the discharge point, like the permanent structure described above in **Section 6.3.1**, would need to extend out past the wave break.

Implementation of the standpipe alternative entails public and work safety concerns: it could act as a barrier that could impact use and enjoyment of the beach and its installation could expose workers and beach visitors to dangerous conditions during installation and maintenance for workers. Costs to implement the standpipe alternative have not been estimated; however the alternative is anticipated to require a substantial economic investment, especially to account for annual re-installation following pre-design and design, environmental documentation, regulatory permitting, and construction activities. As such, it would not meet the Project Objectives relating to implementing, operating and maintaining management techniques in a technically and economically feasible manner.

Environmental Effects

This alternative would not reduce or minimize any environmental effects associated with the proposed Estuary Management Project. The Temporary Outlet Standpipe would function essentially the same as the proposed outlet channel to allow for establishment of lagoon conditions during the management period; however, as a physical structure, there are additional physical environmental impacts and engineering constraints. There are also public and work safety concerns associated with implementation and maintenance of this type of structure.

The Temporary Outlet Standpipe would not avoid significant and unavoidable effects associated with increased water levels in the Estuary for a longer duration. These include potential water quality impacts associated with prolonged closure of the barrier beach, increased risk of inundation of properties, increased risk of flooding in the event of a tsunami, changes in the distribution of both natural vegetation communities, modification of recreation opportunities, including both surfing opportunities and recreational haul-out opportunities in the Estuary. It is uncertain if the Temporary Outlet Standpipe would reduce or avoid the secondary effects to groundwater impact, or if existing conditions would persist. Depending upon its performance, this alternative could potentially reduce the frequency and number of maintenance activities on the barrier beach, as a temporary pipeline may be less susceptible to erosion and wave closure processes associated with the proposed outlet channel. However, additional maintenance related to keeping the standpipe in place, as well as significant aesthetic and public safety impacts in the event that the temporary facility was dislodged by tidal or river flow, would be associated with a temporary standpipe installation.

Implementation of the Temporary Standpipe Alternative could potentially meet the project objectives. However, because implementation of the temporary outlet standpipe has substantial technical uncertainties, would increase aesthetics and public safety impacts, and would not avoid impacts associated with increased water levels for a longer duration within the Estuary, it is not considered the environmentally superior alternative.

6.6.5 Reduced Project Alternative

A Reduced Project Alternative would involve all of the elements of the proposed Estuary Management Project, including artificial breaching outside of a lagoon management period, and creation of an outlet channel following a natural closure to support freshwater conditions during the lagoon management period. However, this alternative would reduce the maximum target water level to 8 feet maximum (instead of 9 feet maximum). This would be accomplished through management of the outlet channel bed elevation to maintain a lower water level. This reduced water surface level target would reduce the area of inundation, thereby reducing potential effects to private properties, vegetation assemblages, and recreational boating haul-outs.

Ability to Meet Project Objectives

As noted in **Table 6-2**, the Reduced Project Alternative could potentially achieve the project objectives, which are directed at improving salmonid habitat, especially for juvenile steelhead, while maintaining Estuary water levels to minimize flood hazards. The Reduced Project Alternative would encourage the formation of perched freshwater lagoon conditions, and would continue to provide flood protection of private properties through the creation of the outlet channel. The amount of habitat created under this alternative would be incrementally reduced, based upon lower water surface elevations. However, the benefit provided through the creation of freshwater lagoon conditions for a longer duration would be reduced by approximately 966 acre feet of storage.

Environmental Effects

Short-term Effects

Short-term effects associated with the Reduced Project Alternative would be equivalent to those identified for the Estuary Management Project, as the Water Agency would create the outlet channel following formation of the barrier beach and closure of the Estuary mouth.

Long-Term Effects

Implementation of the Reduced Project Alternative would reduce significant and unavoidable effects associated with increased water levels, such as vegetation inundation, as the Reduced Project Alternative would decrease the elevation and duration of water levels to 8 feet maximum, thereby reducing inundation impacts to private properties, vegetation, and recreational areas. **Table 6-3** summarizes the environmental trade-offs of the proposed Estuary Management Project compared to the Reduced Project Alternative. The area of inundation associated with 7 feet and 9 feet is shown in **Figures 3.4A through 3.4E of Section 3.0.** The reduction in water level associated with the 8 foot elevation is roughly between the areas shown. Implementation of this alternative would provide an additional estimated 3,599 storage volume, approximately 966 acre-feet less that the proposed project. The Reduced Project Alternative would result in incrementally reduced number of properties affected by within the Estuary Study Area. Additionally, it is anticipated that structures would be avoided at 8 feet. The inundation of recreational haul-out area, as defined by gravel and mudflat area, would also be reduced by 5 acres within the Estuary Study Area. Similar reductions would be expected within the maximum backwater area upstream of Austin Creek to Vacation Beach. The Reduced Project Alternative could result in reduced risk associated with potential tsunami because the water level, although maintained for a longer duration, would be lower than under the proposed project. Disturbance (i.e. beach access, pinniped disturbance, traffic, and noise) resulting from artificial breaching activities would be identical to that associated with current practices under the proposed project.

Implementation of the Reduced Project Alternative would have equivalent water quality impacts associated with prolonged closure of the barrier beach. Implementation of the Reduced Project Alternative would not avoid significant and unavoidable effects to recreation (surfing), as it would still outflows to be managed with an outlet channel, which precludes the formation of wave break conducive for surfing. It is uncertain if this alternative could reduce the groundwater impact or if existing conditions would persist. During the lagoon management period, the Reduced Project Alternative would not reduce the disturbance to the harbor seal haulout, as outlet channel maintenance would be equivalent to the proposed project. However, reduced water surface elevations may improve outlet channel performance, and could contribute to reduced maintenance.

Implementation of the Reduced Project Alternative would substantially meet the project objectives, although the amount of habitat created may be incrementally reduced under this alterative due to lower water elevations (see **Table 6-4**). Implementation of the Reduced Alternative would reduce significant and unavoidable impacts associated with private property inundation, reducing the total number of parcels affected within the Estuary Study Area. It is

anticipated that water surface elevations of 8 feet would avoid structures such as boat docks. It would also reduce the area of vegetation inundation within the Estuary Study by approximately 22 acres, and the area of gravel bar/mudflat inundation by approximately 5 acres, providing for recreational haul-out. Although these impacts would remain significant and unavoidable, implementation of the Reduced Project Alternative is considered environmentally superior to the Estuary Management Project, as it would meet the project objectives and would minimize the area of inundation, and the potential significant unavoidable impacts associated with this area. Although this alternative may be considered environmentally superior, the Water Agency is directed by the Russian River Biological Opinion to maintain higher water levels envisioned under the Estuary Management Plan.

6.6.6 Jetty Modification Alternative

Jetty modification consists of two potential sub-alternatives: 1) complete jetty removal, 2) jetty modification to improve subsurface outflow of water from the Estuary to the ocean, or other potential uses of the jetty as a mechanism for water surface elevation control. The Russian River Biological Opinion requires USACE to remove or modify the jetty if the Water Agency study determines there would be a benefit to fisheries.

Ability to Meet Project Objectives

As noted in **Table 6-2**, it is not known whether the Jetty Modification Alternative could potentially achieve the project objectives, which are directed at improving salmonid habitat, especially for juvenile steelhead, while maintaining Estuary water levels to minimize flood hazards. There is substantial uncertainty regarding how removal of the jetty would affect the coastal geomorphology of the Russian River mouth, and whether those effects would be beneficial or adverse with regard to meeting the project objectives. The Water Agency does not own, or have jurisdiction over, the jetty structure. This alternative would only meet the project objectives if it enhanced salmonid habitat by minimizing tidal influence into the Estuary, or encouraged the formation of perched freshwater lagoon conditions. It is not anticipated that removal of the jetty, in and of itself, would result in conditions that would enhance salmonid habitat by minimizing tidal influence into the Estuary, or encourage the formation of perched freshwater lagoon conditions. Although removal of the jetty would represent a more “natural” condition, in that it would remove a man-made structure that influences the location of the Russian River outlet channel, the jetty has influenced coastal geomorphology since 1929. As such, it is part of the existing environmental baseline for both the Estuary Management Project, and the NMFS’ Russian River Biological Opinion, in its review of effects on listed salmonids.

The ability of the Jetty Modification Alternative to meet the primary project objectives related to habitat enhancement and flood control is uncertain. However, it is anticipated that complete removal of the jetty would require a substantial economic investment by multiple parties in order to complete field investigations, pre-design and design, environmental documentation, regulatory permitting, and construction activities. As such, it would not meet the project objectives relating to implementing, operating and maintaining management techniques in a technically and economically feasible manner.

Environmental Effects

Jetty Removal

Complete removal of the jetty would result in disturbance to the barrier beach area, including excavation below 0 feet to remove subsurface materials. The jetty extends approximately 1,600 linear feet from the parking lot at Goat Rock State Beach, and materials extend below the low tide line. Complete removal of the jetty and its supporting infrastructure, including subsurface excavation, would include removal of material along approximately 1,600 linear feet extending from the Goat Rock State Park parking lot north and northwest to the last remaining segment within the surf zone. The southern 1,100 linear feet includes the jetty's access road, seawall, and access railroad. The northern 500 linear feet of the jetty itself consists of large rock, cemented with concrete, with a trapezoidal cross-section, with a 12-foot wide top flaring out to an approximately 80-foot wide base (Figure 6-2). By 1948, 4,280 tons of rock from the quarry were added to the structure and capped with concrete (Magoon and Treadwell et al. 2008).

Complete removal would likely require the installation of temporary piles to isolate the construction excavation from tidal influence and maintain worker safety. Approximately 200 feet of the jetty protrudes from the beach into the ocean. While the landward half of the jetty retains most of its original concrete cap, the seaward half has deteriorated considerably, with a 50-foot notch incised into the jetty. Construction and demolition activities would likely require at least one summer season, depending upon ocean conditions and access permissions granted by State Parks. Construction equipment would include excavators and haul trucks to remove rubble generated by the demolition of the jetty. Construction activities would result in disturbance impacts related to a full construction team to expose, demolish, and haul away jetty material, which consists of rock, rubble and a concrete cap. Construction related to jetty removal would require permits from USACE, NMFS, USFWS, CDFG, RWQCB, State Lands Commission, Coastal Commission, and California Department of Parks and Recreation.

Removal of the jetty structure would remove a structure that has influenced coastal geomorphology at the mouth of the Russian River since 1929. It is not known how jetty removal would affect the geomorphology of the Russian River outlet, barrier beach formation, or the resulting Estuary. Beyond anecdotal description of the Russian River outlet to the Pacific Ocean prior to installation of the jetty, there is little documentation regarding the alignment of the Russian River outlet channel prior to its present location north of the jetty. Understanding historic beach morphology is probably further confounded by unquantified effects of prior gravel mining and de-forestation on riverine sediment yield. Removal of the jetty, which currently demarks the southern-most location of the Russian River outlet channel under artificial breaching conditions, could potentially result in outlet channel migration to the south. Furthermore, it is possible that removal of the jetty could alter the formation and location of the river mouth such that it migrates south toward Goat Rock, thereby affect recreational access/visitor use. It is uncertain if this alternative could reduce the groundwater impact or if existing conditions would persist.

Removal of the jetty structure would result in direct and indirect impacts to biological resources associated with the level of construction necessary to remove the jetty structure. This would

likely include construction activities directly on the beach for a 4- to 6-month duration, conveyance of materials south along the beach to the Goat Rock State Beach parking lot, equipment staging within the parking lot, and truck haul trips along the single lane roadway that provides access to the parking lot. Impacts would include disturbance to harbor seal haul out usage during the period of construction, as well as potential impacts to sensitive plant species and habitat in the vicinity of the Goat Rock State Beach parking lot and along the jetty itself.

Additionally, when considering sea level rise, beach morphology would change more rapidly in the near-term if the jetty were removed, because removing the hard structures from the beach would allow the outlet channel more latitude in its planform alignment.

Jetty Modification to Improve Subsurface Outflow

As noted in **Chapter 3.0**, it is hypothesized that substantial outflow from the Estuary occurs subsurface through the barrier beach, based on mass balance calculations of inflow from the Russian River and resulting water levels. However, little is known about the permeability of the subsurface component of the jetty so it has not been determined if the jetty substructure impedes or enhances the outflow of water from the lower elevations of the Estuary. Because known historic documentation is limited and the components obscured by sand, additional characterization of the jetty is required.

If further analysis under the Russian River Biological Opinion identifies that the jetty impedes seepage, alteration of the jetty to improve subsurface outflow could be implemented though directional drilling or exposure and excavation of specific locations along the jetty structure to increase subsurface outflow through the base of the jetty structure along its approximately 1,100 linear feet. This type of modification would result in similar single season construction activities along the jetty structure. Construction activities could be scaled and focused such that they are substantially less than the level of construction necessary to remove the jetty structure. However, the level of construction associated with modification of the jetty to improve subsurface flow would be greater than that identified for the Estuary Management Project, both in terms of scale of equipment usage and the length of time that would be required to complete the work.

Implementation of the Jetty Modification Alternative in and of itself would not meet project objectives related to the enhancement of salmonid habitat within the Estuary, as it cannot be demonstrated that modification of the jetty alone would enhance salmonid habitat. Rather, modification of the jetty to improve flow through could represent a sub-alternative that could enhance salmonid habitat in conjunction or combination with the other alternatives identified. Therefore, the Jetty Modification Alternative is not considered environmentally superior. As provided for in the NMFS' Russian River Biological Opinion, the Water Agency will continue to develop and implement a work plan to analyze the potential for jetty modification to result in beneficial effects to salmonid habitat. As required in the NMFS' Russian River Biological Opinion, NMFS and the Water Agency will re-examine jetty modification, and its ability to enhance conditions for salmonids in the Estuary, if it is determined that implementation of the Estuary Management Project is unsuccessful.

6.6.7 Alternative Flood Management Measures

Ability to Meet Project Objectives

As noted in **Table 6-2**, Alternative Flood Management may have the potential to achieve the project objective of improving salmonid habitat, especially for juvenile steelhead, by encouraging the formation of perched freshwater lagoon conditions.[9] Implementation of this alternative would not meet the objective of minimizing flood risk to private property, as the Water Agency would cease artificial breaching in favor of establishing a managed estuary floodplain that would accommodate water levels associated with natural breaching events. However, it would provide for the acquisition of easements or property that would be affected by increased water levels associated with natural breaching events.

The Water Agency would no longer implement artificial breaching activities. However, Alternative Flood Control Measures would not meet the project objectives relating to maintaining and protecting public health and safety as it pertains to property owners, visitors and State Beach employees and Water Agency staff. Natural breach conditions could impact property owner safety by exposing portions of their property to periodic inundation. Additionally, natural breach conditions have a greater potential to create hazard conditions for State Beach visitors, employees and Water Agency staff, as breaches would be uncontrolled, unpredictable and unsupervised.

Finally, it is anticipated that acquisition of portions of as many as 120 parcels along the estuary shoreline within the Estuary Study Area would be necessary to implement this alternative, and additional acquisition may be required for the maximum backwater area, including parcels between Austin Creek and Vacation Beach. Implementation of this alternative would be controversial and require a substantial economic investment by multiple parties. As such, it would not meet the project objectives relating to implementing, operating and maintaining management techniques in a technically and economically feasible manner.

Environmental Effects

Implementation of Alternative Flood Management Measures would include the acquisition of easement or private property at approximately 96 parcels within the Estuary Study Area that are located at elevations that would be affected by water levels of 12 feet. This would be increased to approximately 120 parcels within the Estuary Study Area to acquire easement or private property as parcels that would be affected by water levels of 14 feet. The Water Agency would cease artificial breaching activities, and would rely on easement acquisition to establish a flood plain management area that would be subject to periodic inundation relating to barrier beach formation. As previously noted in **Chapter 3.0**, the highest recorded water levels in the Estuary during the 1996-2009 dataset was 11.1 feet, recorded in November 2000 during a natural breach condition. The Water Agency would work with private land owners to relocate infrastructure located at elevations that could be affected by inundation, such as residential buildings, other structures, piers, septic systems, roadways/driveways, and other facilities. Lands below elevation 14 feet, or

[9] Generally, formation of a perched lagoon can be anticipated; however, depending on tidal conditions and other variables, the barrier beach may naturally breach.

other appropriate elevation, would be managed as an estuary floodplain, limiting the allowable uses within those areas. Compared to current conditions, where regular inundation occurs up to 9 feet, this represents approximately 81 acres of land between the 9 foot contour, and the 14 foot contour within the Estuary Study Area. The potential area within the 14 foot contour that could be set aside as flood management easement is shown in **Figure 6-7A through 6-7C**.

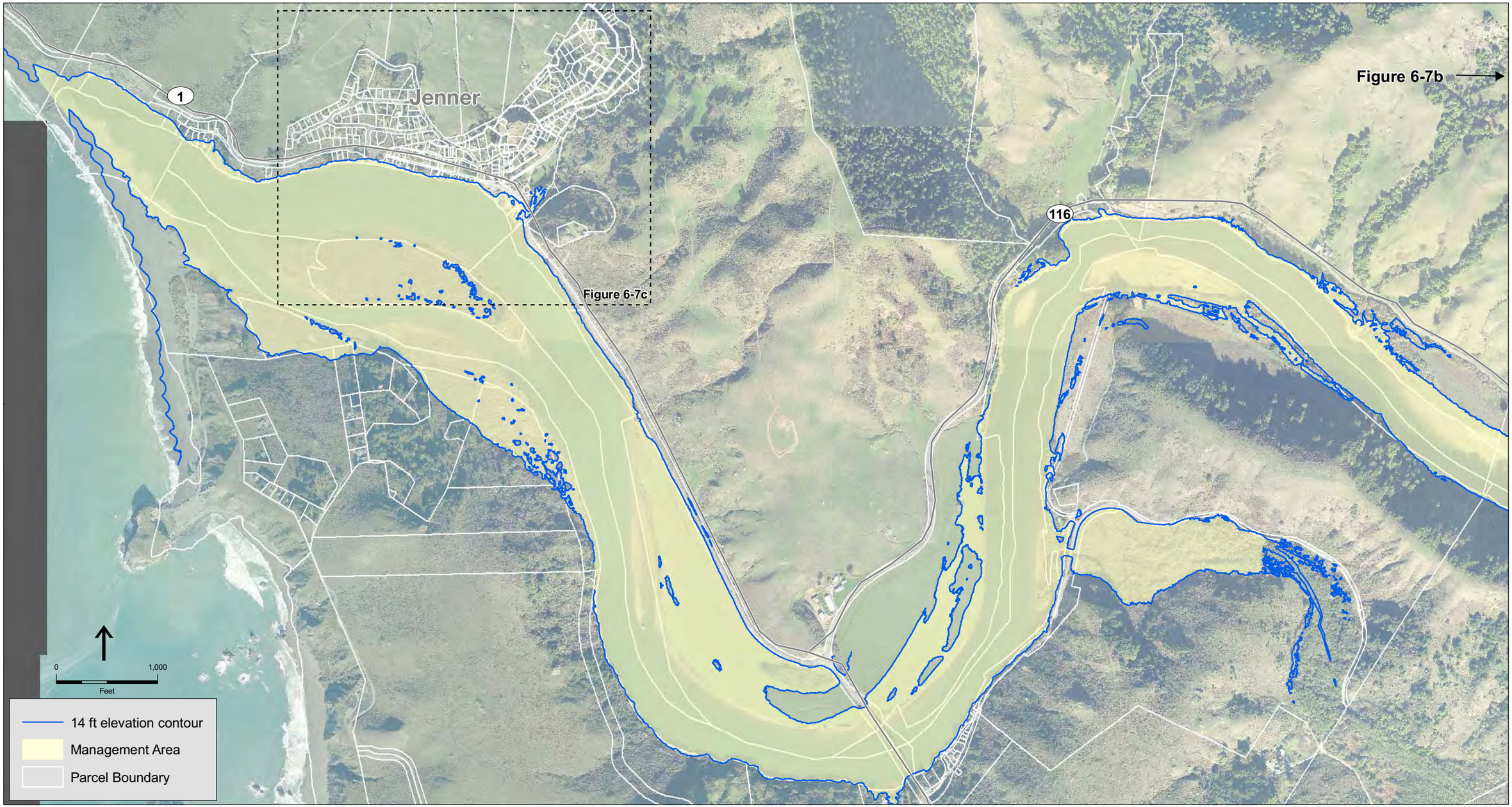
Reversion to a more natural breaching regime with additional inundation area to accommodate Estuary storage could result in one of two general scenarios, both of which would continue to be influenced by the jetty structure: establishment of perched freshwater lagoon conditions, providing habitat enhancement to salmonids; or closure of the barrier beach and subsequent natural breaching, reestablishing tidal conditions. It would avoid construction activities on the barrier beach related to the Estuary Management Project, and would also avoid short term, but less than significant, biological impacts related to those activities.

Implementation of this alternative would increase water surface elevations within the Estuary, and would rely on natural breaching events to maintain water levels below a defined water level. This would incrementally reduce the storage capacity available within the Estuary. Additionally, without a defined outflow channel, or mechanism to establish one, lands above the defined water level could be affected in the event that natural breaching does not occur in a manner or timeframe that accommodates inflow into the Estuary. The Russian River Biological Opinion attempts to minimize breaching and tidal conditions during the lagoon management period; however natural breaching is anticipated to occur under this scenario. Therefore, implementation of this alternative may not achieve all of the project objectives.

Implementation of this alternative would affect existing and proposed land uses at approximately 120 parcels along the Estuary, and would require the relocation of existing facilities to avoid effects from inundation. Under this alternative, portions of Highway 1 would potentially flood. Furthermore, this alternative would not reduce the effect of seawater intrusion into adjacent groundwater wells. Therefore, this alternative is not considered environmentally superior to the proposed project.

6.7 Environmentally Superior Project Alternative

The lead agency is not required by CEQA to adopt an environmentally superior alternative that will not feasibly attain project objectives or reduce environmental effects. In the process of selecting the environmentally superior alternative, CEQA requires that a lead agency demonstrate why a project or an alternative is selected. This is provided in the findings document that is adopted by the Board of Directors. The CEQA Guidelines indicate that when the No Project Alternative is the environmentally superior alternative, the EIR should identify an environmentally superior alternative from among the Proposed Action and other “action” alternatives. In this case, based on the discussion above the No Project Alternative is not the environmentally superior alternative. The No Project Alternative would not meet the primary dual objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard, and would not comply with the NMFS’

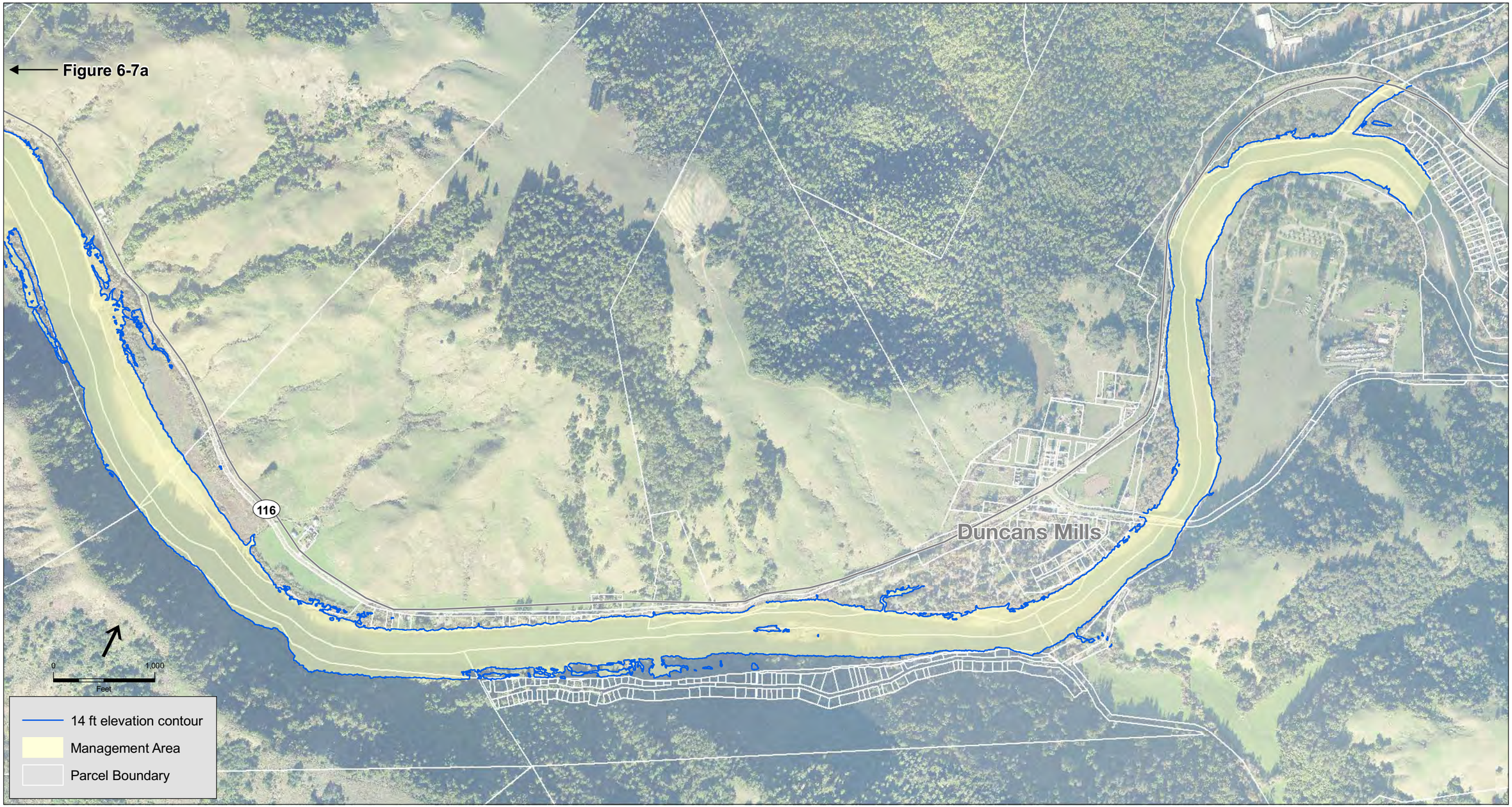


SOURCE: SCWA, 2010 (aerial photo, 2008)

Russian River Estuary Management Project. 207734.01

Figure 6-7a

Alternative Flood Management Measures
14 Foot Contour Management Zone

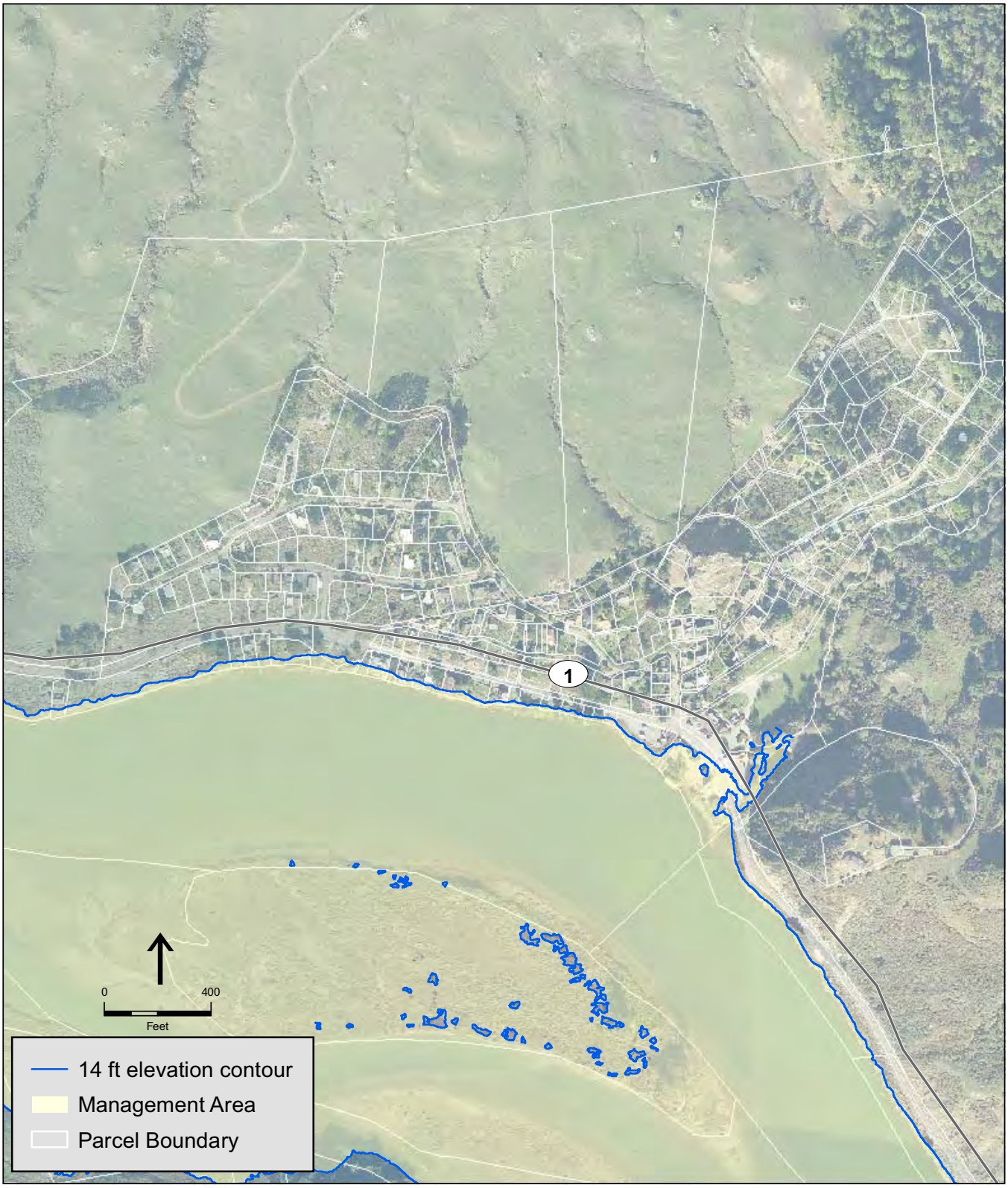


SOURCE: SCWA, 2010 (aerial photo, 2008)

Russian River Estuary Management Project. 207734.01

Figure 6-7b

Alternative Flood Management Measures
14 Foot Contour Management Zone



SOURCE: SCWA, 2010 (aerial photo, 2008)

Russian River Estuary Management Project. 207734.01

Figure 6-7c

Alternative Flood Management Measures
14 Foot Contour Management Zone
Jenner Area

Russian River Biological Opinion, which specifically requires the Water Agency to modify its Estuary management practices.

The Estuary Management Project will fulfill the dual objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard, and maintain consistency with current Water Agency regulatory requirements as established in the Russian River Biological Opinion. The Estuary Management Project will essentially modify the Water Agency's current practices to encourage formation of perched freshwater lagoon conditions for a longer duration, in compliance with the Russian River Biological Opinion. However, significant and unavoidable effects, including impacts from increased water levels for a longer duration (i.e. inundation of properties, beaches, vegetation, groundwater, water quality) would occur under this alternative; therefore although it would achieve the project objectives, it is not considered the environmentally superior alternative.

The Habitat Restoration Alternative could achieve flood control objective via continued artificial breaching. This alternative could potentially reduce effects associated with increased water levels for a longer duration, including tsunami risk, flood risk to properties and structures, vegetation changes, and recreation. Additionally, it may reduce negative effects to water quality. This alternative would provide improved salmonid habitat in Estuary tributaries. Although the Habitat Restoration Alternative would improve salmonid habitat, it would not result in the formation of perched lagoon conditions in the Estuary, as required under the Russian River Biological Opinion. Although this alternative provides environmental benefit and may reduce environmental effects compared to the proposed Estuary Management Project, it cannot be considered the environmentally superior alternative because it would not achieve the project objective to create a perched lagoon, as required by the Russian River Biological Opinion.

The Temporary Standpipe Alterative would achieve the dual project objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard, and would comply with the NMFS' Russian River Biological Opinion, which specifically requires the Water Agency to modify its Estuary management practices. It would not avoid or reduce impacts associated with the proposed Estuary Management Project. For most impacts areas, the Temporary Standpipe Alternative would incur similar or commensurate impacts; additionally, it could create a barrier that prevents successful migration of salmonids, thereby not achieving the fisheries enhancement objectives. Additionally, there is technical uncertainty regarding the feasibility of this alternative, and additional impacts related to installation, maintenance, and operation are anticipated, particularly for aesthetics and public safety. Costs and overall feasibility are unknown. In this case, based on the discussion above the Temporary Standpipe Alternative is not considered environmentally superior to the proposed project.

The Reduced Project Alternative would achieve the dual project objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard. This alternative would have the potential to comply with the objectives of the Russian River Biological Opinion, which specifically requires the Water Agency to modify its

Estuary management practices; however, it would not attain the average water surface elevation of 7 feet as identified in the Russian River Biological Opinion. It would incrementally reduce the significant impacts associated with increased water levels for a longer duration, including tsunami risk, flood risk to properties and structures, and reduce the extent of impacts to pinniped haul out areas and shoreline beach access. It would not reduce impacts to recreation (surfing), or groundwater. Implementation of the Reduced Project Alternative would reduce significant and unavoidable impacts associated with private property inundation, incrementally reducing the total number of parcels affected within the Estuary Study Area. It is anticipated that water surface elevations of 8 feet would avoid structures such as boat docks. It would also incrementally reduce the area of gravel bar/mudflat inundation within the Estuary Study Area by approximately 5.8 acres, thereby reducing inundation effects to pinniped haul outs, and recreational beach area. Implementation of the Reduced Alternative would provide an additional 3,599 acre-feet of increased storage volume; however this represents a reduced volume of storage provided by the proposed project of approximately 966 acre-feet, thereby reducing the volume of potential habitat provided by the proposed project. Although the impacts reduced by the Reduced Alternative would remain significant and unavoidable, implementation of the Reduced Alternative is considered environmentally superior to the Proposed Project, as it would meet the project objectives and would minimize the area of inundation, and the potential significant unavoidable impacts, associated with the proposed project. Although this alternative may be considered environmentally superior, the Water Agency is directed by the Russian River Biological Opinion to maintain higher water levels envisioned under the Estuary Management Plan. Implementation of this alternative, or use of a different water surface elevation to achieve project objectives and minimize impacts, could be achieved through the mechanism of the Adaptive Management Plan, which provides for modification of Estuary Management in coordination with NMFS and CDFG, based upon monitoring and experience gained through project implementation.

The Jetty Removal Alternative may not result in the formation of perched lagoon conditions, and would have substantial environmental impacts associated with its removal. It is unknown whether impacts could be feasibly and substantially reduced because of the multitude of uncertainty around the structure itself and function in the current environment. The Water Agency does not own or have jurisdiction over the jetty structure. Additional long-term effects would be associated with migration of the outlet channel southward, potentially affecting Goat Rock State Beach facilities. Therefore, it is not considered environmentally superior to the proposed project. The Water Agency will continue to develop and implement a study work plan and cost estimate to analyze the jetty structure and its potential effects on the Estuary.

Alternative Flood Management strategies could meet the objective of enhancing rearing habitat for juvenile salmonids, but would meet the objective of minimizing flood hazard through acquisition of private property along the Estuary fringe, thereby designating these properties for flood management uses. This alternative would impact private property owners and land uses along the Estuary, and would require financial commitment for the purchase of easements or private property. Therefore, it is not considered environmentally superior to the proposed project.

6.8 References

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Sonoma County Water Agency (SCWA), Letter to Mr. William Hearn, National Marine Fisheries Service Regarding Russian River Estuary Flood Risk Management Feasibility Study, March 22, 2010.

Sonoma County Water Agency (SCWA), Request for Marine Mammal Protection Act Incidental Harassment Authorization, Russian River Estuary Management Activities, September 2009.

CHAPTER 7.0
Other Topics Required by CEQA

This chapter contains other required CEQA statutory sections that evaluate the potential growth-inducing impacts and significant irreversible and irretrievable impacts.

7.1 Growth-Inducing Impacts and Secondary Effects of Growth

The California Environmental Quality Act (CEQA) Guidelines [Section15126.2(d)] require that an Environmental Impact Report (EIR) evaluate the growth inducing impacts of a proposed project. The EIR should:

> *Discuss the ways in which a proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a wastewater treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discuss the characteristic of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.*

A project can have direct and/or indirect growth inducement potential. Direct growth would result if a project involved construction of new housing. A project can have indirect growth inducement if it would establish substantial new permanent employment opportunities (e.g., commercial, industrial or governmental enterprises) or if it would involve a substantial construction effort with substantial short-term employment opportunities and indirectly stimulate the need for additional housing and services to support the new employment demand. A project would also have an indirect growth inducement effect if it would remove an obstacle to additional growth and development, such as removing a constraint on a required public service.

The proposed project would not involve an increase in population or employment, or construction of new housing. Short-term project activities would involve workers for the course of the breaching activity at the Russian River Estuary. Long-term activities under the proposed project would involve adaptive management strategy to balance flood protection and habitat restoration objectives established by the National Marine Fisheries Services' (NMFS) Russian River Biological Opinion (see **Chapter 2.0, Project Description**). There is no substantial change in the

existing activities of the Water Agency that would increase housing, population, or employment. Therefore, the proposed project would not result in a direct increase in population or employment or new housing.

To determine indirect growth inducement potential, the proposed project was reviewed to ascertain whether it would remove an obstacle to additional growth and development, such as removing a constraint on a required public service. Therefore, to assess whether the proposed project would induce growth indirectly, it must be determined whether the project removes an obstacle for growth.

The project activities are located near the community of Jenner in unincorporated Sonoma County. As described in **Chapters 1.0, Introduction**, and **2.0, Project Description**, the Water Agency will adhere to conditions of and implement strategies established in the NMFS Russian River Biological Opinion and adopt lagoon management practices as part of the proposed project. The adaptive management practices include maintaining an outlet channel and minimizing breaching activities during the lagoon management period and enable the Water Agency to comply with the requirements of the Biological Opinion and to meet the objectives of enhancing fisheries habitat while simultaneously minimizing flood risk to the low-lying properties adjacent to the Estuary.

As part of the proposed Estuary Management Project, the Water Agency's activities would involve continued provision of flood control services and support for existing and planned land uses and would not involve altering the land use or economic constraints to the surrounding floodplain. The proposed project would not directly or indirectly support economic expansion, population growth, or residential construction in the Estuary Management Project area. The purpose of the adaptive management practice is habitat restoration in the Estuary while also providing for flood protection, which does not remove any obstacle to growth. The proposed outlet channel creation and maintenance during the lagoon management period (see **Chapter 2.0, Project Description**) along with the ongoing breaching activity during the rest of the year do not increase the population-serving capacity of the Water Agency, and are not considered growth-inducing.

The Water Agency's activities under the proposed project would involve an adaptive management strategy which supports existing and planned land uses and would not alter the land use or economic constraints in the surrounding floodplain. Therefore, the proposed project would not result in growth inducement.

7.2 Irreversible Environmental Changes and Irretrievable Commitments

Section 15126.2 of the CEQA Guidelines states that an EIR should discuss significant irreversible environmental changes from the project or any irreversible damage from any environmental accidents associated with the project. The EIR should also evaluate any irretrievable commitments of resources, which are those that cause either direct or indirect use of natural resources such that the resources cannot be restored or returned to their original condition. For example, the extirpation of a species from an area is an irreversible commitment.

Types of resources generally considered in an irretrievable or irreversible commitment of resources analysis includes resources like fossil fuels, natural gas, minerals, or timber. As described in **Chapter 2.0, Project Description**, the Estuary Management Project would involve short-term outlet channel formation activity at the Estuary which would require operation of construction equipment such as an excavator or bulldozer. Operation of such equipment would increase the short-term use of refined petroleum products during the operation of the equipment (primarily gas, diesel, and motor oil). However, the energy consumption for the activity would not result in long-term depletion of non-renewable energy resources and would not permanently increase reliance on energy resources that are not renewable. The outlet channel formation activities would not reduce or interrupt existing electrical or natural gas services such that existing supplies would be constrained. Therefore, the Estuary Management Project would not result in an irretrievable and irreversible commitment of natural resources though direct consumption of fossil fuels and use of materials for outlet channel formation during the adaptive management period. The use of the nonrenewable resources is expected to account for a minimal portion of the region's resources and would not affect the availability of these resources for other needs within the region. There would no greater energy or resources consumed than that under the existing conditions.

The Estuary Management Project activities would not involve long-term operation activities that would result in irreversible and irretrievable commitment of energy and material resources (i.e. associated with operations like gravel mining or timber harvesting); however it is recognized that implementation of the Estuary Management Project may affect other resources besides these typically considered in an irretrievable or irreversible commitment of resources analysis, and that those effects could be detrimental. For example, the Estuary Management Project may reduce or eliminate the availability of conditions that support surfing waves; however this is not an irreversible or irretrievable commitment of resources because the process could be reversed.

CHAPTER 8.0
List of EIR Preparers

A list of persons who prepared various sections of the EIR, prepared significant background materials, or participated to a significant degree in preparing the EIR is presented below.

TABLE 8-1
LIST OF PREPARERS

Name	Participation
Sonoma County Water Agency	
Jessica Martini Lamb	Project Manager
Chris Delaney	Hydrology
Pam Jeane	Program Manager; Technical Review
Erica Phelps	Technical Review
Steve Shupe	Legal Review
Cory O'Donnell	Legal Review
ESA	
James E. O'Toole	Project Director; Project Description; Alternatives
Katie Blank	Deputy Project Manager; Introduction; Public Utilities; Cumulative
Paul Curfman	Aesthetics; Recreation
Justin Gragg	Hydrology and Flooding
Asavari Devadiga	Water Quality; Other CEQA Statutory Sections
Aindrea Jensen	Biological Resources
Michael Burns	Geology and Soils
Cherie Kolin	Land Use and Agriculture
Jack Hutchison	Transportation and Traffic
Heidi Koenig	Cultural Resources
Julie Holst	Air Quality
Matthew Fagundes	Noise
Julie Moore	Hazards and Hazardous Materials
Wes McCullough	GIS
Ron Teitel, Perry Jung	Graphics
Philip Williams and Associates	
Matt Brennan	Sea Level Rise; Hydrology; Alternatives

APPENDIX 1

Notice of Preparation, Scoping Report and Scoping Comments

APPENDIX 1.1
Notice of Preparation

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NOTICE OF PREPARATION OF ENVIRONMENTAL IMPACT REPORT

To: State Clearinghouse,
Responsible and Trustee Agencies,
Property Owners and Interested Parties

From: Sonoma County Water Agency
404 Aviation Blvd.
Santa Rosa, CA 95403

Subject: Notice of Preparation of a Draft Environmental Impact Report for the Russian River Estuary Management Project (Estuary Project)

The Sonoma County Water Agency (Agency) is preparing an Environmental Impact Report (EIR) for the proposed Russian River Estuary Management Project (Estuary Project), in accordance with the provisions of the California Environmental Quality Act (CEQA), the State CEQA Guidelines, and the Agency's Procedures for the Implementation of CEQA. The Agency will act as the Lead Agency pursuant to CEQA, and will consider all comments received in response to this Notice of Preparation (NOP), including comments from responsible and trustee agencies, property owners, and interested parties regarding the scope and content of the information to be included in the EIR. This NOP describes the proposed project that will be analyzed in the EIR and identifies the issue areas that will be studied during the environmental review. Agencies and interested members of the public are invited to provide input on the scope of the environmental analysis and alternatives to be evaluated.

Background

The Agency was created in 1949 by the California Legislature as a special district to provide flood protection and water supply services. The Sonoma County Board of Supervisors acts as the Agency's Board of Directors. The Agency's powers and duties, as authorized by the California Legislature, include the production and supply of surface water and groundwater for beneficial uses, control of flood waters, generation of electricity, providing recreational facilities (in connection with the Agency's facilities), and the treatment and disposal of wastewater.

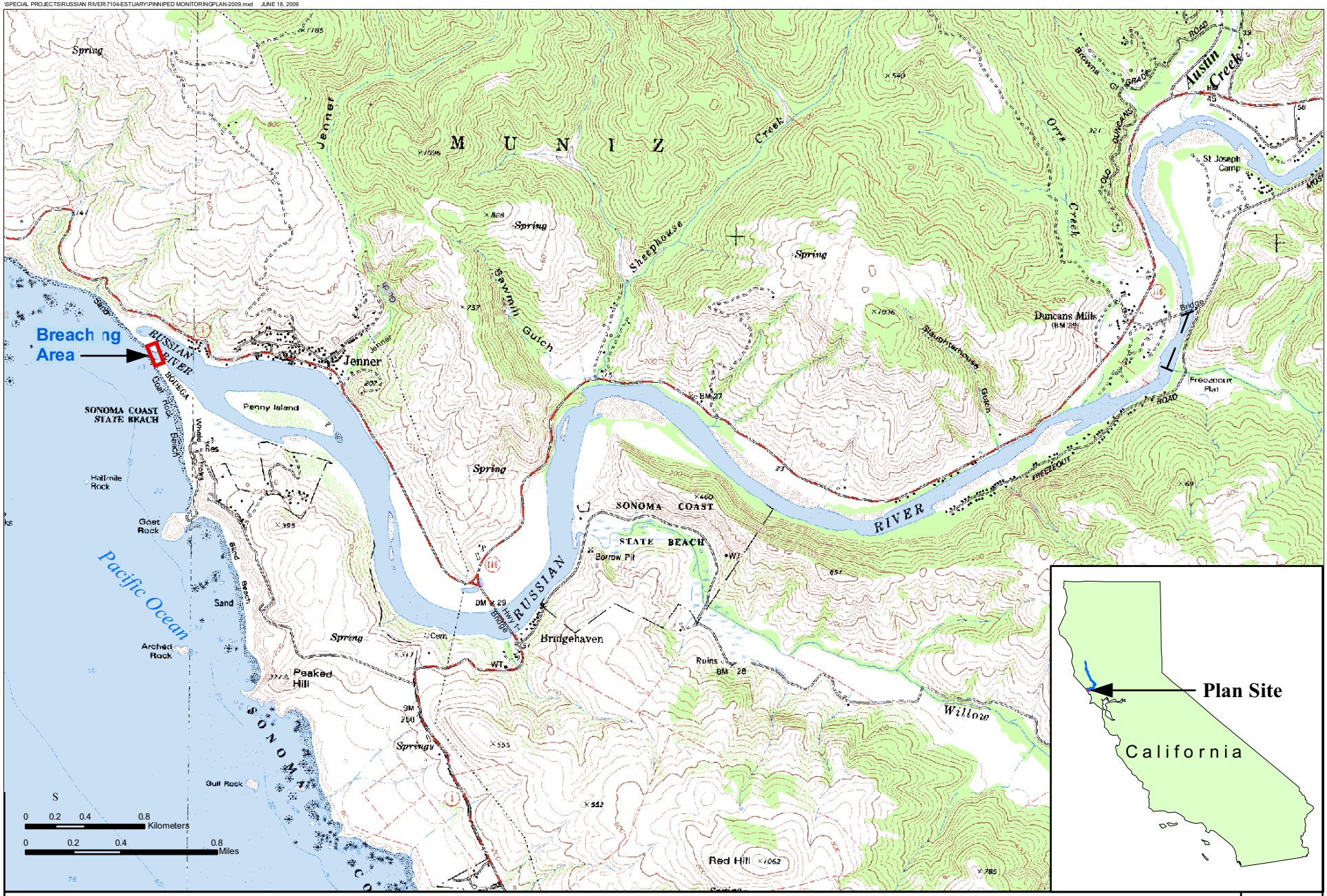
The Russian River Estuary is located approximately 60 miles (97 kilometers) northwest of San Francisco Bay, near the town of Jenner, Sonoma County, California (**Figure 1**). The Estuary extends from the mouth of the Russian River upstream approximately 6 miles (10 kilometers) to an area between Austin Creek and the community of Duncans Mills. The mouth of the Estuary and the Russian River is located at Goat Rock State Beach, which is owned by California State Parks.

The Estuary is open to the ocean tides for much of the year. At certain times, the formation of a barrier beach across the mouth of the Russian River cuts off the tidal connection between the ocean and the Russian River and creates a lagoon. The Estuary may close at any time of the year, although the closures occur most often during the spring, summer, and late fall. Closures result in increasing water levels in the Estuary behind the barrier beach and flooding of low-lying properties may occur. Natural breaching of the barrier beach occurs when Estuary surface levels exceed the height of the barrier beach and overtop it, creating an outlet channel that reconnects the Russian River to the Pacific Ocean. Historically, private citizens breached the barrier beach, enabling the river to flow into the ocean, in an effort to avoid flooding. The Sonoma County Public Works Department accepted responsibility for breaching in the 1950s, using heavy equipment to breach. In the mid-1990s, mechanically breaching the barrier beach became the Agency's responsibility.

The National Marine Fisheries Service (NMFS) issued the *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation District in the Russian River Watershed* (Russian River BO) on September 24, 2008.[1] NMFS' Russian River BO is a

[1] NMFS' Russian River BO may be accessed online at www.sonomacountywater.org and may be reviewed at SCWA's office at 404 Aviation Boulevard, Santa Rosa, CA.

\SPECIAL PROJECTS\RUSSIAN RIVER\7104-ESTUARY\PINNIPED MONITORINGPLAN-2009.mxd JUNE 18, 2009



RRIFR
Russian River Instream Flow and Restoration

Russian River Estuary

This Map is for general reference only.

Figure 1

culmination of more than a decade of consultation between the Agency, the U.S. Army Corps of Engineers (Corps), and the NMFS regarding the impact of the Agency's and Corps' water supply and flood control activities on three fish species listed under the federal Endangered Species Act: Central California Coast steelhead, Central California Coast coho salmon, and California Coastal Chinook salmon. The California Department of Fish and Game (CDFG) issued a consistency determination on November 9, 2009, finding that the Russian River BO was consistent with the requirements of the California Endangered Species Act (CESA) and adopted the measures identified in the BO.

NMFS concluded in the Russian River BO that the continued operations of Coyote Valley Dam and Warm Springs Dam by the U.S. Army Corps of Engineers and SCWA in a manner similar to recent historic practices, together with the Agency's stream channel maintenance activities and estuary management, are likely to jeopardize and adversely modify critical habitat for endangered coho salmon and threatened steelhead.

NMFS' Russian River BO found that artificially elevated inflows to the Russian River Estuary during the low flow season (May through October) and historic artificial breaching practices have significant, adverse effects on the Russian River's estuarine rearing habitat for juvenile salmonids, particularly steelhead. The historic method of artificial breaching, which is done in response to rising water levels behind the barrier beach[2], adversely affects the Estuary's water quality and depths by creating a tidal marine environment with shallow depths and high salinity. NMFS' Russian River BO concludes that the combination of high inflows and breaching practices impact rearing habitat because they interfere with natural processes that would otherwise cause a freshwater lagoon to form behind the barrier beach. According to NMFS, fresh or brackish water lagoons at the mouths of many streams in central and southern California often provide depths and water quality that are highly favorable to the survival of rearing salmon and steelhead.[3]

The Russian River BO requires the Agency to collaborate with NMFS and CDFG and to modify Estuary management in order to reduce marine influence (high salinity and tidal inflow) and promote a higher water level in the Estuary (formation of a fresh or brackish water lagoon[4]) from May 15 to October 15 (referred to hereafter as the "lagoon management period"). Conditions in a fresh or brackish water lagoon are thought to enhance the quality of rearing habitat for juvenile salmonids, particularly steelhead. A program of potential, incremental steps are prescribed to accomplish this, including adaptive management of a lagoon outlet channel on the barrier beach during the lagoon management period. The Agency would continue the historical practice of artificially breaching the barrier beach to prevent flooding outside of the lagoon management period.

Existing Estuary Management Practices

The Agency mechanically breaches the barrier beach when the water level in the Estuary is between 4.5 and 7 feet, as determined by the gauge at the Jenner Visitor's Center, in accordance with the *Russian River Estuary Study 1992–1993*, which specifies breaching the barrier beach when the Estuary water surface level is between 4.5 and 7.0 feet to prevent flooding of low-lying properties. Breaching occurred every year between 1996 and 2009, except 2006. Monthly breaching activities varied year to year; the majority of the breaching events occurred in the fall (October and November), spring (April, May and June) and the month of September. The lowest number of breaching events occurred in 2004 (1 event) and the highest number (13 attempted events with 11 successful breachings) occurred in 2009. Mechanical breaching typically consists of the following actions:

- 24 hours prior to breaching, the Agency contacts State Parks lifeguards and posts signs and barriers to minimize potential hazards to beach visitors.
- A bulldozer or similar equipment is offloaded at the parking lot at Goat Rock State Beach and driven onto the beach via an existing access point.

[2] For the purposes of this project, the term barrier beach is used to describe closed sandbar conditions, consistent with NMFS terminology.

[3] National Marine Fisheries Service. Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation District in the Russian River Watershed. p. 243. September 2008.

[4] A lagoon is formed when a barrier beach restricts tidal exchange in the Estuary.

- A "pilot channel" is cut at a depth below the lagoon water level that will allow river flows to carry sand into the ocean once the last portion of the barrier beach is removed. The size of the pilot channel varies, depending on the height of the barrier beach, the water level of the tide, and the water level in the estuary. A typical channel is approximately 100 feet long, 25 feet wide, and 6 feet deep. The amount of sand that is moved ranges from less than 100 cubic yards to approximately 1,000 cubic yards. The sand is placed onto the beach adjacent to the pilot channel.
- After the pilot channel is dug, the last upstream portion of the barrier beach is removed, allowing river water to flow into the ocean. The rapid outflow of river water carries sand into the ocean, which typically enlarges the pilot channel to between 50-and 100 feet in width within a day after breaching.

The channel is monitored and equipment is driven back to the existing access point and loaded for transport. Signage and barriers are removed, and the channel is periodically monitored by Agency staff.

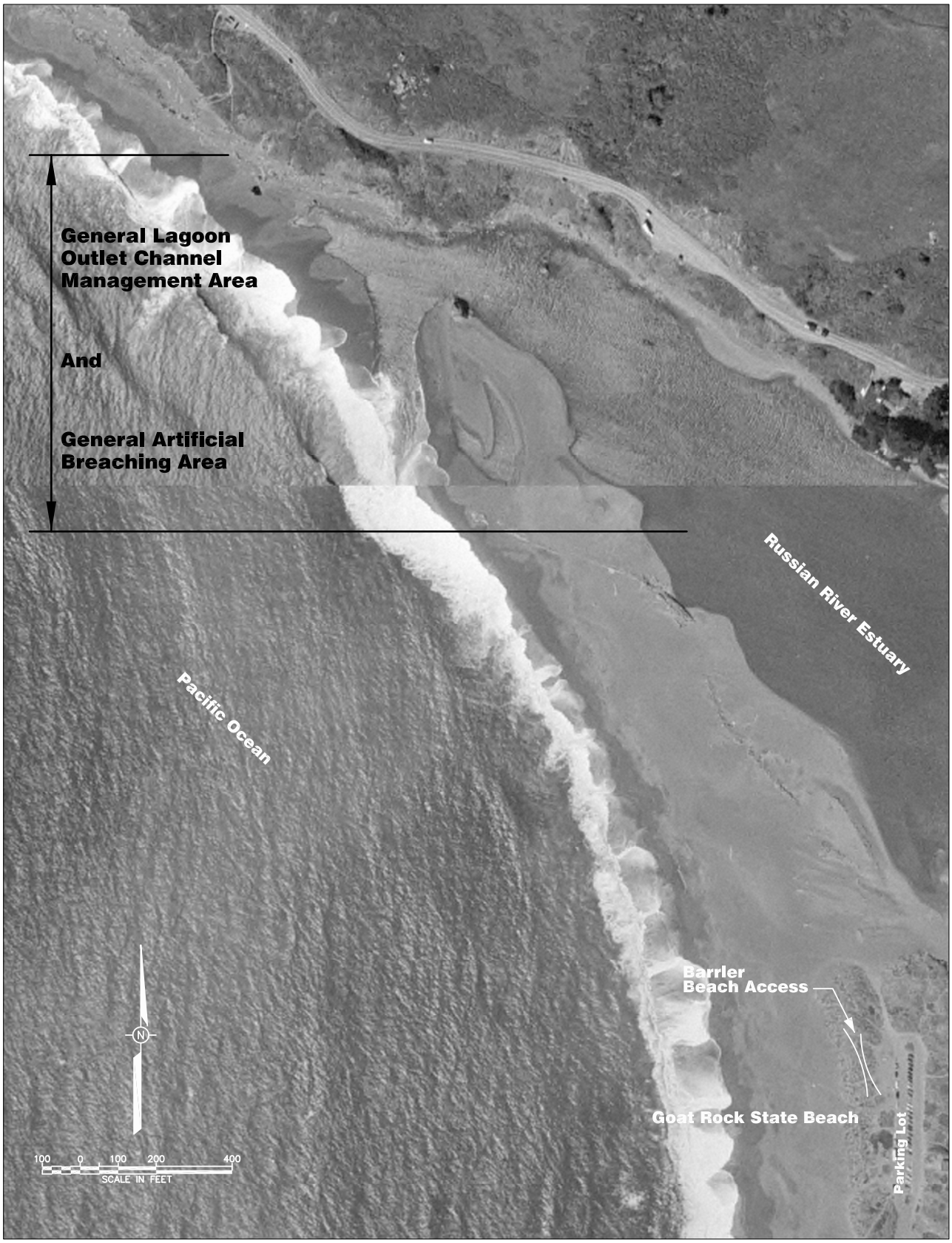
Proposed Russian River Estuary Management Project

In order to comply with the requirements of the NMFS' Russian River BO, the Agency will implement adaptive management of the Estuary with the dual objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing estuary water levels to minimize flood hazard. Rearing habitat may be enhanced by reducing tidal influence on the Russian River Estuary from May 15 to October 15 to increase freshwater habitat available for rearing salmon and steelhead. The Russian River Estuary Management Project proposes the following elements:

Continued Artificial Breaching. The Agency will continue the historical practice of artificially breaching the barrier beach outside the lagoon management period (May 15 to October 15), as allowed in the NMFS' Russian River BO and described in the *Russian River Estuary Study 1992–1993*, to minimize potential flooding of low-lying properties along the Russian River. Artificial breaching outside of the lagoon management period will be implemented consistent with current practices, as previously described.

Lagoon Adaptive Management and Lagoon Outlet Channel. To comply with conditions stipulated in the NMFS' Russian River BO, the Agency will pursue an alternative approach for management of estuarine water levels in the Estuary during the lagoon management period (May 15 to October 15), and will adaptively manage a lagoon outlet channel with the intent of achieving an average daily water surface elevation of at least 7 feet. Adaptive management requires active monitoring of biological productivity, water quality, and physical processes in the Estuary, and refinement of management actions to achieve desired water levels to support biological productivity, while simultaneously providing flood control for properties adjacent to the Estuary.

To create and maintain a shallow, "perched" lagoon with water levels between 4 and 9 feet, the Agency will excavate an outlet channel with a bed elevation low enough to allow outflow from the lagoon to pass over the barrier beach, but high enough to minimize the potential for closure caused by ocean waves. The outlet channel bed slope would be minimized to reduce the potential for unintentional breaching of the barrier beach. The channel would be located within the area that it has been observed to naturally occur, between the jetty and approximately 1,500 feet to the northwest (**Figure 2**). Channel length would vary based upon location, but would establish a slope gradient to provide for overflow while minimizing channel erosion. Various channel locations may be pursued in an effort to adapt other project variables, such as bed slope, bed elevation and channel width, and to take advantage of site features such as areas of reduced wave energy. Physical establishment of the outlet channel during the lagoon management period would be similar in terms of equipment and duration as artificial breaching. Project implementation would increase the duration of freshwater lagoon conditions during the lagoon management period (May 15 to October 15) to increase freshwater habitat available for rearing salmon and steelhead. In the event that the outlet channel erodes the barrier beach to re-establish a tidal inlet, the Agency would resume adaptive management of the outlet channel's width, slope, and alignment in consultation with the NMFS and CDFG after ocean wave action naturally reforms the barrier beach and closes the river's mouth.



\SPEICAL PROJECTS\RUSSIAN RIVER\7339 ACTIVITIES\ESTUARY-MANAGEMENT-ACTIVITIES.dwg MAY 5, 2010

Purpose: Russian River Estuary Management Project Datum: 1929 MSL	SONOMA COUNTY WATER AGENCY 404 Aviation Boulevard Santa Rosa, CA. 95403	In: Russian River At: Jenner County Of: Sonoma, CA. Application By: SCWA Figure 2

Issues to Be Addressed in the EIR

In accordance with CEQA, the Estuary Project EIR will address the potential environmental impacts associated with the Project. Specific areas of analysis may include: Aesthetics, Agricultural Resources, Air Quality, Biological/ Fisheries Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use, Mineral Resources, Noise, Public Services, Recreation, Energy, and Utilities, Aesthetics, and Recreation. Where feasible, mitigation measures will be proposed to avoid or reduce significant impacts. Additionally, potential cumulative impacts of the Estuary Project will be addressed in the EIR. Alternatives analysis will review the No Project Alternative and Estuary management alternatives identified in NMFS' Russian River Biological BO, including jetty modification and alternative flood mitigation strategies. The EIR analysis will consider input and comments received during the NOP review period. Decision-makers, responsible and trustee agencies under CEQA, property owners, and interested persons and parties will also have an opportunity to comment on the Draft EIR after it is published and circulated for public review.

Public Comment Period for this Notice of Preparation

Due to the time limits mandated by State law, responses must be sent at the earliest possible date, but not later than 45 days after receipt of this notice. The public comment period will close at 5:00 p.m. on June 21, 2010. Please include a name, address, and telephone number of a contact person in your agency for all future correspondence on this subject. Please send comments to:

Sonoma County Water Agency
Attn: Jessica Martini-Lamb, Principal Environmental Specialist
404 Aviation Boulevard
Santa Rosa, CA 95403
Comments may also be submitted electronically via email, estuaryproject@esassoc.com

Scoping Meeting

In order for the public and regulatory agencies to have an opportunity to ask questions and submit comments on the scope of the Estuary Project EIR, two scoping meetings will be held during the NOP review period. Comment forms will be supplied for those who wish to submit written comments at the scoping meeting and verbal comments will be recorded. Written comments may also be submitted anytime during the NOP review period, which closes on June 21, 2010. The scoping meetings will be held:

Wednesday May 19, 2010
Community Meeting, Summary of 2010 Estuary Activities: 6:30 p.m. – 7:30 p.m.
Open House Scoping Meeting: 7:30 p.m. – 9:00 p.m.
Jenner Community Center,
10398 Highway 1 Jenner CA 95450

Thursday May 20, 2010
6:30 p.m. – 8:30 p.m.
Sonoma County Permit and Resource Management Department Meeting Room
2550 Ventura Avenue
Santa Rosa, CA 95403

Documents or files related to the Russian River Estuary Management Project are available for review online at www.sonomacountywater.org, or at the Agency's office located at 404 Aviation Boulevard, Santa Rosa, California, 95403. If you have any questions, or if you wish to update information on our mailing list, please contact Jessica Martini-Lamb at (707) 547-1903.

APPENDIX 1.2
Scoping Report and Scoping Comments

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ESA

1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 phone
707.795.0902 fax

www.esassoc.com

memorandum

date July 12, 2010

to Sonoma County Water Agency Staff

from Environmental Science Associates

subject Scoping Report for the SCWA Russian River Estuary Management Project (Estuary Project)

This Scoping Report has been prepared to summarize the scoping process completed for the Sonoma County Water Agency (SCWA) Russian River Estuary Management Project (Estuary Project) Notice of Preparation for the Environmental Impact Report (EIR). It provides an overview of the scoping process completed in accordance with the California Environmental Quality Act (CEQA), as well as a summary of comments received during the scoping process.

1.0 CEQA Scoping Process

A Notice of Preparation (NOP) was prepared by SCWA in accordance with CEQA Guidelines Section 15082 to provide responsible and trustee agencies and the Office of Planning and Research with sufficient information describing the project and the potential environmental effects to enable agencies to make a meaningful response. The NOP was circulated on SCWA letterhead on May 7, 2010. The NOP identified SCWA as the CEQA Lead Agency, and established a 45-day public review period, which ended June 21, 2010.[1] The NOP includes a brief project description, including project location maps, and the probable environmental effects of the project. The purpose of the NOP public review period is to allow for review and comment by public agencies or interested members of the public on the scope of significant environmental issues to be analyzed, reasonable alternatives to be examined, and mitigation measures to be included in the Draft EIR. Response to Notice of Preparation, at a minimum, should identify: the significant environmental issues and reasonable alternatives and mitigation measures that the responsible or trustee agency, or the Office of Planning and Research, will need to have explored in the draft EIR[2]. The NOP was mailed to the State Clearinghouse, and was posted to the SCWA website. The NOP was directly mailed to 431 parties, and a postcard notification of the NOP's availability was sent to 1,231 parties[3].

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1 The public scoping period generally lasts for 30 days; SCWA determined 45 days was appropriate for this project.

2 A generalized list of concerns not related to the specific project does not meet the requirements of CEQA Guidelines Section 15082(b)(3) for a response.

3 The distribution list was developed based on the SCWA databases of regulatory agencies with jurisdiction, local organizations, business, and interest groups, and property owners based on parcels data. Hard copies of the NOP were mailed directly to federal, state, and local agencies with jurisdiction; members of organizations, business, and interest groups that requested a copy; and property owners with postal zip codes within Jenner, Duncans Mills, Monte Rio, Ville Grande, Rio Nido, Camp Meeker, Forestville, Occidental, Bodega Bay, and some in the Dry Creek area. Postcards were mailed to parties that have previously expressed interest in the RRIFR Program, including other local agencies, other interest groups and organizations, and a subset of Sonoma County residents and property owners (outside of the locations listed above).

Scoping has been found to be an effective way to bring together and resolve the concerns of affected federal, state, and local agencies, the proponent of the action, and other interested persons including those who might not be in accord with the action on environmental grounds (CEQA Guidelines Section15083). SCWA held publically noticed scoping meetings on May 19 and 20, 2010 at the locations identified below.

Wednesday May 19, 2010 Community Meeting, Summary of 2010 Estuary activities: 6:30 p.m. – 7:30 p.m. Open House Scoping Meeting: 7:30 p.m. – 9:00 p.m. Jenner Community Center, 10398 Highway 1 Jenner CA 95450	Thursday May 20, 2010 6:30 p.m. – 8:30 p.m. Sonoma County Permit and Resource Management Department Meeting Room 2550 Ventura Avenue Santa Rosa, CA 95403

During an additional scoping meeting (staff meeting) on June 15, 2010, the Water Agency requested participation from regulatory agencies with jurisdiction over the project area or resources during a scoping meeting to solicit their comments and input on the scope of the EIR. Invitees included members from National Marine Fisheries Service (NMFS), United States Army Corps of Engineers (USACE), California Department of Fish and Game (CDFG), California Department of Parks and Recreation (CA State Parks), North Coast Regional Water Quality Control Board, California Coastal Commission, and California State Lands Commission. The meeting was not attended by representatives from the latter two agencies. Scoping has been helpful to agencies in identifying the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in an EIR and in eliminating detailed study issues found not to be important.

2.0 Comment Summary

A total of 33 comment submittals (letters, emails, comment cards) were received. **Table 1** provides a summary of the written comments received during the public scoping process, including identification of the commenter, affiliation, date and comment format, and summary of comments provided. Please note that some of these verbal comments were received in question/answer format, and are provided to allow SCWA review of discussions at the scoping meetings. Collectively, a total of 38 individual verbal comments were received and noted below.

2.1 Major Issues Identified in Comments Received

An overview of the major issues and sub-issues identified during the NOP scoping period is provided below. The number of comments relating to each issue is provided in parentheses.

Project Description (21)

- Project description, outlet channel design, methods and techniques, water surface elevations, baseline conditions, geographic and temporal scope of project.

CEQA Process (31)

- Relationship between other RRIFR elements and EIR scoping process.

CEQA Technical Issues

- **Water Quality Impacts (30)**
  - Microconstituents; pollutant accumulation in lagoon; temperature, dissolved oxygen, salinity, and other parameters.
- **Biological Resources (31)**
  - Harbor seals, marine species, macroinvertebrate, other fish species; vegetation.

- **Fisheries (14)**
    - Habitat and effects on population.
- **Hydrology and Geology (8)**
    - Flows; Beach Sand formation; Sedimentation.
- **Recreation (24)**
    - Surfing and the Surfing Wave.
- **Climate Change (9)**
    - Sea level rise.
- **Cultural Resources (1)**
    - Early consultation, protocol for discovery of artifacts and remains.

Cumulative Impacts (1)

- Relationship to RRIFR Program.

Flood Risk (11)

- Impacts to properties.

Alternatives (26)

- Range of Alternatives; Level of Analysis.
- No Project Alternative, Jetty Modification, Raising Structures as a Flood Risk Alternative, Artificial Reef.
- Parameters, including costs, should be compared among alternatives.

Beyond the Scope of the Project (12)

- Temporary Urgency Change and Petition to change minimum flows under D1610.

2.2 Consideration of Comments Received

A primary purpose of this Scoping Report is to document the process of soliciting and identifying comments from interested agencies and the public. The Scoping Process provides the means by which SCWA and the responsible agencies can determine those issues that interested participants consider to be the principal areas for study and analysis. Significant environmental issues that have been raised during scoping will be addressed in the EIR[4]. The following discussion identifies the issues raised in scoping that will be addressed in the EIR and provides a brief explanation for those issues that will not be considered in the document.

Project Description or Process Clarifications

Comments regarding details in the Project Description, including project objectives, definition of geographic and spatial study areas, general history of the Russian River, the relationship between flows and river mouth closures, outlet channel design, target water elevations, breaching activities, methods, and procedures, project relevance to the RRIFR program, will be addressed in the EIR Introduction, Project Background, and Project Description Sections. The term “adaptive management” will be defined and related to the project in the project description.

Primary concerns related to the CEQA process related to: 1) the structure and format of the NOP scoping meetings and the method of recording formal scoping comments; and 2) the separation of the Estuary Project from other elements required under the Biological Opinion, including the Temporary Urgency Change and Petition to change minimum instream flows under Decision 1610. The relationship between the Estuary Project

[4] CEQA does not require direct response to each comment received during scoping; the comments must be considered and included in the environmental analysis, as appropriate.

and other elements of the Russian River Instream Flow and Restoration Project will be defined in the EIR Introduction, Project Background, and Project Description Sections.

CEQA Technical Issues

Biological Resources

Comments related to biological resources included concerns about impacts resulting from outlet channel creation and longer duration of the freshwater lagoon to harbor seals, macroinvertebrates, vegetation, marine birds, and other common species and their habitats. Of primary concern is the direct impact (harassment) at the harbor seal haulout, and the effect of a longer duration of the barrier beach. The EIR will address the potential impacts on plants and wildlife that may occur due to implementation of project or its alternatives. Specific attention will be placed on species protected by federal or state law or regulations. Analysis will include review of changes in water levels and conditions relating to increased duration of the freshwater lagoon. Mitigation will be identified and discussed, as appropriate. These measures will be developed in consultation with federal and state resource management agencies with regulatory authority over project implementation.

Water Quality

The EIR will review whether increased duration of a freshwater lagoon resulting from the outlet channel will have the potential to adversely affect water quality in the Russian River, its tributaries, and the Pacific Ocean with respect to wildlife, fisheries, and/ or human health. Analysis will also review water quality impacts related to salinity, temperature, dissolved oxygen, and nutrient loading.

Recreation

The EIR will discuss adverse effects on recreational activities, including but not limited to kayaking, surfing, fishing, and beach access, in the project area. The EIR will address potential impacts on California Parks and Recreational holdings in the Sonoma Coast area. The primary concern expressed during the scoping process was the potential impact to the surfing wave. Existing wave conditions and potentials changes resulting from the project, and the subsequent effect on surfing, will be described in the Land Use and Recreation Section of the EIR. If feasible, mitigation will be identified.

Climate Change

Several comments expressed concern that estuary management would be ineffective as a result of climate change and subsequent sea level rise. The EIR will include a discussion of climate change, based on best available science, as it relates to the long-term implementation of the Estuary Project.

Cumulative Impacts

For each resource category, the EIR will include analysis of cumulative effects of the project, in combination with other past, present, and reasonably foreseeable future projects affecting the same resources. Where applicable, this analysis will address other elements of the RRIFR Program relevant to each resource.

Range of Alternatives

The EIR will describe and discuss the direct and indirect environmental effects of implementing the proposed project and alternatives. The alternatives consist of a range of potential methods to achieve the project objectives, freshwater lagoon conditions for salmonid habitat while simultaneously maintaining flood control. Potential alternatives to be included in the EIR are derived from scenarios presented in the NMFS Biological Opinion, including the study of the jetty for removal and other flood control alternatives. The alternatives analysis will be

completed in accordance with CEQA and the “rule of reason”, which requires an EIR to describe a range of reasonable alternatives to the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR is not required to consider every conceivable alternative to a project; rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation. An EIR is not required to consider alternatives which are infeasible.

As part of the evaluation of alternatives, the EIR will address a No Project Alternative. The existing environmental conditions will be described as a baseline condition and will consider potential environmental effects of continuing current management practices and not implementing the proposed project.

3.0 Comments Beyond the Scope of the EIR

Comments related to cost-benefit, and socio-economic effects of the proposed project, flow changes under propose petitions to change D1610, SCWA water contracts, and applicability of methods for other areas like Salmon Creek, that are not directly related to physical environmental impact discussions within the environmental impact analysis will be addressed in the EIR to the extent required under CEQA. The EIR will not present conclusions of the management techniques of the Estuary Project’s applicability to other locations. The EIR will not address water sales, water contracts, or water rights. The EIR will not provide an analysis of public restroom facilities. The EIR will not independently review the sediment flux calculations provided by gravel mining firms.

TABLE 1
SUMMARYOF SCOPING COMMENTS

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
Written Scoping Comments (Letter, Email, Comment Card) Received During the Comment Period			
1	John Chyle	May 13, 2010; Email	• At what elevation is SCWA legally required to modify the beach to lower the lagoon?
			• Describe procedure [for modifying barrier beach and lowering lagoon].
			• Does a water level above 9 feet constitute an emergency condition which must be immediately corrected?
			• What exactly is meant by the term "adaptive management". It seems to imply that guidelines are not necessary, and if something gets out of line an adaptation will be made. However EIR should identify in advance what water quality parameters are, including biological and pharmaceutical products.
			• NOP makes no mention of flows, yet pollutant concentrations may have to be reduced by increasing releases of water.
2	Ken Sund	May 17, 2010; Email	• Requests clarification of methods for maintain 7' water level given that sand shifts daily depending on wind and tides.
			• Inquires about budget and how project could generate income for project directors, local seal watchers, laborers, and other contractors.
			• Opposed to a huge concrete spillway.
3	Steve Mack	May 17, 2010; Email	• Concerned that actions under the Biological Opinion are being done separately.
			• Questions how proposed reduction in flows from Petition to change D1610 and the Temporary Urgency Change Permit fit with the Estuary Project. Should the analysis for the petition to change D1610 be included in this EIR? Why are all SCWA actions related to the BO not evaluated under one CEQA Process?
			• Does initiation of the EIR mean that historic mechanical breaching will continue this summer (2010) until EIR is certified?
			• How does EIR relate to the Marine Mammal permit?
4	Paul and Kathleen Vitale, Property Owners	May 10, 2010; Email	• Concerned about property damage to Bridgehaven residence.
			• Concerned about Water Quality from a recreational kayaker's perspective, particularly with the growth of underwater grass between the Highway 1 bridge and Austin Creek.
			• Project understanding is that the Agency will create a permanent outlet channel to be located somewhere within 1,500 feet of the traditional mouth of the river; however there will be an additional 2 feet depth of the estuary before the outlet channel will become operational.

5 Comment letters are organized in chronological order of receipt. In some instances, a commenter submitted multiple comment letters, summarized separately. Written (hard copy, comment card, or electronic) are coded numerically; verbally comments are coded alphabetically to differentiate the type.

6 Comments were received electronically via the email account, estuaryproject@esassoc.com, hard copy to SCWA Administration Building, 404 Aviation Boulevard, Santa Rosa, California 95403, written comment cards at the scoping meetings, and verbally during the question and answer period at the scoping meeting. The format of the scoping meeting at the Jenner Community Center on May 19, 2010 included a "community meeting" session as well as a separate scoping session; however the public requested that the written questions provided during the community meeting be included in the record as scoping comments. These comments are designated as such.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
4 cont.	Vitale, cont.		• EIR should analyze potential impact of 9 foot water elevation on property.
			• Requests a copy of the Draft EIR.
5	Mike Desin and Cathy Gaidano, Property Owners	May 16, 2010; Email	• Concerned that the project will deny land use on property during recreational months of the year.
			• Concerned that structures (house and garage) may be flooded.
			• Questions what elevation the river will not be allowed to exceed.
			• Questions if any contingencies or back up plans exist to prevent life/ property damage due to flooding.
			• Concerned about compensation. Property is not within a federal flood zone and therefore is not eligible for flood insurance.
			• Concerned that the project creates a new flood zone and questions availability of funding to compensated project-induced flooding.
6	Dian Hardy, Founder, SealWatch Program	May 18, 2010 and June 21, 2010; Emails	• Project overlooks overall ecology at the mouth of the Russian River; focuses only on habitat for endangered salmonids and overlooks harbor seal haulout, resting and foraging site for migratory birds, and fishery for Dungeness crabs.
			• Recommends a holistic perspective to consider human impact on natural systems, i.e. Warm Springs Dam impact on native fishery and resulting population growth and agriculture, forestry, gravel mining, and residential and commercial development.
7	Karen Rasore, Resident	May 18, 2010; Email	• Concerned about effects associated with clearing the mouth at Jenner and using a bulldozer.
			• Recommends leaving the river alone and stop interfering with natural flow and cycle of the river.
			• Should not be the focus of the government to protect property owners over the flora and fauna of the estuary.
7	Ransore, cont.		• Concerned about construction equipment impact to seals.
8	David Jackson		• Questions if the outlet channel method could be applied at the Salmon Creek estuary to prevent storm flooding in dry years.
			• Indicates that understanding is that once the river overtops the sandbar, a channel forms and retained water is released, washing away excess sand, and that this is a “quick” event.
			• Requests explanation of how SCWA will develop the outlet channel, specifically how they will sculpt the sandbar to allow river overflow, while preventing ocean backflow.
9	William Beal, Resident	May 27, 2010; Email	• Project would eliminate sand discharge out into the ocean which could result in total loss of world-class surf spot at the River mouth. Force and direction of river determines the character of the sandbar. Short, weak flow results in a weak sandbar that lasts only a few days. Flow proposed under the project would not have enough sand output to be surfable.
			• Loss of gravel and sand output would affect surf spots (North Side Goat Rock, South Side Goat Rock, Blinds Beach and The Far Cove) south of the project area.
			• EIR should consider potential for increased beach erosion if sandbar is not breached regularly. Sand and gravel that normally collects south of the mouth near Goat Rock State Beach will not be present to prevent winter waves from destroying the road.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
9 cont.	Beal, cont.		• There is a need to develop a database with results of beach and sand depth monitoring to determine if sandbar closure and lack of sand and gravel is affecting other beaches.
			• There is a difference in biological species during open and closed beach conditions. Personal observations indicate more species (seals, birds, whales, sharks) present during open conditions; none during closed. EIR should consider loss of whale habitat, effects to seal colonies and subsequently feeding grounds for sharks if seals relocate, eagles.
			• EIR should address negative effects to ocean Water Quality from pollutants or toxics released to the ocean. Water Quality monitoring for human safety should be required. Concerned that prolonged closure will contribute to poor Water Quality conditions. SCWA needs a public warning system should the river reach a toxic level and notices of potential health hazards should be posted. Will SCWA monitor ocean Water Quality at mouth of river?
			• EIR should identify a worst case/ best case time frame for how long it will take to bring back salmonids to give the public an idea of the longevity.
			• Asserts that State and federal agencies should consider restitution for the surfing community for recreational loss by funding construction of an artificial reef. Artificial reefs provide beach erosion control, habitat, and tourism opportunities.
			• If Jetty removal is attempted, agencies should consider using the rocks to improve surfing conditions at Goat Rock, as a cheap and easy means of demolition disposal.
10	Don McEnhill, Russian Riverkeeper	June 4, 2010; email	• EIR should study the future need and feasibility of raising structures in response to sea-level rise and the benefits that could produce for summer estuary management.
10	McEnhill, cont.		• Project seems focused on short term, but should be evaluated with projected sea-level rise over a longer period to be more effective and more efficiently use funds to create a long-term solution.
			• Concerned that proposed solution will be wiped out by impacts associated with future sea level rise.
			• Proposed project and D1610 flow changes are linked and should not be separated under CEQA. Legal review in the future will demonstrate that the projects are linked. EIR should consider both to be part of the same project.
11	Josh Berry, Save the Waves Coalition	June 16, 2010; Email	• Responding to information provided by Sonoma County surfers regarding the project.
			• Proposed changes to artificial breaching methods and channel design will result in a negative impact to the quality of the surfing wave at the mouth of the river.
			• Surfing at the Russian River mouth is protected under the California Coastal Act.
			• Proposed project could destroy the surfing wave for significant amount of the year. This could have local recreational and economic impacts.
			• Draft EIR should consider impacts to the surfing wave and the public opinion of surfers.
			• Save the Waves Coalition intends to work with the Agency to protect surfing at the Russian River mouth and evolve the Russian River Low Flow Project and the related Estuary Project
12	Rick Baker	June 17, 2010; Email	• Expresses support for the project, which, if successful, has potential to increase estuarine habitat for endangered listed Coho salmon and steelhead.
			• SCWA should consider extending the upper estuary monitoring to include Austin Creek confluence to Highway 116 bridge.
			• EIR should prioritize the removal of the jetty located at the mouth of the estuary. Use the rock and other demolition debris to create additional habitat structures within the Estuary.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
12	Baker, cont.		• Restore the Open Space District properties in the Middle Reach/ Bridgehaven area and similar low lying areas to create flooded/ backchannel habitat. Monitor and consider additional adaptive management options to promote sustainable Benthic and Macro invertebrate habitat consistent with periodic inundated estuarine habitat.
			• EIR should address reprioritization of the elevation, relocation or removal of the private properties located in Jenner between the 8' 8.5' flood levels. If the adaptive management plan results are found to be positive while maintaining a proposed 7' flood level; consideration should be given to maintaining a higher estuarine water level to increase and sustain suitable estuary rearing habitat.
			• Proposed water flow decrease from upriver could have the potential to increase estuary water temperatures. Additional water depth may be needed to ensure that water temperatures remain below potential lethal levels. The end goal of the plan should be to cease mouth breaching operations entirely.
			• Reintroduce historic native estuary vegetation to the lower reach to further support and provide salmonid rearing and Benthic and Macro invertebrate habitat.
13	Barbara Yoder, Resident	June 20, 2010; Email	• Attended workshop in Guerneville and learned that endangered salmonids need a lagoon, which is out of human control, and that only a few properties would be flooded. If these properties were allowed to flood all would be happy.
			• Concerned about lack of public restrooms available along the river for day-trippers. Asserts permanent restrooms with running water should be installed as soon as possible to deter people from relieving themselves in the river.
			• Consequence of low flows is less dilution for pollutants. Water Quality will be a problem until restrooms are installed. Human waste will continue to contribute to high bacteria counts and ecoli, as discussed in the presentation. Recommends SCWA adopt the duty to install public restrooms along length of the Russian River.
			• EIR should asses impact of low flow on fish species, and extend scope beyond the 3 endangered species to things like blue gill, catfish, carp and bass, tree frogs, turtles.
			• EIR should address ludwigia and track colonization. Low flows have contributed to algal blooms.
			• Estuary management and low flows should be kept separate because there can be lagoon creation and high flow such that everything is in the best interest of the majority of species and higher flows allow for greater dilution.
14	Norma Jellison	June 21, 2010	• Concerned that scoping meeting format and means of collecting comments not conducive to purpose, gathering comments from public. Asserts flip charts to write down comments, post-its to add to exhibits are examples of standard methods of capturing written comments at scoping meetings.
			• Asserts major impact of proposed project will be an irreversible and irretrievable commitment of resources.
			• Estuary Project and flows cannot be separated. Discussing flow impacts in cumulative section is insufficient.
			• Attachments: 1. Jellison, Opinion Letter, "Biological Opinion and the Russian River Estuary". 2. Letter dated February 23, 2009 from Jellison to Grant Davis RE: Russian River Biological Opinion – Russian River Instream Flow & Restoration Report/Estuary Management. 3. Letter Dated May 10, 2010 from Jellison to Grant Davis RE: Notice of Petition Requesting Modification to Water Rights for SCWA. 4. Letter Dated June 20, 2010 from Jellison to Grant Davis RE: Petition for a Temporary Urgency Change

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
15	Brenda Adelman Russian River Watershed Protection Committee		• Attended Jenner Meeting (May 19, 2010). Asserts 100 people in attendance, first part of program was informational meeting on Temporary Urgency Change Petition, second part was scoping for Estuary Project. People came with questions they wanted to voice publicly. During community meeting presentations took time away from answering questions on cards. Audience wanted to hear other's questions and responses, but crowd was circulated to various stations to talk to different staff people.
			• At meeting, questioned method of recording comments and learned there was none. There are no rules commenter is aware of regarding how scoping should be conducted, but believes the point is early consultation to determine and avoid controversial issues. While cards were distributed for questions, there is a context in a meeting that does not occur on a card with a question on it. Feels that SCWA was going through motions and is not interested in addressing concerns of community.
			• Discrepancy between geographic scope identified in NOP (6 miles upstream) versus Biological Opinion (7 miles upstream).
			• EIR should address impacts to Monte Rio Beach when mouth is open or closed, occurrence of algae on beach with mouth is open. EIR should be in conformance with Basin Plan standards.
			• Geographic scope should include Monte Rio Beach
			• Concerned lagoon will become a sink for pollutants that bioaccumulate in biota and sediments and may create hazards to humans and fish.
			• Concerned that anoxic ("Dead") zone harbors pollutants.
			• Will there be any studies done to determine extent of pollution in Estuary, whether it is being reintroduced into the water column, and whether it is contaminating the fish.
			• Will anoxic layer affect macro invertebrate food sources of fish?
			• Concerned with bifurcation of estuary project and D1610. Quotes CEQA Section 15003 (h) that an EIR must consider the whole of an action, not its constituent parts. BO states the all eight modifications must be implemented as one RPA (BO, p 241). Quotes other portions of the BO that appear to demonstrate the there is a direct link to D1610 flow changes and the Estuary Project; thereby making it unacceptable to consider them in separate EIRs.
			• References Bill Hearn's article in the *Sonoma County Gazette*. References Item #12 in RRWPC comments to SCWA and SWRQCB on Petition to permanently change flows. Quotes Prunuske Chatam, et. al. assertion that BO objectives do not include natural flows or an increase in salmon and streelhead populations. BA does not provide a quantitative goal for habitat improvement. Are populations still declining, improving, or staying the same under D1610? Is the goal of "improving habitat sufficient to stabilize populations presently below historic numbers? Critical of why Estuary Management and D1610 changes are necessary.
			• EIR should address these questions and verify claims in Hearn's article.
			• Relationship between flows, mouth closings, habitat resources, fish abundance and health, need to be defined in EIR.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
15	Adelman, cont.		• Regarding Hearn's article: 1. The article refers to possible pre-dam river flows of 30 cubic feet per second (cfs), but is unclear about whether these flows occurred throughout the river system. The article fails to assign impacts from all the changes in land use that has occurred in the last 100 years, nor how going back to original flows, would impact the entire system. It is stated that Estuary rearing would help the survival of the species, but fail to mention that normal habitat in the tributaries has been decimated by legal and illegal water diversions, careless agricultural processes, timber harvesting, gravel mining, etc. Now they are left with fewer habitat options, and this scheme is an experiment and possibly a last ditch effort, to save species that may not have a chance otherwise. 2. Flows commonly ran 120 to 180 cfs, therefore "low flow" should be 70 to 85 cfs. No scientific data was provided anywhere demonstrating how the ideal of 70 cfs was arrived at. In fact, at the June 9th meeting in Guerneville, Dr. Hearn kept moving the goal post by first saying that flows would actually be about 85 cfs, and then he said 90 cfs., and then 100-110 cfs. Since the only formal change in the Petition is 70 cfs., there is no regulatory meaning to the other suggested flows.
			• Attachments submitted to SCWA with the Permanent Change Petition to D1610 comments included a chart of the mouth closures (#7). In looking at the chart, it is clear that the trend in the last ten years or so has been for the mouth to remain open most of the time in July and August no matter what the flow. I believe that there were few closures in 2009 between June and September, although summer flows averaged as low as 63 cfs in August.
			• 2002 was a low flow year and the mouth was open most of the time until Oct. 1st, but for two very brief closures in May and June. 2003 was open through September. 2004 was open until October, but for three brief openings in April, May, July/August. 2005 was open all year until mid-September. 2006 was open all year until late October. 2007 was open all summer (May through September) until mid-October. 2008 was closed much of May, but had only two closures for about a week each during June through September. These statistics seem to dispute the NOP claim that frequently the mouth closes in the summer time, at least in the last ten years. We wonder if the barrier beach would be constructed if the first mouth opening comes in September?
			• Asserts Hearn's article proves argument that there is a link between Estuary Project and decreased flows and therefore CEQA and NEPA documents on these two projects should be merged.
			• Asserts need to flood control is central reason of D1610 petition. To imply that summer flows are to high and are harming fish is misleading, since true immediate concern is to control flooding to a limited number of properties.
			• A report has been prepared showing properties that may be subject to inundation at various levels. Further study needs to be conducted because many of the properties listed only flood at 10-12', many are undeveloped. Lifting a few structures would reduce Water Quality problems.
			• No Coho returned last year in spite of tributary work. CDFG explanation was poor ocean conditions. Questions if acidification contributed. EIR should address Water Quality in ocean.
			• What studies have been completed to understand ocean conditions that govern when the mouth opens and closes?
			• What role does climate change play in long term management?
			• Attachments: 1. Dr. Bill Hearn, National Marine Fisheries Service, "Why Change Summer Flows in the Russian River", *Sonoma County Gazette*. 2. Russian River Watershed Protection Committee 2009 Photo Project, Brenda Adelman.
			• Incorporates by reference comments and attachments concerning the Petition for the Permanent Change to D1610 submitted to the State and SCWA on May 13, 2010.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
16	Larry Hanson, Northern California River Watch	June 21, 2010; Email	• Scientific conclusion of Biological Opinion has been compromised by not adhering to scientific principles and subjecting to political decisions. NOAA's determination should not be influenced by flooding effects to low-lying houses and septic systems.
			• Estuary BO is kept as a separate analysis from the low flow BO, but the first is dependent on the latter and should be analyzed together
			• Conclusion that lower flows were historic and should be implemented is based on streambed and hydrology than no longer exists for River. Even in lower flow summers, plenty of water for fish. Questions drastic reduction of flows
			• Artificial breaching needs to stop altogether. BO reduces the amount, but not enough.
			• Recommends removal of barrier at the mouth to allow a more free flow of sand movement to naturalize the system. Along with this could be a slight reduction of flow which would be monitored closely. Diagonal trench could be a next step, if necessary. Last step would be dealing with the houses and septic systems by raising or removing.
17	Don McEnhill, Russian Riverkeeper	June 21, 2010; Email	• Estuary Project should be reviewed in conjunction with the Petition to Modify D1610. It is quite appropriate to undergo separate environmental reviews for this Project and the Petition, but cumulatively must be considered together.
			• EIR should address potential effect on marine organisms that currently utilize the estuary when the estuary is maintained as a closed lagoon.
			• EIR should address the effect on Dungeness crab and other marine species that have been documented by seine netting by SCWA staff.
			• EIR should address the effect of the jetty on percolation rates and ability to control the estuary water levels when the mouth is closed. Could jetty removal increase percolation through the sandbar and increase optimization of water levels? What effect does the jetty have on sandbar mechanics and height and shape? Historic review of photographs of jetty shows that jetty appears to create depositional area for sand on the estuary side of the sandbar. Does jetty increase sandbar height and water effects does this have on estuary management goals?
			• Artificial breaching is required to avoid flooding of a few low lying structures, including Sonoma Coast State Parks Visitor Center and Jenner Post Office. Could estuary management be improved by raising these structures to a higher elevation? Per the BO, managing 8 foot elevation should be studied. If potential biological benefits to operating the estuary at a higher elevation would create deeper pools and higher forage opportunity, consider feasibility and funding the elevation of structure. What are potential sources of funding to raise structures?
			• EIR should review all west coast estuaries and alternative should be added that considers an always-open estuary.
			• In reference to one of the BO objectives, how will the project conserve beach sands? Project should examine the composition and origin of the materials that makes up the beach sand at the river mouth. Understanding is that sand is comprised of material washed down from River, so EIR should examine and understand sediment budget. Concerned that gravel-mining firms take more than just "recharge" and that models to determine sediment flux are run separately for sand and gravel, so EIR should independently review the sediment flux calculations provided by the gravel mining firms to ensure gravel mining will not impact sediment supply to the sandbar.
			• Project should include area of backup resulting from sandbar closure upstream to Northwood/ Bohemian Grove swimming hole.
			• Understands that juvenile steelhead need to undergo acclimatization of salt water and that fish undergo physiological changes to allow them to survive in salt water. If freshwater condition is achieved, then suddenly breached in October (per the BO recommendation that the lagoon be breached after October 15 since juvenile steelhead should be large enough to withstand salt water conditions)will those juveniles be able to withstand abrupt change from fresh to salt water?

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
17	McEnhill, cont.		• Concerned about proposals for Water Quality monitoring. Changing to a closed system could decrease flow and circulation and allow pollutants to accumulate. Past monitoring was limited and focused on periods before and after breach events. Little reliable and comparable data exists for ambient Water Quality or nutrients.
			• Separating the Estuary Project from the Petition to modify D1610 would violate CEQA. Both should be covered in one big EIREIR should fully examine impacts to Water Quality from changes in inflows and propose mitigation.
			• Water Quality issues must be studied for all marine and freshwater organisms that have used or will use the estuary and not just for salmon and steelhead.
			• EIR should consider impact of sea level rise on estuary management, especially Water Quality. Condition project proposes may not be attainable in future.
			• Global warming is changing Water Quality and acidification in ocean. What effect will this have on salmonid food sources in estuary?
			• Would Water Quality conditions the project seeks be possible under new conditions posed by global warming and sea level rise?
18	Sonoma Coast Surfrider	June 21, 2010; Email	• EIR should address deterioration of Water Quality in the estuary, river mouth, and surf area including possible additional pollution from nutrients, regulated and emerging toxins, bacteria, temperature, invasive species, and algae with proposed lower flows and modified breaching practices.
			• No baseline data provided for above mentioned toxins. No existing evidence that lowering flows will be safe for humans or the environment.
			• Lack of comprehensive testing of Water Quality at river mouth and ocean environment in EIR. Public not notified of exact list of toxins that will be tested and all locations testing will be completed.
			• No alternative plan provided should harmful Water Quality impacts from low flow be discovered in the interval.
			• Inadequate data and consideration of diversion on summer water flows. Water contractors have been told water deliveries would be normal this year even with lower flows.
			• No consideration in EIR of impact of lower flow on surfing at the river mouth as well as surfing areas south of the river including North Side Goat Rock, South Goat, Blind Beach, and the Far Cove. These premier Sonoma County surf recreation areas depend greatly on the influx of new sand and gravel. The combination of modifying breaching practices and lower flows will remove the possibility of surfing these areas.
			• No consideration in EIR of beach erosion and subsequent beach access from reduced sand and gravel outflows.
			• Failure to include negative impact on other species such as marine mammals, water fowl, and sea birds due to new proposed estuary management practices and construction of outlet channel in EIR.
			• The Surfing Community of Sonoma County requests that the impact on the wave and Water Quality in the ocean environment be considered in the EIR
19	Carol Vellutini	June 21, 2010; Email and Hard Copy Letter	• Objects to meeting format at the PRMD, Santa Rosa location (May 20). Audience wanted to hear what everyone had to say. Stations did not work because people did not circulate to the right stations.
			• Unclear how cumulative human impacts are affecting flow in 2010. Relationship between flow, mouth closings, and habitat resources need to be fully defined.
			• How will climate change affect the interface of the tributaries, river, and ocean?
			• Requests more historical data on the mouth closures and flow of the river.
			• Why are the natural flows on the lower river being assigned at one point 30 cfs and then the flow north of Healdsburg assigned 125 cfs? Where is the science behind this amount? Entire system should be taken into account.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
19	Vellutini, cont.		• Photos of historic north and south migration of the mouth of the river should be included. Railroad has an impact at the mouth.
			• Other rivers have closed mouths in the summer and are not manipulated artificially.
			• Has seen a report that shows properties may be subject to inundation at various levels. How many actual buildings would flood as opposed to bare land? Is that when the water level is 10' to 12'? EIR should research artificially subjecting the entire river to minimum flows for a few structures.
20	Charles Armor, California Department of Fish and Game, Bay Delta Region	June 21, 2010; Email	• EIR should include a robust analysis and review of the alternatives to adaptive management identified in the Russian River Biological Opinion, including the No Project Alternative, modification or removal of the jetty, and development of alternative flood mitigation strategies that would allow breaching naturally at higher water surface elevations than allowed with current flood control practices. Resulting impacts on beach, fish and wildlife (including marine mammals and fisheries) for each alternative should be fully addressed.
			• A list of structures, with ownership, value, and location, should be provided to assess flood risk as a result of implementation of the project alternatives.
			• These structures and the ability to maintain flood control during the anticipated rise in sea level caused by climate change should also be addressed.
			• Each alternative should review project impacts and their effects on the CDFG's Recovery Strategy for the California Coho Salmon (2004). Project undertaken in the Estuary has potential impact on the success of the Recovery Strategy and DFG's ability to manage the recovery efforts. Alternatives should be reviewed with the best interest of Coho salmon and other anadromous species in mind.
			• Recommends analysis assess the effects of long-term and short-term management of Estuary as a freshwater lagoon on Water Quality. Analysis should consider dissolved oxygen, pH, temperature, salinity, bacteria, pesticides, metals, wastewater constituents. Also consider project effects on invasive species abundance, and food productivity for listed species.
			• EIR should contain a complete description and map of the vegetation communities, wildlife, habitats, creeks, wetlands, and other important habitat features on and around the project area which would be affects by the projector the alternatives.
			• Acreage of vegetation communities should be described.
			• EIR should discuss significant impacts to habitats.
			• Assessment should include the reasonably foreseeable direct and indirect changes (temporary and permanent) that may occur with implementation of the project.
			• EIR should comply with DFG recommended survey and monitoring protocols and guidelines.
			• Lake and Streambed Alteration Agreement may be required. EIR should fully identify potential impacts to stream or riparian resources and provide adequate avoidance mitigation, monitoring, and reporting requirements to support completion of the agreement.
21	Brian Hines on behalf of Rick Baker, Trout Unlimited		• Expresses support for the project, which, if successful, has potential to increase estuarine habitat for endangered listed Coho salmon and steelhead.
			• SCWA should consider extending the upper estuary monitoring to include Austin Creek confluence to Highway 116 bridge.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
21 cont.	Hines, cont.		• EIR should prioritize the removal of the jetty located at the mouth of the estuary. Use the rock and other demolition debris to create additional habitat structures within the Estuary.
			• Restore the Open Space District properties in the Middle Reach/ Bridgehaven area and similar low lying areas to create flooded/ backchannel habitat. Monitor and consider additional adaptive management options to promote sustainable Benthic and Macro invertebrate habitat consistent with periodic inundated estuarine habitat.
			• EIR should address reprioritization of the elevation, relocation or removal of the private properties located in Jenner between the 8' 8.5' flood levels. If the adaptive management plan results are found to be positive while maintaining a proposed 7' flood level; consideration should be given to maintaining a higher estuarine water level to increase and sustain suitable estuary rearing habitat.
			• Proposed water flow decrease from upriver could have the potential to increase estuary water temperatures. Additional water depth may be needed to ensure that water temperatures remain below potential lethal levels. The end goal of the plan should be to cease mouth breaching operations entirely.
			• Reintroduce historic native estuary vegetation to the lower reach to further support and provide salmonid rearing and Benthic and Macro invertebrate habitat.
			• We would also be interested in seeing an accounting of the cost to breach the estuary as it seems to be an unusual subsidy in these lean Sonoma County budget times. The subsidy benefits only a few property owners that have chosen to build in the recognized flood plain. Funding is available for the elevation of structures on the Russian River as has been done in many locations upstream.
22	Josh Berry, Save the Waves Coalition	June 21, 2010; Email letter	• Concerned that changes to artificial breaching, as well as relocation of the breach and design of the breach channel to a location farther north of the historic breach location, will negatively impact quality of surfing waves at the mouth of the river for at least 4 months out of the year.
			• Concerned because this naturally occurring recreational opportunity is already limited on the California Coast, especially Sonoma Coast.
			• Cites California Coastal Act Section 30213 regarding protection of low cost visitor and recreational facilities.
			• Cites California Coastal Act Section 30220 regarding protection of coastal areas for water-oriented recreational activities.
			• EIR must clearly and directly address concerns of local surfers who would lose a limited recreational resource is project is executed as designed.
			• Local surfers expressed to Save the Waves that their concerns and interests were not addressed by SCWA nor the public comment and meeting process.
23	Dick Butler, National Marine Fisheries Service	June 22, 2010; Mailed letter	• During scoping meetings, it was unclear to what extent the Estuary Project EIR will address the effects of summer stream flow changes that will support the Estuary Project's goal of maintaining a closed estuary (lagoon) during summer months.
			• EIR should consider the effects of flow changes associated with interim flow changes (associated with TUC petitions) and use information to address effects of these interim changes on the environment and resources such as recreational boating
			• EIR should include effects to salmonids and salmonid habitat.
			• EIR should include effects to pinnipeds and their habitat.
			• EIR should address effects to commercial, recreational, and other aquatic species and their habitat.
			• BO analyzed impacts to salmon and steelhead and their habitat; however EIR should include new data gathered by SCWA in the two years since, including water quality, biological, and geophysical data.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
23 cont.	Butler, cont.		• Russian River flows can be low and warm during late summer/ early fall and allowing adult salmon access to the estuary and lower Russian River may expose fish to poor water quality and increase predation risk. EIR should evaluate potential effects to passage of adult and smolt Chinook salmon, coho salmon, and steelhead through the estuary.
			• EIR should update the analysis conducted for the IHA application with any new information recently obtained. EIR should not focus only on construction-related impacts, but should also analyze how the estuary project impacts pinniped habitat use, migration patterns, and food availability within the Russian River Estuary.
			• Essential Fish Habitat (EFH) consultation conducted as an addendum to the BO, and concluded that the estuary project adversely effects Pacific salmon EFH, Pacific Groundfish EFH, and Coastal Pelagic EFH. Direct effects to migration, spawning, and rearing of these species should be detailed and updated as appropriate. EIR should expand analysis beyond species considered under Magnuson-Stevens Act and evaluate other species (i.e. Dungeness crab)
24	Katy Sanchez, Native American Heritage Commission	May 18, 2010; Mailed letter	• Contact the appropriate regional archaeological Information Center for a records search to determine if APE has been previously surveyed, if any known resources have already been recorded, the probability to encounter a resources, and whether a survey is necessary to determine if previously unrecorded cultural resources are present.
			• Contact Native American Heritage Commission for: 1) Sacred Lands File Check (USGS 7.5 minute quadrangle, township, range, and section required; 2) List of appropriate Native American Contacts (list attached).
			• Lack of surface evidence does not preclude their subsurface existence. Lead agencies should include in their mitigation plan provisions: 1) to the identification and evaluation of accidentally discovered archaeological resources [CEQA Section 15064.5(f)]; 2) for the disposition of recovered artifacts in consultation with affiliated Native Americans; and 3) for discovery of human remains [Health and Safety Code Section 7050.5, CEQA Section 15064.5(e), and Public Resource Code Section 5097.98].
Jenner Community Meeting and Scoping Meeting- May 19, 2010			
25	Geff Smith (sp)	Community Meeting - Written Comment	• Historically, summer flows were high enough to maintain open mouth conditions naturally and fish populations were high.
			• Reduced flows have increased siltation, algal blooms, and river warming
			• Concerned project is driven by water sales.
26	Darrel Sukovitzen (sp)	Community Meeting - Written Comment	• Draft EIR should consider cumulative effects of fungicide spray that drifts from vineyard production.
			• Questions why permits have been obtained for seal harassment without a management plan/ EIR in place.
			• Questions why the contract with Stewards [of the Redwoods] is not open to public review.
			• Concerned that there is no mechanism to prevent equipment from disturbing seals; contract with Stewards indicates a letter can be written to SCWA and SCWA will write a letter to NOAA.
			• Questions why SCWA/ Stewards contract only calls for seal counts twice per month.
			• Concerned that permit allows SCWA to harass seals within one week of pupping when seals require up to one month to take care of themselves

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
A	Sukovitzen, cont.	Community Meeting - Verbal Comment	• Concerned that comments will not be formally recorded in the Open House meeting format and that SCWA will not included them in the administrative record.
			• Requests Community Meeting comments be included as part of CEQA administrative record.
27	Not Given	Community Meeting - Written Comment	• Questions what information already exists on level of disturbance seals can tolerate, and why would any harassment occur.
			• Asserts SCWA should avoid adding impacts to species that are already challenged.
28	Not Given	Community Meeting - Written Comment	• EIR should consider jetty removal as an alternative that would minimize harassment to seals cause by outlet channel creation.
			• Adaptive management, with jetty removal, could be done through winter releases at the dam.
29	Dr. Donald Coetes (sp)	Community Meeting - Written Comment	• EIR should define "flooding" because it sounds like the natural water level is now defined as flooding.
			• EIR should provide clarification of the proposed design for the outlet channel.
30	Victoria Wikle	Community Meeting - Written Comment	• EIR should define the boundary of the estuary and if it will change [as a result of estuary management].
			• EIR should consider other ways to allow excess water to leave the estuary other than a spillway.
30	Wikle, cont.	Scoping Meeting - Written Comment	• EIR should address need for monitoring of the river between the Hacienda Bridge and the estuary for Water Quality and fish habitat.
31	Jordan West	Community Meeting - Written Comment	• EIR should address impacts to surfing and the resulting effect on the local community.
31	West, cont.	Scoping Meeting - Written Comment	• EIR should address impacts to the surfing community.
			• Requests contact during EIR process.
B	West, cont.	Scoping Meeting - Verbal Comment	• EIR should include alternatives, such as artificial reef construction, that would allow a closed sandbar condition while maintaining surfing opportunities.
32	Cynthia Urbina	Scoping Meeting - Written Comment	• EIR should address impacts on pelicans on Penny Island, which would be submerged as a result of the proposed project.
32	Urbina, cont.		• SEIR should consider impacts, if any, to migratory birds.
C	Brenda Adelman, Water Advisory Committee	Community Meeting - Verbal Comment	• Project does not consider flows.
D	Not Given	Community Meeting - Verbal Comment	• Questions how project will affect Russian River flows, if at all, and water levels upstream.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
D cont.	Not Given,		• How far upstream will effects of project extend?
			• EIR should address how petition reduced flows under revised D1610 would fit in with the estuary plan.
			• Questions if analysis for permanent changes to D1610 should be included in the Estuary Project EIR, or vice versa.
			• Questions why all of SCWA's actions to carry out the BO are not analyzed in one CEQA Process.
E cont.	Not Given	Community Meeting - Verbal Comment	• Requests EIR include a precise water level at which breaching is triggered.
F	Not Given	Community Meeting - Verbal Comment	• Requests EIR clarification of how water level will be kept at 7 feet.
G	Not Given	Community Meeting - Verbal Comment	• EIR should address alternatives in case outlet channel does not work.
H	Not Given	Community Meeting - Verbal Comment	• Asserts the need to know in advance what Water Quality parameters will be (for both biological and Water Quality).
I	Not Given	Community Meeting - Verbal Comment	• Questions what type of studies or analyses will be conducted during summer estuary activities.
J	Not Given	Community Meeting - Verbal Comment	• [In response to questions about impacts to seals] Asserts that seals leave once sandbar closes anyways.
K	Not Given	Community Meeting - Verbal Comment	• Questions how SCWA can separate the [RRIFR] elements when they are inseparable.
L	Not Given	Community Meeting - Verbal Comment	• Questions how SCWA determined that one week is the appropriate neo-natal bonding time frame for seal pups.
M	Not Given	Community Meeting - Verbal Comment	• EIR should establish limits for assessing impacts, i.e. for Water Quality
N	Not Given	Community Meeting - Verbal Comment	• Project accommodates additional water contracts with cities.
O	Not Given	Community Meeting - Verbal Comment	• EIR must establish baseline for water depth and flow.
P	Not Given	Community Meeting - Verbal Comment	• Requests clarification because NOP says goal is to "manage flows to minimize flood risk" but the range of summer flows under the BO is only 70-85 cfs, so how will the EIR look at flows?
Q	Not Given	Community Meeting - Verbal Comment	• Asserts Temporary Urgency Change petition only asks for lower flows in the lower part of the river, solely for estuary management.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
R	Not Given	Community Meeting - Verbal Comment	• EIR should address elevating structures as an alternative.
S	Not Given	Verbal Comment	• EIR mitigation measures tend to do only the minimum to avoid a significant impact under CEQA and a desire to see this EIR put forward more robust and realistic mitigation measures for salmon and pinniped protection.
T	Not Given	Verbal Comment	• Request that it be made clearer that the estuary management action is just one of a suite of improvements being undertaken by SCWA for fisheries. The commenter said it wasn't clear from this meeting that other enhancements are also being pursued (spawning habitat enhancements, flows, etc, further up the watershed). • The commenter stated that this may help public perception if they realize that estuary management is not the sole action proposed for salmon enhancements.
U	Not Given	Verbal Comment	• Request that EIR consider how the estuary management proposal will impact Coho migration timing (juvs and adults) as well as marine species such as Dungeness.
Santa Rosa PRMD Scoping Meeting - May 20, 2010			
V	Not Given	Verbal Comment	• Comment responds to other discussions that estuary management would provide a food source for harbor seals. Asserts that that the seals use the estuary to hunt salmon and that leaving the area may effect this relationship. It was discussed that stomach content analyses showed little salmon in seal diet, but commenter stated that seals only eat the stomach out of salmon, and this would not show up in the stomach analysis and would skew the data.
W	Not Given	Verbal Comment	• Flooding: Tax dollars are regularly used to manage the estuary in order to protect the few homes near the water, should they really be there?
X	Not Given	Verbal Comment	• Backwater and river flows meet at the top of the estuary catching floating debris. If water levels are raised the debris will move farther upstream, potentially adversely affecting a different set of riverfront land owners.
Y	Not Given	Verbal Comment	• EIR should address impacts to fish habitat resulting from backflows into Austin Creek.
Z	Not Given	Verbal Comment	• EIR should include alternatives such as those identified in the NOAA Coho Recovery Plan (i.e. elevating structures).
AA	Not Given	Verbal Comment	• EIR should clarify location of the proposed outlet channel. Does it go south to Goat Rock?
BB	Not Given	Verbal Comment	• EIR should include occurrence and effects of seepage of river water through the sandbar
CC	Not Given	Verbal Comment	• EIR should clarify if this type (duration) of closure could occur naturally.
DD	Not Given	Verbal Comment	• EIR should include a historic account of natural river conditions and operations, beginning with the system in the early 1900s, to catalog major milestones, including but not limited to the Potter Valley Project, (1909), Lake Pillsbury on the Eel River and the resulting (1922), and inhabitation on Penny Island, to develop an understanding of natural and human-influenced conditions.
EE	Not Given	Verbal Comment	• EIR should analyze potential increase in nutrient levels in estuary.
FF	Not Given	Verbal Comment	• EIR should address the cost to taxpayers to breach the sandbar for the benefit of nine properties.
GG	Not Given	Verbal Comment	• Questions if estuary water levels have reached or exceeded target conditions, especially during high winter flows when it is unsafe to get machinery onto beach.
HH	Not Given	Verbal Comment	• EIR should address potential compensation for property owners/ agricultural grazing operations that would be affected by higher water elevations.
II	Not Given	Verbal Comment	• Questions whether current artificial breaching process would constitute a "take" already.
JJ	Not Given	Verbal Comment	• Questions if breaching will occur this season.
KK	Not Given	Verbal Comment	• EIR should address potential impacts of waiting for the estuary to naturally breach (i.e. what if it did not breach until December--what would effect be on species that rely on closed conditions at that time, like Chinook salmon.

Comment Letter No.[5]	Commenter, Affiliation	Correspondence Dated/ Method Received[6]	Comments
LL	Not Given	Verbal Comment	• EIR should address effects of freshwater lagoon on predation of salmonids by harbor seals. Asserts that this plan favors the seals by providing food source.

Ann DuBay

From: John Chyle [jchyle@sonic.net]
Sent: Thursday, May 13, 2010 1:48 PM
To: Ann DuBay
Cc: Ken Wikle
Subject: Jenner Community Meeting

Ann DuBay, I am concerned with the following : 1 Mention is made that you want to have a lagoon elevation of at least 7.0 ft. MSL and to keep it within a range of 4.0 to 9.0 ft. My question is, at what elevation will you be legally required to modify the barrier beach to lower the lagoon? Please describe this procedure. Am I to understand that above 9.0 ft. constitutes an emergency condition which must be immediately corrected? 2. " Adaptive Management" requires, among other items, monitoring of water quality, as per your Notice. Just what is meant here? Adaptive management is a neat concept. It seems to imply that guide lines are not necessary(or even known) and that if something gets out of line then an adaptation will be made. This isn't good enough. We must know in advance what the water quality parameters are and they must be included in documents before signing. Certainly, this would include biological and pharmaceutical products. It is not sufficient for us to rely on the agency when limits have not been set. 3. No mention of water flow has appeared to me in the "Notice of Preparation". Yet, concentrations of pollutants may have to be reduced by increasing releases of water. This ties in with my second point,ie, water quality.

Ann DuBay

From: victorsund@comcast.net
Sent: Monday, May 17, 2010 9:45 PM
To: Ann DuBay
Subject: Jenner questions

Ann-
If you are in charge of the communications for SCWA and other agencies I'm sure you will end up knowing a lot about this project, people who stand to gain from it and people who oppose it..
I'm sceptical. By what methods will the water level be kept at the 7' or so that is a target height. The sands shift every day at the mouth depending on wind and tides. I know that if there's money in the budget, it will get spent because that means income for project directors, local seal watchers, laborers and other contractors. I would organize opposition against a huge concrete spillway. There. I've shown my hand. That's part of what this invitation for questions is about.
No anonymity, Ken Sund says this.
..

Ann DuBay

From: Steve Mack [smack@sweetwatersprings.com]
Sent: Monday, May 17, 2010 4:21 PM
To: Ann DuBay
Subject: Questions for May 19 Jenner meeting

Ann, SCWA is involved in several actions related to the Russian River Biological Opinion now, but they appear to be being done separately. Specifically, there's this EIR on the Estuary Management Plan, there's the SCWA Petition to change Decision 1610 which should lead to another EIR, and there's the Temporary Urgency Change (TUC) Petition for this summer and for which there is another public meeting next week (but we don't get a public meeting on the D1610 Petition!). How will the Estuary Management Plan affect Russian River flows (if at all) and Russian River water levels and how far upstream? And how will the proposed reduction in Russian River flows from the Petition to change D1610 and the TUC fit with the Estuary Management Plan? What other relationships should we be aware of? Should the analysis for the Petition to change D1610 be included in this EIR (or vice versa)? Why aren't all SCWA actions related to carrying out the BO evaluated in one CEQA process?

Does initiation of this EIR mean that the historic mechanical breaching will continue this summer until the EIR is certified (which likely won't happen until this summer is well over)? How does this EIR relate to the Marine Mammal permit that I understood was issued this winter/spring?

Specifically related to this summer in the estuary, what kind of studies/analyses will be going on this summer? Where can we find results/updates on what's happening with the studies? How long will these studies continue?

Just a few of the questions regarding these projects – I'm sure others will have more.

Thanks for asking,

Steve Mack
General Manager
Sweetwater Springs Water District
(707) 869-4000

E-mail message checked by Spyware Doctor (7.0.0.514)
Database version: 6.15010
http://www.pctools.com/spyware-doctor-antivirus/

Katie Blank

From: paul vitale [paulvitale@earthlink.net]
Sent: Monday, May 10, 2010 12:28 PM
To: estuaryproject
Cc: Vitale Kathleen
Subject: Russian River Estuary Project

Categories: Green Category

Dear Ms Martini-Lamb:
We have a cabin located on the Russian River at 29011 Willow Creek, Jenner (also known as Bridgehaven). This property has been in continuous use by our family since the 1920s. It is located approximately one mile from the mouth of the River and would most likely classified as one of the flood prone "low-lying properties along the Russian River". When time and the body permit, we are enthusiastic kayakers. We know that water quality is a key problem for the river, particularly with the advancing growth of underwater grass between the Highway One bridge and Austin Creek.

While we support county and state efforts to maintain and upgrade the conditions of the river, particularly the estuary, we have concerns about the proposed outlet channel being proposed.

If I understand the proposed estuary project, artificial breaching will continue to be practiced (May 15-October 15) as needed to prevent flooding of low-lying properties (i.e., when the estuary exceeds 7 feet at the visitor center). In addition, an Agency will create a permanent outlet channel to be located somewhere within 1,500 feet of the traditional mouth of the river. However, there appears to be an additional 2 feet to the depth of the estuary before the outlet channel will become operational. If I understand the estuary program, I would like to determine the impact of a potential 9 feet estuary will have on my property. Thank you for your consideration of this question. I would also appreciate receiving a copy of the draft EIR when it is made available for public comment.

Paul Vitale, AICP
1530 Tuolumne St
Vallejo, CA 94590
707-643-7765

Katie Blank

From: Mike Desin [mdesin@westliveoak.net]
Sent: Sunday, May 16, 2010 11:02 AM
To: estuaryproject
Cc: Cathy Gaidano
Subject: Estuary Project

Categories: Green Category

Dear Ms. Martini-Lamb,

We are property owners in Jenner whose property boundary extends into the river. We have concerns that the Estuary Project will deny us land use on our property during the recreational months of the year.

Additionally, we have structures (our house and garage) that could be flooded. At what elevation will the river not be allowed to exceed? Are there any contingencies or back up plans to prevent life/property damage due to flooding?

As you know, we are not in a federal flood zone, and as such cannot secure flood insurance. Since this plan potentially creates a new flood zone, what funds are available to compensate for a man caused flood?

I wish I could bring our concerns up at the meeting, but due to the short notice we are unable to attend.

Regards,

Mike Desin
Cathy Gaidano
11052 Burke Ave.
P.O. Box 49
Jenner, CA 95450-0049
415-389-1996

Katie Blank

From: Dian Hardy [themis300@yahoo.com]
Sent: Tuesday, May 18, 2010 6:41 AM
To: estuaryproject
Cc: Dian Hardy
Subject: Change in estuary management
Attachments: Letter re change in estuary management.wps

Categories: Green Category

DIAN HARDY

11757 Mondo Way

Guerneville, CA 95446

707.869.9455

themis y om

When we try to pick anything out by itself, we find it hitched to everything else in the universe.
- John Muir

Here we go again, folks. What I'm learning to call the Humpty-Dumpty School of Resource Management is in full spate; in order to save three endangered salmonid runs, agencies - federal, state and county - appear willing to overlook the totality of the ecology found at the mouth of the Russian: the harbor seal haulout, a resting and foraging site for migratory birds and a fishery that includes Dungeness crabs, amongst other species.

I do not understand this almost willful failure of agencies to carry forward an ecological perspective as called for, one would assume, in the enabling language for the Endangered Species Act. If such a vision is not part of the ESA, I submit that we need a Department of the Ecology, capable of seeing the forest AND the trees, the ocean AND the river, the seals AND the salmon and lest any of my two-legged comrades despair of me completely, the people who reside and recreate at the coast, river and ocean.

A holistic perspective would consider the human impact on our planet's natural systems of primary concern. In the present case, Warm Springs Dam had a huge impact on the native fishery, essentially destroying it and replacing it with a mechanistic model. The dam allowed enormous population growth in Sonoma County and the resulting inputs from agriculture, forestry, gravel mining and residential and commercial development further decimated the salmon. Native American gathering lands and a way of life that was sustainable fell to the dam's construction.

I say it's time we start demanding that agencies responsible for policy decisions make them based on a holistic understanding of what an ecosystem is. I remember one winter when a series of storm washed out the road to

Goat Rock and the hundreds and hundreds of birds and seals who gathered there for weeks, unmolested by even our curiosity, benevolent though it may be.

Let your county supervisors, SCWA, Fish and Game and your federal representatives know your concerns that a new perspective is needed.

Dian Hardy

Founder, Sealwatch Program

Katie Blank

From: Katie Blank on behalf of estuaryproject
Sent: Monday, June 21, 2010 1:31 PM
To: 'Dian Hardy'
Subject: RE: Response to NOP

Good Afternoon Ms. Hardy:

Thank you for your participation in the scoping process. We appreciate your comments and will consider them during preparation of the Russian River Estuary Project EIR. Please note this email as confirmation that SCWA and ESA have received your scoping comments via email (both the submittal on 5/18/10 and 6/21/10). Please let me know if you have any additional questions or concerns during the environmental review process.

Regards,

Katie Blank
ESA | Water
1425 N. McDowell Boulevard, Suite 200
Petaluma, CA 94954
707.795-0900 | 707.795-0902 fax
707.795-0950 direct | 858.335-2295 cell
kblank@esassoc.com

From: Dian Hardy [mailto:themis300@yahoo.com]
Sent: Monday, June 21, 2010 4:46 AM
To: estuaryproject
Cc: Dian Hardy
Subject: Response to NOP

Good People:

Please let me know this has been received.

Dian

Response to Notice of Preparation (NOP) for the Environmental Impact Report on the Russian River Estuary Management Project

I will not attempt to make specific responses to specific statements made in this draft document. My *metier* is that of a generalist, a threat to the status quo, a visionary. The technicians have made certain claims for which I have no interest or expertise in refuting. Instead, I will send my letter (below), the letter I was driven to write after attending an early meeting at the Jenner boathouse where the plan to change the management of the estuary was first brought to my notice.

&&&&&&&&&&&

Here we go again, folks. What I'm learning to call the Humpty-Dumpty School of Resource Management is in full spate; in order to save three endangered salmonid runs, agencies - federal, state and county - appear willing to overlook the totality of the ecology found at the mouth of the Russian: the harbor seal haulout, a resting and foraging site for migratory birds and a fishery that includes Dungeness crabs, amongst other species.

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I say it's time we start demanding that agencies responsible for policy decisions make them based on a holistic understanding of what an ecosystem is. I remember one winter when a series of storm washed out the road to Goat Rock and the hundreds and hundreds of birds and seals who gathered there for weeks, unmolested by even our curiosity, benevolent though it may be.

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-John Muir

Dian Hardy
Founder, Sealwatch Program

Katie Blank

From: Rasore [rasore@sbcglobal.net]
Sent: Tuesday, May 18, 2010 7:30 AM
To: estuaryproject
Subject: Jenner estuary

Categories: Green Category

I live in Villa Grande and have seen the effects of clearing the mouth at Jenner. The river seems much more healthy when you leave it alone. I am so passionately opposed to bulldozing the estuary that I don't quite know where to start. We need to stop interfering with the natural flow and cycle of the river. The practice seems destructive and invasive, at best. It should not be the focus of government to protect property owners over the flora and fauna of the estuary. People are restricted from walking out to the mouth when seals are present and yet I have seen many pictures of huge bulldozers moshing right over the beach. Go away, leave things be and go focus on something more important. Spend our money more prudently lest you invoke more anger than you already have. Sincerely, Karen Rasore

Katie Blank

From: David Jackson [kc6ssf@earthlink.net]
Sent: Tuesday, May 18, 2010 1:28 PM
To: estuaryproject
Cc: ann.dubay@scwa.ca.gov
Subject: SCWA Press release - Russian River sandbar management

Categories: Green Category

"Jenner, CA – The Sonoma County Water Agency (SCWA) will hold two meetings on Wednesday, May 19 at the Jenner Community Center to discuss proposed changes to the Russian River estuary. A third meeting will be held in Santa Rosa on Thursday, May 20."

"Since the mid-1990s, SCWA has artificially breached the sandbar when it closes in the summer and water levels in the estuary threaten low-lying properties. In the future when the sandbar closes, the Biological Opinion calls for SCWA to sculpt the sandbar to allow river water to flow over the top (to prevent flooding) but keep ocean water from entering. The freshwater lagoon that will be created is intended to provide an enhanced environment for young steelhead."

Please explain how this is done. My experience is that once the river overtops the sandbar, a channel is formed and the retained water is released, washing away additional sand. This is usually a "quick" event!

Can this be applied at the Salmon Creek estuary, just preventing storm flooding in dry years?

Thanks: David Jackson
(240 Bean Ave.)
1451 Keiser Ave.

David Jackson
Santa Rosa, CA

Katie Blank

From: William Beal [billywillgo@gmail.com]
Sent: Friday, May 28, 2010 4:26 PM
To: estuaryproject
Subject: estuary Project
Attachments: Letter to SCWA.doc

Categories: Green Category

TO: Sonoma County Water Agency
404 Aviation Boulevard Santa Rosa, CA 95403
Attn: Jessica Martini-Lamb, Principal Environmental Specialist

From: William Beal
POBOX 514
Bodega Bay Ca.
94923
E-Mail = billywillgo@gmail.com
Date: May, 28th 2010

I would like to submit my questions and concerns about the Russian River Estuary Project. I have attached a word document and I hope that will work.
If not I'm going to also add my list to this e-mail. Could I please request a return e-mail so I know that my list of questions was received and directed to
the proper people related to this project.

Thank you,
William Beal

Some points that I would like to be considered.

Point #1 River Surfing Area

The Russian River Mouth is one of Sonoma County best surf areas. I would like to first explain to any non-surfers the dynamics of the spot so that they will understand how this plan will result in the TOTAL loss of this world-class surfing spot.

* This area only becomes a surf spot when the river pushes sand out into the ocean to form a sand bar. IF THE RIVER DOES NOT PUSH SAND OUT INTO THE OCEAN THERE IS NO SURF SPOT!

*When the river pushes through the sand berm and creates a sand bar in the ocean the life of that sand bar is determined by the force and direction of the flow of the river. If it is a short weak flow with a bad flow direction the result is a short weak sand bar that only last a few days. If the flow is of the type proposed and a channel is created the resulting flow will NOT have enough sand output to help in creating a surf-able sand bar.

Point #2 Other Surfing Areas

This plan to stop the river from breaking through the sand berm will not only completely remove the possibility of surfing in the river area but the resulting loss of sand/river gravel input into the ocean will I believe adversely effect other surfing spots to the south of the river outflow area. These beach's to the south all rely on this sand to help in the formation of surf-able sand bars. I base this statement on 25 years of observing the resulting good surf year after a large out flow season and the resulting bad surf year following a low or infrequent outflow season.

* Please consider the negative effects on 4 more surfing areas south of the river known as North Side Goat Rock, South Side Goat Rock, Blinds Beach and The Far Cove. These spot depend greatly on the influx of new sand and gravel. The sand that is pushed into the ocean by the sand bar breach and the rocks and river gravel that are pushed out with the river water are carried mostly south by the prevailing waves and currents where they gathers to create ideal ocean bottom condition for surfing.

*Please consider that the before mentioned surfing spot known as North Side Goat Rock is also one of Sonoma Counties premier surfing areas. This spots quality depends solely on the changing bottom conditions and because this spot is just south of the river area I believe it will be greatly affected by this change in the natural cycle.

Point #3 Beach Erosion

I believe there is also a possibility of increased beach erosion due to the loss of sand and river gravel that has historically been part of this shifting coastal eco system. Those familiar with Goat Rock State Beach will know that the entrance road to the lower south side parking area is under constant threat from ocean erosion and has already in the last few years been scaled back from a two lane road to a one lane road due to wave damage and erosion.

A1.2-29

* Please consider that if the sandbar is not breached regularly the sand rocks and gravel that are missing from this ocean system will not be flowing south from the river and collecting in this already threatened area. There will be a possibility that when the larger surf of winter arrives the beach will not be large enough in size to stop the waves from destroying this road and potentially other unknown areas.

* Please consider monitoring the beach conditions and sand depths during this project. I see a need to build a database that will allow someone in the future to determine if the lack of sand and river gravel flowing into the ocean is adversely affecting the beaches to the north and south?

Point #5 Other Species

I would like the potential negative impact on other species habitat to be considered. Over the years I have observed this area hundreds of times in the "Flowing River" stage, and in the "Closed River" stage, and I have found the difference (with regards to wildlife) between the two to be drastic. When the river is open and flowing there are seals, hawks, osprey, eagles, ducks, pelicans, otters, whales and sharks along with the fish. The place becomes a wonderful spectacle of all types of animals when the river is open. When the river is closed most of these animals are gone and the place is almost completely void of (visible) life.

* Please consider the loss of whale habitat. I have seen whales not 50 yards from the beach just outside the flowing river. I have heard it said that they come in close to rub on the bottom where the river has pushed out

coarse gravel and river rocks. If there is no flow out into the ocean these types of ocean bottom conditions will be effected and this whale stop-over could be adversely effected.

* Please consider the seal colony. I have observed, and I'm sure data would confirm, that the seal colony is all but gone when the river is closed. Although there may be a small number of seals willing to brave the long beach crossing after the river closes, the large numbers of 30 or 40 seals that are there with an open river drops to one or two. There is no doubt that this local seal population will be adversely effected if the river was to be closed for 5 months. They have NEVER had to live with that possibility, and a closed river for 5 months is statistically an unnatural condition. I see no way to see this potential impact as anything but drastic and long lasting.

* Please consider the Great White Shark. This winter a large number of surfers witnessed a great white shark attempting to feed on a seal not 25 yards off the beach. River mouths are known great white shark feeding areas and this feeding area could be adversely affected if the river remained closed and the seal colony relocated.

* Please consider the loss of habitat for the many birds of prey that feed in this area. This year was a banner year for Golden Eagles and Bald Eagle fishing near the river mouth and their presence has been noticed here for more then 30 years. These great birds are just a few of the many birds of prey using this area to feed while the river is open. There is no doubt that all these birds would be negatively effected by the potential long term lost of this food resource.

Point#6 Ocean Users Danger

I would like the possibility of an adverse impact on people and the environment from the river water flowing into the ocean to be considered.

*Some attention should be given to the possible negative effects on the ocean environment if any pollutants or toxic levels of water were to be released into the ocean. I feel that some type of monitoring system should be implemented for the sole purpose of keeping the discharged water at a safe level for humans and the ocean environment regardless of fish habitat. Attention with the understanding that people surf directly in the path of the out-flowing water as it flows out to sea, for long periods of time, sometimes for many consecutive days.

* Does the SCWA have an ocean users warning plan if the river should reach a toxic level while flowing into the sea? Just say the river became closed for 2 or 3 months without any outflow. And despite any monitoring the water became hazardous to humans, would there be some type of public notification posted for recreational ocean users to the north and south when the water began to flow into the ocean? In many other places some county agency will post signs on the beach notifying beach goers to the hazardous ocean conditions and also place on-line and in print warnings for the public to see.

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There should be a worse case best-case time frame giving to the public for this project.

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* Sonoma County residents who are being affected by this project should be giving an acceptable time frame for when this project will be reviewed. Residents should be able to have an idea of how long this may go on.

* All information that will be used to decide if this project is working should be made public now so that the numbers and information can be studied and compared to data as it is taken and when the project is reviewed.

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If this salmon habitat project is at some point found to work, and the loss of Sonoma Counties premier surfing resource becomes a long-term project then I feel the state or federal agencies should consider giving restitution to the surfing community for their loss by funding an artificial reef project here in Sonoma County. There are a few places along our coast that could benefit from the many positives that go along with artificial reef projects.

Look at this website for info - http://www.asrltd.com/our_solutions/multi_purpose_reefs/

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Name: William Beal
Address: POBOX 514 Bodega Bay CA. 94923
Date: 5/29/10

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A1.2-31

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Scoping Comment Letter 9
Attachment

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Katie Blank

From: Katie Blank
Sent: Monday, June 07, 2010 9:03 AM
To: estuaryproject
Subject: FW: Returned mail: see transcript for details --Estuary EIR e-mail link??

Katie Blank
ESA | Water
1425 N. McDowell Boulevard, Suite 200
Petaluma, CA 94954
707.795-0900 | 707.795-0902 fax
707.795-0950 direct | 858.335-2295 cell
kblank@esassoc.com

From: Jessica Martini Lamb [mailto:Jessica.Martini.Lamb@scwa.ca.gov]
Sent: Friday, June 04, 2010 4:01 PM
To: Katie Blank; Jim O'Toole
Subject: FW: Returned mail: see transcript for details --Estuary EIR e-mail link??

Is there a problem with the email for estuary nop comments?

Jessica Martini- Lamb

Sent from my Windows Mobile phone

From: Don McEnhill <rrkeeper@sonic.net>
Sent: Friday, June 04, 2010 :14 PM
To: Jessica Martini Lamb <Jessica.Martini.Lamb@scwa.ca.gov>
Subject: Fwd: Returned mail: see transcript for details --Estuary EIR e-mail link??

Hi Jessica,

Just got a bounce from e-mail listed in Scoping notice....tried suffix @esaassoc.com assuming you were using ESA and that bounced too!
Thanks,
Don

Begin forwarded message:

From: Mail Delivery Subsystem <MAILER-DAEMON@a.mail.sonic.net>
Date: June 4, 2010 1:10:42 PM PDT
To: <rrkeeper@sonic.net>
Subject: Returned mail: see transcript for details

The original message was received at Fri, 4 Jun 2010 13:10:40 -0700
from 76-191-197-202.dsl.dynamic.sonic.net [76.191.197.202]

----- The following addresses had permanent fatal errors -----
<estuaryproiect@esassoc.com>
(reason: 550 No such user (estuaryproiect@esassoc.com))

----- Transcript of session follows -----
... while talking to exchange.esassoc.com.:

DATA

<<< 550 No such user (estuaryproiect@esassoc.com)
550 5.1.1 <estuaryproiect@esassoc.com>... User unknown
<<< 503 Bad sequence of commands
Reporting-MTA: dns; a.mail.sonic.net
Received-From-MTA: DNS; 76-191-197-202.dsl.dynamic.sonic.net
Arrival-Date: Fri, 4 Jun 2010 13:10:40 -0700

Final-Recipient: RFC822; estuaryproiect@esassoc.com
Action: failed
Status: 5.1.1
Remote-MTA: DNS; exchange.esassoc.com
Diagnostic-Code: SMTP; 550 No such user (estuaryproiect@esassoc.com)
Last-Attempt-Date: Fri, 4 Jun 2010 13:10:41 -0700

From: Don McEnhill <rrkeeper@sonic.net>
Date: June 4, 2010 1:10:40 PM PDT
To: estuaryproiect@esassoc.com, Jessica Martini Lamb <Jessica.Martini.Lamb@scwa.ca.gov>
Subject: Estuary Management EIR scoping comment

A1.2-33

Jessica & ESA,

I intend to submit more extensive scoping comments by the June 21st deadline but just in case I am not able to I would like to submit the following today.

The projected sea level rise by 2040 is 39 inches along our coastline. High tides, storms, high upstream flows and other events will ultimately drive that level higher during those events. Inevitably property damage will occur at some point in the foreseeable future due to flooding from sea level rise combined with the events mentioned above. The EIR should study the future need and feasibility of raising the few low-lying structures in the RR Estuary in response to sea level rise and what benefits that could produce for summer estuary management.
The project focus seems to be short-term but any estuary management efforts should be evaluated with projected sea level rise over a longer period to be more effective and more efficiently use scarce funds and resources to create longer term solutions. We are concerned that any solutions today will be wiped out by sea level rise in the future.
We also comment that separating this estuary EIR process from the D1610 modification and any flow modifications on the Russian River will face obstacles under CEQA as they are integrally linked and numerous court cases support this contention. It is clear from the RR Biological Opinion that flows and estuary management are inexorably linked and any legal review in the future will likely confirm this fact. We strongly urge you to consider the Estuary EIR and any future EIR on D1610 or flows to be part of the same project.

Sincerely,
Don McEnhill

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Don McEnhill
Executive Director & Riverkeeper
Russian Riverkeeper
PO Box 1335
Healdsburg, CA 95448
707-433-1958
fx: 707-433-1989
rrkeeper@sonic.net
www.russianriverkeeper.org

Russian Riverkeeper works with the community to advocate, educate, and uphold our environmental laws to ensure the protection and restoration of the Russian River for the health and benefit of all who use and enjoy it.

Become a member today at www.russianriverkeeper.org!

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Become a member today at www.russianriverkeeper.org!

Katie Blank

From: Josh Berry [josh@savethewaves.org]
Sent: Wednesday, June 16, 2010 4:48 PM
To: estuaryproject
Subject: Russian River Estuary Project

Follow Up Flag: Follow up
Flag Status: Completed

Categories: Green Category

Sonoma County Water Agency
Attn: Jessica Martini-Lamb, Principal Environmental Specialist
404 Aviation Boulevard
Santa Rosa, CA 95403

Dear Jessica Martini-Lamb,

Sonoma County surfers recently informed our organization about the proposed Russian River Estuary Management Project (Estuary Project).
Due to this project's proposed changes to the way the river mouth at the Pacific Ocean is artificially breached, as well as the change of location of the breach and the design of the breach channel, local residents are very concerned that the Estuary Project will have a negative impact on the quality of the surfing wave at the mouth of the Russian River, effectively destroying the surfing there for a significant amount of time each year.

The Russian Rivermouth is a well-known, occasionally fantastic surf spot and is legally protected under the California Coastal Act. Local surfers and residents who rely on surfing visits for economic and recreational value cannot afford to lose this natural wonder. Has the Sonoma County Water Agency considered the effects to the surfing wave, and the public opinion of surfers, in its EIR for this project?

Save The Waves Coalition is a nonprofit organization dedicated to protecting and preserving the coastal environment, with an emphasis on the surf zone, and educating the public about its value. We hope to work with you to guarantee the protection of the surf spot at Russian River mouth while also evolving the Russian River Low Flow Project and its related Estuary Project. Feel free to write back with any questions or comments concerning this issue.

Thank you,
Josh

Josh Berry
Environmental Director
Save The Waves Coalition
http://www.savethewaves.org
josh@savethewaves.org
831.426.6169 office
415.578.8388 mobile

Katie Blank

From: Rick Baker [RickBaker@sonic.net]
Sent: Thursday, June 17, 2010 4:03 PM
To: estuaryproject
Subject: Estuary Plan Comment
Attachments: 100617 Estuary Plan Comment.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Attached, please find comments for you consideration regarding the Sonoma County Water Agencies Russian River Estuary Management Project.

Regards,
Rick

Rick Baker, Assoc. AIA
Designer/Construction Drafting
127 Alderbrook / Santa Rosa, CA 95405
v. 707/545-8860
m.707/889-7541

June 17, 2010,

Sonoma County Water Agency
Attn: Jessica Martini-Lamb, Principal Environmental Specialist
404 Aviation Boulevard
Santa Rosa, CA 95403

RE: Draft Environmental Impact Report for the Russian River Estuary Management Project (Estuary Project)

I am writing to you to express my support for the Sonoma County Water Agencies 2010 Estuary Project. If successful, the proposed Project has the potential to increase Russian River estuarine habitat for ESA listed Coho salmon and Steelhead.

While conducting the project, I would like the Sonoma County Water Agency to take into consideration the following comments for various aspects of its Project.

- Extend the Upper Estuary monitoring to include the Austin Creek confluence to the Hwy 116 Bridge. Review of the SCWA's '*Russian River Fish and Macro-Invertebrate Study, 2003-2005*' illustrates that a large portion of the salmonid and steelhead sample distribution is found within the Upper Estuary/Cassini reach. Past in-stream habitat improvements of lower Austin Creek have created rearing and migration opportunities which the Estuary Adaptive Management Plan may enhance. Expanded and continual monitoring of this area is vital in verifying that it can remain suitable migration and rearing habitat for Austin Creek Salmonid and Steelhead within this reach.
- Re-prioritize the removal of the jetty located at the mouth of the estuary. Use the rock and other appropriate demolition debris to create additional habitat structures within the Estuary.
- Restore the Open Space District properties in the Middle Reach/Bridgehaven area and similar low lying areas to create flooded/backchannel habitat. Monitor and consider additional adaptive management options to promote sustainable Benthic and Macro invertebrate habitat consistent with periodic inundated estuarine habitat.
- Re-prioritize the elevation, re-location or removal of the private properties located in Jenner between the 8'-8.5' flood levels. If the adaptive management plan results are found to be positive while maintaining a proposed 7' flood level; consideration should be given to maintaining a higher estuarine water level to increase and sustain suitable estuary rearing habitat. Proposed water flow decrease from upriver could have the potential to increase estuary water temperatures. Additional water depth may be needed to ensure that water temperatures remain below potential lethal levels. The end goal of the plan should be to cease mouth breaching operations entirely.
- Re-introduce historic native estuary vegetation to the lower reach to further support and provide salmonid rearing and Benthic and Macro invertebrate habitat.

Scoping Comment Letter 12 (cont.)

I appreciate the opportunity to present to you my thoughts regarding the Draft Environmental Impact Report for the Russian River Estuary Management Project. Feel free to contact me if you have any questions or would like to discuss these items in depth.

Regards,
Rick Baker, Assoc. AIA
Ph: 707-545-8860
Email: RickBaker@sonic.net

Katie Blank

From: Barbara Yoder [Barbara.Yoder@comcast.net]
Sent: Sunday, June 20, 2010 1:58 AM
To: estuaryproject
Subject: Low Flow Consequences for Fish and Humans

Follow Up Flag: Follow up
Flag Status: Completed

As a citizen who attended the Sonoma County Water Agency workshop in Guerneville this week, I can say that I learned that the thing that the endangered salmon species need is a lagoon, that creating a lagoon is pretty much out of human control because it depends in substantial part upon ocean wave action to create the sand bar at Jenner, that there are apparently just a few houses flooded in Jenner and that if these houses were simply allowed to flood then all would be happy (the salmon—at least when mother nature generates a sand bar to close the mouth of the river-- and the humans and fish that live in the remainder of the river because there is more dilution of the pesticides, chemicals, and fecal matter that is coming down the river).

What I was not able to raise because of time was my observation that there are not enough public bathrooms for boaters to use on the river between Healdsburg and Guerneville. We need rest rooms, accessible to the day trippers, preferably every ¼ mile of river, but certainly not more than 1 mile between pit stops. We need to provide a map and guide to all river day trippers that shows them where they can go to the bathroom. If we do not have sufficient restrooms, then the Sonoma County Water Agency ought to install them for the public's use. The bathrooms need to be within easy walking of the river, and there need to be signs posted on the river that tell people how near the next restroom is and how to get to it.

The consequence of low flow is that there is less dilution of the pollutants. As I talk with people who are coming down the river about where they should go to the bathroom, I am surprised at the number of people that think going in the river is OK. It is my believe that it is better to squat at the side of the river in the dirt than to relieve oneself in the river. Presuming that it is not at all advisable to go in the river, then we need to do a couple things: first and foremost, assess the number of public restrooms, determine where more are needed, install them as soon as possible with running water and until such time, service port a potties, provide information to canoeists, kayakers, and day trippers about where the toilets are, sign-post them along the river, and generally allow people to do the right thing. I think that if we did these things we would find that most people do not prefer to go in the river or relieve themselves in the bushes.

We as river users will continue to have poor quality water until we accept the fact that a person cannot spend 5 hours on a river trip and not go to the bathroom. Removing human waste from the river and river banks would definitely help the river quality. Until we solve that problem, then having low-flow will continue to lead to Ecoli and other high bacteria counts, as reported at the meeting. I recommend that the Sonoma County Water Agency adopt the duty to install a sufficient number of public toilets along the length of the Russian River. A direct consequence of low-flow is higher concentration of contaminants. Urine can't be good for the river, can it? Fecal matter is particularly bad, I believe.

My second recommendation is that we conduct our assessment of the impact of low flow on all species of fish and wild life (not to mention human life); we should immediately expand our scope beyond the endangered species 3 (all salmon, I believe). I see fewer blue gill, cat fish, carp and bass, tree frogs, turtles, and otters than in the past, and I'm sure that others could add to the list of fish, amphibians, and animals that seem to have diminished in number. For sure, Fish and Game should be collecting data on number and size of all species of fish (not simply salmon) that they are capturing in their nets and video.

Finally, little mention was made of the Ludwigia and algae blooms. I have been trying to clear my bend of the river of Ludwigia for the past 10 years and I can say that it's pretty clean (but other parts of the river have huge blooms). While the Ludwigia has been a problem for some time, it seems to be growing exponentially and it might be good to track the

amount of invasion as part of the environmental assessment. What seemed particularly new with the low flow this past year was the lime green algae blooms that got so large (at least in the Hilton and Highcroft Beach area where I reside). I took to raking the stuff out of the river because it really was taking over just at the water's edge. I asked the Sonoma County Water Agency staff whether they was any health risk associated with handling and removing the stuff and they said there wasn't, though we need to be careful to not disrupt the underlying sediment (probably where the heavy metals are hanging out, best not to be disturbed).

In sum, then, I recommend that we assess a number of factors not associated with the health of the salmon. It is good that the Laguna creation strategy is being studied separately from the low flow, because I came to the conclusion that we could have Laguna creation and high flow and that such a combination would likely be in the interests of the majority of fish and animal species, given that higher flows allow for greater dilution of the bad things being put into the river.

In closing, I hope to hear from the Sonoma County Water Agency that they are taking on the task of providing public restrooms along the length of the Russian River---it seems to me that is the least they can do for us while they subject us to this low-flow business!

Barbara Yoder
Forestville
(707)887-7013

Katie Blank

From: NORMA JELLISON [normalj@monitor.net]
Sent: Tuesday, June 22, 2010 8:45 AM
To: estuaryproject
Cc: Katie Blank
Subject: Fw: Estuary Management Plan Russian River Jenner CA
Attachments: Biological Opinion and the Russian River Estuary.doc; Grant Davis SCWA Ltr on RR BO Estuary Mgmt.doc; St Wtr Res Ctrl Bd Ltr Addressed to SCWA Re SCWA Instream Flow Reductions.doc; Russian River Temp Flow Changes SCWA Letter June 20, 2010.doc

Katie - See if these will open. They are all in .doc saved in windows. If not when I get home tonite, I will see what I can do. Norma

-------Original Message-------

From: NORMA JELLISON
Date: 6/21/2010 8:03:58 AM
To: estuaryproiect@esassoc.com
Subject: Fw: Estuary Management Plan Russian River Jenner CA

A1.2-37

-------Original Message-------

From: NORMA JELLISON
Date: 6/21/2010 7:52:36 AM
To: estuaryproiect@esassoc.com; Jessica.Martini.Lamb@scwa.ca.gov
Subject: Estuary Management Plan Russian River Jenner CA

Dear Jessica -

This correspondence is in response to the SCWA notice of preparation of a Draft EIR for the Russian River Estuary - the Estuary Management Plan.

I share concerns expressed by many regarding the scoping meeting. The structure of the evening and the set up of the tables without means of collecting comments (flip charts for example to write down comments, post its to add to exhibits - all very standard methods of capturing written comments at scoping meetings) did not seem to be conducive to the stated purpose of a scoping session - to gather comments from the audience/public.

I believe the major impact of the proposed Estuary Management Plan will be an irreversible and irretrievable commitment of resources. Changes to the estuary will have far reaching and long term irreversible significant negative environmental impacts to the this rich estuarine environment.

I am enclosing a number of letters and opinion pieces that I have written on the subject of the estuary, the Biological Opinion, the proposed Incidental Harassment Permit and the Petitions for lowering the flow of the Russian River - changes to Decision 1610. Contained within these are my concerns and comments regarding the plans for altering the estuary and its land and water resources. I believe these are relevant to the environmental assessment underway and ask that they be considered as my

scoping comments.

To my concerns regarding the proposal to alter the mouth of the Russian River, I add my belief that the agency cannot separate the estuary management process from the lowering of flows. The plan to maintain an closed mouth is impossible to achieve without lowering the flows. Regardless of the requirements to lower the flow contained in the BO, the fact remains that the plan to manage the estuary is absolutely linked to being able to control the flows to achieve the goal of a sustained closed mouth. Discussing the flow impacts in the cumulative section of the EIR is insufficient. Segmentation is illegal under CEQA.

Finally, I submit that the letter and background documents from the Russian River Watershed Protection Council provide an excellent summary of critical issues relative to this undertaking that merit thoughtful and considerable analysis and response in the preparation of the Environmental Impact Report. I look forward to reviewing that document.

Norma

Norma Jellison
PO Box 1636
Boedega bay CA 94923

Katie Blank

From: Jessica Martini Lamb [Jessica.Martini.Lamb@scwa.ca.gov]
Sent: Monday, June 21, 2010 8:30 AM
To: Katie Blank; Jim O'Toole
Cc: estuaryproject; Records
Subject: FW: Notice of Preparation of Draft EIR Russian River - Estuary Management Plan

Follow Up Flag: Follow up
Flag Status: Completed

From: NORMA JELLISON [mailto:normalj@monitor.net]
Sent: Monday, June 21, 2010 7:57 AM
To: estuaryproiect@esassoc.com; Jessica Martini Lamb
Subject: Notice of Preparation of Draft EIR Russian River - Estuary Management Plan

Below please find my comments on the Incidental Harassment Permit that I ask be included with the email and forwarded letter comments on the preparation of a Draft EIR for the above cited project.
Norma Jellison

Sent to:
PR1.0648-XQ82@noaa.gov
DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration

RIN 0648-XQ82

Takes of Marine Mammals Incidental to Specified Activities;
Russian River Estuary Management Activities

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; proposed incidental harassment authorization; request For comments.

Michael Payne, Chief, Permits, Conservation and Education Division,
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225.

This letter provides comments on the above referenced notice of proposed incidental harassment authorization at the Russian River Estuary in Sonoma County CA - RIN 0648-XQ82 - published in the Federal Register November 12, 2009.

I read the Federal Register notice, the Sonoma County Water Agency's (Water Agency) Application and the Pinniped Monitoring Plan. Each of the latter documents, accessed from the Federal Register page, is integral to understanding the Notice itself and the basis of its findings and recommendations. Unfortunately, the Application and the Monitoring Plan are incomplete as posted and thus deficient. Both documents lack figures that are important to reading and understanding them and the Notice that is constructed based on them. The Application is lacking Figures 1, 2, and 4 as well as Figures 5, 6 and 7 - all of the figures are referenced in text discussions of various matters and yet the page of the document for each of these figures is blank. This is also true of the Monitoring Plan where Figure 1 and 2 pages are blank. This missing information is materially significant and negatively impacts a clear understanding of the application and monitoring plan. I believe the entire Notice, Application and Monitoring Plan should be re-circulated and re-noticed in the Federal Register with the missing figures in place.

Nevertheless, I provide the following comments regarding the Notice as it is appears in the November 12, 2009 Federal Register.

I find the Description of the Estuary deficient in its omission of materially important information. The description of the Estuary is lacking in detail. Nowhere in the Notice or any of the other two documents it relies on is it stated that he Russian River is not a naturally flowing stream, being controlled and/or substantially influenced by the Warm Springs Dam and the Eel River diversion.

Moreover the River is impacted throughout its entire 60 mile length by agricultural withdrawals - legal and illegal, and legal and illegal discharges from wastewater treatment facilities and failing septic tanks. These examples are but a few examples among a host of other man induced alterations and uses that result in an extremely impaired river system.

Neither is the Estuary itself naturally functioning, being impaired by a concrete jetty, one major impairment, constructed by the Corps of Engineers in the 1950s that has resulted in major changes to the functioning of the Estuary and to the beach. As recently as 10 years ago, the jetty was fully exposed rock along its entire length with a +/- 5' drop off to the beach on its Estuary side, in all but flood season. Today, State Park rangers and lifeguards can drive their vehicles across the jetty to approach the mouth of the river as needed.

All of the above information is important information to disclose, as it has material input to the functioning of the mouth and the Estuary.

Moreover, while it is true that the Water Agency has breached the closed mouth for a number of years to prevent flooding of low lying homes and businesses in Jenner, these activities were accomplished without the benefit of a harassment permit from the NMFS.

Omission of this information is material. A complete understanding of the functioning of the mouth is lacking and the errant nature of nature itself - the weather, tides, winds - makes the proposed modifications nothing short of an experiment with significant adverse impacts to the Estuary environment and its inhabitants, both animal and human and most particularly the marine mammlas that call it home - the largest harbor seal colony in Sonoma County.

The beach is also an important resting place for local and migratory birds. At times hundreds of gulls,terns,cormorants and pelicans cover the beach. Some, like the Brown Pelican are species of special concern. The Brown Pelican was recently removed as an endangered species listing under the Endangered Species Act. The Brown Pelican is also a migratory bird, along with other migratory birds such as Heermans gulls that rest on this beach.

Statements in section titled Lagoon Outlet Channel Management to the effect that "Modifications to the barrier beach would be small departures from the existing beach and channel topography....and "the new channel would be similar to the channel configurations resulting from the previous breaching practices" and especially the statement "...and consistent with natural processes" are undocumented, unsupported by facts and highly speculative, given the untested nature of the proposed undertaking. Having watched the results of the breaching actions during the last ten plus years and especially the experimentation that has commenced during the last months of this year, I find these statements to be preposterous.

The mouth of the river is not a naturally functioning system. The upstream impacts of dams and diversions with the resulting changes in flows, coupled with the proposals to reduce inflows by up to 2/3 associated with Order 1610, the Biological Opinion and the intermittent Emergency Orders of recent years, when coupled with the impacts on the functioning of the mouth due to the presence of the jetty all point to the shear folly of such a label. This is all not even considering the unpredictability of the ocean conditions and their impact on the mouth and the beach. From my perspective, experiments with opening the mouth this summer and early fall and simulating the longer term plans for beach configurations were not successful.

A1.2-39

Under Artificial Sand Bar Breaching there are statements that the Estuary may close **naturally** (emphasis added) throughout the year as a result of a barrier beach forming across the mouth of the Russian River. Times of year of the closures are stated as "...the mouth usually closes during the spring, summer and fall...." Again there is no mention of the upstream Warm Springs Dam outflow and Eel River diversions management influences on the river flows, or the State Water Quality Control Board Orders among other influences (drought years) on the functioning of the Estuary closures.

In the section Description of Marine Mammals in the Area of the Specified Activity there are a number of statements and conclusions that are questionable at best or are counter to the intentions of the Marine Mammal Protection Act, are incomplete or incorrect. For example, the statement that the Jenner Harbor Seal Colony is the largest in Sonoma County is true. It is also the largest north of Drakes Estero in Marin County to the mouth of the Eel River in Mendocino County. This fact gives a broader context for the importance of this colony. Further, not only has there been a daily census conducted since 1989 by the Elinor Twohy, resident naturalist of Jenner, the site has also been the subject of census monthly since 1987 by Dr Joe Mortenson who also has included it as part of the regional Harbor Seal census conducted since 1998 in association with Pt Reyes National Seashore. Finally, the site has been part of the state Harbor Seal survey and census effort (1982-1995 and 2004) by NOAA's NMFS and Southwest Fisheries Science Center et al.

One omission in the Description is the existence since 1985 = 24 years of a Seal Watch program by Stewards of the Coast and Redwoods (previously Stewards of Slavianka, the Russian name for the Russian River). Stewards is the non profit organization that supports the Russian River Division of California State Parks. This program of volunteers on the beach maintains MMPA distances from the Harbor Seal haulout, interpreting Harbor Seal behaviors in general and those of this colony specifically for State Park visitors. Moreover, the Seal Watch volunteers count the colony from the overlook prior to the beginning of each shift (an AM shift from 10-2 and a PM shift from 2-6

on weekends from March to Labor Day). This data entered on data sheets in a beach log maintained for each year of Seal Watch activity also includes weather and tide conditions, conditions of the beach and mouth, the presence of other marine mammals, birds etc, as well as births witnessed and harassment incidents by various sources. Seal Watch volunteers attend an annual training seminar conducted by State Park naturalists and other naturalists and scientists from for example, the Marine Mammal Center and Pt Reyes National Seashore and are also instructed on the beach by long time Seal Watch volunteers.

One incorrect statement is associated with stampedes and statements about the causes of fleeing the colony. Having personally been on the beach as a Seal Watch volunteer for 12+ years and otherwise observed the colony from the overlook at other times, I assert that stampedes are not infrequent as stated. In fact they occur often. Total flushing of the colony is often associated with people approaching too close to the haulout whether the mouth is open or closed. Some people ignore the signs posted on the beach warning not to approach the seals and citing the MMPA (at times that Seal Watch volunteers are not present). It also occurs at times when kayaks, sailboats and motor boats approach too close to the haulout, and on occasion when the huge numbers of resting birds (gulls, terns, cormorants and pelicans) that frequent the beach lifting off in unison prompt total abandonment of the beach - fleeing into the river by the colony. Consulting Seal Watch records would likely reveal these facts/document such incidents. Moreover, consulting with Elinor Twohy and her data would no doubt likewise confirm cases of full abandonment of the haulout due to harassment of various sources.

The statement "....Therefore, although the Agency's operations may harass pinnipeds present on the beach, it is likely many have left due to the presence of people...." is especially troubling. First of all, it is impossible to state unequivocally that on the day of a proposed Agency activity "..many.." (Harbor Seals) would have "left the beach due to the presence of people." Abandonment/flushing does NOT happen on a daily basis. While it does happen more often than suggested by the statement in the Notice, it is not constant. When Seal Watch is present, flushing or stampedes from people walking on the beach is pretty much eliminated. At other times, when Seal Watch is not present (weekdays), people actually observe the posted warning MMPA signs, thus flushing the seals does not happen all the time.

The conclusion that because not all Harbor seals during recent breaching activities have flushed and some remain while equipment is on the beach = "..Therefore, harbor seals at most would flush into the water in response to maintenance activities but may also remain alert or make small movements...." is mixing statement about breaching and maintenance. Comparing past actions by the colony associated with an occasional breaching of the mouth to 4 days in a row of machinery on the beach is comparing apples and oranges. And comparing the work to create the outlet channel - a major 4 day industrial event with people and machinery working on the beach and 2-3 days of maintenance to what occurred with breaching activities up to this point in time is likewise unrealistic and unreasonable.

Most troubling in this respect is the statement "Implementation of the lagoon outlet channel, as rewuired by the NMFS' Russian River Biological Opinion, has not yet begun, but the potential direct effects on harbor seals and their pups would be expected to be similar to artificial breaching activities as construction methods would be very similar." Comparing the occasional artificial breaching activities which to date for the most part occur on one day to 4 solid days of machinery and personnel on the beach for hours digging the outlet channel is not reasonable, realistic or an honest comparison. The impacts will in no way be similar. Implying they will be is beyond pure speculation and premature in nature. It is inappropriate at best and inaccurate at worst.

Another conclusion that is troubling is that associated with the impacts of the proposed activity on the pups and on mother pup relationships. First of all, the fact that the Jenner haulout is not a "designated pupping beach" is irrelevant. There have been pups born on this haulout every year since Seal Watch began its program (24 years). Pups on the beach have been documented by Mortenson in the scientific literature. I personally have observed pups being born on this beach, every year since I started Seal Watch over 12 years ago. The numbers vary from year to year, but I know of no year that no pups were born on this haulout. This past year (2009), I personally observed 2 pups born while on the beach on a Seal Watch shift. On April 25, I counted 18 pups from the overlook at the beginning of my Seal Watch shift. On May 1, the number of pups was 27 (Mortenson pers obs/count).

While the data may confirm the assertion that peak pupping occurs in early to mid May, that fact does not eliminate the potential for births after mid May when this lagoon outlet channel activity will begin. Statements that the "...the opportunity for mother/pup bonding is not expected to be impacted by implementation of the lagoon outlet channel or artificial breaching activities..." is pure speculation. I disagree with the logic statements that lead to this conclusion and thus I disagree with the conclusion. From the Notice: "The peak of pupping season is **likely** (emphasis added) mid-May in most years. Implementation of the lagoon will begin around may 15th. By this time bonding will have occurred. The number of artificial breaches in March April and May have been low in past and occur in a single day over several hours. Therefore (my added word) artificial breaching activities are not expected to impact mother/pup bonding." Comparing past **one day over several hours** activities that mostly DID NOT HAPPEN IN MARCH APRIL AND MAY to **4 days of nearly constant construction activity with heavy equipment and lots of personnel on the beach** beginning May 15 is unreasonable and the conclusion is logically unsupportable.

The literature evidences several studies of the importance of mother/pup bonding. Beyond the bonding time, this is a nursery. It is a critical place for the pups even after bonding is complete and they are on their own/weaned. And they would only be weaned IF, a big IF, they were born such that they would be weaned by mid May. This would not be the case for pups born the first weeks of May thru the 15th, as nursing continues for up to 4 weeks. So the conclusion that the bonding would be over is false in these cases, and the fact that pups could well still be being nursed on the haulout makes it problematic for this activity to ensue while nursing is still the case. Even if one somehow (???) concludes that all bonding is over and all pups are weaned, the importance of the haulout to the pups as a place to rest and be among the safety of numbers of adults is also important and arguably critical to the pups. Suddenly being forced off the beach by these activities at such a young and vulnerable time (mortality just after weaning and in the first year is high as it is) is problematic and could result in higher mortalities among the pups of this colony.

The conclusion "NMFS has preliminary (sic) determined that impact to pinnipeds on the beach during Estuary management activities would be limited to short term (i.e. one day or less) behavioral harassment in the form of artificial alertness or flushing...." is inconsistent with the description of the activity as 4 days of construction activity. "...Further, the lack of evidence of permanent abandonment of the haulout despite Agency breaching the beach for years indicates long term or permanent abandonment of the haulout is unlikely..." This conclusion is premature. Comparing one day occasional breaching activities with 4 days of industrial level activities associated with the lagoon channel outlet construction cannot logically lead to this conclusion.

In fact, using the impact on the colony of the lone male Elephant Seal (ES) that hauled out on this beach as a surrogate for this industrial level of activity leads to the opposite conclusion. The colony was originally a harbor seal storm shelter with a peak in numbers in the storms before breeding. The ES totally eliminated part of the Jenner colony annual cycle, the winter haulout, and then later the

breeding haulout population when he lingered into breeding season (2007). Charts and graphs previously provided to NMFS document this impact. What was left during the ES occupation was the peak in molting. This is the time that the river is proposed to be kept closed. If that occurs it is likely, the haulout would fail then as the level of harassment associated with human interference would be significant. Again, the conclusion that outlet channel construction and maintenance activity is not expected to change the natural cycle of using the Jenner haulout on a daily basis and that modification of the habitat from the construction would be temporary in nature is premature at best and erroneous.

Comments in the Notice section Anticipated Effects on Habitat relative to salmonids and pinniped predation are troublesome. There is a statement that "These activities would result in physical alterations of the Jenner haulout but are essential to conserving and recovering endangered salmonids species (which are important prey for pinnipeds)." There is no scientific evidence/proof in the Biological Opinion that the proposed activities are in fact essential to conserving and recovering endangered salmonid species. In fact it is speculated that this activity will take place, will eliminate the Harbor Seal haulout and salmonids will be no better off than they were before this project ensued.

Of grave concern is the erroneous statement that salmonids are an important prey for pinnipeds and elsewhere that the increase in the rearing habitat quality ... And increaed salmonid abundance...ultimately provides more food for seals present in the action area is incorrect and disingenuous. Linda Hanson in her study (pub 1993) during the 1989-1991 extended years of river mouth closure due to drought, showed that salmonids make up a minor part of the Harbor seal diet. This was the case at a time when they were readily available as there was no outlet to the ocean making the salmonids trapped at the river mouth readily available prey for the haulout seals. The scat analysis portion of the Hanson study showed that Harbor seals at this site do not utilize salmon as a major prey species. To try to turn the negative impact on Harbor seals from this activity into a positive based on a specious argument that the Harbor seals will eat (and thus have a potential negative impact) on the very species that is the basis for the activity is disingenuous and patently absurd.

In conclusion, the IHA permit application in the Federal Register is based on many assumptions. Some are about overcoming the Pacific Ocean whims to engineer the sand bar at the mouth of the Russian River. Others are about the possible benefits of this engineering on the salmonids of the Russian River. Whether these assumptions are valid is highly speculative and moot.

More predictable are the responses of the major north coast colony of Harbor seals at the mouth of the Russian River to the manipulation of the bar. Commencing during the late pupping period at this colony, trains of personnel and machinery will travel down the bar for up to 4 days in succession. To my knowledge this is an unprecedented act of sustained harassment by earth moving machinery on marine mammals. There are several likely consequence of driving bulldozers and/or excavators down the beach through the breeding and molting haulouts that form from March to July at the mouth of the Russian. The seals will certainly leave the beach in the short term, but perhaps in the long term as well. There is a well documented history of such flights to a variety of causes, including the occasional use of machinery to breach the river mouth. But most causes do not persist over a period of days and weeks. However, the colony was largely abandoned for several years in reaction to a single rogue Elephant seal for months during its winter haulout.

The ES appeared to be attempting to mate with the Harbor seals, pursuing and killing some of them, including pups. The heavy equipment is to be put in play on 15 May, when the seals are still assembled for breeding, pupping, and nursing. The arrival of industrial machinery at the end of the

breeding period will certainly disrupt the colony. The nursery where mothers suckle and play with their young may be abandoned, since mothers can be the most reactive of Harbor seals to potential dangers. The critical period between birth and weaning may be interrupted by flight from the equipment. At the same time, loud noise from the equipment may mask the calls of Harbor seal pups that keep them together with their mothers in the Russian River, if they stay. If driven to the sea without their habitual nursery area, maintaining contact between mother and young will depend on hearing the calls of pups over the sound of the surf. Underwater, vibrations from the machinery may impact any mating stations of male Harbor seals, who display acoustically under water.

Statements regarding "....consideration being given to the beach environment, effort would be made to minimize the amount and frequency of mechanical intervention, thereby reducing disturbances to seals and other wildlife, as well as State Park visitors on the beach" are not born out by later descriptions and tables regarding the proposed activities. No clustering of monitoring activities is proposed, and there is little note of the large numbers of State Park visitors that frequent this beach. The Sonoma Coast State Beaches entertain over 4million visitors each year, making it one of the most visited State parks in CA. The mouth of the Russian River, where the river meets the sea is for the thousands that stop at the overlook on Route 1 to see it and to see the Harbor Seals, a very visceral connection between land and the sea. For some it is the closest they will ever get to the ocean and to its marine life as embodied in the Harbor Seal colony.

The worst case though highly likely scenario that may result from this activity is an often deserted beach with bulldozers and excavators displacing and replacing Harbor seals and the many many birds that rest on the beach. And ultimately all of this will eliminate a treasured site in a State Park and a Marine Reserve. The thousands of tourists and locals who stop at the overlook of the Russian River mouth to celebrate where the river meets the sea and the display of sea mammals and birds will see machinery at work instead of nature.

Widespread local opinion is that what needs engineering is not the bar, but the remains of a failed jetty at the mouth, which prevents it from closing naturally. Why isn't the jetty the first order of business? Rather than spend millions of dollars on a grand engineering experiment with likely adverse impacts on a 24 year old Harbor seal colony, the largest in Sonoma County and north of Drakes Estero to the Eel River, and eliminate a major interpretation program for the Sonoma Coast State Beach, why not first eliminate the jetty doing less harm to the colony and see if that has a positive impact on the river dynamics and the habitat for the iconic salmonids?

If NMFS proceeds with the issuance of this IHA, as seems inevitable, many will be watching and reviewing the monitoring. If the colony is abandoned due to the lagoon outlet channel construction and maintenance activities and will be calling for the revocation of the permit.

Sincerely,

Norma Jellison

POBOX 1636

Bodega Bay CA

The Biological Opinion and the Russian River Estuary

Recently, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) released its Biological Opinion (BO). The result of 10+ years of studies, the BO proposes a number of actions intended to lead to the recovery of the three salmonid species of the Russian River – coho, Chinook and steelhead. Because certain of the water supply and flood control operations of the Corps of Engineers and Sonoma County Water Agency threaten to jeopardize steelhead and coho, the NMFS has identified actions including reduced river flows and estuary adaptive management. Details of the proposed actions can be found on the SCWA website by clicking on the RRIFR - Russian River Instream Flow Report symbol in the upper left hand corner of the home page.

While the BO is to be implemented over a 15 year period to allow for environmental impact studies of the impacts of the proposals, a key concern is with plans to implement main stem flow reductions and estuary management = discontinuing breaching the sandbar that forms at the river mouth in the immediate future – as early as 2009 and definitely by 2010. While "some form of environmental review" is suggested, the SCWA and NMFS have not committed to a full and robust EIR for the proposed interim or temporary urgency changes.

Unfortunately, the BO does not consider the effects of the proposed actions on any species other than the salmonids. A number of people and organizations are seeking an integrated wholistic approach to the restoration plan which takes into account the rich and varied environment of the Russian River estuary and Goat Rock Beach. Both the estuary and the beach spits at the rivers mouth provide a rich habitat for many endangered, threatened and protected species in addition to the emblematic salmonids.

For 34 years, Harbor Seals have hauled out on the spits of Goat Rock Beach in Jenner, including pupping in the spring. The Jenner haulout is the largest Harbor Seal haulout in Sonoma County. It is also the largest north of Drakes Estero in Marin County to the mouth of the Eel River in Mendocino County. Harbor Seals are protected by the Marine Mammal Protection Act, also administered by NOAA/NMFS.

This Harbor Seal haulout is one of the most intensively studied haulouts in northern California, with a daily census conducted since 1989 by the intrepid Elinor Twohy of Jenner. The site has also census monthly since 1987 by Dr Joe Mortenson who also has included it as part of the regional Harbor Seal census conducted since 1998 in association with Pt Reyes National Seashore. Finally, the site has been part of the state Harbor Seal survey and census effort (1982-1995 and 2004) by NOAA's NMFS and Southwest Fisheries Science Center et al.

The Harbor Seals were the basis for the formation in 1985 of the Seal Watch program and thus Stewards of Slavianka, the Russian name for the Russian River and the original name for Stewards of the Coast and Redwoods. Stewards is the non profit organization that supports the Russian River Division of California State Parks. Annually, Stewards

brings hundreds of school children to the Sonoma Coast to experience the ocean environment. Perhaps most importantly, the Harbor Seals serve as ambassadors to the ocean. Thousands of Sonomans and tourists stop at the Route 1 overlook north of Jenner specifically to see the Harbor Seals. For many, the seals provide a link to the otherwise inaccessible marine environment.

The Goat Rock Beach at Jenner is an also an important resting place for local and migratory birds. At times, hundreds of gulls, terns, cormorants and pelicans cover the beach. Some, like the Brown Pelican, are species of special concern. The Brown Pelican was recently removed from the endangered species list, the Endangered Species Act. The Brown Pelican is also a migratory bird, along with other migratory birds such as Heermans gulls, that rest on this beach. Migratory birds are protected by the Migratory Bird Treaty Act. Research is beginning to highlight the importance physiologically of resting for birds, just as hauling out is for marine mammals.

Data collected over the years shows that when the river mouth is closed by the sandbar the Harbor Seal numbers decrease substantially. As soon as the mouth is breached, the Harbor Seals return in numbers commensurate to pre sand bar levels. The Harbor Seals haulout on the spit edges along the river near the mouth. This low profile spit habitat provides easy access to the river. This habitat and easy access is especially important when pups are born and taken immediately into the river by the mother, later for pup swimming lessons, and in general for occasional swims when the seals are active during their daytime haulout period. Harbor Seals are nocturnal – feeding in the deep, cold ocean waters at night. Thus, daytime haulout habitat is critical for the species. The low profile beach at Goat Rock also provides ease of access to the ocean, either from haulout locations on the ocean side of the beach or by entering the river and surfing or swimming out into the ocean.

That this Harbor Seal colony is easily disrupted was observed during the five-year period when a maturing male Elephant Seal hauled out on the beach – in the winter/early spring (Dec-Feb) and the late summer/early fall (July-Sept) molt periods. In the final year of his presence – 2007, when he lingered into the breeding season, the haulout population was severely reduced. At that time, the only period when the Harbor Seal numbers were more in the normal range for the site was when the Elephant Seal was not present. That year, he did not return for the molt period, a time when the sandbar tends to consistently form, or in the winter. It is likely that if the sandbar is not breached, given their historic propensity to for the most part abandon the site when the sandbar forms, it highly likely that this historic and significant Harbor Seal colony could disappear.

Prolonged closure of the mouth contributes to disruption of the seals and birds as people walk down the beach and flush the birds and seals. Studies in the mid nineties documented this phenomenon. Signs posted on the beach and the Seal Watch volunteers assist in keeping disruption of the seals to a minimum. Flushing the seals is considered harassment under the Marine Mammal Protection Act. As noted previously, daytime resting is important to both birds and seals.

Scoping Comment Letter 14
Attachment 2 (cont.)

The estuary also provides important habitat for a number of fish, in addition to salmonids, such as flounder and sculpin. It is also an important habitat for juvenile Dungeness crab. The vibrant estuary contributes to the many birds that feed in the estuary and the ocean off the mouth – Osprey, diving ducks, pelagic birds and those listed previously.

Finally, but no less importantly, there is the concern for water quality in the estuary. Lowered flows and the proposed lagoon associated with no breaching of the sandbar are sure to concentrate pollutants known to be in the river from upstream outflows and land uses. The river side of Goat Rock Beach is used by many visitors to the coast as a safe place to enter the water to wade and swim. Further, the water quality impacts of low flows and pollutant concentration in the lagoon on the fish and other animals and birds that use the river are also of concern. And, while there is a commitment not to allow flooding of homes and businesses in Jenner during the early implementation of the estuary management plan (to begin in 2009 or 2010), the BO does say that if this plan proves successful in aiding the salmonids, commencing in 2014 flood proofing by raising structures or otherwise eliminating flooding impacts are part of the long term plan.

The numerous significant adverse impacts associated with the proposed estuary management plan are such that everyone who lives, recreates, or just plain cares about the Russian River, its estuary and Goat Rock Beach should be closely watching this process. This is not about salmon versus seals and birds. It is a call to take an integrative wholistic approach to salmon recovery that doesn't sacrifice an incredibly rich diverse environment that is a connection for many people to the otherwise mysterious and inaccessible ocean. Send your comments to NMFS (William.Hearn@noaa.gov), and SCWA (Randy.Poole@scwa.ca.gov). The Sonoma County Supervisors also serve as the Board of the SCWA. The State Water Resources Board is the final arbiter for the interim proposal as well as for the long term plan. Hearings at the SWRCB should be scheduled for the interim proposals in the spring. Updates on hearings and ways to forward comments for consideration before the State Water Resources Control Board will be forthcoming.

Norma Jellison

NORMA JELLISON
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normalj@sonic.net

June 20, 2010

GRANT DAVIS, GENERAL MANAGER
SONOMA COUNTY WATER AGENCY
404 AVIATION BLVD
SANTA ROSA CA 95403-9019

Dear Mr. Davis:

I am writing to you concerning the Sonoma County Water Agency's (SCWA) Petition for a Temporary Urgency Change—Permits 12947A, 12949, 12950, and 16596 : April 4, 2010.

I wish to express concern regarding the modification of summer flows in the lower Russian River from 125 cfs to 70 cfs for this year: May 1 through October 15th. I utilize the Russian River in the following way(s): recreation, naturalist, birder, docent for the Harbor Seals, and for spiritual well being.

I am concerned that water quality will deteriorate from greatly lowered flows, including possible additional pollution from nutrients, regulated and emerging toxins, bacteria, temperature, invasive species, blue-green algae, etc. Lowering the flows to 70 cfs will seriously impede my enjoyment of the river and may impact my health and well-being. This action could also put children, pet dogs, and wildlife at great risk as well.

I believe the overall health of the watershed has greatly deteriorated, including impacts to other species besides salmonids, such as amphibians, sea birds, seals, unlisted fish and other aquatic life, etc. I wonder why the Biological Opinion, which requires that SCWA apply for this flow change, did not first require addressing other problems in the river that harm fish including excess sediments, temperature, and nutrient pollution? Can lower flows this summer cause bigger floods next winter given full reservoirs?

I understand that north of the river's confluence with Dry Creek, normal flows will be in effect this year, and only the lower river will have greatly lowered flows. This is coming at a time when the reservoirs are full. Apparently the purpose of this action would be to experiment with a closed Estuary at the mouth of the Russian River in order to help Steelhead fish. While I would like to see Steelhead saved, I am concerned that the collateral damage to water quality and ecosystem integrity may be too great.

Please see letter written regarding previous actions regarding this river that I attach here as the issues raised remain of concern for this petition. I am concerned that this change could cause adverse impacts to my use of the Russian River.

Sincerely,

Norm Jelli n

Norma Jellison

NORMA JELLISON
P O BOX 1636
BODEGA BAY CA 94923
(707) 875-3799
NORMALJ@SONIC.NET

May 10, 2010

GRANT DAVIS, GENERAL MANAGER
SONOMA COUNTY WATER AGENCY
404 AVIATION BLVD
SANTA ROSA CA 95403-9019

PROTEST REGARDING: NOTICE OF PETITION REQUESTING MODIFICATION TO WATER RIGHTS PERMITS FOR SONOMA COUNTY WATER AGENCY BY MODIFYING THE MINIMUM INSTREAM FLOW REQUIREMENTS: PERMITS 12947A, 12949, 12950, AND 16596 (APPLICATIONS 12919A, 15736, 15737, AND 19351)

PETITION FILED: 9-23-09 COUNTY: Mendocino & Sonoma Russian River

I hereby protest the modification to water rights permits for the Sonoma County Water Agency calling for lowering Russian River summer flows in the lower river from 125 cfs to 70 cfs during a normal rain year. I utilize the Russian River in the following way(s): as a volunteer, docent for California State Parks Russian River District Seal Watch program and as a Sonoma County Coast resident I seek solace at the river mouth, walk portions of the beach, and otherwise recreate at the river mouth and along its lower limits.

I am concerned about a number of issues associated with lowered instream flows. A key area of concern is the impacts to water quality associated with this action.

The lower Russian River is a major recreation area visited by thousands of people from all over California and beyond. Goat Rock State Beach is one of the most visited beaches of the Sonoma Coast State Beaches, which beaches have among the highest visitor counts of any State Park - over 4 million visitors a year. Goat Rock Beach at the mouth of the Russian River is especially popular. It is easy to get from Highway 101 and Route 1. It has long served as an area inland locals (Santa Rosa, Napa, Solano and East Bay counties as well as the greater Sacramento area) seek for relief from the summer heat. People vacation here from all over the state and nation.

The Russian River side of Goat Rock Beach provides the only location where there is a safe alternative for families with children to recreate and wade and swim without concern for the dangers inherent in the ocean side beaches. Body contact sports are a key recreational opportunity that I feel will be negatively impacted by the reduction in instream flows.

Coupled with the SCWA's Estuary Management Plan that will maintain a closed river mouth trapping and reducing water exchange - outflow into the ocean and inflow from the ocean tides - the reduced instream flows will result in ever increasing impaired water quality conditions. Among the impaired water quality that will without a doubt occur and in fact have been measured by the SCWA are higher temperatures. Associated impacts occur with respect to DO, BOD and other measured constituents.

These above parameters as impacted by reduced instream flows and exchange contribute to cumulative impacts associated with deteriorating water quality such as elevated nutrient, toxin and bacteria levels (coliform of major concern). There is potential for eutrophication in the estuary and subsequent negative environmental effects such as anoxia and severe reductions in water quality with associated harm to fish and other animal populations that may occur. The deteriorated water quality, as noted has high potential to negatively impact the body contact sports potential of this State Park Beach on its river side.

PROTEST REGARDING: NOTICE OF PETITION REQUESTING MODIFICATION TO WATER RIGHTS PERMITS FOR SONOMA COUNTY WATER AGENCY BY MODIFYING THE MINIMUM INSTREAM FLOW REQUIREMENTS: PERMITS 12947A, 12949, 12950, AND 16596 (APPLICATIONS 12919A, 15736, 15737, AND 19351) PETITION FILED: 9-23-09 COUNTY: Mendocino & Sonoma Russian River

NORMA JELLISON PROTEST LETTER, Page 2 May 10, 2010

In addition to the use of this riverside beach area by swimmers and waders, especially children, the lower river is a favored location for boating – kayaking and canoeing. Use of the river by these recreational constituents and the associated businesses that support the recreational uses will all be negatively impacted by the lowered flows and deteriorated water quality.

Further issues of concern are relative to the impact of impaired water quality on the Harbor Seal colony at the mouth of the Russian River, on other pinnipeds, on bird species, fish, the Dungenss Crab nursery and a host of other amphibians and riverine species (e.g. river otters) that call the lower river and the estuary home. All of these species use the river to dive, feed, swim and mature. Many of them spend large portions of their lives on and in the river mouth and in the water column. Thus all are potentially negatively impacted by reduced water quality associated with lowered flows and the potentially impaired conditions of the lower river and the estuary.

The Goat Rock Beach at Jenner is an important resting place for local and migratory birds. At times, hundreds of gulls, terns, Brown Pelicans cormorants and other pelagic bird species cover the beach. Some, like the Brown Pelican, are species of special concern. The Brown Pelican was recently removed from the endangered species list, the Endangered Species Act.and experienced significant die off this year along the California coast. The Brown Pelican is also a migratory bird, along with other migratory birds such as Heermans gulls, that rest on this beach. Migratory birds are protected by the Migratory Bird Treaty Act. Research is beginning to highlight the importance physiologically of resting for birds, just as hauling out is for marine mammals. The Sonoma Coast is part of the California National Monument. All of these birds and others, such as diving ducks, use the river to forage, swim, dive and rest. Thus, impacts to the water quality have high potential to negatively impact these species and impair their ability to use the lower river and estuary ecosytem.

The Harbor Seal colony at Goat Rock Beach has been established on Goat Rock Beach for over 35 years. It is the largest Harbor Seal Colony north of Drakes Bay in Marin County to the Eel River in Mendocino County. The colony uses the beach to rest, and it is a pupping location.

Water quality impairment associated with low flows and a closed estuary has high potential to negatively impact this colony. The Harbor Seals use the river to swim, dive and forage. When pups are present, the mothers use the river to teach the pups to swim. Harbor Seals enjoy protections of the Marine Mammal Protection Act and in consideration of this colony, the SCWA was required to secure an Incidental Harassment Authorization permit for its proposed Estuary Management Plan activities on the beach.

Lowered flows are a key aspect of the Estuary Management Plan to maintain the river mouth in a closed position. This then creates a long beach connecting what is now a south beach and a north beach with the river mouth between them. This entices beach walking of its now enhanced length. Save for the untested outlet channel that may provide some manner of egress for the Harbor Seals, the historic way for the Harbor Seals to enter the ocean is by swimming out the river mouth. This egress will be blocked, save for the untested outlet channel planned to contain some water and allow some inflow, though all remains to be tested by reality.

The main alternative egress for the Harbor Seals to enter the ocean for their natural night time foraging will be for them to cross the beach to the ocean, an activity that expends a considerable amount of energy. They are agile in the water and move with difficulty on land. When they are confronted on their way across the beach to the ocean by people walking on the beach, they often will retreat back to the river side of the beach. This disrupts their natural habits and keeps them hostage on the beach to some extent until visitors leave the beach area at nightfall.

Conversely, all of the above pinnipeds and birds that use the river can also be contributory to deteriorated water quality associated with elevated bacteria levels due to lowered river flows and the lack of significant water exchange. This merits study.

PROTEST REGARDING: NOTICE OF PETITION REQUESTING MODIFICATION TO WATER RIGHTS PERMITS FOR SONOMA COUNTY WATER AGENCY BY MODIFYING THE MINIMUM INSTREAM FLOW REQUIREMENTS: PERMITS 12947A, 12949, 12950, AND 16596 (APPLICATIONS 12919A, 15736, 15737, AND 19351) PETITION FILED: 9-23-09 COUNTY: Mendocino & Sonoma Russian River

NORMA JELLISON PROTEST LETTER, Page 3 May 10, 2010

I am concerned that this plan for lowering the instream flows does not address the potential harm to fish – e.g. flounder and sculpin, the Dungeness crab nursery in the estuary, amphibians, other aquatic species that provide forage for many of the above named species. For example, it is highly likely sediment, suspended solids, temperature, DO, BOD, bacteria among other constituents will have negative impacts on the entire ecosystem in the estuary.

Neither the Biological Opinon nor this proposal to lower the instream flows consider the above issues regarding water quality impacts noted, the impacts to recreational uses at the river side beach, the impacts to species that live in and use the river and its estuary as part of their life cycles. Neither is there consideration of the existing conditions in the upstream segments of the river that contribute to any existing impaired water quality of the Russian River. Whatever conditions exist upstream are transported downstream and concentrate in the lower reaches and in the estuary. The impaired conditions are now further exacerbated by cumulative impacts due to the concentration of constituents, interactions of constituent and the lack of exchange. Why aren't water quality parameters such as toxins and bacteria being tested? Why aren't sediments being tested, when the lowered instream flows and lack of exchange is likely to concentrate toxins and other constituents with potential to harm the ecosystem in the sediment?

I am concerned that the Notice regarding this change will cut off public comment BEFORE any environmental review is complete. I am particularly concerned that there has been no analysis of many parameters of water quality mentioned or of data collected thus far. More years of data are needed before permanent changes are made.

I ask that the public process be kept open. I request that environmental monitoring and analysis be augmented to include pertinent water quality parameters that should be of concern in an environment of public use and body contact sports. It is unacceptable to ignore the impacts on recreational use and the economic impacts associated with lowered flows and impaired water quality – for example if the Goat Rock Beach has to be closed to body contact and the river to boating due to water quality deterioration. Further I request that impacts to species and the entire ecosystem discussed in this letter be addressed.

Addressing the issues raised in this letter regarding water quality, monitoring of other constituents than those currently monitored, addressing the ecosystem wide impacts of these actions to lower instream flows, considering impacts on river use by recreational users – swimmers at Goat Rock Beach and boaters associated with potential negative water quality impacts are examples of actions and considerations would lead me to drop my protest.

The Notice of Preparation of a Draft EIR for the Russian River Estuary Management Project likewise omits consideration of any of the above parameters and is flawed in that regard.

I have sent a true copy of this protest to the Sonoma County Water Agency.

Sincerely,

Norma Jellison

c: Grant Davis, Sonoma County Water Agency
404 Aviation Blvd Santa Rosa CA 95403-9019
and by separately addressed letter

Norma L Jellison
P O Box 1636 Bodega Bay CA 94923
(707) 875-3799

February 23, 2009

Mr Grant Davis
Assistant General Manager
Sonoma County Water Agency
Santa Rosa Ca 95404

Dear Mr Davis:

RE: Russian River Biological Opinion – Russian River Instream Flow & Restoration Report/Estuary Management

I am writing regarding the Biological Opinion issued by NMFS for the Russian River. I recognize the purpose of the BO is to improve habitat for salmonids. I support efforts to restore and improve habitat for this endangered species. However, I feel a wholistic approach is missing from the report and the actions proposed, especially those referred to as Estuary Management. Lower river flows, changed estuary conditions and the prolonged closure of the mouth will have significant adverse impacts the entire ecosystem of the mouth and on a host of species that call the estuary home – especially the Harbor Seal colony and the many migratory and local birds that rest on Goat Rock Beach and its sand spits. As Harbor Seals are a protected species under the Marine Mammal Protection Act, these adverse impacts on the colony must be addressed before actions are taken that will have negative impacts.

I realize you were at the Jenner Visitor Center at the meeting convened in December to discuss a more holistic approach to the plans for the estuary. Also at that meeting a number of participants asked for a broader concern for impacts on the many species that call the estuary home. Finally, it was determined that an Environmental Assessment is required to issue the required permit due associated with the potential for take of the protected marine mammals due to harassment from actions contemplated by estuary management.

I wanted to take this opportunity to forward to you some of the back ground information below that was contained in letters I forwarded to Dr Bill Hern of the National Marine Fisheries Service late last year. I do so as SCWA is a party to the BO and is the chief sponsor and implementing agency for the contemplated estuary actions that have the potential to be most disruptive to the Harbor Seal colony, the birds and the many other animals, birds, vertebrates and invertebrates of the estuary.

The Jenner Harbor Seal colony has been established on Goat Rock Beach at the mouth of the Russian River since 1974 - 34 years. I have been a Seal Watch volunteer on this beach for over 12 years. Seal Watch is a volunteer program of Stewards of the Coast and Redwoods. Stewards with its many volunteer docent programs supports State Parks in the Russian River District and its Sonoma Coast State Park – Sonoma Coast Beaches and Willow Creek Watershed. The proposal to allow the mouth to remain closed from Spring to Fall has the potential to eliminate the oldest volunteer program of Stewards, Seal Watch, which was the genesis in 1985 for Stewards of Slavianka (the Russian name for the Russian River), the original name of Stewards. While the concerns expressed herein are mine, they are largely shared by the Stewards Board and State Parks staff.

Of the 21+ Sonoma Coast Harbor Seal haul outs that constitute the Sonoma County Harbor Seal Census, the Jenner/Goat Rock haul out is the most significant. The Jenner colony's numbers fluctuate from well over 400 to 200 seals, depending on time of year and conditions at the mouth of the River, making this colony the largest and most significant Harbor Seal colony in Sonoma County and from Drakes Beach in Marin County to the mouth of the Eel River in Mendocino County.
Norma L Jellison/SCWA/Grant Davis

February 23, 2009

In addition, the site is a rookery, with Harbor Seal pups born annually on the beach in the spring. The estuary plays a critical role for the pups to learn to swim and bond with the mothers in a safe, relatively placid environment.

Of additional concern is the lack of recognition and discussion of the adverse impacts on the birds that use Goat Rock Beach at the mouth of the Russian River for resting. At times, the numbers of Cormorants, Gulls, Terns and Brown Pelicans resting on the beach are so significant that one cannot see the Harbor Seals hauled out on the river's edge. The Brown Pelican has just been removed from Endangered Species listing, however all of these birds are protected. And finally though no less importantly there are a number of other species that use the estuary as a nursery, Dungeness crab being one iconic to the Northern California Coast.

While neither exhaustive nor quantified, at this time, some of the adverse impacts that will result from closure of the mouth and the lowered flows include:

- Prolonged closure of the mouth of the river in spring during Harbor Seal pupping season negative impacts on the pups, which are especially vulnerable at this time, disturbance at this time has the potential to cause abandonment of this haulout.
- A prolonged closed mouth during molt period = Harbor Seals will leave with potential for the haulout to be abandoned.
- Prolonged closure = more disturbance by flushing of Harbor Seals by humans walking down the beach = increased harassment of a protected Marine Mammal under the MMPA.
- Prolonged closure = more disturbance by flushing of birds which rest on the beach as a necessary part of their metabolic processes and life cycles.
- Prolonged closure/lagoon with lowered river flows negative water quality impacts from impaired WQ of upstream flows negative impacts on Harbor Seals (adults and especially pups), other wildlife, salmonids and other fish, and people/children who swim in the river upstream from the Jetty.
- Potential for increased predation on salmonids collecting at the mouth/now lagoon by Osprey, Cormorants and other birds attracted to these enhanced conditions for predation.
- Potential for increased predation on salmonids by influx of River Otters, Sea Lions attracted to the salmonids collecting at the closed mouth/now lagoon.

There is also the question of the flooding impacts of the mouth closure on homes in Jenner, the Jenner Visitor Center, the US Post Office and other riverside business on Route 1.

I do not see a rationale for moving ahead with the lowered flows and closure of the mouth effective in Spring of 2009, per news reports and statements by staff, as opposed to the BO which says 2010 on page 249. Nor do I understand the basis for proceeding with estuary management without consideration of the significant environmental impacts of proposed actions on the entire ecosystem. Experimenting with actions and then studying the impacts on the estuary is the wrong way to proceed. Too much is at stake for all of the species that call it home and visit it and use it as their gateway to the ocean.

Yours truly,
rm L Jellis
Norma L Jellison

C: Tom Roth, Congresswoman Lynn Woolsey, District Office Santa Rosa
SWRCB/VWhitney
NMFS/Hearn and DeAngelis
Madrone Audubon/ Hichwa
Russian River Keeper/McEnhill
Stewards of the Coast and Redwoods/Luna
Marine Mammal Center/Wilson
Russian River Watershed Protection Committee/Adelman

Katie Blank

From:	Jessica Martini Lamb [Jessica.Martini.Lamb@scwa.ca.gov]
Sent:	Monday, June 21, 2010 8:38 AM
To:	Katie Blank; Jim O'Toole; estuaryproject
Cc:	Records
Subject:	FW: Scoping Comments on Estuary Project
Attachments:	ScopingSCWAEstuary6-10.doc; B. HearnEstuaryGazette Art.doc; RRWPC Photo Project 2009-LR.pdf
Follow Up Flag:	Follow up
Flag Status:	Completed

-----Original Message-----
From: Brenda Adelman [mailto:rrwpc@comcast.net]
Sent: Sunday, June 20, 2010 8:42 PM
To: Jessica Martini Lamb
Cc: Grant Davis; Ann DuBay; Brad Sherwood
Subject: Scoping Comments on Estuary Project

SCWA:

On behalf of RRWPC I hereby submit my scoping comments on the Estuary Project. Please notice the 2009 Photo Project Report that is attached.

Let me know if you received and could open all three attachments.

Thank you,

Brenda Adelman

RRWPC

Russian River Watershed Protection Committee P.O.

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Sonoma County Water Agency
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June 21, 2010

Russian River Watershed Protection Committee (RRWPC) Scoping comments on SCWA's Notice of Preparation of a Draft EIR for the Russian River Estuary
Comments by Brenda Adelman

Introduction:

These comments are being filed on behalf of Russian River Watershed Protection Committee (RRWPC). We are a nonprofit public benefit organization incorporated in the State of California since 1980. Our supporters number approximately 1200 property and business owners, recreationists, and other concerned citizens in the lower river area from Healdsburg to Jenner. We also have a great deal of support from many others who appreciate our advocacy on behalf of the Russian River.

RRWPC supporters and activists utilize the Russian River for recreation and/or tourism, for fishing, swimming, for artistic expression, spiritual well being, for exercise and personal health of ourselves, family, friends and pets, and for replenishment of health and energy needed to balance out the stresses of modern day life. Due to its proximity to Bay Area urban centers, the beautiful and peaceful lower Russian River is easy to access and allows a natural refuge from everyday cares. Many of our supporters own properties in the lower river for

their summer enjoyment, but reside and work in the greater Bay Area and beyond. Because of all this, they have a great interest in this proposed project.

RRWPC supports all comments and concerns entered into the record by Elinor Twohy and Norma Jellison. Those two people are extremely knowledgeable about the seals, birds, and the Coastal environment, and we strongly support their work and concerns. In particular, the issues of the seals, the opening and closing of the mouth, and the incidence of migrating and other birds are extensively addressed by them and have our full support.

1. Concerns regarding scoping meeting process:

On May 19th, RRWPC attended a scoping meeting in the town of Jenner. Approximately 100 people attended. The first part of the program was an informational meeting on the Temporary Urgent Change Petition to the State Board for the Russian River recommending that flows be lowered this summer from 125 cfs to 70 cfs.

The second part of the meeting was intended as the scoping meeting for the Estuary Project. It is important to mention that this was a highly aware, environmentally sophisticated crowd, a fact of which SCWA staff was aware. It included a former Supervisor, the Manager of Sweetwater Water District, and many others who were known to SCWA as having long histories of addressing environmental concerns. The people in attendance came with questions and concerns that they wanted to voice publicly.

SCWA began this segment of the meeting with a description of the planned project and also information about the Marine Mammal Act. They had circulated cards and asked people to write down their questions. But as they were making presentations, time was taken to respond to many questions about the specific project plans. SCWA staff had planned to give presentations and then break up the group and have people circulate around to various stations that were set up to talk to different staff people about the project. Yet the audience wanted to stay intact and hear each other's questions and responses.

Representing RRWPC, I asked whether there was any recording being made of people's comments (electrical or by hand notes), so the Agency could have a record of what was being said in order to more fully address issues raised in the Draft EIR. I was told there was no recording taking place at the meeting, nor would there be any recording of questions at the individual stations.

EIRs covering joint projects with Federal Agencies must have one scoping session. While there are no rules that I am aware of on how this should be conducted, nevertheless, the whole point of the process is early consultation to determine and perhaps address controversial issues. We believe that the spirit of the intent was lost because of the lack of any recording of the proceedings. In this technological age, it would have been so easy to do. While cards were distributed for questions, there is a context in a meeting that does not occur on a card with a question on it. This left citizens with the appearance that the Agency was merely going through the motions and not sincerely interested in addressing the concerns of the community.

Scope of project:

Geographical limit:

The Estuary Project takes place in the Russian River from the mouth to a little upstream of the town of Duncans Mills (Austin Creek), stated to be about six miles upstream of the Estuary (BO says 7 miles upstream). Last October we took pictures of the river in Monte Rio the day before and the day after the mouth was open (October 5th and 6th). This was part of a photo project we worked on all summer. (Report attached to this document.)

The pictures indicate a profound impact on Monte Rio Beach when the mouth is open or closed, the water being at least a foot higher when closed and at least 200 extra feet of beach exposed when open. Furthermore, there was a considerable amount of algae left on the beach when the mouth was opened, indicating amounts present in the water when mouth was closed. (Monte Rio Beach is one of the worst impacted by algae with a great deal of Ludwigia as well.) These seem to fit the narrative standards for nutrients in the Basin Plan and need to be addressed. What is the fate of the algae during each of these circumstances? How does it affect the fish and the Estuary? What impact might this have on the availability of pathogens? The study area should be expanded to include Monte Rio Beach.

The closing of the mouth slows the flow of water and turns the lower river into a lake? To what extent will (and has) this "lake" become a sink for pollutants that bioaccumulate in the biota and sediments to create a harmful environment for people and fish? In fact, we have concerns that the "dead zone" (anoxic zone) in the Estuary harbors many toxic pollutants. Are/will any studies be done to determine the extent of pollution in the Estuary, whether it is being reintroduced into the water column, and whether it is contaminating the fish (Are there any fish samples being studied?)? Also, to what extent does the anoxic bottom affect

the macro invertebrate food sources of the fish? Are there any other threatened or endangered species or species of concern in the Estuary? How will they be affected by this project? (We assume you will pay especial attention to the issue of the seals.)

Bifurcation of Estuary Project and "Low Flow" Changes to D1610:

We are concerned about the bifurcation of the Estuary Project EIR and changes to D1610 EIR. In Section 15003 (h): Policies, it states that, "***The lead agency must consider the whole of an action, not simply its constituent parts, when determining whether it will have a significant environmental effect***."

This project is based on requirements in the Biological Opinion, which is a legally binding document issued by the National Marine Fisheries Service. Page 241 of the BO presents the Reasonable and Prudent Alternatives (RPA). It states that, "***All eight modifications and additional actions must be implemented as one RPA***."

Item 1 directs SCWA to petition the State Board to change minimum bypass flows in Decision 1610 (D1610), and also calls for SCWA to complete all necessary environmental documentation to promote changes to D1610 minimum flows as per Section X.A.1

Item 2 (page 242) includes the following: "***SCWA will collaborate with NMFS and modify their estuary water level management in order to reduce marine influence…..in the estuary during the summer and promote a higher water surface elevation in the estuary for purposes of enhancing the quality of rearing habitat for age 0+ and 1+ steelhead***."

Furthermore, the following statement appeared on page 231 of the BO: "***Proposed project operations will likely have significant effects on the PCE of estuarine critical habitat for each salmonid species because flow management at WSD and CVD will create high inflows to the estuary during the low flow season and the sandbar breaching activities at the mouth will significantly affect water quality in the lowermost segment of the river***."

In fact, the NOP (page 3) states that, "***NMFS' Russian River BO found that artificially elevated inflows to the Russian River Estuary during the low flow season (May through October) and historic artificial breaching practices have significant, adverse effects on the Russian River's estuarine rearing habitat for juvenile salmonids, particularly steelhead….NMFS' Russian River BO concludes that the combination of high inflows and breaching practices impact rearing habitat because they interfere with natural processes that would otherwise cause a freshwater lagoon to form behind the barrier beach. According to NMFS, fresh or brackish water lagoons at the mouths of many streams in central and southern California often provide depths and water quality that are highly favorable to the survival of rearing salmon and steelhead***."

These statements appear to attest to the fact that there is a direct link between D1610 flow changes and the Estuary Project, thereby making it unacceptable to consider them in separate EIRs.

Natural flows and breaching the mouth:

In his article appearing in the June 3rd edition of the *Sonoma County Gazette* (attached), Dr. William Hearn, chief author of the Biological Opinion, repeatedly referred to "natural flows" that used to occur in the Russian River more than 100 years ago and prior to the building of three major dams. He goes on to make the case that juvenile Steelhead **appear** to thrive in fresh water lagoon conditions and would have a much higher rate of survival if low flow conditions could be maintained.

In our comments to SCWA and the State Board on the Petition to permanently change D1610, RRWPC submitted a document entitled: "*Review of the Flow Proposal in the Russian River Draft Biological Assessment*" by Prunuske Chatham and scientific review members, Daniel Malmon, William Murphy, and Bill Trush, all Ph.D's, September 24, 2004. (Since we have already submitted the document to SCWA with our Comments on D1610 flows, we simply reference it now. It was attachment #12 in that packet.)

They ask the critical question (page 17): "*How are the Russian River's salmon and steelhead populations faring under the present D1610*?"

Page 21 of the document complains, "*Not only is natural flow missing from the stated objectives (of Biological Assessment), but an increase in salmon and steelhead populations is not a clear objective either. Rather, an "improvement" of existing summer habitat and habitat protection under increased future water demand is the objective. The Draft BA does not assess the contemporary status of salmon and steelhead populations in the Russian River Basin. Are populations improving, still declining, or staying about the same under D1610? Is the goal of "improving" habitat sufficient to stabilize declining populations presently below historic numbers? The Draft BA never provides a quantitative goal for habitat improvement*."

RRWPC believes that this critique also applies to the Biological Opinion and comments made by Dr. William Hearn as to why the Estuary Project and the D1610 Petition are necessary. This EIR should address these issues and verify the claims made to justify this project. The relationship between flows, mouth

closings, habitat resources, fish abundance and health, including reproductive health, all needs to be fully defined.

RRWPC replied to the Bill Hearn article (Sonoma County Gazette, June 3, 2010, page 1) with this about "natural" flows:

In order to promote the recovery of Coho and Steelhead, the article notes that federal officials recommend, "*One of these steps {leading back to recovery} involves restoring a more natural flow regime for the Russian River, while being careful to not unduly impact water quality and other resources*."

The article refers to possible pre-dam river flows of 30 cubic feet per second (cfs), but is unclear about whether these flows occurred throughout the river system. The article fails to assign impacts from all the changes in land use that has occurred in the last 100 years, nor how going back to original flows, would impact the entire system. In fact, it is stated that Estuary rearing would help the survival of the species, but fail to mention that normal habitat in the tributaries has been decimated by legal and illegal water diversions, careless agricultural processes, timber harvesting, gravel mining, etc. Now they are left with fewer habitat options, and this scheme is an experiment and possibly a last ditch effort, to save species that may not have a chance otherwise.

Actually, when Dr Hearn talks about going back to "natural flows", he doesn't explain that they are only recommending such flows for the lower river and not the entire system. Flows north of Healdsburg will only be reduced to 125 cfs (which is our normal flow and with which we could probably be content). By assigning a theoretical historical flow of 30 cfs and then appear generous by saying they will allow us three times that amount, is manipulative and condescending and certainly not at all scientific.

Furthermore, the article states that while normal low flow had been 125 cfs, ACTUAL flows commonly ran 120 to 180 cfs, therefore "low flow" should be 70 to 85 cfs. No scientific data was provided anywhere demonstrating how the ideal of 70 cfs was arrived at. In fact, at the June 9th meeting in Guerneville, Dr. Hearn kept moving the goal post by first saying that flows would actually be about 85 cfs, and then he said 90 cfs., and then 100-110 cfs. Since the only formal change in the Petition is 70 cfs., there is no regulatory meaning to the other suggested flows.

The phrase, "*not duly impact water quality*" has not been defined and no specific regulatory standards are offered. It merely states that the Regional Water Quality Control Board provided oversight on water quality monitoring. Yet, nutrient monitoring conducted last year by SCWA incorporated excessive detection limits, which resulted in worthless data. Temperature was extremely high, but no concern expressed even though some steelhead and Chinook may remain in the system in the summer time. Our impression is that the Regional Board was involved in setting up the monitoring program and then afterwards actually paid little attention to the process.

Scoping Comment Letter 15 (cont.)

Another aspect to this situation is the link between low flows and Estuary closure. Our attachments submitted to SCWA with the Permanent Change Petition to D1610 comments included a chart of the mouth closures (#7). In looking at the chart, it is clear that the trend in the last ten years or so has been for the mouth to remain open most of the time in July and August no matter what the flow. I believe that there were few closures in 2009 between June and September, although summer flows averaged as low as 63 cfs in August.

For example, 2002 was a low flow year and the mouth was open most of the time until Oct. 1st, but for two very brief closures in May and June. 2003 was open through September. 2004 was open until October, but for three brief openings in April, May, July/August. 2005 was open all year until mid-September. 2006 was open all year until late October. 2007 was open all summer (May through September) until mid-October. 2008 was closed much of May, but had only two closures for about a week each during June through September. These statistics seem to dispute the NOP claim that frequently the mouth closes in the summer time, at least in the last ten years. We wonder if the barrier beach would be constructed if the first mouth opening comes in September?

In any case, Dr. Hearn's comments seem to prove the argument that there is an indisputable symbiotic link between the Estuary Project and decreased flows. Therefore, CEQA and NEPA documents on these two projects (Estuary and D1610) should be merged.

Flooding justifies need for low flows:

Another circumstance linking the Estuary Project to the D1610 revision is the estuary flooding which in turn triggers the need to artificially open the mouth when water levels exceed seven feet. This flooding is directly related to Russian River flows and is the central reason for requiring SCWA to petition the State to change D1610 and reduce lower river flows by 45% (125 cfs. To 70 cfs). To imply that summer flow levels in the lower river are too high and are harming the threatened fish is really misleading, since the true immediate concern is for the flooding of a limited number of properties.

A report has been prepared showing about 90 properties that may be subject to inundation at various levels. Further study needs to be conducted because many of the properties listed only flood when water levels go over 10-12'; numerous properties are undeveloped or underdeveloped, and some are abandoned. We suggest that more meaningful research be done sooner rather than later, so we can see if the flow problem can be resolved by simply lifting a few structures out of the flood plain, rather than subjecting a whole river to minimal flows and potentially significant water quality problems. (Dr. Hearn has admitted that flows might be able to remain at 125 cfs if the flood issue could be addressed.)

What is the role of ocean conditions in the Estuary Project?
In response to a question about the Coho Broodstock Program, we recently learned that no Coho returned last year in spite of a great deal of tributary work to improve conditions. The explanation from a key Fish and Game official was that poor ocean conditions probably accounted for the disappointing results. Could these conditions include acidification? Could they include other water quality problems? Will water quality problems in the ocean be addressed as part of this project?

Ocean conditions also help govern when the mouth opens and closes. Since we noted a possible trend in the mouth remaining open in summer under numerous flow conditions, one would think that conditions may be different in the ocean to explain this. What studies will be conducted to better understand the ocean's role in the opening and closing of the mouth?

Also, there has been a lot mentioned in the media the last several years about global warming and rising sea levels. What role could this be playing in the long term management of this project?

RRWPC incorporates by reference our entire packet of comments (25 pages) and 32 attachments concerning the Petition for the Permanent Change to D1610 submitted to the State and SCWA on May 13, 2010.

Attachments:

Photographic Report on Water Quality Conditions in Russian River

"Why Change Summer Flows in the Russian River" by Dr William Hearn, iSonoma County Gazette, June 3, 2010

WHY?

Change Summer flows in the Russian River?!

By Dr. Bill Hearn,
National Marine Fisheries Service

There is considerable buzz in the lower Russian River community about the effects of reducing the river's summer flows. Will water quality be impacted? Will we have to drag our kayaks through the shallows? And what about the seals at Jenner; will new water level management plans drive them out? Are flow reductions really necessary, should the Jenner estuary become pond-like, and who is behind it?

For at least two decades, the degradation, restoration, and protection of the Russian River, its fisheries, water quality, and recreational resources have been hot topics in Sonoma County. Much has been accomplished to protect the river from the county's human population growth and development. However, the river's coho salmon population is now nearly extinct, and the river's several steelhead populations are a mere, small remnant of what they were 50 years ago. With responsibility for promoting the protection and recovery of salmon and steelhead listed under the Federal Endangered Species Act (ESA), NOAA's National Marine Fisheries Service (NMFS) has found several causes for these species declines, and it has identified steps that will likely promote their recovery. One of these steps involves restoring a more natural flow regime for the Russian River, while being careful to not unduly impact water quality and other resources.

Why Change Things?

To understand the importance of a natural summer flow regime, it is necessary to consider what is "natural". The Mediterranean climate along California's central and southern coast produces a predictable "drought" lasting 5 months or longer every year. In this area, stream flows naturally drop to very low levels by early fall.

Along our coast where rivers flow into the ocean, ocean wave action typically forms barrier beaches across river mouths, so that rivers become naturally cut off from the ocean. When separated from the ocean by a barrier beach, the most downstream segment of the river forms a freshwater or somewhat salty (brackish) lagoon that can provide extremely important rearing habitat for juvenile steelhead.

The water quality dynamics of these lagoons are complex and dependent on inflow, geology, and ocean processes. Sometimes it can take several weeks for high quality conditions to become established. Nevertheless, researchers have found that a disproportionately large number of returning adult steelhead are reared for extended periods in these "closed lagoons" compared to the survival and return of adults that were reared mainly in headwater tributaries.

The ocean survival of lagoon reared steelhead is higher because the juveniles are able to grow quicker and larger in the highly productive lagoon environment.

Homes along the estuary are threatened by water backing up at the barrier beach so the sand bar is mechanically breached with a deep cut to prevent flooding these homes.

During the early years of Sonoma County, natural summer flow in the Russian River was relatively low (approximately 30 cfs during August and September). The mouth of the river at Jenner often closed during summer months. This is not surprising given how low tributary stream flows are during summer, even in undeveloped watersheds.

However, for the past 100 years the mainstem Russian River has had a remarkably different and artificial flow regime during summer months. Water supply and summer flows have progressively increased beginning with the construction of the Potter Valley Hydroelectric Project in 1909. With that project, Eel River flows are diverted to the upper Russian River. The construction of Lake Pillsbury (1921), Lake Mendocino (1959), and Lake Sonoma (1981) further and greatly increased water supply and summer flows in the Russian River.

In 1986 State Water Resources Control Board (SWRCB) Order D-1610 set minimum summer flows in the river, including a minimum flow of 125 cfs at the Hacienda Bridge in Forestville. Yet summer flows have not been maintained at 125 cfs during normal water years, rather they have been closer to about 180 to 220 cfs. In normal water years, summer flows in the Russian River have been 6 to 7 times higher than natural.

This is great for boating, but it disrupts the natural formation of a lagoon between Jenner and Duncans Mills. Under natural lower inflows, the river would flow straight through the barrier beach (not over it). However, when flows are six times the natural flow, the water backs up behind the beach, threatens flooding, and thus requires someone to breach the beach.

The result is a tidal, unstable environment that is more salty, shallower than a more natural "ponded" system, and relatively poor quality habitat for rearing salmonids. The very high summer flows also degrade the quality of coldwater rearing habitat for steelhead between Ukiah and Cloverdale.

Scoping Comment Letter 15
Attachment 1 (cont.)

Nowhere else along the coast of California are rivers discharging highly elevated, artificial flows (over 100 cfs) to the ocean during summer with resulting impacts to listed species.

Through a Biological Opinion (BiOp) issued in September 2008, NMFS directed Sonoma County Water Agency (SCWA) to petition the SWRCB to reduce minimum stream flows in the Russian River from late spring through early fall. The exact minimum flow would be determined during an interim period of approximately seven years.

Water Agency staff seining during estuary studies of water quality and fish habitat

The BiOp states that a minimum flow of about 70 cfs at the Hacienda Bridge together with a 10 to 15 cfs operational buffer flow would result in an 80 to 85 cfs flow that may achieve multiple objectives of protecting lagoon habitat near Jenner, while retaining boating flows in the lower river and avoiding significant water quality impacts.

A 10 to 15 cfs operational buffer is needed by SCWA in order to ensure compliance with any minimum flow standard. Thus with a 70 cfs minimum flow, flows would generally be in the vicinity of about 80 to 85 cfs.

The BiOp states that during the approximately seven year interim period, SCWA should seek temporary changes in minimum flows so that water quality, boating and other potential effects of a 70 cfs minimum flow and alternatives can be adequately assessed. After this period of study and assessment, with input from the public and involved agencies such as SCWA, Department of Fish & Game, and NMFS, the SWRCB will be able to determine the best minimum flow for the Russian River and its resources, and then make a permanent change to D-1610. This will be a long process, with substantial environmental assessment and opportunities for public comment.

Concerns about Flow and Estuary Changes

Concern by some members of the public about reduced summer flows and new approaches to managing water levels in the river's estuary generally fall into three areas: impacts to water quality, boating, and the harbor seals at Jenner.

Unease about water quality impacts is due to the simple fact that pollutants can become concentrated at lower flows. Contaminants (e.g., pesticides and pharmaceuticals), excessive nutrients that promote algae growth, and pathogens (e.g., fecal coliform) are in the river. Urban waste treatment facilities along the Russian River do not discharge to the river between mid-May and October 1.

However, faulty septic systems as well as human and animal contact do periodically cause high levels of pathogens under both normal (125 cfs minimum) and dry year (85 cfs minimum) summer flows. Pollution from faulty septic systems and other sources must be stopped at its source.

Flushing pollution to the ocean with highly elevated, artificial flows is causing harm to listed salmonids and is contrary to rational water management policy. Dilution is not the solution to pollution, especially in a

Mediterranean climate.

To help address the effects of alternative low minimum flows, SCWA will be monitoring and analyzing the effects of alternative summer flows on diverse water quality parameters. The Regional Water Quality Control Board is providing oversight.

River kayaking and canoeing are usually swift water recreation activities. In general, the quality of a river boating experience increases with flow—up to a point. However, high artificial flows that facilitate a high quality, summer boating experience can come with a high ecological and societal cost. Yet, summer boating in the Russian River can likely be preserved by identifying a flow that minimizes the need for boaters to drag their boats through shallow riffles.

Preliminary evaluations suggest that a flow in the range of 75 to 90 cfs at Hacienda Bridge creates such conditions, and that this is probably within the range of flows needed to create a closed lagoon at Jenner. Note that 75 to 90 cfs is still roughly three times higher than pre-dam summer flows for the lower Russian River. NMFS BiOp anticipated the need for additional evaluation of boating flows and flows needed to create a closed lagoon. That evaluation will be occurring during the approximately seven years prior to the change in D-1610.

Concerns about new water level management practices in the estuary on seals include apprehension that heavy equipment will frighten or even run over animals, and fears that with a closed lagoon, seals will be displaced from the mouth of the river where hundreds of animals congregate during various times of the year.

SCWA has been operating heavy machinery for many years on the beach at Jenner without significant adverse effects on harbor seals. The new management plan simply calls for making a shallower and longer "slot" at an angle to the ocean.

Harbor Seals live at the mouth of the Russian River where food is plentiful. Flow from the river to the sea follows a natural path until the barrier beach is formed The Biological Opinion requires creating an overflow channel similar to the natural path - as opposed to the straight deep cute - to allow river water to flow into the ocean but no ocean water to flow back into the lagoon

NMFS is charged with protecting both harbor seals under the Marine Mammal Protection Act (MMPA) and salmon listed under the ESA. NMFS issued an Incidental Harassment Authorization under the MMPA to SCWA and through the permit process, NMFS marine mammal specialists identified limits for beach management actions and required monitoring in order to protect seals.

NMFS also requires SCWA to conduct extensive long-term monitoring of estuarine water quality and biological productivity. Changes in estuarine water level management must be done in a manner that ensures the harbor seal population will remain stable and healthy, while reducing impacts to listed salmonids.

Russian River Watershed Protection Committee

2009 Photo Project

Report: June 21, 2010

By Brenda Adelman for RRWPC

Photographic Report on 2009 Water Quality Conditions in Lower Russian River:

Response to proposed 45% cut in summer flows.

By Brenda Adelman for RRWPC

I. INTRODUCTION

In late May, 2009, in anticipation of very low summer flows as measured at the Hacienda Bridge, I started taking photographs from the Hacienda Bridge, the Guerneville (Old) Bridge, and the Monte Rio Bridge and Beach every week until early October, but for one week. Several other photographers assisted, including Laurie Ross, Larry Hanson, Shula Zuckerman, Kim Pistey, Tom Meldau, Shane McColgin, and Community Clean Water Institute volunteers.

Photographs were taken between the end of May and the end of September between Steelhead Beach and Monte Rio Beach. We also received a few photos from supporters and have included one picture from the Duncans Mills area as well. We ended up with thousands of photos and this report offers just a sample of representative scenes we shot.

Our goal was to photograph water quality problems, mostly in the form of nuisance algae and Ludwigia and also to show the water levels as the summer progressed. The two dams at Guerneville and Vacation Beach kept waters consistently high in that area all summer. The area where flow changes were most visible was the Kid's Beach in Monte Rio, which is east of the bridge. That was also the area with some of the worst algae. Over the course of the summer we saw many different kinds of attached and unattached algae and offer a representative sample in the pictures. We don't know the names of what we found, but hope some more knowledgeable than ourselves will be able to identify them.

We also tracked water quality monitoring reports as well as pathogen exceedances and beach postings. Furthermore, we include flow data as measured at Hacienda. There are no other flow gauges for the lower river that we know about. Unfortunately, the nutrient data for the entire year included inappropriate protocols and is very inadequate for scientifically determining the extent of the problem. Hopefully this will be corrected in 2010.

This report is divided into several sections including, algae, Ludwigia, water levels and impact on beaches, both by flow control and opening of mouth. We include two sets of before and after pictures, upstream and downstream of the Monte Rio Bridge showing the impact of opening the mouth of the river. Two of the pictures were taken on October 5th just as the mouth was being opened, and two were taken the very next day. The difference is profound.

After the breaching, when the water went way down, the beaches where the water had been were covered with algae. I talked to Regional Board staff about the algae and was told they would take samples. I was later informed that toxic blue-green algae had been found in the area of the Kids' beach at Monte Rio.

We include Hacienda flow data here, which we obtained from Sonoma County Water Agency. All of the flows through Sept. 30, 2009, had been verified by USGS. The October flows had not yet been verified. Over the course of the summer, of the 130 days total, 57 days the flow was under 85 cfs, and 31 days were under 70 cfs. The lowest flow was 47 cfs on August 17, 2009.

A few of the pictures state "pathogen exceedence". This means that weekly monitoring at Monte Rio Beach for pathogens was out of compliance on that date. The temperature data came from Hacienda or Johnson's Beach monitoring sites and averaged about 20 to 25 Celsius, which is far too high for salmonids. Temperatures diminish considerably in the fall however.

RRWPC requests that the enclosed photographs not be used for any purpose other than as evidence for consideration of changes to Decision 1610, either Temporary or Permanent. They may also be used by North Coast Regional Board staff for scientific evidence of water quality impairment of the lower Russian River. We do not allow these photos to be used for any commercial purpose without written permission. Where no photo credits are given, pictures were taken by Brenda Adelman.

II. MOUTH BREACHING & FLOW IMPACTS

Breaching of Mouth: impacts on Monte Rio Beach: looking west....

Photo 0145 was taken from the Monte Rio Bridge in the afternoon on Oct. 5, 2009 around 4 pm. looking west. Notice signs on mid-right of photo, far into the water. On far left notice accentuated plant on cement structure and plants submerged behind it. The water here was much higher than I had seen all summer at this location.

Hacienda flow: 92 cfs (not yet verified by USGS)

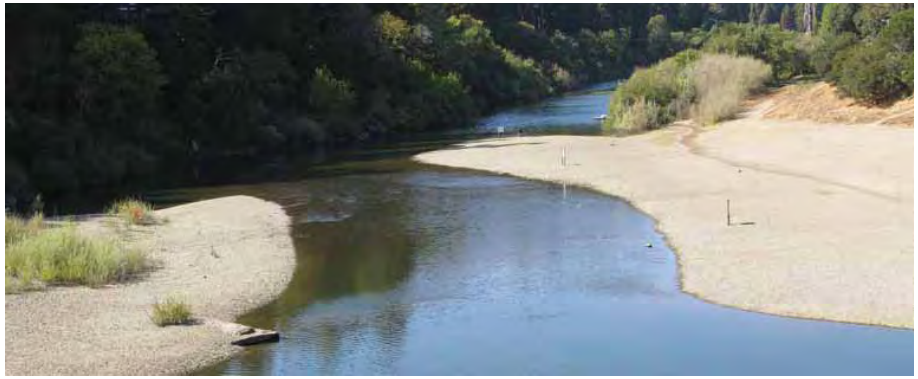

Photo 0228 was taken one day later (Oct. 6, 2009) of the same scene (magnification a bit different however.) In this picture you can see flat rectangular cement structure with plant behind it and beach all exposed behind.

On the right you can see the sand bar jutting way out with signs that had been far into the water on Oct. 5th, now far back on the sand. The line in the sand behind the signs is where the water had been the day before. Also, you can see sand bar jutting way out beyond bushes in upper right of photo. Although you can't see it in this picture, that beach is covered in algae where the water had been.

Hacienda flow: 102 cfs (not verified by USGS)

Breaching of Mouth: impacts on Monte Rio Beach: looking east….

Photo 0165: This picture was taken about 4 pm on Oct. 5th. The water line is right behind white wood platform. Bushes along the bank and Ludwigia go far out beyond water line.

Photo 0239: This was taken around 2:30 pm on Oct. 6th after breaching of the mouth. You can see white platform far back on sand and sand bar juts out beyond Ludwigia.

Low flow impacts on Monte Rio Beach:

Photo 5845: This is another comparison of the same beach scene looking east. This picture was taken earlier in the season on July 11, 2009. Water levels are more than October 6th but less than October 5th when the mouth was closed. The mouth was open when this picture was taken.

Hacienda Flow: 112 cfs
Temperature: (Johnson's Beach) 23 Celsius

Photo 7924: This picture contrasts with 5845 in that you can see that the river level is much lower (mouth open in both pictures). This was the most visible bridge location where we can see the impact of flow levels on the river. It was taken on Aug. 15, 2009

Hacienda Flow: 50 cfs
Temperature: (Johnson's Beach) 25 Celsius

III. ALGAE:

Photo 0329: This is essentially a blow up of photo 0228 on page 3 (upper right of photo) and taken Oct. 6, 2009 at Monte Rio Beach looking west. It shows prevalent algae in water and on beach AFTER opening of the mouth of the river. You can also see water line from prior day in bottom right corner.

Photo 0387: taken by Bill Clark behind his Duncans Mills vacation home on July 31, 2009 in the morning.

Hacienda flow: 76 cfs
Monte Rio Pathogen exceedence

Photo 4752: This photo was taken from the Monte Rio Bridge looking west on June 22, 2009. The whole water column seems to be subject to a large algal bloom. In subsequent visits, it was not nearly so iridescent green.
Hacienda flow: 157 cfs
Temperature:

Photo 0326: This picture was taken on Aug. 22nd from the Monte Rio Bridge looking east towards the Kid's Beach. As I looked down into the water in the middle of the bridge, the floating algae could be seen going by.
Hacienda flow: 64 cfs
Temperature: (Johnson's Beach) 23.63 Celsius

Photo 0407: This was taken at the Monte Rio Kid's Beach while down at the beach, also on Aug. 22nd. I believe that this is a different kind of algae than what was seen in the prior picture.
Hacienda flow: 64 cfs
Temperature: (Johnson's Beach) 23.64 Celsius

Photos 6814 and 7239: These photos were both taken at the Kid's Beach (from the beach) in Monte Rio. 6814 was taken on Aug. 2, 2009 and 7239 was taken on Aug. 8th. They were both from the same area.
Hacienda flow: 71 cfs and 64 cfs
Temperature: (Johnson's Beach) 23.35 Celsius

Temperature: (Johnson's Beach) 23 Celsius

ALGAE continued

Photo 6980: This picture was taken from Hacienda Bridge on Aug. 2, 2009 Looking west (downstream), the hill on the right is where the pipe is located and the algae is right down below.
Hacienda flow: 71 cfs
Temperature: 22 C

Photo 0369: This was taken at the footings of the Vacation Beach Dam (from the road) soon after it was taken down. The picture was taken on Oct. 6, 2009. The algae are very bright green as you can see, but we don't know what it is. Regional Board staff verified that it is not blue-green algae.
Hacienda flow: 102 cfs

Photo 8100: This picture was taken from the Hacienda Bridge on the North side and looking over to the right. There is a huge outcropping of Ludwigia on this bend and immediately downstream is the large mat of attached algae. This picture was taken on Aug. 16, 2009.
Hacienda flow: 51 cfs
Temperature: 23 C

Johnson's Beach algae photographed by Shula Zuckerman on September 27, 2009. The picture speaks for itself.
Hacienda flow: 69 cfs
Temperature: 21 C

Photo 3542: Picture of floating and submerged algae taken by Laurie Ross in the Steelhead Beach area on August 18, 2009
Hacienda flow: 51 cfs
Temperature: 23 C

Photo 3552: Steelhead Beach algae taken by Laurie Ross on August 16, 2009
Hacienda flow: 51 cfs
Temperature: 23 C

Photo 3311: taken by Laurie Ross in the Steelhead Beach area. This picture shows both Ludwigia and the attached floating and attached tubular algal plant under the water's surface. July 20, 2009 at west Steelhead Beach area, I found the same kind of growth at Hacienda looking south from the bridge on the right bank. **Photo 6327** was taken July 19, 2009.
Hacienda flow: 69 cfs
Temperature: 23 C

IV. LUDWIGIA

This invasive plant has overrun much of the Laguna and is now evident throughout the entire lower Russian River watershed. The Laguna Foundation eradicated it fairly successfully a few years ago in one area (near Stony Point west of Cotati), but it rapidly came back full force when not maintained. It now fills the entire channel.

Ludwigia is found in outgrowths from the bank along the whole lower river. We photographed downstream of SCWA facilities, but we know it occurs upstream as well, although not as prevalent as the lower section of the river. We include representative photos here going down the river from Mirabel (Steelhead Beach) to Monte Rio.

Steelhead Beach: Photo 7-31c looking downstream on July 31, 2009. You can see seven outcroppings in this picture along the bank. Hacienda flow on that date was 76 cfs. Picture taken by Tom Meldau and Shane McColgin.

Sunset Sunset Beach Ludwigia pictures taken by Larry Hanson (Photos 0098, 0024, 0026).

Photos 0024 and 0026 were taken west of the main Sunset Beach on July 25, 2009
Hacienda flow: 71 cfs

Photo 0098 was taken on July 4, 2009 in about the same location
Hacienda flow: 128 cfs

Hacienda Beach:

Photo 8091 was taken on August 16, 2009 (**Hacienda flow:** 51 cfs) and shows a large outcropping just north of the Hacienda Bridge looking down to the right.

Photo 8384 was taken looking south on the Hacienda Bridge towards the right bank on August 22, 2009.
Hacienda flow: 64 cfs

Photo 6684: Hacienda Bridge looking downstream at the left bank. Picture taken July 26, 2009 This is an outcropping of Ludwigia right next to outcropping of submerged attached algae.
Hacienda flow: 74 cfs.

Oddfellow's Bridge:
Photo 30002 taken by Kim Pistey, I believe at the Oddfellow's Bridge. (I was unable to contact her to verify.) The picture was taken in late August.

Old uerneville Bridge: (looking east):
Photo 6246: taken July 18, 2009.
Hacienda Flow: 81 cfs.

Dubrava Beach:
Photo (#8) taken September 5, 2009 by Shula Zuckerman.

North bank between Russian River County Sanitation District and Monte Rio Beach:
Photo 3200: taken by CCWI volunteer. Not sure of date, but I had noticed area and it had been pretty consistently the same all summer.

Monte Rio id's Beach:
Photo 6591 taken July 25, 2009.
Hacienda Flow: 71 cfs

Researched and prepared by volunteers for:
Russian River Watershed Protection Committee
PO Box 501
Guerneville, CA 95446
rrwpc@comcast.net
www.rrwpc.org

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Graphic design and layout by Sonoma County Gazette Publisher Vesta Copestakes

Katie Blank

From: Larry Hanson [larryjhanson@comcast.net]
Sent: Monday, June 21, 2010 10:36 AM
To: estuaryproject
Subject: Scoping comments on the Estuary Project

Follow Up Flag: Follow up
Flag Status: Completed

June 21, 2010

Jessica Martini-Lamb

estuaryproject@esassoc.com

Scoping comments on the Estuary Project

Scientific analysis has been compromised

The conclusion of the BO has been compromised by not sticking to a scientific analysis, and instead, including political decisions to influence a possible different outcome if a true scientific analysis were made. The Russian River flows back up into an estuary when the mouth naturally closes threatening to flood some existing low-lying houses and septic systems. The decision about what happens to these houses should be left to the government agencies that have that purview. This should not be part of NOAA's scientific analysis.

A political decision that was made is by allowing a flooding situation of a few houses to change a different scientific outcome affecting the whole river system. This is not scientific, nor is it reasonable.

The biological and scientific evaluation has been piece-mealed.

Even though the estuary BO is kept as a separate analysis from the low flow BO, the first is dependent upon the latter and, therefore, should be analyzed together. The conclusion that lower flows were historic and therefore we need to go back to them is based on a streambed and hydrology that no longer exists for the Russian River. Before significant impacts took place, the river meandered most of its length with debris structures creating large holes. Even in lower flow summers, there was likely plenty of water for the fish. The unimpacted watershed retained and released water throughout the year, unlike our current impacted one that allows much of the water to run off during winter flows. It was a much different regime and we cannot completely go back to it. I am questioning the drastic reduction of the RR flows, not the slight reductions that would ameliorate the problems for salmonids in the upper RR.

The artificial breaching of the RR mouth needs to stop altogether. The BO reduces the amount of breaching which is good, but not good enough.
My recommendation is that the barrier at the mouth needs to be removed which will allow a more free flow of sand movement to naturalize the system. Along with this could be a slight reduction of RR flow which would be monitored closely. The diagonal trench could be the next step if necessary. The last step would be dealing with the houses and septic systems by raising or removing—a one-time process verses continual and costly breaching several times a year, year in and year out, that severely affects the marine animals and other aspects of the river system.

Thank you for giving my critique and suggestions consideration.

Sincerely,

Larry Hanson

Manager, Northern California River Watch

Katie Blank

From: Don McEnhill [rrkeeper@sonic.net]
Sent: Monday, June 21, 2010 12:34 PM
To: Jessica Martini Lamb; estuaryproject
Subject: Estuary Management EIR scoping comments
Attachments: Estuary Scoping comments.pdf; ATT98393.htm

Follow Up Flag: Follow up
Flag Status: Completed

Please let us know if you have any trouble opening or reading our comments.
Sincerely,
Don

RUSSIAN RIVERKEEPER®
"We're On It!"

June 21, 2010

Sonoma County Water Agency
Attn: Jessica Martini-Lamb, Principal Environmental Specialist
404 Aviation Boulevard
Santa Rosa, CA 95403
via email, estuaryproiect@esassoc.com

Re: Comments on Notice of Preparation of a Draft Environmental Impact Report for the Russian River Estuary Management Project (Estuary Project)

Dear Ms Martini-Lamb,

I am submitting these comments on behalf of our 1400 members and in support of our mission to work with the community to advocate, educate and uphold the environmental laws to ensure the protection and restoration of the Russian River for the health and benefit of all who use and enjoy it.

The Estuary Project (Project) is in response to the Russian River Biological Opinion (BO) issued in September 2008. The BO issued a list of Reasonable and Prudent Alternatives (RPA) that are required for the Sonoma County Water Agency to undertake. The suite of RPA actions is clearly linked and constitutes a project under CEQA definitions. The Project EIR should be reviewed in conjunction with proposed reduction in flows per the petition to the State Water Resources Control Board to modify Decision 1610 (Petition). It could be quite appropriate to undergo separate environmental reviews for this Project and the Petition but cumulatively they have to be considered together.

Regarding the Project scoping issues to be reviewed we offer the following comments that should be reviewed in the upcoming EIR under CEQA.

What is the potential effect on marine organisms that currently utilize the estuary when the estuary is maintained as a closed lagoon? What will be the effect on Dungeness crab and other marine species that have been documented by seine netting by SCWA staff?

A jetty built with rocks and then overlaid with concrete lies under the sandbar at the mouth of the river. Regarding this jetty, what effect does it have on percolation rates and ability to control the estuary water levels when the mouth closes? Could removing this jetty increase the percolation through the sandbar and increase optimization of estuary water levels? What effect does the jetty have on sandbar mechanics and height and shape? Reviewing our pictures of the jetty at various sandbar conditions it appears that the jetty creates depositional area for sand on the estuary side of the sandbar, does the jetty help increase the sandbar height and what effect does this have on estuary management goals?

Several low-lying structures cause the need for artificial breaching the sandbar to avoid flooding, including the Sonoma Coast State Parks visitor center and Jenner Post Office. How

PO Box 1335 Healdsburg, CA 95448 ❖ 707-433-1958 ❖ Fax 707-433-1989 ❖ info@russianriverkeeper.org

could estuary management be improved by raising these structures to a higher elevation? In some of the related studies and reports for the BO it was noted that managing the estuary at a higher level than 8ft could be beneficial, this should be studied. In studying the potential biologic benefits to operating the estuary higher than 8ft, wouldn't a grater range of estuary levels produce deeper pools and higher forage opportunities for Salmon and Steelhead? Considering how low-lying structures in other areas have been elevated to reduce the flooding potential is this feasible? What are potential sources of funding to raise these structures?

The NOP states that the alternatives analysis will consider a no project alternative and the estuary management alternatives identified in the BO. However some west coast estuaries that have existing populations of ESA listed Salmon and Steelhead are not closed estuaries but remain open all summer to ocean tides. The EIR should review all west coast estuaries and an alternative should be added that considers an always-open estuary as a viable alternative since some west coast estuaries operate well for salmon in this manner.

One of the BO objectives says, "SCWA will manage water surface elevations in the Russian River estuary by conserving beach sands and…" in light of this statement, how will this Project conserve beach sands? As this subject is raised in the BO we would expect the Project EIR to examine the composition and origin of the material that makes up the beach sand at the river mouth. Our understanding is that the sand is comprised of material washed down the Russian River so it would seem that examining and understanding the sediment budget of the Russian River would be important for this EIR. In addition, although gravel-mining firms claim they are only taking what they term "recharge", our consultants inform us their methodology is questionable for determining actual inflows and outflows. The modeling employed to determine sediment flux are also limited by having to run sand and gravel separately, which can understand actual sediment transport. In light if this it would seem proper for the Project EIR to independently review the sediment flux calculations provided by the gravel mining firms to ensure that gravel mining will not impact sediment supply to the sandbar at the river mouth.

The "lagoon" area that backs up when the sandbar is closed and prior to 8ft in Jenner extends well upstream of Duncans Mills the proposed Project Area. In the past we have noted the backup extending to Northwood / Bohemian Grove swimming hole so the Project area should cover the entire area that could be influenced by the Project.

The project EIR should examine the BO recommendation that the "lagoon" be breached after October 15th, since juvenile steelhead should be large enough to withstand salt-water conditions. It is our understanding that juvenile steelhead need to undergo acclimatization of salt water and that the fish undergo physiological changes to allow them to survive in salt water. If the estuary (lagoon) achieves a freshwater condition and then is suddenly breached in October, will those juveniles be able to withstand an abrupt change from fresh to salt water?

We are gravely concerned about proposals for monitoring water quality in the estuary. Changing the estuary from a generally open system to a closed system could decrease flow and circulation and allow pollutants to accumulate. Past water quality monitoring of normal flow and estuary management conditions was very limited and focused primarily on periods before during and just after breach events. Little reliable and comparable data exists for ambient water quality or nutrients for the past flows and estuary management. At a recent

Scoping Comment Letter 17 (cont.)

public meeting by SCWA the EIR preparer, SCWA claimed that this Project EIR will not examine water quality issues and that those would be covered under the EIR for the Petition to modify Decision 1610. Under CEQA the estuary management Project and Petition are both part of a larger project, responding to the BO so we would either expect one big EIR or both Projects covered under a Programmatic EIR. To separate the Project and Petition EIR's would violate CEQA so we expect this EIR to fully examine impacts to water quality from changes in inflows as well as propose mitigations. Water quality issues must be studied for all marine and freshwater organisms that have used or will use the estuary and not just for Salmon and Steelhead.

Lastly, one of the biggest issues facing coastal estuaries is global warming and sea level rise. It is projected on various maps that the sandbar at the river mouth will be under water at some point in the near future. The EIR has to consider the impact of sea level rise on estuary management and especially water quality. If the sandbar is regularly overtopped during wind events or normal tides due to sea level rise the entire condition this EIR strives for might not be attainable in the future. Additionally global warming is changing the water quality of the Ocean and leading to increasing acidification. What effect will this have on salmon and steelhead food sources in the estuary? Would the water quality conditions that the Project is seeking even be possible under new conditions posed by global warming and sea level rise?

We appreciate your consideration of our comments on this Project EIR.

Sincerely,

Don McEnhill
Executive Director

Katie Blank

From: Sonoma Coast Chapter of Surfrider Foundation [sonomacoastsurfrider@comcast.net]
Sent: Monday, June 21, 2010 12:41 PM
To: estuaryproject
Subject: re: Surfrider Scoping Comments

Follow Up Flag: Follow up
Flag Status: Completed

Sonoma Coast Chapter of Surfrider Foundation

The Surfrider Foundation is a non-profit grassroots organization dedicated to the protection and enjoyment of our world's oceans, waves and beaches. The Surfrider Foundation now maintains over 50,000 members and 90 chapters worldwide.

A1.2-60

Comments and Concerns for the Notice of Preparation for the Environmental Impact Report on the Russian River Estuary Management Project:

1. Deterioration of water quality in the estuary, river mouth, and surf area including possible additional pollution from nutrients, regulated and emerging toxins, bacteria, temperature, invasive species, and algae with proposed lower flows and modified breaching practices.
2. No baseline data provided for above mentioned toxins. No existing evidence that lowering flows will be safe for humans or the environment.
3. Lack of comprehensive testing of water quality at river mouth and ocean environment in EIR. Public not notified of exact list of toxins that will be tested and all locations testing will be completed.
4. No alternative plan provided should harmful water quality impacts from low flow be discovered in the interval.
5. Inadequate data and consideration of diversion on summer water flows. Water contractors have been told water deliveries would be normal this year even with lower flows.
6. No consideration in EIR of impact of lower flow on surfing at the river mouth as well as surfing areas south of the river including North Side Goat Rock, South Goat, Blind Beach, and the Far Cove. These premier Sonoma County surf recreation areas depend greatly on the influx of new sand and gravel. The combination of modifying breaching practices and lower flows will remove the possibility of surfing these areas.
7. No consideration in EIR of beach erosion and subsequent beach access from reduced sand and gravel outflows.
8. Failure to include negative impact on other species such as marine mammals, water fowl, and sea birds due to new proposed estuary management practices and construction of outlet channel in EIR.

The Surfing Community of Sonoma County requests that the impact on the wave and water quality in the ocean environment be considered in the Environmental Impact

Report on the Russian River Estuary Management Project. The Surfrider Foundation promotes responsible acts to preserve, restore, and protect the salmon population.

Please direct any inquiries on this matter to
Sonoma Coast Chapter of Surfrider
sonomacoastsurfrider@comcast.net

Katie Blank

From: Carol Vellutini [carolvsr@sonic.net]
Sent: Monday, June 21, 2010 1:51 PM
To: estuaryproject
Subject: Scoping comments on SCWA's Notice of Preparation of a Draft EIR for the Russian River Estuary

Follow Up Flag: Follow up
Flag Status: Completed

Sonoma County Water Agency
Attn: Jessica Martini-Lamb
404 Aviation Blvd.
Santa Rosa, CA 95403

June 21, 2010

Scoping comments on SCWA's Notice of Preparation of a Draft EIR for the Russian River Estuary

I attended a scoping meeting in Santa Rosa on the Russian River Management Project. First of all let me say that I extremely object to meetings where the public is asked to comment and then the SCWA states that the public has to break up and circulate to various stations. The audience that night wanted to hear what everyone had to say and protested the format. The audience was allowed to stay intact longer but the shift to stations in my opinion did not work and the public that night did not circulate to stations. The public benefits from hearing what others have to say and the responses. I have never understood the Water Agency's reason for breaking into stations as the focus. Please note that I am protesting the station method. The public wants to hear everyone speak and benefits from an exchange of ideas and comments.

I have lived in Sonoma County all my life. The Russian River has had many human impacts. The cumulative effect of these impacts have been studied. However, I am not clear on how, in 2010, all these impacts are affecting the flow. The legal and illegal diversions, careless agricultural practices, timber harvesting, gravel mining, etc. all effect flow and the normal habitat in the tributaries. The tributaries in some cases are severely degraded. The relationship between flows, mouth closings, habitat resources need to be fully defined. The rainfall in the last ten years has affected the tributaries. Fish populations are down or not present in many tributaries. How will our changing climate affect the interface of the tributaries, the river and the ocean?

Studies have been done on other rivers north and south of the Russian river. In my opinion the Russian River has more human impact currently than other nearby rivers, but I do not have any statistics on that. The three major dams and artificial regulating the flow of the river have an impact. I would ask for more historical data on the mouth closures and flows of the river. Why are the natural flows on the lower river being assigned at one point 30 cfs and then the flow north of Healdsburg assigned 125 cfs? Where is the science behind this amount? The entire system has to be taken into account.

The migration of the mouth of the river north and south has been discussed by locals. The railroad also had an impact at the mouth. Photos need to be included of the historical north and south

migration of the mouth of the river. I have traveled to other rivers up north and many have closed mouths in the summer. These rivers are not manipulated artificially. I have seen a report that shows about 90 properties on the Russian River that may be subject to inundation at various water levels. How many actual buildings would flood as opposed to bare land? Is that when the water level is 10' to 12'? If some structures were lifted out of the flood plain how many are we talking about? Do you artificially subject the entire river to minimum flows for a few structures? Could you research that?

Thank you for your time.

Sincerely,

Carol Vellutini

Carol Vellutini
610 Willrush St.
Santa Rosa, CA 95401
707-546-6308
carolvsr@sonic.net

Sonoma County Water Agency
Attn: Jessica Martini-Lamb
404 Aviation Blvd.
Santa Rosa, CA 95403

June 21, 2010

Scoping comments on SCWA's Notice of Preparation of a Draft EIR for the Russian River Estuary

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Thank you for your time.

Sincerely, Carol Vellutini

Carol Vellutini

Public Comment Card

Russian River Estuary Management Project
Scoping Meetings
May 19 and 20, 2010

Comment Card: Name: _____

Address: _____

Organization (if any): _____

Comment: _____

Katie Blank

From: Debbie Hultman [DHULTMAN@dfg.ca.gov]
Sent: Monday, June 21, 2010 2:09 PM
To: estuaryproject
Subject: Russian River Estuary Management Project
Attachments: Russian River Estuary Management Project-SCH#2010052024-Martin-McKannay061710EL.pdf

Ms. Martini-Lamb,

Please see the attached letter. Original to follow.

hank you,

Debbie Hultman, Office echnician
Department of Fish & Game
Bay Delta Region
Habitat Conservation Unit
(707) 944-5548 phone

State of California – The Natural Resources Agency
DEPARTMENT OF FISH AND GAME
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
(707) 944-5500
www.dfg.ca.gov

ARNOLD SCHWARZENEGGER, Governor
John McCamman, Director

June 21, 2010

Ms. Jessica Martini-Lamb
Sonoma County Water Agency
404 Aviation Boulevard
Santa Rosa, CA 95403

Dear Ms. Martini-Lamb:

Subject: Russian River Estuary Management Project, Notice of Preparation of the Draft Environmental Impact Report, SCH #2010052024, County of Sonoma

The Department of Fish and Game (DFG) has reviewed the Notice of Preparation (NOP) of the draft Environmental Impact Report (EIR) for the Russian River Estuary Management Project (Project). The NOP was received in our office on May 12, 2010.

The Project as a whole proposes to implement adaptive management to the Russian River Estuary (Estuary) in order to comply with the National Marine Fisheries Service Russian River Biological Opinion and DFG's Consistency Determination. The purpose of the adaptive management plan is to enhance rearing habitat for juvenile salmonids and manage estuary water levels to minimize flood hazard. Rearing habitat would be enhanced by reducing tidal influence on the Estuary from May 15 to October 15 to increase freshwater habitat available to rearing salmon and steelhead.

DFG is identified as a Trustee Agency pursuant to the California Environmental Quality Act (CEQA) Section 15386 and is responsible for the conservation, protection, and management of the State's biological resources. DFG is submitting comments on the NOP as a means to inform the Lead Agency of our concerns regarding sensitive resources which could potentially be affected by the project.

Alternatives Analysis
The EIR should include a robust analysis and review of the alternatives to Adaptive Management identified in the Russian River Biological Opinion. These alternatives include the No Project Alternative, modification or removal of the jetty and the development of alternative flood mitigation strategies allowing for the ability to let the Estuary breach naturally at higher water surface elevations than allowed with current flood control practices. The resulting impact on the beach, water quality, fish and wildlife (including marine mammals and fisheries) for each these alternatives should be fully addressed in the EIR.

A list of structures, with ownership, value and location, should be provided to asses flood risk as a result of the implementation of the project alternatives. These structures and the ability to maintain flood control during the anticipated rise in sea level caused by climate change should also be addressed.

Each alternative analysis should review project impacts and their effect on the California Department of Fish and Game's *Recovery Strategy for the California Coho Salmon* (2004) (Recovery Strategy). Any project undertaken in the Estuary has a potential impact on the success of the Recovery Strategy and DFG's ability to manage the recovery efforts. Alternatives should be reviewed with the best interest of the Coho salmon and other anadromous fish species in mind.

Water Quality
DFG recommends that the analysis assess the effect of long- and short-term management of the Estuary as a freshwater lagoon on water quality. The analysis should consider, at a minimum, the effects of dissolved oxygen, pH, temperature, salinity, bacteria, pesticides, metals, wastewater constituents and other water quality parameters throughout the length of the Estuary. The analysis should also consider the Project's effects on invasive species abundance, as well as food productivity for listed species.

Biological Resources
The EIR should contain a complete description and map of the vegetation communities, wildlife habitats, creeks, wetlands, and other important habitat features on and around the project area which will be affected by the project for each of the alternatives under consideration. Acreage of vegetation communities and habitat types should be described. The EIR should identify and discuss any significant impacts to habitats. The discussion on impacts to vegetative communities and wildlife should address the various lengths of time that an Estuary closure would be maintained. The NOP notes the lagoon management period is from May 15 to October 15, during this time it could be reasonably expected that the Estuary could be closed for 5 months, the EIR should address possible changes in vegetative communities and wildlife as a result of extended Estuary closure.

DFG recommends that the EIR include a complete assessment (including but not limited to type, quantity and locations) of the habitats, flora and fauna within and adjacent to the project area, including endangered, threatened, and locally unique species and sensitive habitats. The assessment should include the reasonably foreseeable direct and indirect changes (temporary and permanent) that may occur with implementation of the project. Rare, threatened and endangered species to be addressed should include all those which meet CEQA definition (see CEQA Guidelines, Section 15380). DFG-recommended survey and monitoring protocols and guidelines are available at http://www.dfg.ca.gov/wildlife/species/survey monitor.html.

Lake and Streambed Alteration Agreement
For any activity that will divert or obstruct the natural flow, or change the bed, channel, or bank (which may include associated riparian resources) of a river or stream, or use material from a streambed, DFG may require a Lake and Streambed Alteration Agreement (LSAA), pursuant to Section 1600 et seq. of the Fish and Game Code, with the applicant. Issuance of an LSAA is subject to CEQA. DFG, as a responsible agency under CEQA, will consider the CEQA document for the project. The CEQA document should fully identify the potential impacts to the stream or riparian resources and provide adequate avoidance, mitigation, monitoring and reporting commitments for completion of the agreement. To obtain information about the LSAA notification process, please access our website at http://www.dfg.ca.gov/habcon/1600/ or to request a notification package, contact the Lake and Streambed Alteration Program at (707) 944-5520.

Scoping Comment Letter 20 (cont.)

Ms. Jessica Martini-Lamb
June 21, 2010
Page 2

DFG appreciates the opportunity to comment on the Russian River Estuary Management Project. DFG staff is available to meet with you to further clarify our comments and provide technical assistance on any changes necessary to protect resources. If you have any questions, please contact Mr. Adam McKannay, Environmental Scientist, at (707) 944-5534; or Mr. Richard Fitzgerald, Coastal Habitat Conservation Supervisor, at (707) 944-5568.

Sincerely,

Charles Armor
Regional Manager
Bay Delta Region

cc: State Clearinghouse

Katie Blank

From: Brian Hines [brian@ncsr.com]
Sent: Monday, June 21, 2010 3:59 PM
To: estuaryproject; Kent MacIntosh; Mike Fitzpatrick; Mike Orton; Nick Morello; Rick Jorgensen; Brian Hines; Brian Arata; Jerry Arrigoni; Julie Carlson; Nick Wheeler; Rick Baker; 'Carlo Bongio'; Julie Carlson
Subject: RETU Estuary Plan Comment Letter
Attachments: Estuary Plan Comment.pdf

Attached please find the Redwood Empire Chapter of Trout Unlimited's comment letter on the Russian River Estuary Plan.
Thank you.

Redwood Empire Trout Unlimited
P.O. Box 3237
Santa Rosa, CA 95402-3237

June 17, 2010

Sonoma County Water Agency
Attn: Jessica Martini-Lamb, Principal Environmental Specialist
404 Aviation Boulevard
Santa Rosa, CA 95403

RE: Draft Environmental Impact Report for the Russian River Estuary Management Project (Estuary Project)

We are writing to you to express our support for the Sonoma County Water Agencies 2010 Estuary Project. If successful, the proposed project has the potential to increase estuarine habitat for ESA listed Coho salmon and Steelhead.

While conducting the project, Redwood Empire Trout Unlimited would like the Sonoma County Water Agency to take into consideration the following comments for various aspects of its Estuary Project.

Extend the Upper Estuary monitoring to include the Austin Creek confluence to the Hwy 116 Bridge. Review of the SCWA's '*Russian River Fish and Macro-Invertebrate Study, 2003-2005*' illustrates that a large portion of the salmonid and steelhead sample distribution is found within the Upper Estuary/Cassini reach. Past in-stream habitat improvements of lower Austin Creek have created rearing and migration opportunities which the Estuary Adaptive Management Plan may enhance. Expanded and continual monitoring of this area is vital in verifying that it can remain suitable migration and rearing habitat for Austin Creek Salmonid and Steelhead within this reach.
Re-prioritize the removal of the jetty located at the mouth of the estuary. Use the rock and other appropriate demolition debris to create additional habitat structures within the Estuary.
Restore the Open Space District properties in the Middle Reach/Bridgehaven area and similar low lying areas to create flooded/backchannel habitat. Monitor and consider additional adaptive management options to promote sustainable Benthic and Macro invertebrate habitat consistent with periodic inundated estuarine habitat.

Re-prioritize the elevation, re-location or removal of the private properties located in Jenner between the 8′-8.5′ flood levels. If the adaptive management plan results are found to be positive while maintaining a proposed 7′ flood level; consideration should be given to maintaining a higher estuarine water level to increase and sustain suitable estuary rearing habitat. Proposed water flow decrease from upriver could have the potential to increase estuary water temperatures. Additional water depth may be needed to ensure that water temperatures remain below potential lethal levels. The end goal of the plan should be to cease mouth breaching operations entirely which we consider to be TAKE under the ESA.

Re-introduce historic native estuary vegetation to the lower reach to further support and provide salmonid rearing and Benthic and Macro invertebrate habitat.

We would also be interested in seeing an accounting of the cost to breach the estuary as it seems to be an unusual subsidy in these lean Sonoma County budget times. The subsidy benefits only a few property owners that have chosen to build in the recognized flood plain. Funding is available for the elevation of structures on the Russian River as has been done in many locations upstream. The Redwood Empire Chapter of Trout Unlimited has been advocating the elevation of these structures since at least 1992.

We appreciate the opportunity to present to you our thoughts regarding the Draft Environmental Impact Report for the Russian River Estuary Management Project. Feel free to contact us if you have any questions or would like to discuss these items in depth.

Sincerely,
REDWOOD EMPIRE CHAPTER
TROUT UNLIMITED

Rick Baker, Past-President
Board of Directors

Katie Blank

From: Josh Berry [josh@savethewaves.org]
Sent: Monday, June 21, 2010 4:19 PM
To: estuaryproject
Subject: Observations on Russian River Estuary Project
Attachments: RussianRiver-STW-June21.pdf

Dear Sonoma County Water Agency,

Attached is a letter from Save The Waves Coalition, representing our surfing members' interest in protecting the limited surfing recreational resources available at the mouth of the Russian River, in regards to how the Russian River Estuary Project would effect the recreational resource there. Today a hard copy of this letter has also been mailed to SCWA.

Sincerely,

Josh Berry
Environmental Director
Save The Waves Coalition
http://www.savethewaves.org
josh@savethewaves.org
831.426.6169 office
415.578.8388 mobile

June 21, 2010

Sonoma County Water Agency
404 Aviation Boulevard
Santa Rosa, CA 95403

Re: **Russian River Estuary Management Project** (DEIR)

Dear Sonoma County Water Agency,

This letter contains our organization's comments and observations about the Sonoma County Water Agency's **Notice of Preparation of a Draft EIR for the Russian River Estuary.** At the request of local Sonoma County surfers who frequent the popular surf spot at the mouth of the Russian River in Jenner, we have investigated the project from surfers' perspective. In this letter Save The Waves Coalition would like to comment on the Estuary Project and insert citizen interests and rights that have been ignored in this estuary project's design and public review process.

Save The Waves Coalition is a nonprofit 501(c)3 organization based in Davenport, California and our mission is to protect and preserve the coastal environment from development, with an emphasis on the surf zone, and to educate the public about the value of the surf zone.

Due to the proposed Estuary Project's changes to the way the mouth of the Russian River is artificially breached, as well as the relocation of the breach and the design of the breach channel to a location farther north of the historic breach location, surfers are very concerned that the Estuary Project will have a negative impact on the quality of the surfing wave at the mouth of the Russian River, effectively destroying this surf spot for at least 4 months out of the year. Our concern is that this project destroys a naturally occurring recreational opportunity that is already in limited availability on the California coast, especially on the Sonoma County coast.

In the California Coastal Act, Section 30213 states: *"Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred."* Surfing and surf spots (locations where ocean waves are ridden for the sport of surfing) are a prime example of these low cost visitor and recreational facilities, since a naturally occurring surf spot is exceptionally low-cost to society, provided for free by nature, while also providing and in fact

Scoping Comment Letter 22 (cont.)

creating a well-developed and rich local surfing economy and culture.

The California Coastal Act, Section 30220 further states: *"Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses."* Surfing is a key example of this, as it can only be practiced in the ocean and never at inland areas; surf spots in California only exist on the Pacific Coast and must, according to our organization and the opinion of our supporters, be protected as they are publicly available in very limited supply.

The mouth of the Russian River is a well-known, occasionally fantastic surf spot and is legally protected under the Coastal Act. Save The Waves Coalition respectfully insists that the SCWA Russian River Estuary Project EIR must clearly and directly address the very real concerns of surfers who could lose a limited recreational resource if this project is executed as designed. Local surfers inform our organization that to date their concerns and interests have not been satisfactorily addressed by the SCWA nor by the public comment and meeting process.

Our organization, our members and our supporters recognize and respect the importance of providing freshwater lagoon habitat for fish populations, and we strongly believe that this project can protect wild fish habitat while also favorably protecting the very limited surfing resources located at the mouth of the Russian River. We look forward to the more inclusionary involvement and participation of surfers' interests in the Russian River Estuary Project.

Sincerely,

Josh Berry
Environmental Director
Save The Waves Coalition

PO Box 183 3500 Coast Highway Davenport, CA 95017 831.426.6169 www.savethewaves.org

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southwest Region
777 Sonoma Ave., Room 325
Santa Rosa, CA 95404-4731

June 22, 2010

In response, refer to:
151422SWR2006SR07316

ORIGINAL DOCUMENT
SONOMA COUNTY WATER AGENCY
To MARTINI-LAMB
JUN 23 2010

CF/45-5.1-2.1 Russian River Estuary Management Project - Correspondence

Jessica Martini-Lamb
Principal Environmental Specialist
Sonoma County Water Agency
404 Aviation Boulevard
Santa Rosa, CA 95403

Dear Ms. Martini-Lamb:

This letter is in response to the Sonoma County Water Agency's (SCWA) May 2010, Notice of Preparation of a Draft Environmental Impact Report (DEIR) for the Russian River Estuary Management Project (Estuary Project) in Sonoma County, California. NOAA's National Marine Fisheries Service (NMFS) issued the *Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation District in the Russian River Watershed* (Russian River Biological Opinion (BO)) on September 24, 2008. NMFS' Russian River BO analyzed and addressed the impact of the Agency's and the Corps' water supply and flood control activities on three fish species listed under the federal Endangered Species Act: Central California Coast steelhead (*Oncorhynchus mykiss*), Central California Coast coho salmon (*O. kisutch*), and California Coastal Chinook salmon (*O. tshawytscha*). Specifically regarding the estuary management component of SCWA's proposed action, the Russian River BO determined that artificially elevated inflows to the Russian River estuary during the low flow season (May through October) and historic artificial breaching practices have significant, adverse effects on the Russian River's estuarine rearing habitat for juvenile salmonids, particularly steelhead. NMFS's Reasonable and Prudent Alternative (RPA) required SCWA to modify estuary management in order to reduce marine influence (high salinity and tidal inflow) and promote higher water levels in the Estuary (formation of a fresh or brackish water lagoon) from May 15 to October 15. Thus, the Estuary Project analyzed as part of the DEIR is, in effect, the same as the estuary component in NMFS' RPA. Therefore, the term "Estuary Project" will be used interchangeably from here onward when referring to either entity.

The Russian River BO states that management of a closed lagoon will likely require both new techniques in managing outflow at the barrier beach and reduced inflows during summer months. The Russian River BO directs SCWA to pursue Temporary Urgency Changes (TUC) to D-1610 to reduce summer inflow prior to a final change in D-1610 that will be supported by a separate EIR and water rights regulatory process, which we anticipate will be completed sometime between 2014 and 2016. NMFS' staff attended recent public CEQA scoping meetings for the Estuary

Project. However, in these meetings it was unclear as to what extent the Estuary Project EIR will address the effects of summer stream flow changes that will support the Estuary Project's goal of maintaining a closed estuary (lagoon) during summer months. We believe that it is reasonable that the EIR for the Estuary Project consider the effects of flow changes associated with interim flow changes (associated with the TUC petitions) and use existing information to address the effects of these interim changes on the environment and resources such as recreational boating.

In addition to this recommendation, NMFS has the following concerns and suggestions, outlined in further detail below, regarding the scope and content of the DEIR: (1) effects to salmonids and salmonid habitat; (2) effects to pinnipeds and their habitat; and (3) effects to commercial, recreational, and other native aquatic species and their habitat.

1) Effects to salmonids and salmonid habitat

The Russian River BO analyzed impacts to salmon/steelhead and their habitat from the Estuary Project, as well as the estuary component of the RPA. However, SCWA has gathered new water quality, biological, and geophysical data during estuary monitoring and study during the almost two years since the Russian River BO was issued. This new information should be considered when addressing potential effects of the Estuary Project.

Furthermore, the Estuary Project has the potential to affect the passage of adult and smolt stages of Chinook salmon, coho salmon, and steelhead through the estuary. Because Russian River flows can be low and warm during late summer/early fall, artificially opening the estuary and allowing adult salmon access to the estuary and lower Russian River may expose fish to poor water quality and increase predation risk. The effects of the Estuary Project on out-migrating smolts will require careful monitoring of outlet conditions and coordination between SCWA, the California Department of Fish & Game, and NMFS. The DEIR should evaluate these potential effects.

2) Effects to pinnipeds and their habitat

On March 30, 2010, NMFS issued an Incidental Harassment Authorization (IHA), under the authority of the Marine Mammal Protection Act, to SCWA to take small numbers of harbor seals (*Phoca vitulina richardii*), California sea lions (*Zalophus califonianus*), and northern elephant seals (*Mirounga angustirostris*) incidental to estuary water level management events and monitoring activities associated with the Estuary Project. "Take" is defined as harassing, hunting, capturing, or killing, or attempting to harass, hunt, capture, or kill any marine mammal, while "Harassment" is defined as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal in the wild, or has the potential to disturb a marine mammal in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. For the DEIR, NMFS suggests that SCWA update the analysis conducted for the IHA application with any new information recently obtained. The DEIR should focus not only on construction-related impacts, but should also analyze how the Estuary Project impacts pinniped habitat use, migration patterns, and food availability within the Russian River estuary.

3) Effects to commercial, recreational, and other native aquatic species and their habitat

As an addendum to the Russian River BO, NMFS conducted an Essential Fish Habitat (EFH) consultation under authority of the Magnuson Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), as amended by the Sustainable Fisheries Act of 1996. The Magnuson-Stevens Act establishes a national program to manage and conserve the fisheries of the United States by ensuring habitat considerations receive increased attention for the conservation and management of fishery resources. The Act required each existing, and any new, Fishery Management Plan to describe and identify EFH for the fishery, minimize to the extent practicable adverse effects on such habitat, and identify other actions to encourage the conservation and enhancement of such habitat. Essential Fish Habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. §1802(10)).

The EFH consultation conducted for the Russian River BO concluded that the Estuary Project adversely affects Pacific salmon EFH, Pacific Groundfish EFH, and Coastal Pelagic EFH. The direct result of these effects is that the function of EFH for migration, spawning, and rearing of Pacific salmon is eliminated, diminished, or disrupted, and the function of EFH for rearing of Pacific Groundfish and pelagic species is eliminated or diminished. The results and conclusions of the EFH analysis should be thoroughly detailed within the DEIR, and further updated where new information allows. Furthermore, SCWA should expand their effects analysis beyond species considered under the Magnuson-Stevens Act and evaluate effects to other native species (*e.g.*, Dungeness crab) potentially impacted by the Estuary Project.

NMFS appreciates the opportunity to review and comment on your agency's proposed environmental assessment for the Estuary Project. Please contact Mr. Rick Rogers at 707-578-8552, or via e-mail at rick.rogers@noaa.gov, if you have any questions concerning this letter or require additional information.

Sincerely,

Dick Butler
North Central Coast Office Supervisor
Protected Resources Division

COPY

STATE OF CALIFORNIA
Arnold Schwarzenegger, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
(916) 657-5390 - Fax

May 18, 2010

Jessica Martini-Lamb
Sonoma County Water Agency
404 Aviation Boulevard
Santa Rosa, CA 95403

RE: SCH#2010052024 Russian River Estuary Management Project (Estuary Project); Sonoma County.

Dear Ms. Martini-Lamb:

The Native American Heritage Commission (NAHC) has reviewed the Notice of Preparation (NOP) referenced above. The California Environmental Quality Act (CEQA) states that any project that causes a substantial adverse change in the significance of an historical resource, which includes archeological resources, is a significant effect requiring the preparation of an EIR (CEQA Guidelines 15064(b)). To comply with this provision the lead agency is required to assess whether the project will have an adverse impact on historical resources within the area of project effect (APE), and if so to mitigate that effect. To adequately assess and mitigate project-related impacts to archaeological resources, the NAHC recommends the following actions:

- ✓ Contact the appropriate regional archaeological Information Center for a record search. The record search will determine:
  - If a part or all of the area of project effect (APE) has been previously surveyed for cultural resources.
  - If any known cultural resources have already been recorded on or adjacent to the APE.
  - If the probability is low, moderate, or high that cultural resources are located in the APE.
  - If a survey is required to determine whether previously unrecorded cultural resources are present.
- ✓ If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
  - The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure.
  - The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.
- ✓ Contact the Native American Heritage Commission for:
  - A Sacred Lands File Check. **USGS 7.5 minute quadrangle name, township, range and section required.**
  - A list of appropriate Native American contacts for consultation concerning the project site and to assist in the mitigation measures. **Native American Contacts List attached.**
- ✓ Lack of surface evidence of archeological resources does not preclude their subsurface existence.
  - Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5(f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities.
  - Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.
  - Lead agencies should include provisions for discovery of Native American human remains in their mitigation plan. Health and Safety Code §7050.5, CEQA §15064.5(e), and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

ORIGINAL DOCUMENT
SONOMA COUNTY WATER AGENCY
TO MARTINI-LAMB
MAY 21 2010

Sincerely,

Katy Sanchez
Program Analyst
(916) 653-4040

CF/15-11-9 Russian River Mouth Excavation

CC: State Clearinghouse

COPY

Native American Contact List
Sonoma County
May 18, 2010

Scoping Comment Letter 24
Attachment

The Federated Indians of Graton Rancheria
Gene Buvelot
6400 Redwood Drive, Ste — Coast Miwok
Rohnert Park, CA 94928 — Southern Pomo
coastmiwok@aol.com
(415) 895-1163 Home
(415) 259-7819 Cell

The Federated Indians of Graton Rancheria
Frank Ross
100 Cielo Lane, Apt 102 — Coast Miwok
Novato, CA 94949 — Southern Pomo
miwokone@yahoo.com
(415) 269-6075

Ya-Ka-Ama
7465 Steve Olson Lane — Pomo
Forestville, CA 95436 — Coast Miwok
info@yakaama.org — Wappo
(707) 887-1541

The Federated Indians of Graton Rancheria
Greg Sarris, Chairperson
6400 Redwood Drive, Ste — Coast Miwok
Rohnert Park, CA 94928 — Southern Pomo
coastmiwok@aol.com
707-566-2288
707-566-2291 - fax

Suki Waters
P.O. Box 53 — Coast Miwok
Jenner, CA 95450 — Pomo
(707) 865-2248

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources forthe proposed SCH# 2010052024 Russian River Estuary Management Project (Estuary Project); Sonoma County.

Katie Blank

From: David Keller [dkeller@eelriver.org]
Sent: Wednesday, May 19, 2010 2:36 PM
To: estuaryproject
Subject: Address correction for notices

To: Jessica Martini-Lamb, SCWA
Staff at ESA

From: David Keller
Bay Area Director
Friends of the Eel River
1327 I St.
Petaluma, CA 94952
(707) 763-9336
dkeller@eelriver.org

We recently received the NOP for the DEIR for the Russian River Estuary Management Project. It was addressed to me, but mailed to the main FOER offices, newly relocated at PO Box 2039, Sausalito, CA 94966 from the old Garberville address.

Please change your files for mail sent to me, so that they will be sent to my current address in Petaluma, as listed above.

Thank you for your attention to this.

David

Change to Distribution List 2

Katie Blank

From: Vickie Gerber [vgerber@cityofnovato.org]
Sent: Thursday, May 13, 2010 5:23 PM
To: estuaryproject
Subject: Name change/mailing list

Categories: Green Category

Jessica,

Could you please change our City Manager's name from Daniel E. Keen to Michael S. Frank on future mailings from the Sonoma County Water Agency?

Many thanks,

Vickie Gerber
Executive Secretary/Deputy City Clerk
City of Novato
75 Rowland Way
Novato, CA 94945
415.899.8905
vgerber@cityofnovato.org

NOTICE: The information contained in this email and any document attached hereto is intended only for the named recipient(s). If you are not the intended recipient, nor the employee or agent responsible for delivering this message in confidence to the intended recipient(s), you are hereby notified that you have received this transmittal in error, and any review, dissemination, distribution or copying of this transmittal or its attachments is strictly prohibited. If you have received this transmittal and/or attachments in error, please notify me immediately by reply e-mail and then delete this message, including any attachments.

Scoping Comment 25

Have A Question?

Please write out any questions you would like to have answered during tonight's meeting.

Name (or anonymous): Geoff Smith 707-865-1165

Question:
IN THE LATE 50's, 60's, + 70's, SUMMER-TIME FLOWS WERE TOO ENOUGH TO KEEP THE MOUTH OPEN ON ITS OWN. FISH POPULATIONS WERE SOME OF THE HIGHEST. REDUCED FLOWS HAVE INCREASED SILTATION, ALGE BLOOMS AND RIVER WARMING. LOWER FLOWS HAVE FAILED IN OTHER RIVERS. IS THIS ANOTHER EXPERIMENT FOR THE SALE OF WATER?

THIS QUESTION NOT READ

Scoping Comment 26

WATER QUALITY-EIR

Have A Question?

Please write out any questions you would like to have answered during tonight's meeting.

Name (or anonymous): Darrell Sukovitzen

Question: In the Draft EIR - will the cumlative effects of fungaside spray drift from vinyard production going into waterway's be adressed?

Scoping Comment 27

Have A Question?

Please write out any questions you would like to have answered during tonight's meeting.

Name (or anonymous): _____

Question: (1) What information already exists on level of disturbance Seals can tolerate + why would any harassment occur—?

(2) Can't we avoid adding impacts to these species attempting to survive so many challenges already.

NOP

Scoping Comment 26 (cont.)

Have A Question?

Please write out any questions you would like to have answered during tonight's meeting.

Name (or anonymous): Darrell Sykoviteen darrellS@Sonic.net

Question: Why has there been permits obtained for Seal harasment By SCWA, without a management plan/EIR Draft in place?

Why is the Contract with Stewards not open to public Review?

Who is to stop Equipment from Disturbing Seals? - the Contract with Stewards says that they can only wright a Letter to SCWA, + SCWA will wright a letter to NOAH.

Scoping Comment 28

Have A Question?

Please write out any questions you would like to have answered during tonight's meeting.

Name (or anonymous): _____

Question: Considering the potential harassing of seals due to channelizing events, what are the considerations for a one time removal of the jetty to naturalize the river mouth system, then do adaptive management on the release of water via dams?

Scoping Comment 29

Have A Question?

Please write out any questions you would like to have answered during tonight's meeting.

Name (or anonymous): Dr. Donald Coates

Question: a) How is this flooding defined? Sounds like the natural level of water is now defined as "flooding"?

b) What is proposed design of their proposed outlet channel?

SEALS

Scoping Comment 26 (cont.)

Have A Question?

Please write out any questions you would like to have answered during tonight's meeting.

Name (or anonymous): Darrell Suriovitzen

Question: Why dose the SCWA/Stewards Contract only Call for Seal Counts 2x per month?

Seal Pups need up to 1 month to Be able to take Care of themselves. Why dose SCWA intend to Harass them only 1 week After they are Born? ! ! !

Scoping Comment 30

SANDBAR

Have A Question?

Please write out any questions you would like to have answered during tonight's meeting.

Name (or anonymous): Victoria Wikle

Question:

① Please define the boundary of the estuary and will it change?

② Will you consider other ways to allow excess water to leave the estuary other than spillway?

Scoping Comment 31

Have A Question?

Please write out any questions you would like to have answered during tonight's meeting.

Name (or anonymous): Jordan West

Question: In your adaptive management proposal is there any consideration in regards to avoiding the destruction of sonoma counties only world-class wave and the massive impact that holds on the local community.

* EFREM - IF WE DON'T HAVE TIME TO READ THIS, WE CAN INCLUDE IN MEETING NOTES, WHICH WILL BE POSTED ONLINE

Have A Question?

Please write out any questions you would like to have answered during tonight's meeting.

Name (or anonymous): Dian Hardy -

Question: Please Read this Letter From Dian Hardy - the Founder of "Seal Watch" (She is in Germany)

Scoping Comment 32

Public Comment Card

Russian River Estuary Management Project
Scoping Meetings
May 19 and 20, 2010

Comment Card: Name: Cynthia Urbina

Address: PO Box 11 Jenner

Organization (if any):

Comment:

· EIR should address pelican impacts on shore of Penny Island as this area will be submerged under proposed project.

· Consider migratory birds impacts, if any.

Scoping Comment 31

Public Comment Card

Russian River Estuary Management Project
Scoping Meetings
May 19 and 20, 2010

Comment Card: Name: Jordan West

Address: 1545 Shaw Ct. Bodega Bay CA 94923

Organization (if any):

Comment: I'm highly concerned about protecting our world class wave and the endangered surfing community this project promises to affect. Please aware me through email how I can be more effective in voicing my opinion. Email: coastalroots@yahoo.com

Sincerely, Jordan West

Public Comment Card

Russian River Estuary Management Project
Scoping Meetings
May 19 and 20, 2010

Comment Card: Name: Victoria Wikle

Address: PO Box 151, Villa Grande, CA 95486

Organization (if any):

Comment: I would like to see more attention and monitoring of the river between the Hacienda Bridge and the estuary particularly for water quality & fish habitat.

APPENDIX 2

Air Quality – Supporting Documentation

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CRITERIA POLLUTANT EMISSION CALCULATIONS

Off-Road Emissions - Heavy Equipment

	ROG		CO		NOX		SO2		PM10		PM2.5	
Equipment (HP)	**EF lbs/hr**	**lb/day**	**EF lbs/hr**	**lb/day**	**EF lbs/hr**	**lb/day**	**EF lbs/hr**	**lb/day**	**EF lbs/hr**	**lb/day**	**EF lbs/hr**	**lb/day**
Rubber Tired Dozers (500)	0.3614	2.89	1.7426	13.94	3.2079	25.66	0.0026	0.02	0.1366	1.09	0.1257	1.01
Excavators (500)	0.1984	1.59	0.6160	4.93	1.9280	15.42	0.0023	0.02	0.0710	0.57	0.0653	0.52
Total (pounds per day)		**4.48**		**18.87**		**41.09**		**0.04**		**1.66**		**1.53**
Total (tons per year)		**0.07**		**0.28**		**0.62**		**0.00**		**0.02**		**0.02**

Off-road Assumptions:

No. of dozers	1
No. of excavators	1
Hours per day for each	8
breach days per year	30

Note: PM10 and PM2.5 emissions are based on PM emissions factors from the Offroad model with PM10 and PM2.5 fractions applied to the PM EF (SCAQMD, 2006)

On-Road Emissions - Worker Vehicels and Equipment Haul Trucks

	Veh type and speed (mph)	**g/mi**	**lb/mi**	**lb/day**	**lb/year**	**tons/year**
	LD truck - 25	0.061	0.00013448	0.02	0.65	0.0003
	LD truck - 45	0.032	7.0548E-05	0.01	0.34	0.0002
ROG	HD truck - 25	1.102	0.0024295	0.16	4.66	0.0023
	HD truck - 45	0.562	0.001239	0.08	2.38	0.0012
			Total	**0.27**	**8.03**	**0.0040**
	LD truck - 25	2.716	0.00598776	0.96	28.74	0.0144
	LD truck - 45	1.987	0.00438059	0.70	21.03	0.0105
CO	HD truck - 25	5.889	0.01298303	0.83	24.93	0.0125
	HD truck - 45	3.594	0.00792342	0.51	15.21	0.0076
			Total	**3.00**	**89.91**	**0.0450**
	LD truck - 25	0.432	0.0009524	0.15	4.57	0.0023
	LD truck - 45	0.366	0.00080689	0.13	3.87	0.0019
NOX	HD truck - 25	13.675	0.03014824	1.93	57.88	0.0289
	HD truck - 45	12.557	0.02768347	1.77	53.15	0.0266
			Total	**3.98**	**119.48**	**0.0597**
	LD truck - 25	0.005	1.1023E-05	0.00	0.05	0.0000
	LD truck - 45	0.003	6.6139E-06	0.00	0.03	0.0000
SO2	HD truck - 25	0.019	4.1888E-05	0.00	0.08	0.0000
	HD truck - 45	0.016	3.5274E-05	0.00	0.07	0.0000
			Total	**0.01**	**0.23**	**0.0001**
	LD truck - 25	0.049	0.00010803	0.02	0.52	0.0003
	LD truck - 45	0.037	8.1571E-05	0.01	0.39	0.0002
PM10	HD truck - 25	0.466	0.00102735	0.07	1.97	0.0010
	HD truck - 45	0.366	0.00080689	0.05	1.55	0.0008
			Total	**0.15**	**4.43**	**0.0022**
	LD truck - 25	0.045	0.00010025	0.02	0.48	0.0002
	LD truck - 45	0.034	7.5698E-05	0.01	0.36	0.0002
PM2.5	HD truck - 25	0.429	0.00094517	0.06	1.81	0.0009
	HD truck - 45	0.337	0.00074234	0.05	1.43	0.0007
			Total	**0.14**	**4.08**	**0.0020**

On-road Assumptions:

light-duty trips/day	5
heavy-duty trips/day	2
breach days per year	30
miles at 25 mph	32
miles at 45 mph	32

It is assumed that each roundtrip would have a length of 64 miles (from Santa Rosa) and vehicles would travel 32 miles at 25 mph and 32 miles at 45 mph.

APPENDIX 4

Local Regulatory Framework Governing Environmental Resources

Environmental resources are often governed at a local level, specific to the types and uses of resources within local jurisdictions. California state law requires each county and city to adopt "a comprehensive, long-term general plan for the physical development of the county or city, and any land outside its boundaries which bears relation to its planning" (Government Code section 65300). State Planning and Zoning Law (Government Code Section 65302(a)) establishes the requirements for elements to be included in the general plan.

The *Sonoma County General Plan 2020* (County of Sonoma PRMD, 2008) is a revision of the pervious General Plan adopted in 1989. The General Plan establishes policies to guide decisions on future growth, development, and conservation of resources through 2020 in a manner consistent with the goals and quality of life desired by the County's residents. The *Sonoma County General Plan 2020* establishes a regulatory framework for management of resources within the Estuary project area. The subsections below, organized by resource topical area, summarize relevant General Plan elements, or reiterate specific goals, objectives, and policies that are considered in the analyses in **Chapter 4, Environmental Setting, Impacts, and Mitigation Measures**.

4.1 Geology and Soils

The *Sonoma County General Plan 2020* includes Resource Conservation elements that identify goals and policies that may be pertinent to geologic resources under the proposed project. The Resource Conservation Element provides goals and policies for the conservation of natural resources including water, forests, soils, rivers, harbors, fisheries, wildlife, minerals, and other natural resources. It supports the county's economic base by promoting the production and use of the county's resources. It guides land use decisions that will contribute to the long-term maintenance of resource production.

For Soil Erosion, Goal RC-2 is to promote and encourage soil conservation and management practice that maintain the productivity of soil resources. Objective RC-2.1 calls for ensuring that permitted uses are compatible with reducing potential damage due to soil erosion. Objective RC-2.2 is to establish ways to prevent soil erosion and restore areas damaged by erosion.

For Water Resources, Goal RC-3 calls for the conservation, enhancement, and management of water resources, protection of their quality, and assurance of an adequate long term supply of water

for domestic, fishing, industrial and agricultural use. Objective RC-3.1 is to preserve watersheds and groundwater recharge areas by avoiding the placement of potential pollution sources in areas with high percolation rates. Objective RC-3.2 requires development standards in recharge areas to maintain groundwater supplies. Objective RC-3.3 calls for the preservation and enhancement of the quality of surface and groundwater resources. Objective RC-3.4 is to insure that land uses in rural areas be consistent with the availability of groundwater resources.

For Mineral Resources, Goal RC-11 calls for providing for production of aggregates to meet local needs and contribute the County's share of demand in the North Bay production-consumption region, and managing aggregate resources to avoid needless resource depletion and ensure that extraction results in the fewest environmental impacts. Objective RC-11.1 calls for using the Aggregate Resources Management Plan to establish priority areas for aggregate production and to establish detailed policies, procedures, and standards for mineral extraction. Objective RC-11.2 calls for minimizing and mitigating the adverse environmental effects of mineral extraction and reclaim mined lands.

4.2 Hydrology and Flooding

The following goals, objectives, and policies relating to surface water hydrology and flooding are defined within the Public Safety Element of the *Sonoma County General Plan 2020* are applicable to the proposed project:

Policy for Reduction of Potential Damage from Geologic Hazards

GOAL PS-1: Prevent unnecessary exposure of people and property to risks of damage or injury from earthquakes, landslides and other geologic hazards.[1]

> **Objective PS-1.1:** Continue to develop and utilize available data on geologic hazards and associated risks.
>
> **Objective PS-1.2:** Regulate new development to reduce the risks of damage and injury from known geologic hazards to acceptable levels.
>
> **Objective PS-1.3:** Utilize the Sonoma County Hazard Mitigation Plan to help reduce future damage from geologic hazards.

The GP 2020 also outlines a number of policies that shall be used to achieve these objectives. Those policies relevant to the project include: Policy PS-1a, Policy PS-1b, Policy PS-1c, Policy PS-1d, Policy PS-1e, Policy PS-1f, Policy PS-1k, and Policy PS-1m.

Policy for Reduction in Potential Damage from Flooding

GOAL PS-2: Reduce existing flood hazards and prevent unnecessary exposure of people and property to risks of damage or injury from flood hazards.

> **Objective PS-2.1:** Maintain complete data on flood hazards.

[1] Geologic hazards, as defined in the GP 2020, include tsunamis.

Objective PS-2.2: Regulate new development to reduce the risks of damage and injury from known flooding hazards to acceptable levels.

Objective PS-2.3: Utilize the Sonoma County Hazard Mitigation Plan to help reduce future damage from flood hazards.

The GP 2020 also outlines a number of policies that shall be used to achieve these objectives. Those policies relevant to the project include: Policy PS-2a, Policy PS-2b, Policy PS-2d, Policy PS-2e, Policy PS-2f, Policy PS-2g, Policy PS-2h, Policy PS-2i, Policy PS-2l, Policy PS-2m, Policy PS-2s, Policy PS-2u, and Policy PS-2v.

4.3 Water Quality

Review and consideration of local regulations and policies relevant to water quality is focused on the North Coast Bain Plan, described in Section 4.3.

4.4 Biological Resources

Sonoma County General Plan 2020

The following goals, objectives, and policies for protecting biological resources defined within the Open Space and Resource Conservation Element of the *Sonoma County General Plan 2020* are applicable to the proposed project:

Policy for Biotic Habitat Areas

GOAL OSRC-7: Protect and enhance the County's natural habitats and diverse plant and animal communities.

Objective OSRC-7-1: Identify and protect native vegetation and wildlife, particularly occurrences of special status species, wetlands, sensitive natural communities, woodlands, and areas of essential habitat connectivity.

Objective OSRC-7.3: Establish development guidelines to protect designated Biotic Habitat Areas and assure that the quality of these natural resources is maintained.

Objective OSRC-7.4: Where appropriate, support regulatory efforts by other agencies to protect biotic habitat.

Objective OSRC-7.5: Maintain connectivity between natural habitat areas.

Objective OSRC-7.6: Establish standards and programs to protect native trees and plant communities.

Objective OSRC-7.8: Encourage voluntary efforts to restore and enhance biotic habitat.

Objective OSRC-7.9: Preserve and restore the Laguna de Santa Rosa, San Pablo Bay and Petaluma marshes and other major marshes and wetlands.

Objective OSRC-7.10: Promote production of native marine and shoreline plant and animal habitats along the Pacific Coast and San Pablo Bay shorelines.

***Policy OSRC-7b*:** Rezone to the Biotic Resources combining district all lands designated as Biotic Habitat Areas. Prepare and adopt an ordinance that provides for protection of designated Biotic Habitat Areas in conformance with the following principles. Until the ordinance is adopted, require that land use and development in designated areas comply with these principles:

1. For discretionary projects, notify applicants of protected habitats and species and possible requirements of Federal and State regulatory agencies, request identification of known protected habitats and species, and:

    a. In designated Biotic Habitat Areas, require site assessment and adequate mitigation. The priorities for adequate mitigation are, in order of highest to lowest priority:

        - Avoid the habitat.
        - Mitigate on site to achieve no net loss.
        - Mitigate off site to achieve no net loss.
        - Create replacement habitat off site to achieve no net loss.

        To the extent feasible, the mitigation required by the County should be consistent with permit requirements of Federal and State regulatory agencies.

    b. In designated Marshes and Wetlands, require a setback of 100 feet from the delineated edges of wetlands. The setback may be reduced based upon site assessment and appropriate mitigation.

    c. In designated Habitat Connectivity Corridors, encourage property owners to consult with CDFG, install wildlife friendly fencing, and provide for roadway undercrossings and oversized culverts and bridges to allow movement of terrestrial wildlife.

    d. The acreage required for adequate mitigation and replacement habitat shall be at least two times the acreage affected unless a lower level is acceptable to the applicable State and Federal agencies, with the amount depending on the habitat affected and the applicable mitigation priority value.

2. For discretionary projects in all designated Biotic Habitat Areas, send referrals to appropriate regulatory agencies and, where such agencies' comments or other agency information indicates biotic resources could be adversely affected, require site assessment, compliance with agency requirements and adequate mitigation pursuant to the priorities in (1) (a).*

***Policy OSRC-7c*:** Notify discretionary and ministerial permit applicants of possible requirements of Federal and State regulatory agencies related to jurisdictional wetlands or special status species.*

***Policy OSRC-7f*:** Support acquisition of conservation easements or fee title by the Sonoma County Agricultural Preservation and Open Space District (SCAPOSD) of designated Biotic Habitat Areas.*

***Policy OSRC-7k*:** Require the identification, preservation and protection of native trees and woodlands in the design of discretionary projects, and, to the maximum extent practicable, minimize the removal of native trees and fragmentation of woodlands, require any trees removed to be replaced, preferably on the site, and provide permanent protection of other existing woodlands where replacement planting does not provide adequate mitigation.

***Policy OSRC-7l*:** Identify important oak woodlands, assess current protection, identify options to provide greater protection of oak woodlands and their role in connectivity, water quality and scenic resources, and develop recommendations for regulatory protection and voluntary programs to protect and enhance oak woodlands through education, technical assistance, easements and incentives.*

***Policy OSRC-7n*:** Encourage landowners to voluntarily participate in a program that protects officially designated individual trees or groves that either have historical interest or significance or have outstanding size, age, rarity, shape or location.*

***Policy OSRC-7r*:** Develop comprehensive programs for preservation and restoration of the freshwater marsh habitat of the Laguna de Santa Rosa area, the extensive marsh areas along the Petaluma River, other tidal marshes, and freshwater marshes such as the Pitkin, Kenwood, Cunningham, and Atascadero Marshes. Include mechanisms for preservation and enhancement such as land acquisition, zoning restrictions, public and private conservation easements, regulating filling, grading or creation, floodwater retention, and wetland restoration.*

***Policy OSRC-7t*:** Continue to actively participate in the FishNet4C program and work cooperatively with participating agencies to implement recommendations to improve and restore aquatic habitat for listed anadromous fish species and other fishery resources.*

***Policy OSRC-7u*:** Identify and consider designation of old growth Redwood and Douglas Fir as sensitive natural communities. Encourage preservation and public acquisition of remaining old growth Redwood and Douglas Fir forests in private ownership with the County. Because of their rarity and biological importance, these sensitive natural community types should be made priorities for protection through conservation easements, fee title purchase, or other mechanisms.*

Policy for Riparian Corridors

GOAL OSRC-8: Protect and enhance Riparian Corridors and functions along streams, balancing the need for agricultural production, urban development, timber and mining operations, and other land uses with the preservation of riparian vegetation, protection of water resources, flood control, bank stabilization, and other riparian functions and values.

Objective OSRC-8-1: Designate all streams shown on USGS 7.5 minute quadrangle topographic maps as of March 18, 2003, as Riparian Corridors and establish streamside conservation areas along these designated corridors.

***Policy OSRC-8b*:** Establish streamside conservation areas along both sides of designated Riparian Corridors as follows, measured from the top of the higher bank on each side of the stream as determined by PRMD:

1. Russian River Riparian Corridor: 200'

2. Flatland Riparian Corridors: 100'
3. Other Riparian Corridors: 50'*

***Policy OSRC-8i*:** As part of the environmental review process, refer discretionary permit applications near streams to CDFG and other agencies responsible for natural resource protection.*

***Policy OSRC-8j*:** Notify permit applicants of possible Federal and State permit requirements in areas near streams and notify landowners whose property overlaps or touches a designated Riparian Corridor regarding the public hearings on the proposed regulations affecting them.*

Policy for Marine Fishery and Harbor Resources

GOAL OSRC-9: Protect and conserve the quality of ocean, marine and estuarine environments for their scenic, economic and environmental values.

Objective OSRC-9-1: Utilize the Local Coastal Plan as the policy document for protection of marine fishery and harbor resources.

***Policy OSRC-9a*:** Incorporate policies for protection and conservation of ocean marine and estuarine environments into the Local Coastal Plan.

County of Sonoma Tree Ordinances

The Tree Protection Ordinance (Section 26-88-010[m]) of the Sonoma County Code sets preservation and protection standards for protected trees with a nine inch or greater diameter at breast (standard) height (dbh). Protected trees include big leaf maple (*Acer macrophyllum*), black oak (*Quercus kelloggii*), blue oak (*Quercus douglasii*), coast live oak (*Quercus agrifolia*), interior live oak (*Quercus wislizenii*), madrone (*Arbutus menziesii*), oracle oak (*Quercus morehus*), Oregon oak (*Quercus garryana*), redwood (*Sequoia sempervirens*), valley oak (*Quercus lobata*), California bay (*Umbellularia californica*) and their hybrids. Only mature valley oaks are considered a protected tree of special significance and are given special consideration in the design review process to the extent that mature specimens shall be retained to the fullest extent possible. The number and size of replacement plantings is calculated using one of the two arboreal value charts as instructed in the ordinance. Arboreal Value Chart No. 1 requires analysis to be completed in the creation area and requires 100 percent replacement or in lieu fees. Arboreal Value Chart No. 2 requires analysis of the entire site but allows for removal of up to 50 percent of the arboreal value. Compensation for the loss of trees greater than 50 percent requires determining the number of trees to replace using the arboreal value chart.

County of Sonoma Local Coastal Plan

The County of Sonoma Local Coastal Plan (LCP), amended in 2001, established goals and policies to protect, maintain, enhance and restore the overall quality of the coastal zone environment and its natural and man-made resources. Additionally, the LCP aims to assure orderly balanced utilization and conservation of coastal zone resources taking into account the social and economic needs of

the people of the state. The following environmental resource summaries and policies and recommendations governing specific resource categories are applicable to the proposed project.

Enivornmental Resource Summaries

6. MunizJenner Highcliffs

Steep cliffs dominate the area from Timber Gulch to Russian Gulch. Bluffs and grass land are the major communities from Russian Gulch south to the Highway 1 bridge.

Russian Gulch is an anadromous fishery spawning stream and its shore is a surf-casting area for day and night smelt. Osprey nests have been reported in the Russian Gulch watershed.

At the intersection of Highway 116 and Highway 1, there is a flat area used for hay production. Jenner Pond, near this intersection, is one of the most visible freshwater wetlands in the coastal zone. In spite of its immediacy to Highway 1, this pond is used extensively by shorebirds, ducks, coots and rails.

Sanctuary-Preservation Areas:

- Russian Gulch stream
- Offshore rocks (seabird nesting sites) south of Russian Gulch
- Jenner Pond
- Riparian corridors of Timber Gulch, Russian Gulch, Jenner Gulch, and the Russian River north edge
- Rocky intertidal area

Conservation Areas:

- Agricultural surrounding Jenner Pond
- Little Black Mountain

7. Duncans Mills

The Duncans Mills unit extends to the inland limit of tidal influence in the Russian River, or roughly to Saint Joseph Camp.

South of the Russian River the steep slopes are covered by dense coastal woodlands, while the land to the north is predominantly grassland community. A well-developed riparian community parallels the river on either side.

Duncans Mills Marsh, privately owned by the adjacent property owners, is a unique freshwater marsh containing a wood duck nesting area and several plants uncommon in California.

Sanctuary-Preservation Areas:

- Duncans Mills freshwater marsh and adjacent riparian area

- Osprey nest site
- Riparian corridor on north and south sides of the Russian River
- Redwood Tree on Freezout Road

Conservation Areas:

- Part of coastal woodland south of Rancho del Paradiso subdivision

8. Pacific View-Willow Creek-Russian River South Side

The Pacific View-Willow Creek unit is dominated in its southern half of coastal grassland and in the northern half by coastal woodland. Coastal beaches are sandy cusps at the north and south extremes with rocky intertidal between. The coastline is part of the Sonoma Coast State Beach and includes Goat Rock State Park and Shell, Wright, Gleason, and Portuguese Beaches.

Riparian vegetation stretches along both sides of the Russian River and is also dominant plant growth along Willow Creek, Kolmer Gulch and Scotty Creek.

The Willow Creek Ranch, south of the river, contains the largest freshwater marsh in the Sonoma coastal zone from the junction of Willow Creek with the Russian River to the east and southeast about one mile.

The secluded upland coastal woodlands (redwood and Douglas fir) and adjacent grasslands are territory for the spotted owl and contain a number of documented nesting sites for the osprey which feed particularly along the Willow Creek wetland area.

Large offshore rocks, Arch Rock and Gull Rock, are nesting areas for several seabirds, and have provided nesting for peregrine falcons.

The coastline off of Portuguese Beach, between Duncans Point and Furlong Gulch, and at the mouth of the Russian River are three areas of surf smelt or day smelt and night smelt.

A heron rookery is located on Penny Island in the cypress trees on the northeastern side of the island. Successful nesting at this site has been observed during the most recent three years. The island is presently part of the State Park, but does not have any particular sanctuary status. Log shags in the Russian River from Penny Island to Willow Creek provide habitats for seals, sea lions, and water birds and should be preserved.

Sanctuary-Preservation Areas:

- Penny Island
- Willow Creek freshwater marsh
- Coastal bluff at Duncan Point
- Rare and/or endangered plant site
- Osprey nest sites

- Heron rookeries in Willow Creek Park
- Freshwater marsh, sand spit, and riparian corridor on south side of the Russian River
- Riparian corridor of Willow Creek upstream to its second land-crossing by Willow Creek Road
- Riparian corridor of Scotty Creek and Kolmer Gulch
- Rocky intertidal area

Conservation Areas:

- Coastal woodland and grassland between the south side of Freezeout Creek and the north side of Willow Creek

Environmental Resources Management Recommendations

Sandy Beaches and Sand Spits, including Smelt Spawning Areas

1. Prohibit the opening of sandbars except for maintenance of tidal flow to assure the continued biological productivity of streams and associated wetlands and in particular cases to prevent flooding. Bars should not be breached until there is sufficient in-stream flow to preserve anadromous fish runs.

Dunes and Coastal Strand

5. Preserve and protect coastal dune habitats from all but resource dependent, scientific, educational, and passive recreational uses including support facilities. Disturbance or destruction of any dune vegetation should be prohibited unless as required for public park facilities, and then only if revegetation is a condition of project approval.

7. Minimize foot traffic for all permitted uses, including recreation, on vegetated dunes. Where access through dunes is necessary, well-defined footpaths or raised boardwalks shall be developed and used. Access areas should be posted with explanations describing the importance of the use of limited access routes for the purpose of protecting the plant communities.

8. Identify wildlife nesting and breeding habitats of rare or sensitive plants or animals for the publicly owned dune areas in order to temporarily restrict access to these areas during identified breeding and nesting seasons.

Riparian

Note: Where General Plan standards and policies are more restrictive than the following, development shall comply with the General Plan or Coastal Plan policies, whichever are more restrictive, provided that no development shall be approved which does not comply with Coastal Plan policies.

12. Prohibit filling, grading, dredging, excavation or creation in the watercourse of a riparian corridor unless it is shown that such action will maintain the value of the area as a habitat for wildlife and aquatic organisms and is compatible with continued viability of the habitat.

Wetlands (Marshes. Ponds. Reservoirs, Seeps)

Note: Where General Plan standards and policies are more restrictive than the following, development shall comply with the General Plan or Coastal Plan policies, whichever are more restrictive, provided that no development shall be approved which does not comply with Coastal Plan policies.

16. Encourage restoration of marshlands where feasible.

18. Prohibit filling, grading, diking, dredging, and creation in wetlands, except under special conditions delineated in the Coastal Act Section 30234. All projects must maintain or enhance the functional capacity of the wetland or Estuary. Dredging, when consistent with the provisions of the Coastal Act and where necessary for the maintenance of the tidal flow and continued viability of the wetland habitat, should be subject to the following conditions:

    - Prohibit dredging in breeding and nursery areas and during periods of fish migration and spawning.
    - Limit dredging to the smallest area feasible.
    - Require protective measures for dredging and excavation such as silt curtains, diapers, and weirs to protect water quality.
    - Remove structures as soon as possible once they have served their purpose.

    Dredge spoils should not be deposited in areas subject to tidal influence or in areas where public access would be significantly adversely affected, as well as certain environmentally sensitive areas.

Minimize creation on land adjacent to wetlands during maximum seasons of breeding bird activity (March 1 to July 1).

Rare or Endangered Plants and Animals

58. Protect designated sites of rare or endangered plants. Prior to any development in or adjacent to designated sites, conduct precise botanical surveys to determine the distribution of any rare or endangered plants. Botanical surveys should be conducted during natural blooming season of species in question. Development should be sited and designed and constructed to prevent impacts of grading, paving, creation of roads or structures, runoff, and erosion from significantly degrading rare or endangered plant habitats, and shall be compatible with the continuance of such habitat areas.

59. Assure compliance with the Federal Endangered Species Act of 1973 and the California Endangered Species Act of 1970 as amended.

Osprey Nest Sites

60. Limit recreational activities near identified osprey nesting sites to low intensity passive recreation. These limitations are especially important during May through July when incubation takes place.

64. Prohibit removal of osprey nests.

64. Prohibit development of structures and avoid development of new roads if at all possible within the nesting site areas.

Heron Rookeries

65. Prohibit public access in areas of identified heron rookeries. Access to Penny Island should be limited to low intensity usage for scientific and educational purposes. Scientific and educational use should be managed so as not to interfere with heron nesting. (February to mid July).

66. Prohibit new development (creation of structures or roads) within 600 feet of a rookery.

Spotted Owl Territory

67. Minimize impacts of development near identified Spotted Owl nesting and breeding areas.

Marine Mammal Haulout Grounds

72. Limit recreational activities near and prohibit disturbance of designated areas used for harbor seal and sea lion hauling-out grounds to passive recreation to insure continued viability of these habitats.

Sonoma Coast State Park General Plan and EIR

The Sonoma Coast State Park (SP) General Plan and EIR (Plan) was certified in 2007 to address increasing visitation while protecting important natural and cultural resources. The Plan reflects the state parks' dual roles as stewards of sensitive plant and wildlife resources and the providers of recreational areas, and was designed to provide infrastructure guidance for elements of the park, including potential improvement of facilities, while analyzing impacts on environmental resources pursuant to the CEQA. Specific policies regarding vegetation and wildlife within the park are described below.

Goal NAT-1: Protect, maintain, and, where appropriate, restore the diversity of natural areas within Sonoma Coast SP. Protect special-status plants within Sonoma Coast SP and manage resources for their perpetuation and enhancement in accordance with State and federal law.

> **Guideline NAT-1A:** Inventory and monitor Sonoma Coast SP's natural resources including natural communities and special-status plants to document their distribution and abundance.
>
> **Guideline NAT-1B:** Protect and restore natural areas in those areas where they will not recover in a reasonable timeframe if left untreated. This may be accomplished through maintenance or re-establishment of natural processes such as fire, flooding, and succession.
>
> **Guideline NAT-1C:** Control and/or eradicate non-native invasive species to prevent their establishment and spread. Priority for control efforts should be directed toward species that are most invasive, ecologically detrimental, and/or conspicuous within areas that contain intact native plant communities. Maintain database on distribution and abundance of target populations.
>
> **Guideline NAT-1D:** When implementing habitat restoration projects and landscaping around facilities, use native species that are appropriate to the site and that are obtained

from native plant species within Sonoma Coast SP boundaries or from within 5 miles of Sonoma Coast SP. This includes transplanted cuttings and rootstocks or seedlings and saplings grown from collected seed that are genetically compatible. Ensure that all mulches are free of foreign seed.

Guideline NAT-1E: Avoid fragmentation of intact habitat areas when creation new facilities and siting trails.

Guideline NAT-1F: Acquire land or conservation easements from willing sources that would act as a protective buffer for critical resources or that are essential for the completion of goals in resource management programs.

Guideline NAT-1G: Cooperate with existing regional conservation plans and policies, and participate in the development of regional conservation plans when such programs are consistent with Sonoma Coast SP natural resources goals.

Guideline NAT-1H: Develop interpretive programs and facilities that inform visitors about the importance of protecting the diversity of native plant life at Sonoma Coast SP.

Goal NAT-2: Restore, maintain, protect, and ensure the perpetuation of native fauna at Sonoma Coast SP. Protect special-status fauna within Sonoma Coast SP and manage resources for their perpetuation and enhancement in accordance with State and federal law.

Guideline NAT-2A: Protect common and sensitive fauna and their habitats for the purpose of establishing and maintaining self-sustaining populations in a natural ecological setting. Avoid human-induced disturbance and degradation of natural areas. Protect special habitat elements such as snags and monarch roost trees.

Guideline NAT-2B: Develop specific programs to protect and rehabilitate sensitive animal populations and their habitats using sound ecological principles and professionally accepted methods. Include species that are locally important.

Guideline NAT-2C: Inventory and monitor selected common and special-status fauna to identify population trends. Protect all special status fauna occurring within Sonoma Coast SP. Monitor and develop baseline data for future management, assess the health of the populations, and take corrective actions if necessary.

Guideline NAT-2D: Identity, maintain, and protect wildlife movement corridors within Sonoma Coast SP.

Guideline NAT-2E: Maintain working relationships with other land owners and stakeholders in the vicinity of Sonoma Coast SP, to coordinate efforts to identify and preserve habitat linkages.

Guideline NAT-2F: Establish cooperative agreements, conservation easements, or purchasing land from willing owners to provide buffers and habitat linkages to existing resources within Sonoma Coast SP.

Guideline NAT-2H: Remove barriers to fish passage where feasible to provide habitat linkages to existing resources within Sonoma Coast SP.

Guideline NAT-2I: Control the establishment and spread of invasive animal species that are detrimental to the integrity of ecological processes or special-status fish, wildlife, or plant species and their habitat.

Guideline NAT-2J: Develop interpretive programs and facilities that inform visitors about the importance of protecting the diversity of native fauna at Sonoma Coast SP.

Guideline NAT-2K: Reduce and, where possible, eliminate wildlife access to human food and garbage by using wildlife-proof trash containers where appropriate in Sonoma Coast SP, including administration and residence areas.

4.5 Fisheries

Refer to the policies listed in Section 4.4 above.

4.6 Land Use and Agriculture

The Sonoma County General Plan 2020 includes Land Use, Agricultural Resources, and Open Space and Resource Conservation elements that identify goals and policies that apply to land uses and agricultural uses relevant to the proposed project.

Land Use Element. The Land Use Element establishes policies for guiding land use and development in accordance with planned future growth, including the distribution, location, and extent of land uses and their associated standards of population density and building intensity. The Land Use Element provides goals and objectives that are relevant to the Proposed Project. Goals LU-1, LU-2, LU-5, LU-8 focus on accommodating growth in Sonoma County with consideration of environmental constraints, capacities of public services and maintaining agricultural lands.

Agricultural Resources Element. The Agricultural Resources Element establishes policies that protect the stability and productivity of agricultural lands and the agricultural industry in the County. This element provides goals and objectives that are related to the Proposed Project. Goals AR-1, AR-5, AR-8 seek to promote the agricultural industry and facilitate agricultural production. Goal AR-8 has objectives to support the Williamson Act program (Objective AR-8.1) as well as participate with wastewater generators to establish programs for agricultural reuse of treated wastewater (Objective AR-8.2, Policy AR-8f).

Open Space and Resource Conservation Element. The Open Space and Resource Conservation Element provides goals and policies for the conservation of natural resources including water, forests, soils, rivers, harbors, fisheries, wildlife, minerals, and other natural resources. It supports the county's economic base by promoting the production and use of the county's resources. It guides land use decisions that will contribute to the long term maintenance of resource production. Goal OSRC-3 calls for the conservation, enhancement, and management water resources to assure an adequate long term supply of water for domestic, fishing, industrial and agricultural use. Goal OSRC-9 seeks to protect and conserve the quality of ocean, marine and estuarine environments for their scenic, economic and environmental values, and recommends utilizing Local Coast Plan.

Sonoma County Zoning Regulations

The Zoning Regulations are the primary implementation tool for the land use policies identified in the Sonoma County General Plan. Land uses within the project area will be subject to the requirements of the Zoning Regulations under Chapter 26, which implements the goals and policies of the General Plan by identifying specific types of land uses, intensity of uses and development standards to be used in guiding the development and use of land within unincorporated areas of the County.

4.7 Recreation

4.8 Cultural Resources

The following goals, objectives, and implementation measures related to cultural resources included in the County's general plan are applicable to the Estuary Project:

Goal OSRC-19: Protect and preserve significant archaeological and historical sites that represent the ethnic, cultural, and economic groups that have lived and worked in Sonoma County, including Native American populations. Preserve unique or historically significant heritage or landmark trees.

> **Objective OSRC-19.1:** Encourage the preservation and conservation of historic structures by promoting their rehabilitation or adaptation to new uses.
>
> **Objective OSRC-19.2:** Encourage preservation of historic buildings or cemeteries by maintaining a Landmarks Commission to review projects which may affect historic structures or other cultural resources.
>
> **Objective OSRC-19.3:** Encourage protection and preservation of archaeological and cultural resources by reviewing all development projects in archaeologically sensitive areas.
>
> **Objective OSRC-19.4:** Identify and preserve heritage and landmark trees.
>
> **Objective OSRC-19.5:** Encourage the identification, preservation, and protection of Native American cultural resources, sacred sites, places, features, and objects, including historic or prehistoric ruins, burials grounds, cemeteries, and ceremonial sites. Ensure appropriate treatment of Native American and other human remains discovered during a project.
>
> **Objective OSRC-19.6:** Develop and employ procedures to protect the confidentiality and prevent inappropriate public exposure of sensitive archaeological resources and Native American cultural resources, sacred sites, places, features, or objects.
>
> > ***Policy OSCR-19a*:** Designate the County Landmarks Commission to review projects within designated historic districts.
> >
> > ***Policy OSCR-19b*:** Refer proposals for County Landmark status and rezoning to the Historic Combining District to the County Landmarks Commission.

***Policy OSCR-19c*:** The County Landmarks Commission shall review Historic Building Surveys and make recommendations for designation of structures or cemeteries as county landmarks.

***Policy OSCR-19d*:** Include a list of historic structures proposed for designation as County landmarks in Specific or Area Plans or Local Area Development Guidelines and refer the list to the Landmarks Commission for their recommendations.

***Policy OSCR-19e*:** Refer applications which involve the removal, destruction or alteration of a structure or cemetery identified in a historic building survey to the Landmarks Commission for mitigation. Measures may include reuse, relocation, or photo-documentation.

***Policy OSCR-19f*:** Use the Heritage or Landmark Tree Ordinance and the design review process to protect trees.

***Policy OSCR-19g*:** Pursue grant funding for the preparation and updating of historic resource inventories.

***Policy OSCR-19h*:** Designate the County Landmarks Commission to administer a preservation program for stabilization, rehabilitation, and restoration of historic structures.

***Policy OSCR-19i*:** Develop a historic resources protection program that provides for an ongoing process of updating the inventory of historic resources. Such a program should include:

1. Periodic historic building surveys,
2. Formalized recognition of the inventory of historic resources as recommended by the State Office of Historic Preservation, including rezoning to the Historic Combining District, and
3. Procedures for the protection of recognized historic resources for both ministerial and discretionary permits.

***Policy OSCR-19j*:** Develop an archaeological and paleontological resource protection program that provides:

1. Guidelines for land uses and development on parcels identified as containing such resources,
2. Standard project review procedures for protection of such resources when discovered during excavation and site disturbance, and
3. Educational materials for the building industry and the general public on the identification and protection of such resources.

***Policy OSCR-19k*:** Refer applications for discretionary permits to the Northwest Information Center to determine if the project site might contain archaeological or historical resources. If a site is likely to have these resources, require a field survey and preparation of an archaeological report containing the results of the survey and include mitigation measures if needed.

***Policy OSCR-19l*:** If a project site is determined to contain Native American cultural resources, such as sacred sites, places, features, or objects, including historic or prehistoric ruins, burial grounds, cemeteries, and ceremonial sites, notify and offer to consult with the tribe or tribes that have been identified as having cultural ties and affiliation with that geographic area.

***Policy OSCR-19m*:** Develop procedures for consulting with appropriate Native American tribes during the General Plan adoption and amendment process.

***Policy OSCR-19n*:** Develop procedures for complying with the provisions of State Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98, if applicable, in the event of the discovery of a burial or suspected human bone. Develop procedures for consultation with the Most Likely Descendant as identified by the California Native American Heritage Commission, in the event that the remains are determined to be Native American.

4.9 Noise

Refer to discussion in **Chapter 4.0, Environmental Setting, Impacts, and Mitigation Measures**. Local policies are not extracted because they are directly incorporated into the impact analysis.

4.10 Air Quality

The *Sonoma County General Plan*'s Resource Conservation Element includes goals and policies regarding the protection and enhancement of air quality in the region. The County's goal in maintaining air quality is to "Preserve and maintain good air quality and provide for an air quality standard that will protect human health and preclude crop, plant, and property damage in accordance with the requirement of the federal and State Clean Air Acts" (Sonoma County, 2008). The General Plan Resource Conservation Element contains the following objectives and policies that would generally be applicable to the Estuary Project:

Objective OSRC-16.1: Minimize air pollution and greenhouse gas emissions.

Objective OSRC-16.2: Encourage reduced motor vehicle use as a means of reducing resultant air pollution.

***Policy OSCR-16i*:** Ensure that any proposed new source of toxic air contaminants or odors provide adequate buffers to protect sensitive receptors and comply with applicable health standards. Promote land use compatibility for new development by using buffering techniques such as landscaping, setbacks, and screening in areas where such land uses abut one another.

Sonoma County has taken a leadership role in climate protection by being the first county in the nation where 100 percent of its cities and the County pledged by resolution to reduce both GHG and air pollution emissions throughout the community, and by being the first county in the nation where 100 percent of its cities and the County determined their baseline GHG emissions for municipal operations. Sonoma County released its Community Climate Action Plan in October

2008. This plan presents a number of solutions to reduce countywide GHG emissions by 25 percent below 1990 levels by 2015. These solutions focus on reductions in four sections: Electricity and Natural Gas, Transportation and Land Use, Agriculture and Forests, and Solid Waste (CPC, 2008).

4.11 Traffic

The circulation and transit goals, objectives, and policies expressed in the preceding sections are countywide in scope. In addition, there are circulation and transit issues that are applicable to specific planning areas or smaller geographic portions of the county. This section includes those policies, organized by Planning Area.

The Circulation Element of the *Sonoma County General Plan 2020* establishes goals, policies, and objectives both countywide and for specific planning areas or smaller geographic portions of the county. These goals, policies, and objectives are established to maintain and improve traffic infrastructure and conditions within the project area. The following goals are countywide in scope. Goal 2.5 of the Circulation Element requires the County to provide and maintain a highway system capacity that serves projected highway travel demand at acceptable levels of service in keeping with the character of rural and urban communities. The County will implement the following objectives:

> **Objective CT-3.1:** Maintain level of service (LOS) C or better on roadway segments unless a lower LOS has been adopted as shown on Figure CT-3.
>
> **Objective CT-3.2:** Maintain LOS D or better at roadway intersections.
>
> **Objective CT-3.3:** Allow the above LOS to be exceeded if it is determined to be acceptable due to environmental or community values, or if the project(s) has an overriding public benefit that outweighs lower levels of service and increased congestion.

4.12 Hazards and Hazardous Materials

Refer to discussion in **Chapter 4.0, Environmental Setting, Impacts, and Mitigation Measures**.

4.13 Public Services and Utilities and Public Safety

The Public Facilities and Services Element in the *Sonoma County General Plan 2020* addresses management of public services, including water, wastewater management, public education, parks and recreation, fire protection, solid waste management, and utilities. The goals, policies, and objectives are primarily focused on maintenance and provision of services, with respect to population growth. Rural development in the project area is heavily reliant on groundwater supplies and septic sewer systems, and is not connected to major municipal infrastructure systems; therefore, the following policies are identified for consideration of this project.

Policy PF-1f: Avoid extension of public sewer services outside of either a sphere of influence adopted by LAFCO[2] or the Urban Service Area. To the extent allowed by law, consider exceptions to this policy only: (1) Where necessary to resolve a public health hazard resulting from existing development.

Policy PF-1h: Avoid extension of public water service to a property that is outside of both the Urban Service Area and the water provider's sphere of influence adopted by LAFCO. Consider exceptions to this policy, to the extent allowed by law, only: (1) Where necessary to resolve a public health hazard resulting from existing development such as failing wells or groundwater contamination (Sonoma County, 2008).

4.14 Aesthetics

The Open Space and Resource Conservation Element of the *Sonoma County General Plan 2020* (Sonoma County 2008) established the regulatory framework for protecting, preserving, and enhancing scenic landscape features. The following goals and objectives address scenic landscape units, highways, and corridors.

GOAL OSRC-2: Retain the largely open, scenic character of important Scenic Landscape Units.

Objective OSRC-2.1: Retain a rural, scenic character in Scenic Landscape Units with very low intensities of development. Avoid their inclusion within spheres of influence for public service providers.

Objective OSRC-2.2: Protect the ridges and crests of prominent hills in Scenic Landscape Units from the silhouetting of structures against the skyline.

Objective OSRC-2.3: Protect hills and ridges in Scenic Landscape Units from cuts and fills.

GOAL OSRC-3: Identify and preserve roadside landscapes that have a high visual quality as they contribute to the living environment of local residents and to the County's tourism economy.

Objective OSRC-3.1: Designate the Scenic Corridors on Figures OSRC-5a through OSRC-5i along roadways that cross highly scenic areas, provide visual links to major recreation areas, give access to historic areas, or serve as scenic entranceways to cities.

Objective OSRC-3.2: Provide guidelines so future land uses, development and roadway construction are compatible with the preservation of scenic values along designated Scenic Corridors.

Additionally, Highway 116 route is protected by the *Highway 116 Scenic Highway Study*, which includes policies and standards to protect the unique rural character of this route.

[2] LACFCO is an acronym representing Local Agency Formation Commission.

Greenhouse Gas Emissions

Off-road Emissions

	CO2		CH4		N2O		CO2e
Equipment (HP)	**EF lbs/hr**	**M tons/yr**	**EF lbs/hr**	**M tons/yr**	**EF lbs/hr**	**M tons/yr**	**M tons/yr**
Rubber Tired Dozers	264.36	28.78	0.03	0.00	0.01	0.00	29.09
Excavators	234.00	25.47	0.02	0.00	0.01	0.00	25.72
Total (metric tons)		**54.25**		**0.01**		**0.00**	**54.80**

Off-road Assumptions:

No. of dozers	1
No. of excavators	1
Hours per day for each	8
breach days per year	30

For N2O: Diesel emission of GHG (CCAR, 2009)

10150	g CO2/gal	
0.26	g N2O/gal	
N2O emissions =	0.000026	ratio of N20 emission to CO2 Emissions

On-road Emissions	**Veh type and speed (mph)**	**g/mi**	**lb/mi**	**lb/day**	**(CO2e) metric tons**
	LD truck - 25	483.86	1.07	170.68	2.32
	LD truck - 45	357.86	0.79	126.23	1.72
CO2	HD truck - 25	1977.04	4.36	697.38	9.49
	HD truck - 45	1640.55	3.62	578.69	7.87
				Sub Total	**21.40**
	LD truck - 25	0.04	0.00	0.01	0.00
	LD truck - 45	0.03	0.00	0.01	0.00
CH4	HD truck - 25	0.01	0.00	0.00	0.00
	HD truck - 45	0.00	0.00	0.00	0.00
				Sub Total	**0.01**
	LD truck - 25	0.07	0.00	0.03	0.10
	LD truck - 45	0.05	0.00	0.02	0.08
N2O	HD truck - 25	0.01	0.00	0.00	0.01
	HD truck - 45	0.00	0.00	0.00	0.01
				Sub Total	**0.19**
CO2e				**Total**	**21.61**
				Project Total	76.41
				Net increase	48.40

On-road Assumptions

Trips per day LD Truck	5
Trips per day HD Truck	5
breach days per year	30
Miles at 25 mph	32
Miles at 45 mph	32

Gasoline emission of GHG (CCAR, 2009)

420.8595	g CO2/mile	Offroad average for 25 and 45 mph
0.0346	g CH4/mile	(CCAR, 2009)
0.0621	g NO2/mile	(CCAR, 2009)
CH4 emissions =	0.000082	ratio of CH4 emission to CO2 Emissions
N2O emissions =	0.000148	ratio of N20 emission to CO2 Emissions

Diesel emission of GHG (CCAR, 2009)

1808.7915	g CO2/mile	Offroad average for 25 and 45 mph
0.0048	g CH4/mile	(CCAR, 2009)
0.0051	g NO2/mile	(CCAR, 2009)
CH4 emissions =	0.000003	ratio of CH4 emission to CO2 Emissions
N2O emissions =	0.000003	ratio of N20 emission to CO2 Emissions

It is assumed that each roundtrip would have a length of 64 miles (from Santa Rosa) and vehicles would travel 32 miles at 25 mph and 32 miles at 45 mph.

Global Warming Potential for CH4 = 25; GWP for N2O = 296.