# 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.

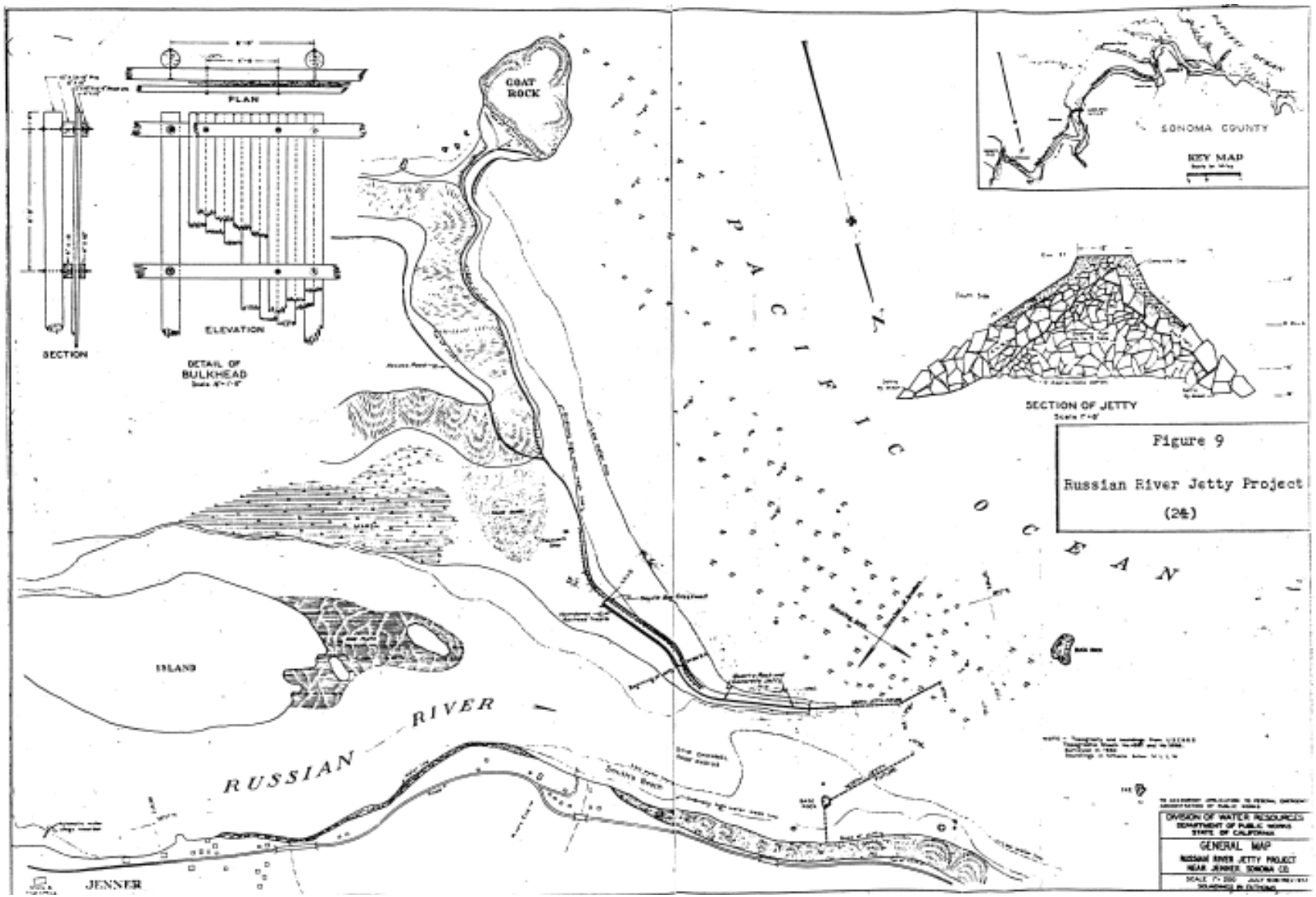
In the 1960s, the idea of capitalizing on the gravel and sand deposits was again considered and so plans for improving the jetty were put into motion once again. Local citizens and scientists in the area began to question the environmental impacts of commercially developing the deposits and so plans 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;

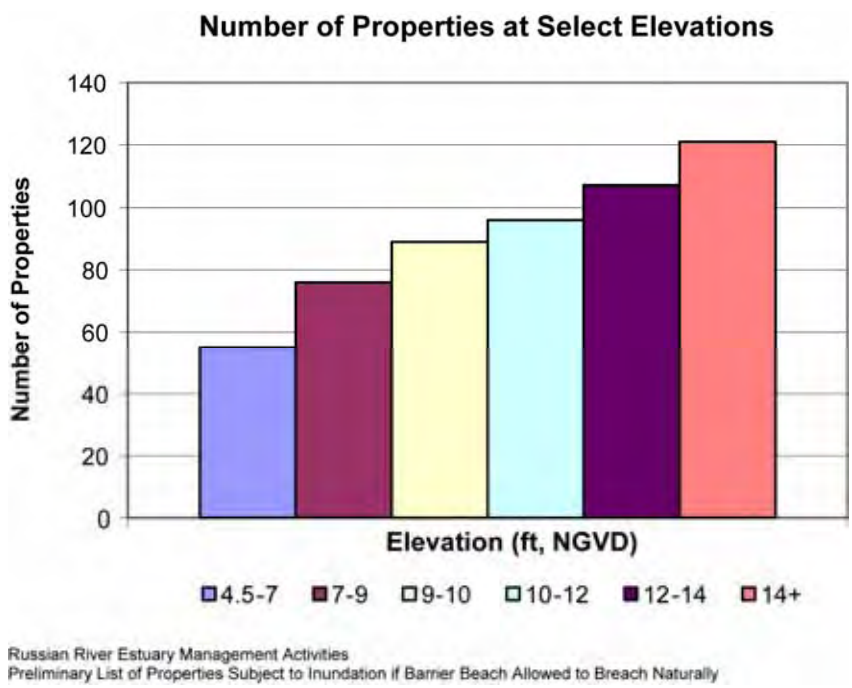
2. Estuary monitoring results indicate that freshwater habitats, or temporary closure of the estuary provide substantial benefit to rearing juvenile steelhead; and

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<br>• Disturbance of cultural resources<br>• Increased noise levels<br>• Potential for release of hazardous materials |
| **Long-Term Impacts** |
| • Effects on harbor seal haulout use<br>• 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**.

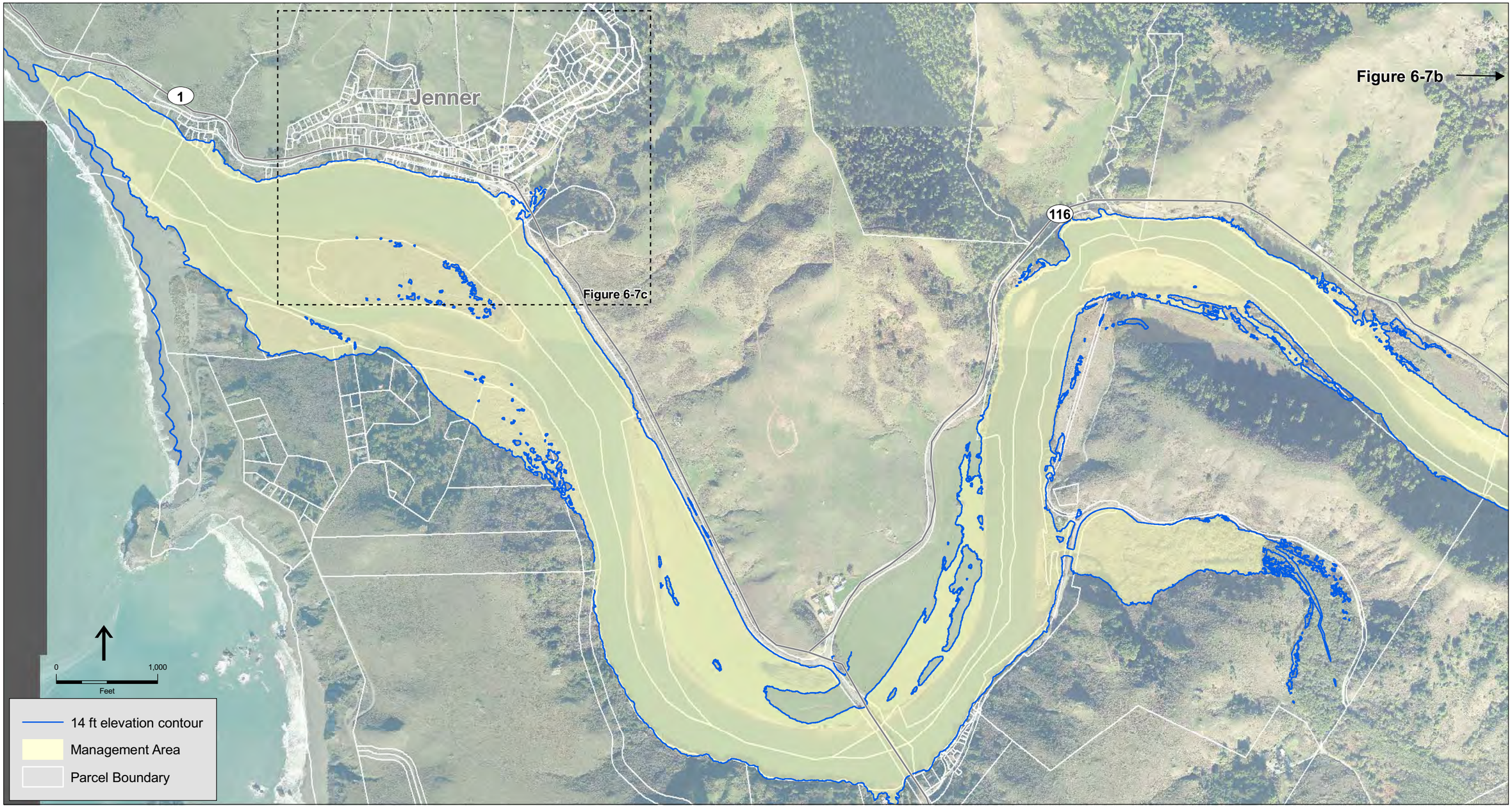
Reversion to a more natural breaching regime with additional inundation area to accommodate Estuary storage could result in one of two general scenarios, both of which would continue to be influenced by the jetty structure: establishment of perched freshwater lagoon conditions, providing habitat enhancement 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’

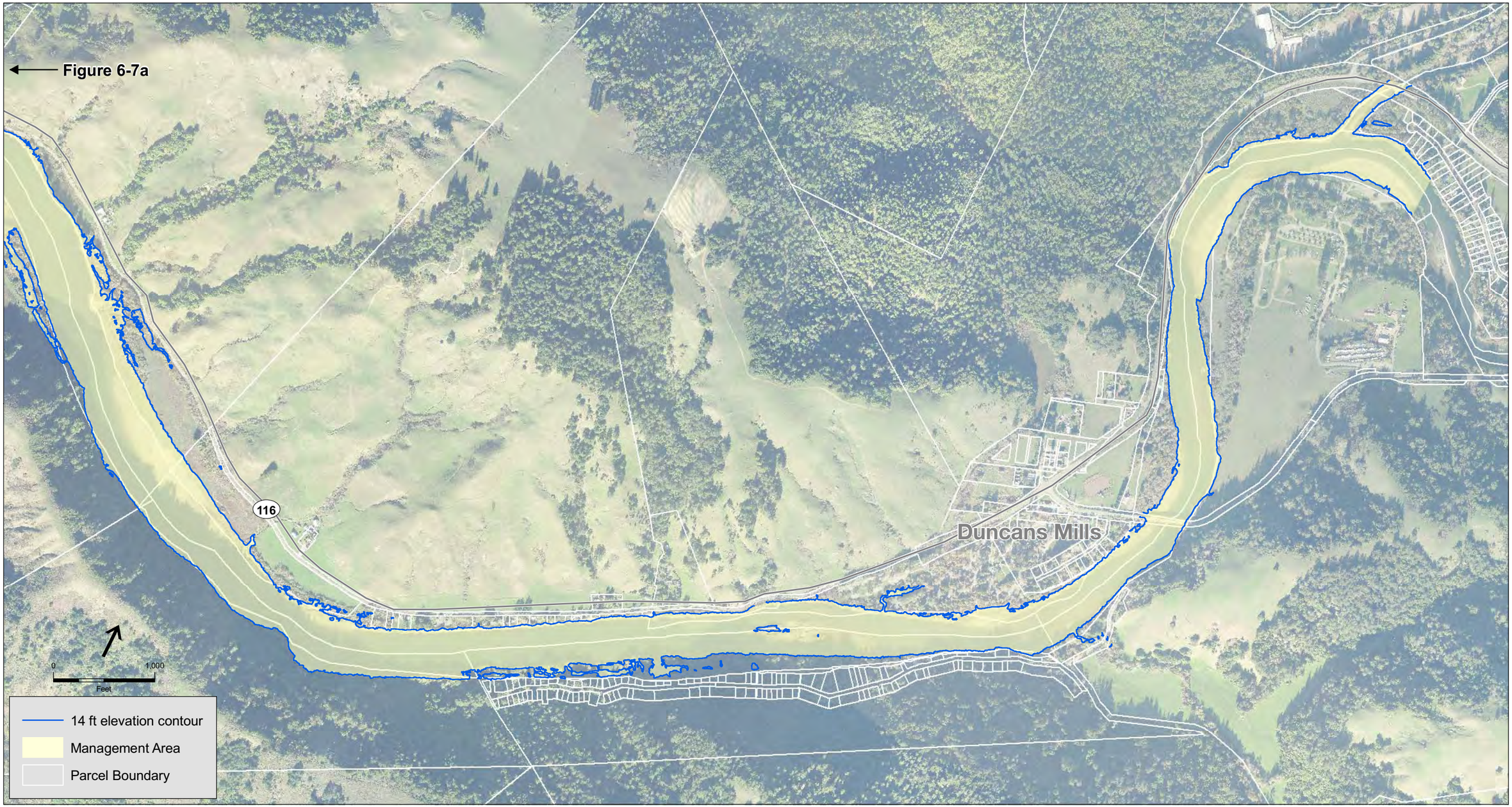



SOURCE: SCWA, 2010 (aerial photo, 2008)

Russian River Estuary Management Project. 207734.01

**Figure 6-7a**

Alternative Flood Management Measures
14 Foot Contour Management Zone

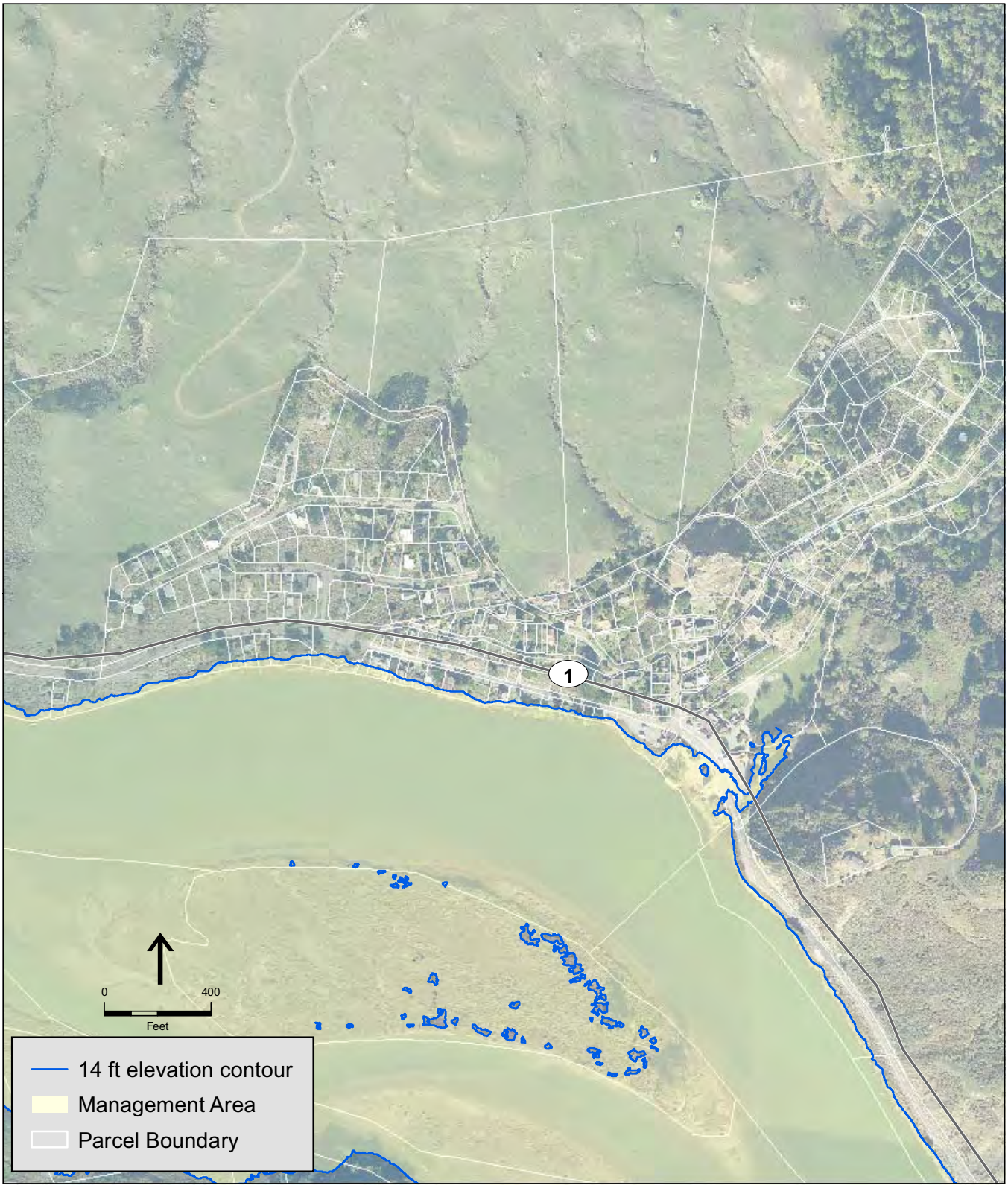



SOURCE: SCWA, 2010 (aerial photo, 2008)

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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