# Developing the Sonoma Valley Salt and Nutrient Management Plan

SONOMA COUNTY WATER AGENCY

**Presenters**

Christy Kennedy, Jim Blanke

RMC *Innovative Solutions for Water and the Environment*

January 17, 2013

# Recycled Water Policy

*Background*

- State Water Resources Control Board (SWRCB) adopted May 2009
- Stakeholder driven development
- Developed to streamline permitting and increase use of recycled water

*Drivers*

- Promote recycled water use
- Protect high quality groundwater basins
- Statewide regulatory consistency
- Address contaminants of concern

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# Salt & Nutrient Management Plan is a Regulatory Document

- Required as part of Recycled Water Policy
- Characterizes various sources of salts & nutrients

Plan Purpose:

- Helps understand effects of salts and nutrient loading within the basin
- Used to proactively manage the basin loading to be protective of groundwater quality objectives outlined by the Basin Plan

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# Salt & Nutrient Management Plan Required Elements

- Groundwater monitoring plan
- Goals and objectives for water recycling and stormwater recharge
- Salt and nutrient source characterization, assimilative capacity, loading estimates and fate & transport
- Measures to manage loading
- Anti-degradation analysis

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# Sonoma Valley SNMP Approach

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# Existing Water Quality Analysis

- Data Sources: DWR, CDPH, GAMA, USGS, SCWA
- Inclusion of 2003-2006 USGS Study data is critical for a good baseline analysis
- Depth information is limited – averaging across all depth intervals for mixing model
- Overall good water quality with very low nitrate, and flat trends for TDS and nitrate
- Baylands: area of historic saline groundwater to be considered a separate zone in mixing analysis

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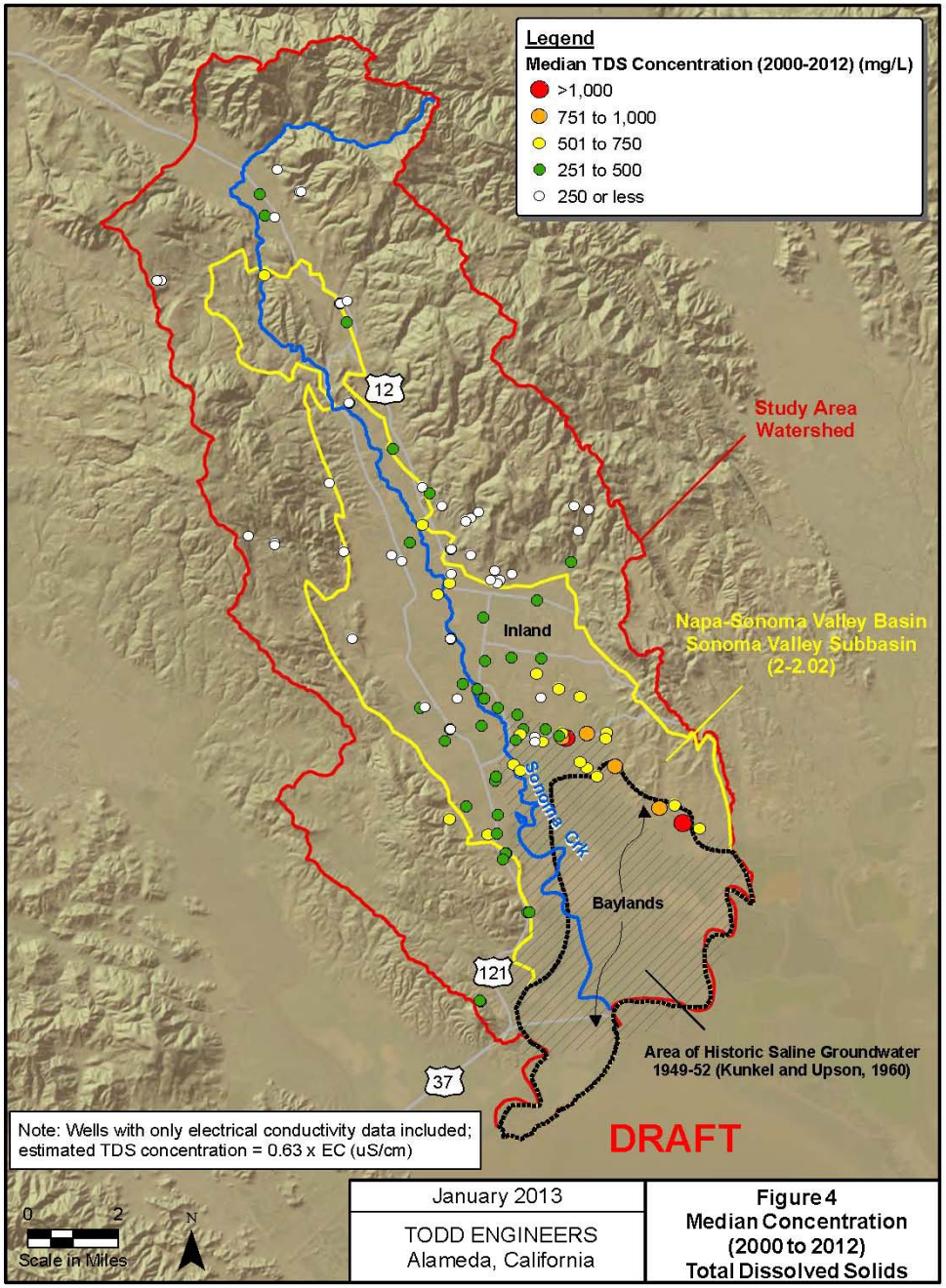
Napa-Sonoma Valley Basin
Sonoma Valley Subbasin
(2-2.02)
Inland
Sonoma Crk
Baylands
121
37
San Pablo Bay
DRAFT
0
2
Scale in Miles
N
January 2013
TODD ENGINEERS
Alameda, California
Figure 4a
Median Concentration
(2000 to 2012)
Total Dissolved Solids




January 2013

TODD ENGINEERS
Alameda, California

**Figure 4**
**Median Concentration (2000 to 2012) Total Dissolved Solids**

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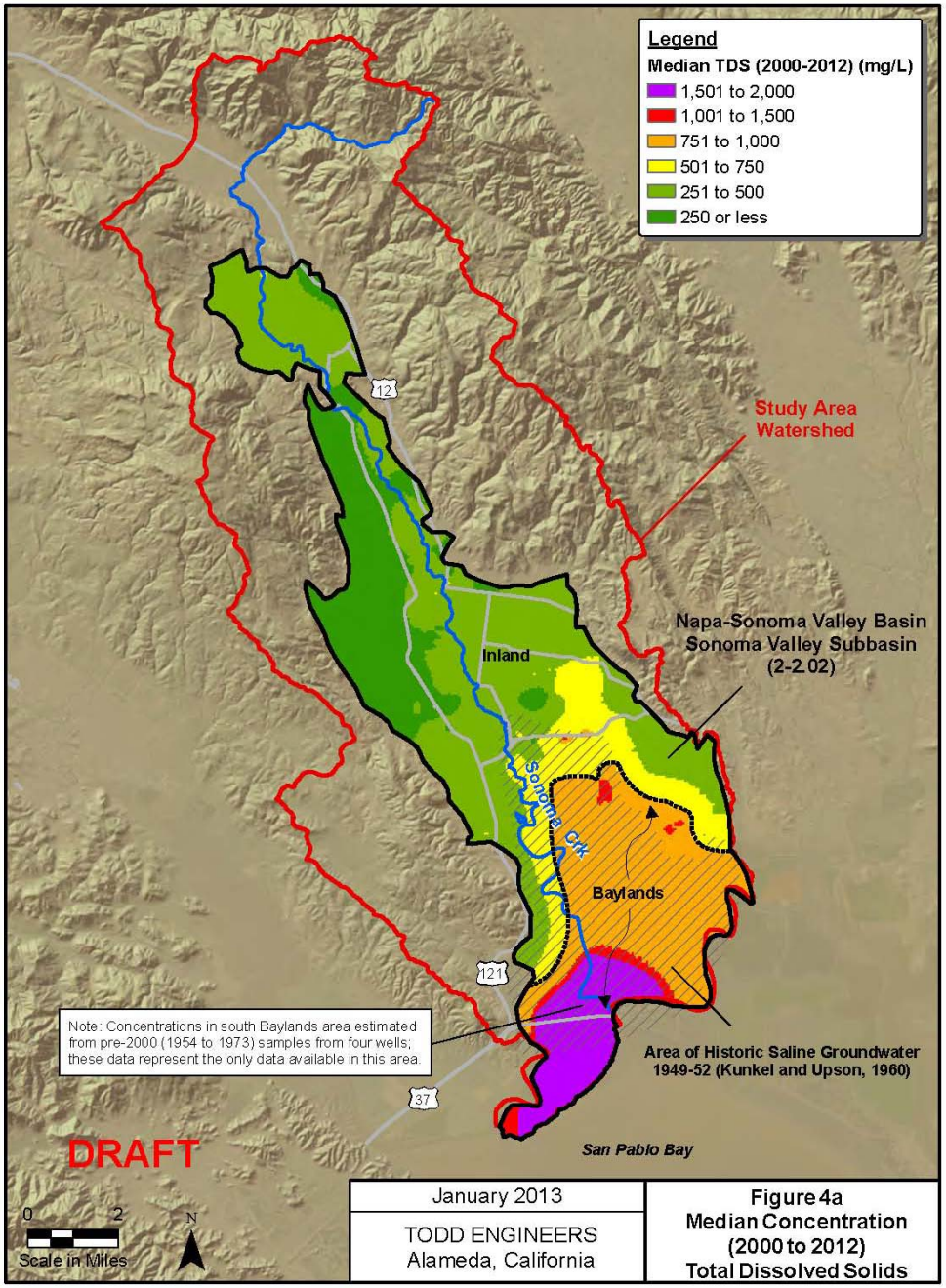
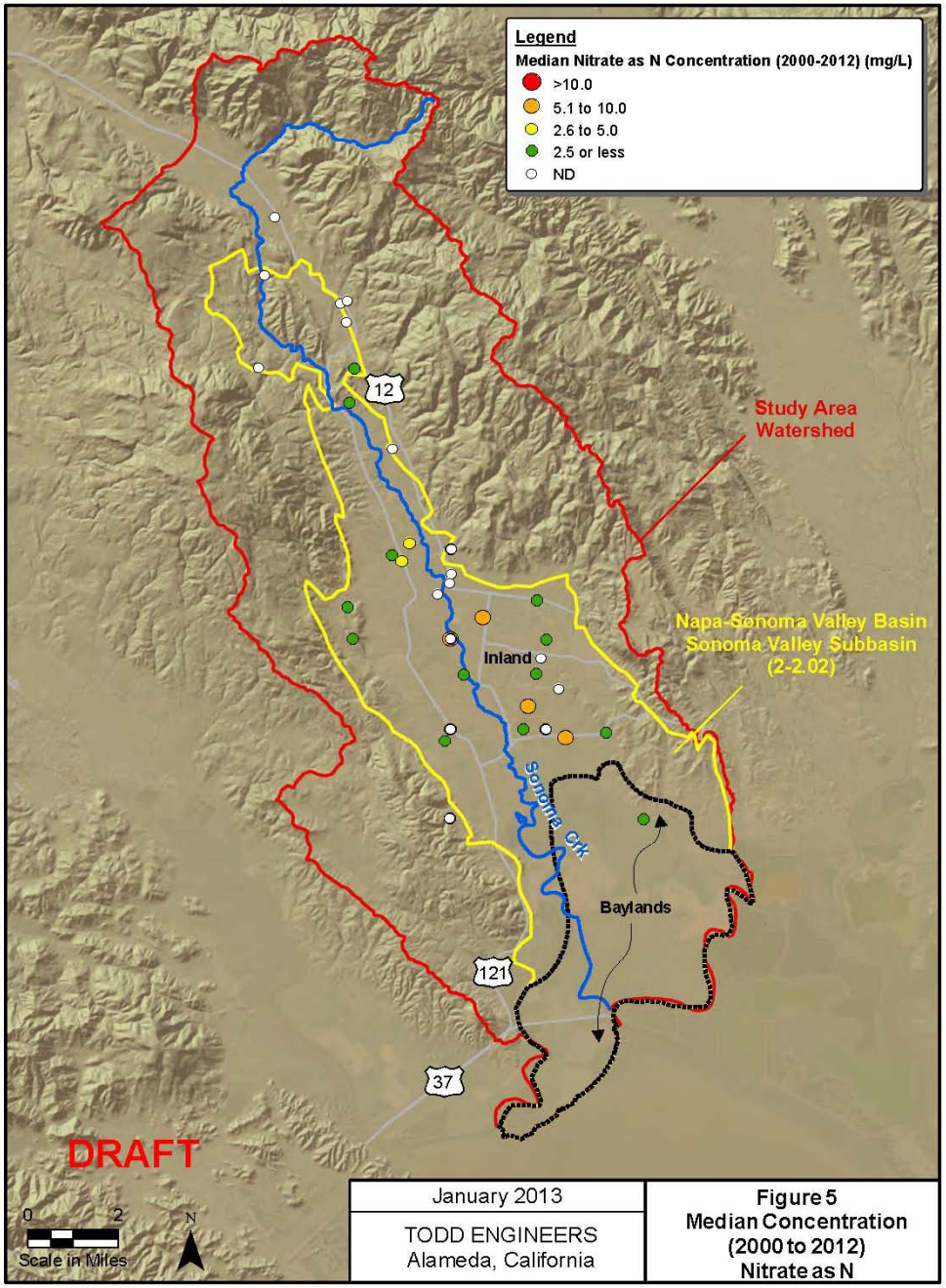

Legend
Median TDS (2000-2012) (mg/L)
1,501 to 2,000
1,001 to 1,500
751 to 1,000
501 to 750
251 to 500
250 or less
Study Area Watershed
Napa-Sonoma Valley Basin
Sonoma Valley Subbasin
(2-2.02)
Inland
Sonoma Crk
Baylands
Area of Historic Saline Groundwater
1949-52 (Kunkel and Upson, 1960)
San Pablo Bay
12
121
37
Note: Concentrations in south Baylands area estimated from pre-2000 (1954 to 1973) samples from four wells; these data represent the only data available in this area.
DRAFT
0 2
Scale in Miles
N
January 2013
TODD ENGINEERS
Alameda, California
Figure 4a
Median Concentration
(2000 to 2012)
Total Dissolved Solids


Legend
Median Nitrate as N Concentration (2000-2012) (mg/L)
>10.0
5.1 to 10.0
2.6 to 5.0
2.5 or less
ND
12
Study Area
Watershed
Napa-Sonoma Valley Basin
Sonoma Valley Subbasin
(2-2.02)
Inland
Sonoma Crk
Baylands
121
37
DRAFT
0
2
Scale in Miles
N
January 2013
TODD ENGINEERS
Alameda, California
Figure 5
Median Concentration
(2000 to 2012)
Nitrate as N

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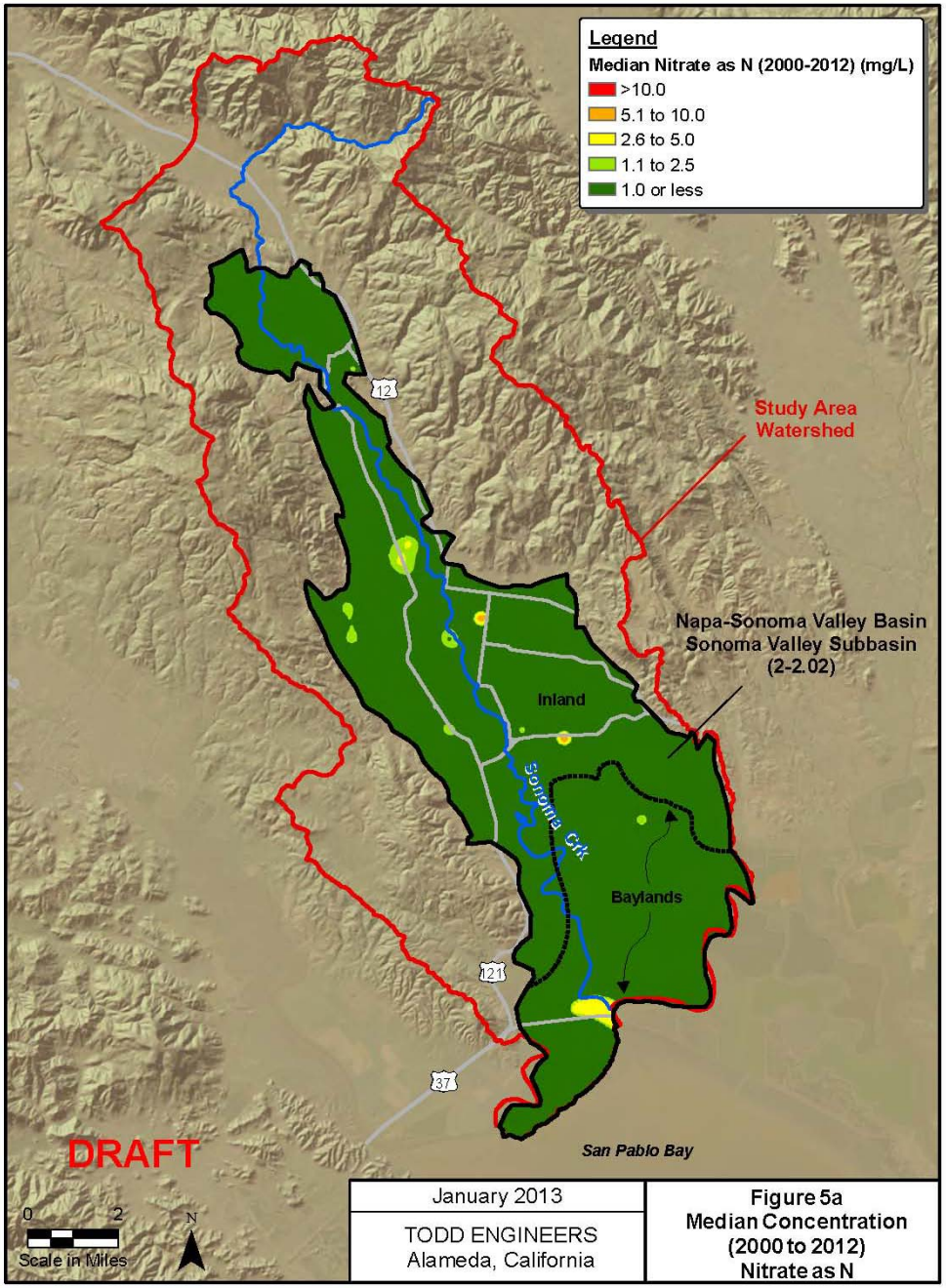
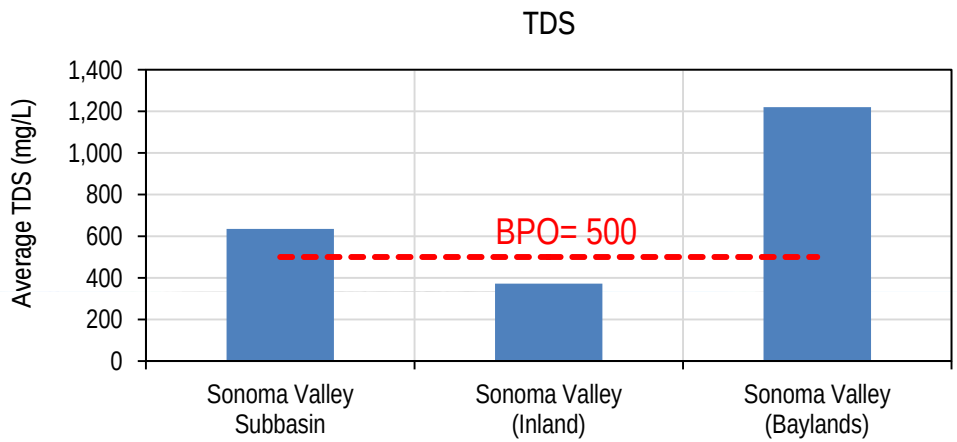
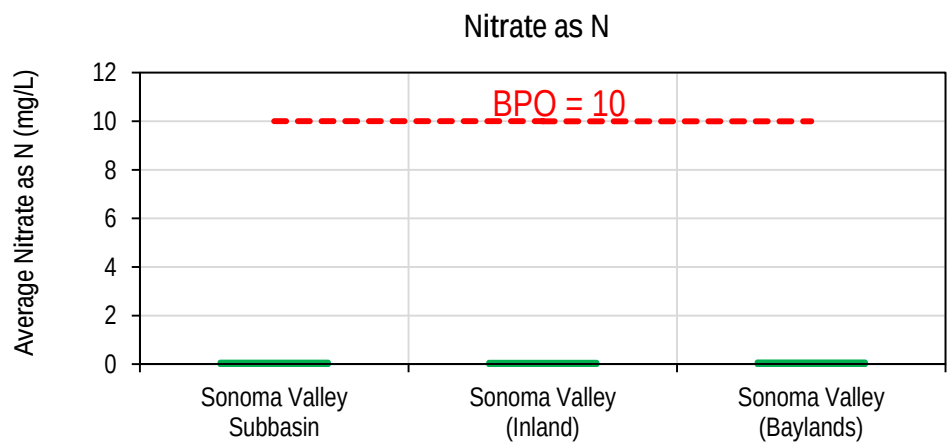

Legend
Median Nitrate as N (2000-2012) (mg/L)
>10.0
5.1 to 10.0
2.6 to 5.0
1.1 to 2.5
1.0 or less
Study Area Watershed
Napa-Sonoma Valley Basin
Sonoma Valley Subbasin
(2-2.02)
Inland
Baylands
Sonoma Crk
12
121
37
San Pablo Bay
DRAFT
0
2
Scale in Miles
N
January 2013
TODD ENGINEERS
Alameda, California
Figure 5a
Median Concentration
(2000 to 2012)
Nitrate as N

# Assimilative Capacity Analysis

| | Sonoma Valley Subbasin | Sonoma Valley (Inland) | Sonoma Valley (Baylands) |
|---|---|---|---|
| **TDS** | | | |
| Average | 635 | 372 | 1,220 |
| Basin Plan Objective | 500 | 500 | 500 |
| Assimilative Capacity | -135 | 128 | -720 |
| **Nitrate as N** | | | |
| Average | 0.06 | 0.06 | 0.07 |
| Basin Plan Objective | 10.00 | 10.00 | 10.00 |
| Assimilative Capacity | 9.94 | 9.94 | 9.93 |



# Loading Analysis is Focused on TDS and Nitrogen

Other Constituents could be addressed based on:

- Data availability
- Stakeholder concerns

January TAC discussion summary:

- Limit plan to salt and nutrients parameters while being responsive to regulatory requirements in the RW Policy
- Arsenic, iron, manganese are naturally occurring, implementation measures would not be effective to control/regulate
- Confirm approach by looking at additional parameters in recycled water quality
- Monitor CECs consistent with the RW Policy

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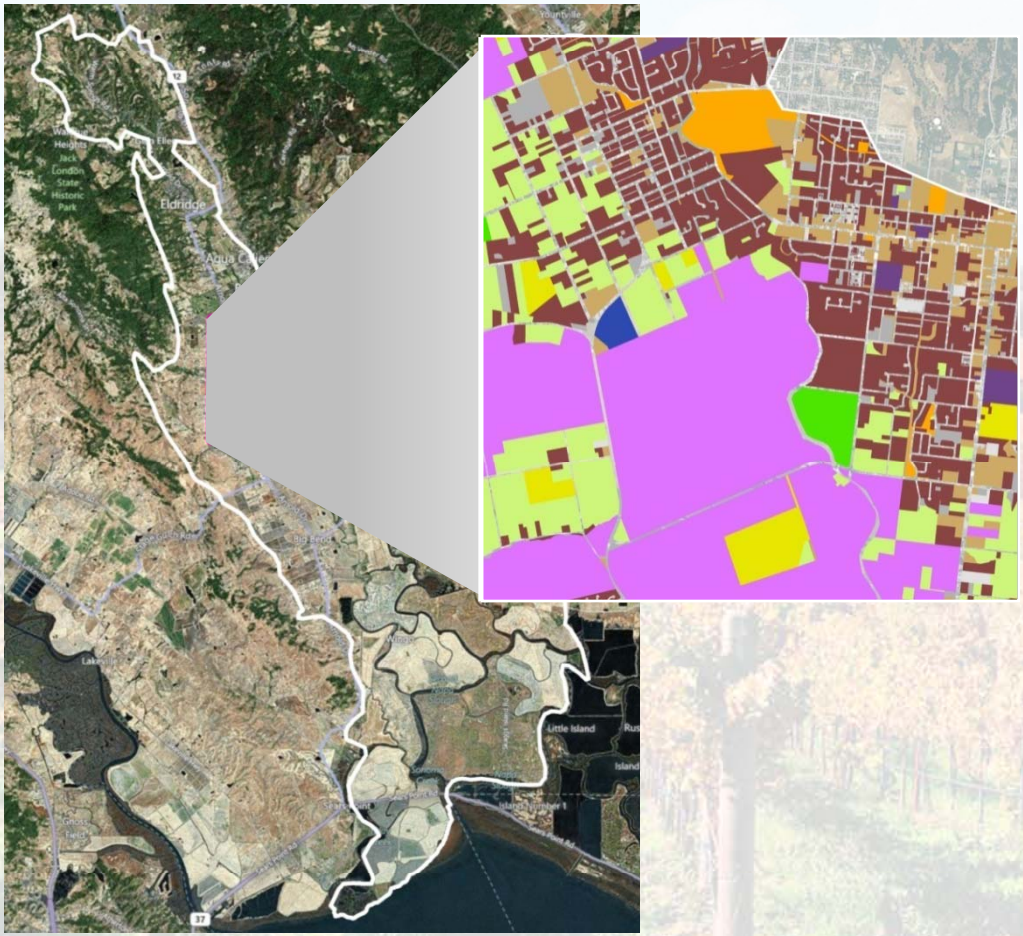
# Loading Approach Is Highly Dependent on Land Use




## List of Landuse

- Agricultural Commodities
- Apartments
- Park (Private)
- Park/Other Recreational Facility (City)

### Loading Landuse

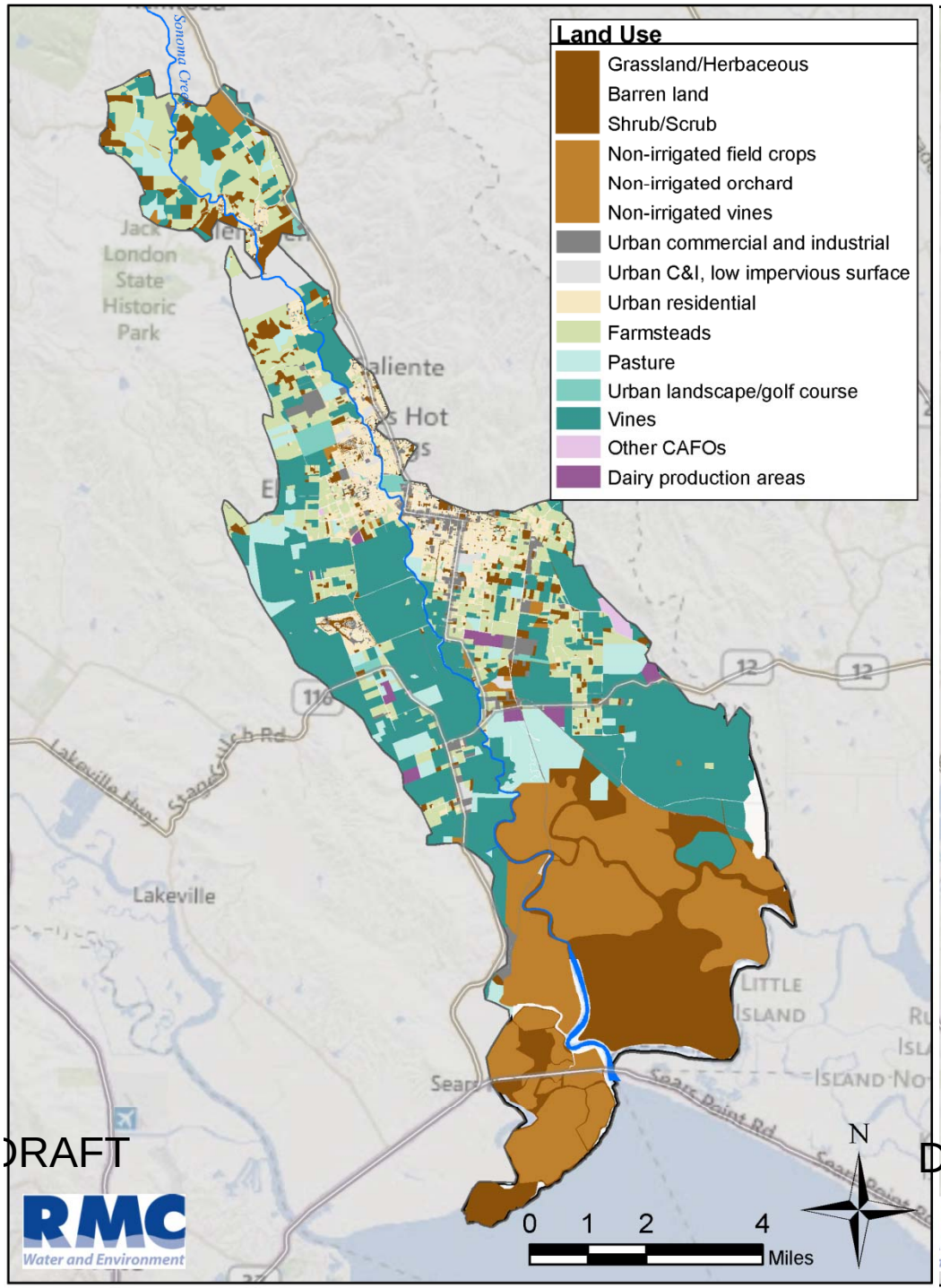
- Dairy
- Golf
- Irrigated Agriculture
- Irrigated Vine
- Non-Residential Urban
- Non-irrigated Agriculture
- Parks and Camps
- Residential
- Rural Residential
- Schools
- Vacant Commercial/Industrial
- Vacant Residential
- Water

### Landuse Factors

- Crop Coefficient
- Irrigation
- Fertilizer/Amendment (Salts)
- Livestock (Salts)
- Fertilizer/Amendment (Nutrients)
- Livestock (Nutrients)
- Uptake/Offtake (Nutrients)
- Other losses (Nutrients)
- Municipal Inputs (Salts)
- Municipal Inputs (Nutrients)

- Mineral Processing
- Miscellaneous Commercial Spaces
- Miscellaneous Industrial
- Motels
- Non-irrigated Vineyards
- Nurseries
- Office Buildings
- Orchards
- Orphanages
- Outdoor Recreational Facilities (Private)

- Transitional Use
- Utilities
- Vacant Commercial Land
- Vacant Industrial Land
- Vacant Residential Land
- Volunteer Fire Departments
- Warehouses
- Wastelands
- Water Sources


Land Use
Grassland/Herbaceous
Barren land
Shrub/Scrub
Non-irrigated field crops
Non-irrigated orchard
Non-irrigated vines
Urban commercial and industrial
Urban C&I, low impervious surface
Urban residential
Farmsteads
Pasture
Urban landscape/golf course
Vines
Other CAFOs
Dairy production areas
Sonoma Creek
Jack London State Historic Park
Lakeville
LITTLE ISLAND
0 1 2 4
Miles
N

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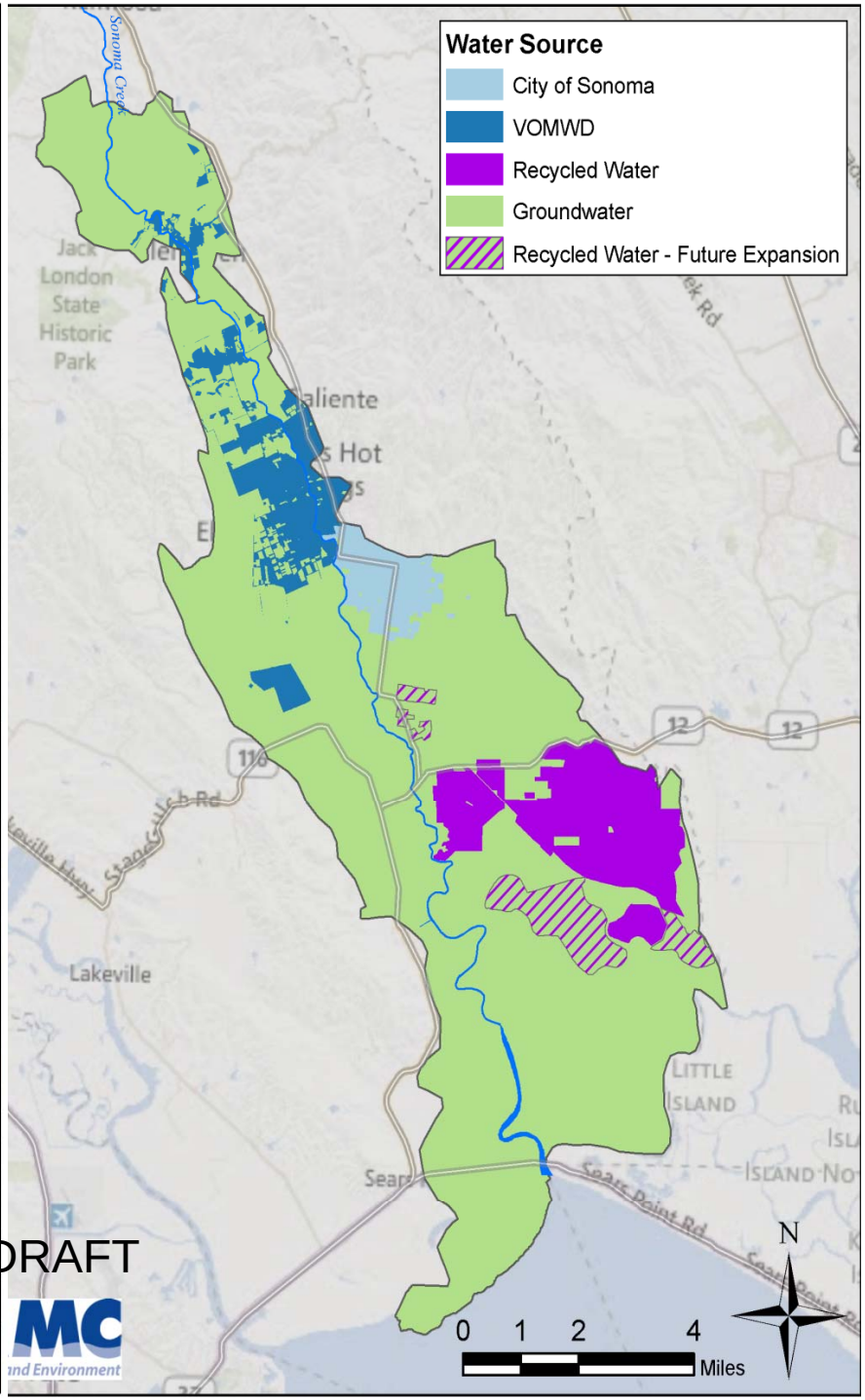
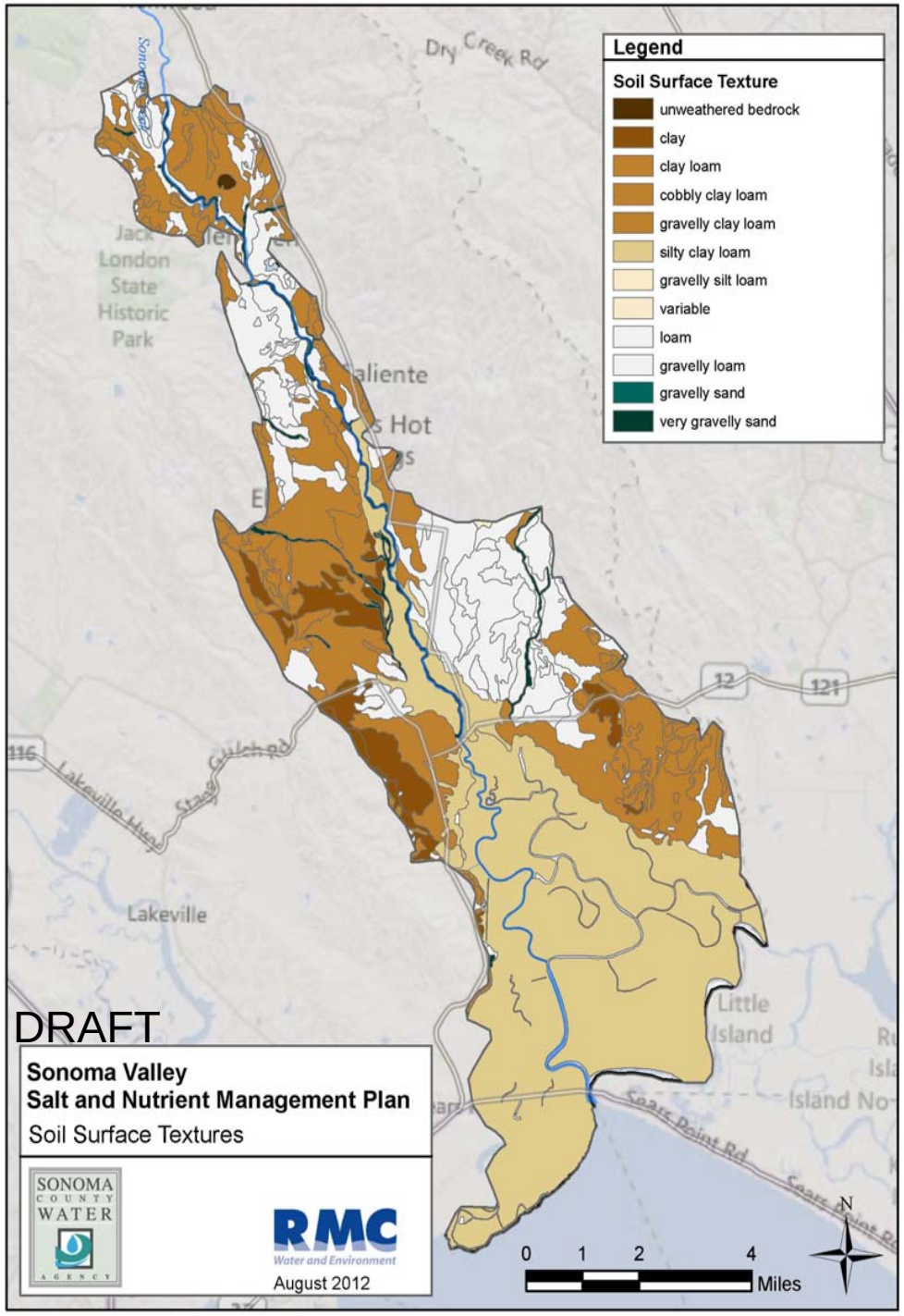
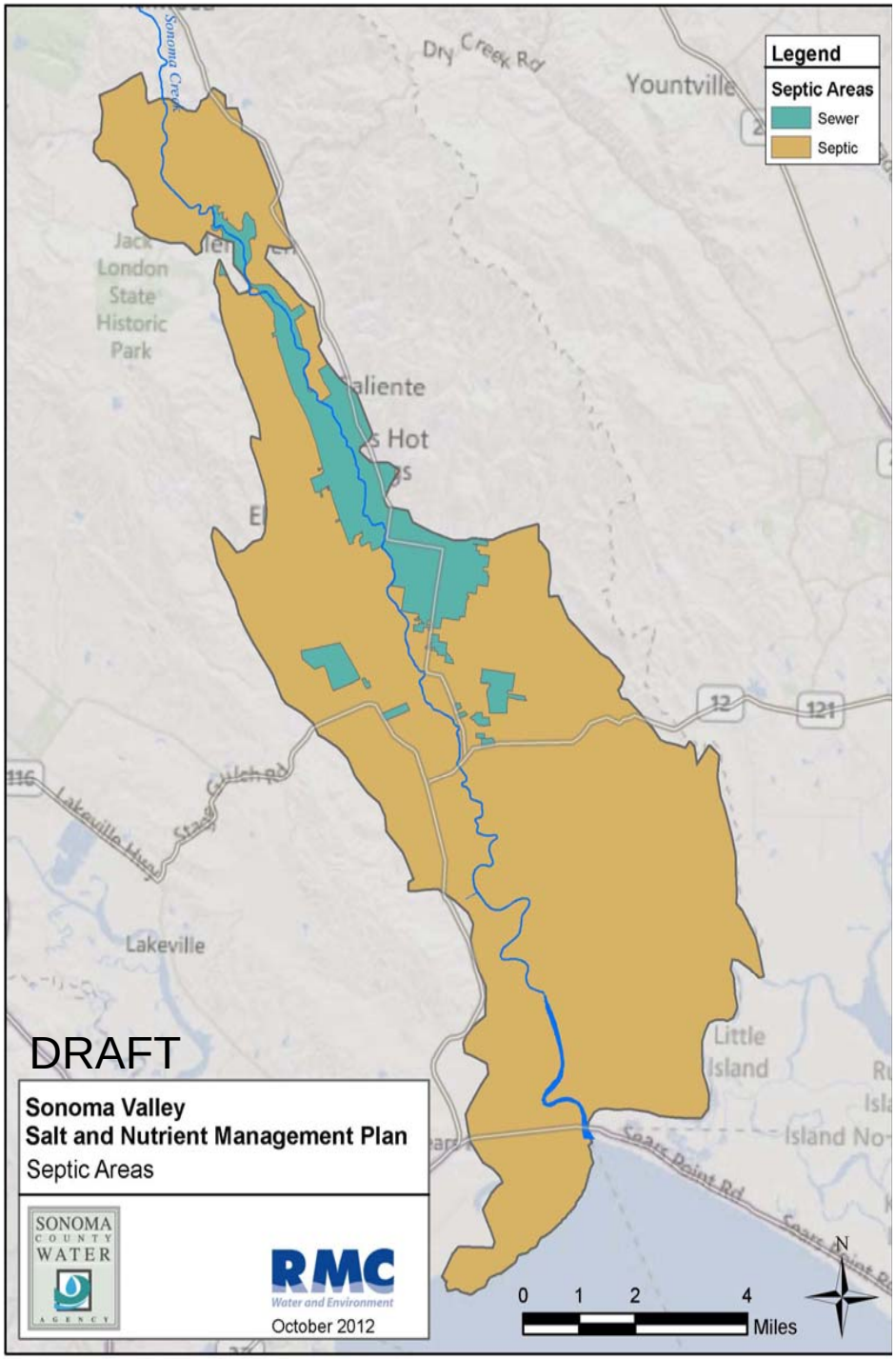

Water Source
City of Sonoma
VOMWD
Recycled Water
Groundwater
Recycled Water - Future Expansion
Sonoma Creek
Jack London State Historic Park
Lakeville
LITTLE ISLAND
0 1 2 4
Miles
N

DRAFT


Legend
Soil Surface Texture
unweathered bedrock
clay
clay loam
cobbly clay loam
gravelly clay loam
silty clay loam
gravelly silt loam
variable
loam
gravelly loam
gravelly sand
very gravelly sand
Dry Creek Rd
Jack London State Historic Park
Lakeville
Little Island
Island No
Soars Point Rd
DRAFT
Sonoma Valley
Salt and Nutrient Management Plan
Soil Surface Textures
SONOMA COUNTY WATER AGENCY
RMC
Water and Environment
August 2012
0 1 2 4
Miles
N


Legend
Septic Areas
Sewer
Septic
Dry Creek Rd
Yountville
Jack London State Historic Park
Lakeville
Little Island
Island No
Soars Point Rd
DRAFT
Sonoma Valley
Salt and Nutrient Management Plan
Septic Areas
SONOMA COUNTY WATER AGENCY
RMC
Water and Environment
October 2012
0 1 2 4
Miles
N

# Model Assumptions – Key Highlights

| Key Fields | Source/Assumptions |
|---|---|
| Land Use Class | Land use data from 2012 Sonoma County Assessor's Office, then compared to 2020 General Plan |
| Water Source | Water source applied based on SCWA shapefiles for City, District and recycled water application areas |
| Applied Water | DWR land and water use data, 4-yr average compared to 21-yr available CIMIS data for Sonoma Valley |
| Applied Nitrogen | Draft values developed by agronomist (literature values and professional judgment) for total acreage, then compared to Sonoma County Fertilizer sales records. Application rates scaled to match sales (25% reduction). Numbers further refined with input on vineyard and dairy practices |
| Applied TDS | Draft numbers developed by agronomist then checked against soil amendment sales in Sonoma County. Application rates scaled to match sales. Numbers further refined with input on vineyard and dairy practices |
| Uptake | Agronomist estimated – multiplied reported yield figures by reported N concentrations for harvested plant parts, balances checked, adjusted for irrigation and fertilization practices in each land cover category |
| Leachable N | Calculated for each land cover class based on balance between application, gaseous loss (volatilization and denitrification) and uptake, then adjusted depending on local soil conditions |
| Adjustment Factor | Soil adjustment factor derived from soil permeability classes and soil textural classes using NRCS method – scaled linearly |

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# Preliminary Loading Factors - DRAFT

| Land Use Group | Total Area (ac) | Percent Irrigated | Applied Water (in/yr) | Applied Nitrogen (lbs/acre-year) | Nitrogen Uptake (lbs/acre-year) | Leachable Nitrogen (lbs/acre-year) | Applied TDS (lbs/acre-year) |
|---|---|---|---|---|---|---|---|
| Non-irrigated vines | 284 | 0% | 0 | 18 | 16 | 0 | 84 |
| Non-irrigated Orchard | 41 | 0% | 0 | 75 | 60 | 8 | 292 |
| Non-irrigated Hay | 8,489 | 0% | 0 | 34 | 22 | 8 | 170 |
| Urban Commercial and Industrial | 1,018 | 5% | 51.1 | 92 | 60 | 23 | 584 |
| Urban C&I, Low Impervious Surface | 807 | 30% | 51.1 | 92 | 60 | 23 | 584 |
| Farmsteads/Rural-Residential | 5,608 | 10% | 28.7 | 61 | 42 | 13 | 376 |
| Urban Residential | 2,238 | 15% | 51.1 | 92 | 60 | 23 | 584 |
| Urban Landscape/Golf Course | 370 | 75% | 51.1 | 92 | 60 | 23 | 584 |
| Flowers and Nursery | 7 | 50% | 39.4 | 124 | 81 | 31 | 956 |
| Pasture | 686 | 100% | 51.1 | 0 | 0 | 0 | 0 |
| Vines | 13,075 | 100% | 6.3 | 29 | 23 | 3 | 168 |
| Other CAFOs | 102 | 10% | 0 | 84 | 0 | 75 | 730 |
| Dairy Production Areas | 349 | 0% | 0 | See Dairy Parameters | | | |

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# Preliminary Dairy Parameters-DRAFT

| Characteristic | Production Area | Ponds | Land Application Area |
|---|---|---|---|
| % of Total Parcel Area | 6% | 1% | 93% |
| Applied Nitrogen (lbs/acre-year) | 20 | 141 | 367 |
| Used Nitrogen (lbs/acre-year) | 0 | 0 | 352 |
| Leachable Nitrogen (lbs/acre-year) | 8 | 113 | 7 |
| Applied TDS (lbs/acre-year) | 82 | 933 | 1,280 |

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# Water Recycling Goals & Objectives

- Consistent with 2010 UWMP for Sonoma

| | Current RW Use | Future RW Use (2030) |
|---|---|---|
| SVCSD | 1,350 AFY | 4,069 AFY |

# Stormwater Recharge/Use Goals & Objectives

Relevant Planning Documents/Studies

- Slow It, Spread It, Sink It
- WaterSmart Guidebook
- LID Design Manual
- Stormwater-Groundwater Recharge Scoping Study

Numerical recharge goal setting to come out of stormwater project (above) implementation. Future SNMP update will incorporate.

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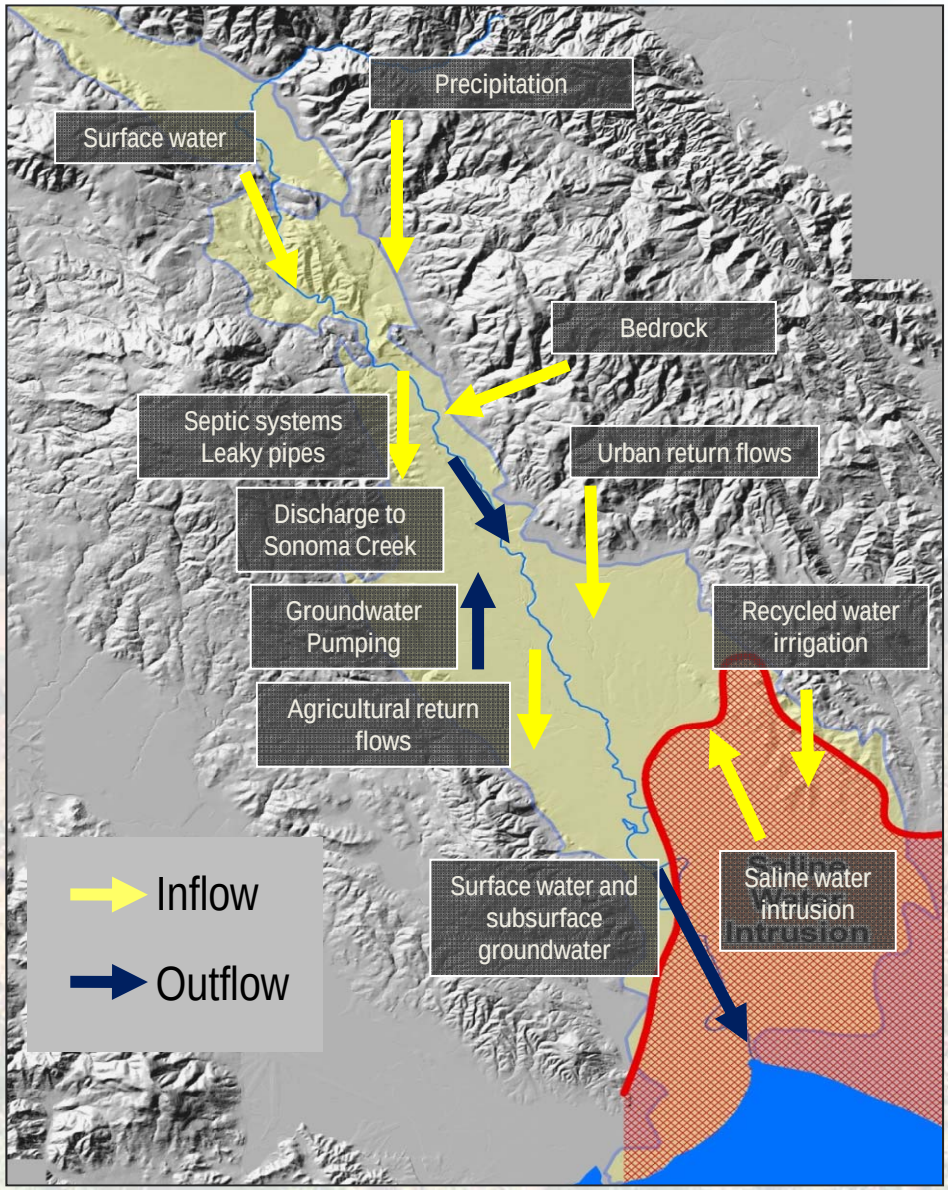
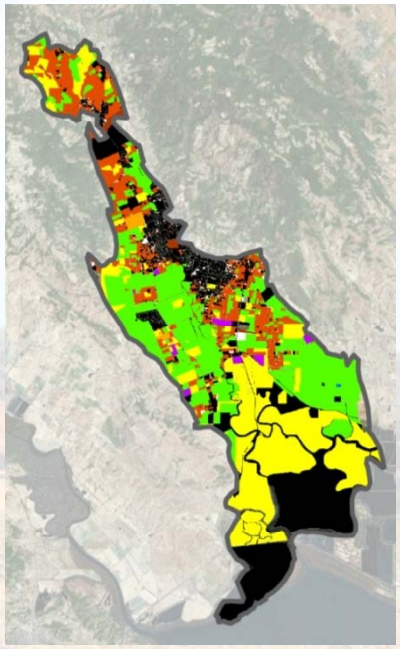
# Mixing Model Proposed to Evaluate Sources and Sinks




Model includes basic components:

- Estimation of chemical mass in storage
- Source and sink concentrations
- Application of concentrations to flows
- Source loading and sink removal
- 10-year planning horizon, look at changes in water use and land use

# Implementation Measures Developed Collaboratively



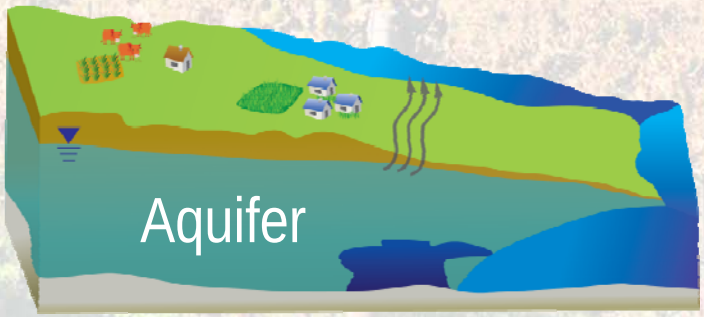
- Engage land and water managers
- Will be data driven
- Seek material benefit

*Significant load reductions*

*In impacted areas*

*Implementable & timely*

- Monitor mainly to verify performance

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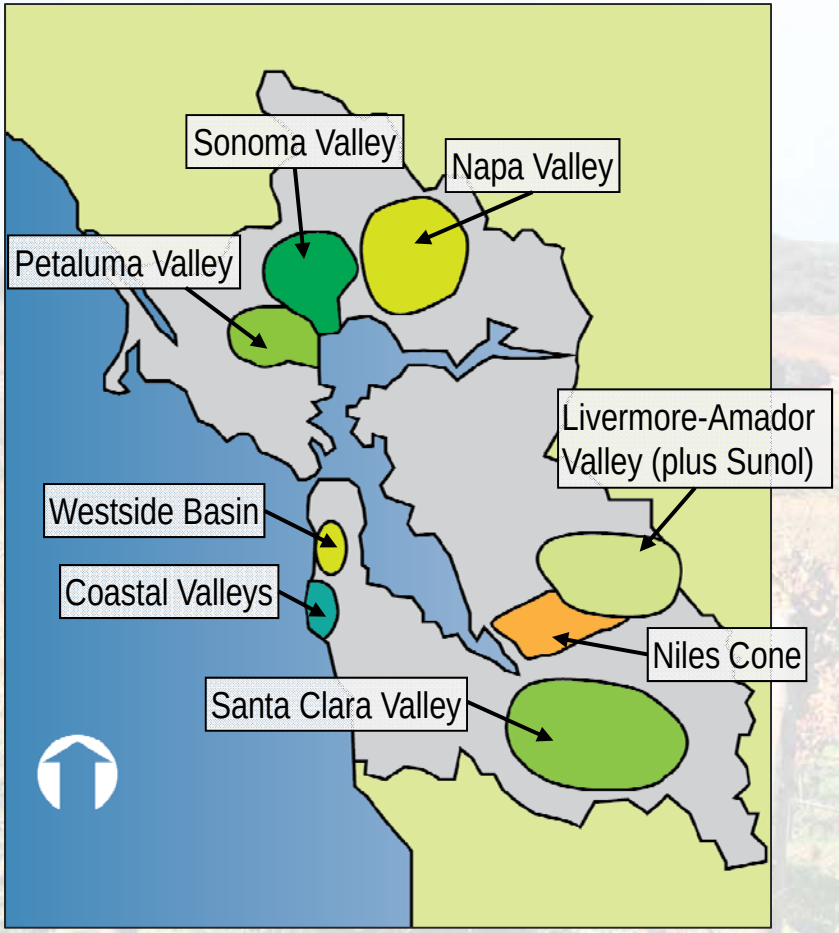
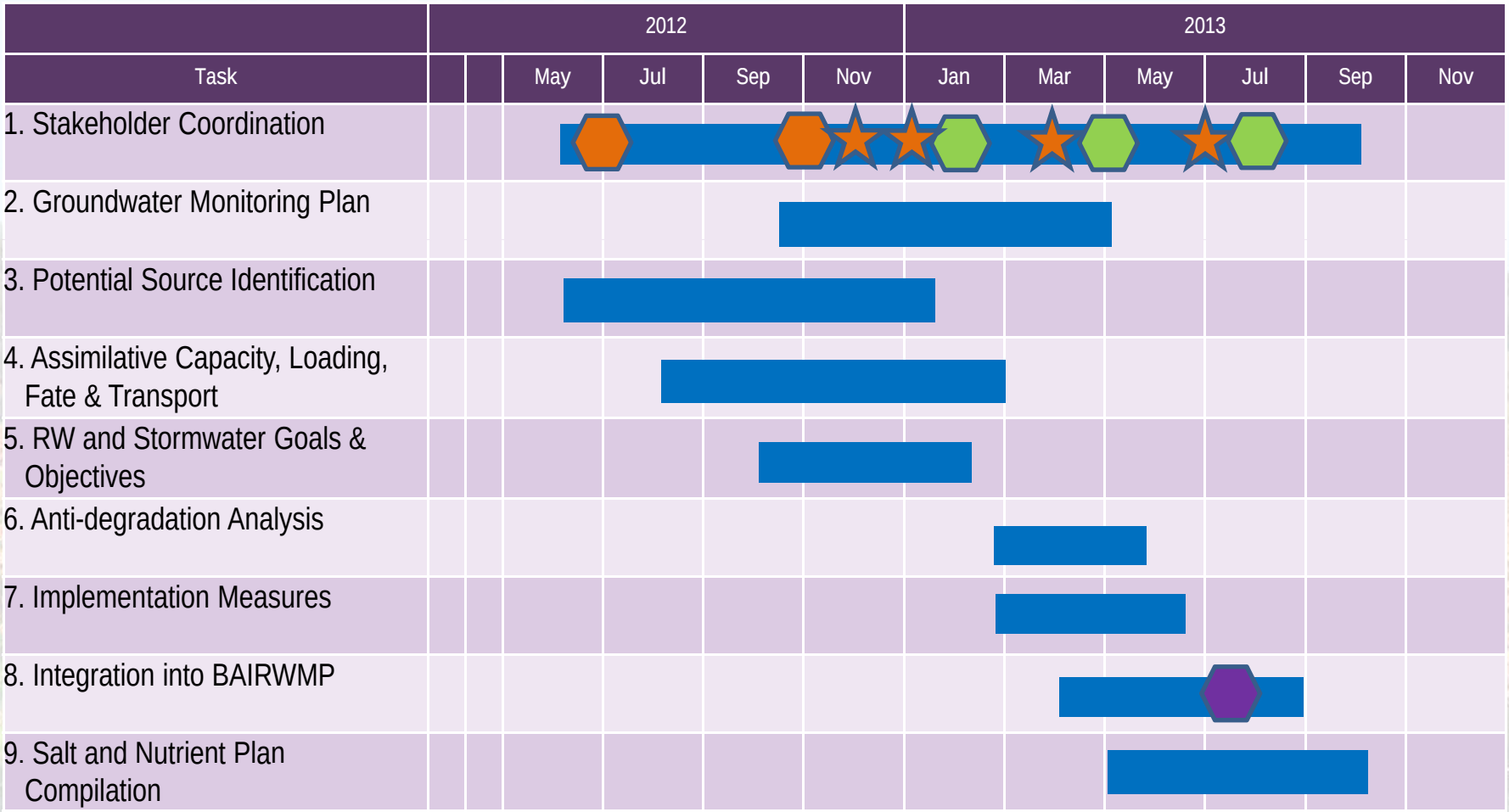
# Sonoma SNMP Prop 84 Funding Requires Templates Be Developed to Translate throughout the Region



# Schedule for Sonoma Valley SNP

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# Please Submit Comments/Questions on SNMP Process and Technical Analysis by January 31, 2013

Christy Kennedy: ckennedy@rmcwater.com, 415.321.3400

More information on Sonoma Valley Groundwater can be found here: http://www.scwa.ca.gov/svgroundwater/

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