

NORTH COAST REGIONAL WATER QUALITY CONTROL BOARD

Vineyard and Orchard Permit Scoping



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Lynette Shipsey, Water Resource Control Engineer
Lance Le, Water Resource Control Engineer
Katharine Carter, Senior Environmental Scientist
Alydda Mangelsdorf, Environmental Program Manager

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1.0 BACKGROUND

The State Water Resources Control Board (State Water Board) and the Regional Water Quality Control Boards (Regional Water Boards) are the primary agencies tasked with the responsibility for protection of water quality pursuant to the Porter-Cologne Water Quality Control Act (Porter-Cologne Act) as codified in the Water Code, Division 7. The Porter-Cologne Act is the principal law governing water quality regulation in California and establishes a comprehensive program to protect water quality and the beneficial uses of water. The Porter-Cologne Act applies to surface waters, wetlands, and ground water and to the discharge of waste and other controllable factors affecting water quality. Pursuant to the Porter-Cologne Act (California Water Code section § 13000 et seq.), the policy of the State is as follows:

- The quality of all the waters of the State shall be protected,
- All activities and factors affecting the quality of water shall be regulated to attain the highest water quality within reason, and
- The State must be prepared to exercise its power and jurisdiction to protect the quality of water in the State from degradation.

Under the authority of the Porter-Cologne Act, the Regional Water Boards regulate discharges primarily through issuance of National Pollutant Discharge Elimination System (NPDES) permits for point source discharges and waste discharge requirements (WDRs) and waivers of WDRs for nonpoint source discharges. Additionally, the Federal Clean Water Act (CWA) requires States to develop a program to protect the quality of water resources from the adverse effects of nonpoint source water pollution. Nonpoint source (NPS) discharges can come from many diffuse sources and occur when water flows off of land, roads, buildings, and other features of the landscape carrying pollutants into drainage ditches, lakes, rivers, wetlands, bays, and aquifers. The State Water Board's *Nonpoint Source Management Plan* and the *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program* (Nonpoint Source Policy) explain how nonpoint source discharges are to be addressed (e.g., through WDRs, waivers of WDRs or prohibitions), thus fulfilling the requirements of the Federal CWA and Porter-Cologne Act.

1.1 Agricultural Lands Discharge Program

The North Coast Regional Water Quality Control Board (North Coast Regional Water Board) is developing and implementing a broad Agricultural Lands Discharge Program to address nonpoint source related water quality impacts associated with agricultural land use activities within the North Coast Region. There are approximately 320,000 acres of agricultural lands within the Region, which are primarily used for vineyards, orchards, row crops, grain, alfalfa, and hay production, as well as pasture land, and dairies. Agricultural nonpoint source discharges can contain pollutants such as pesticides, nutrients, organic matter, salts, pathogens, and sediment. The North Coast Regional Water Board's Agricultural Lands Discharge Program consists of separate permits (i.e. WDRs and waivers of WDRs) and watershed stewardship activities that address agricultural nonpoint source discharges of waste and other controllable factors. The scope of the permits within the Agricultural Lands Discharge Program is defined by either agricultural land use and/or geographic location, for example the Scott River Watershed Sediment and Temperature Waiver of Waste Discharge Requirements (WDR) or the General WDR for Dairies.

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In March 2017, the Board endorsed staff's proposal to prioritize development of a targeted permit within the Agricultural Lands Discharge Program specifically for vineyards and orchards. Shortly thereafter, the North Coast Regional Water Board received funding for a new Irrigated Lands Program staff position and in early 2018 hired a new staff member who is currently dedicated to the development of the vineyard and orchard permit (Permit). The Permit will be designed to implement the requirements of the North Coast Regional Water Board's *Water Quality Control Plan for the North Coast Region* (Basin Plan) including the Antidegradation Policy and the Nonpoint Source Policy to effectively and practicably prevent and/or mitigate potential water quality risks including, but not limited to: nutrient, sediment, temperature, heavy metal, and pesticide discharges.

In August 2018, North Coast Regional Water Board staff began conducting research and geospatial analyses of factors in the North Coast Region related to discharges of waste from vineyards and orchards to assist in identifying the scope and content of the Permit. This effort was undertaken to determine if a single crop permitting effort is warranted and if the Permit should apply regionwide or be more limited in geographic scope. Staff conducted analyses of geospatial watershed factors and agricultural land use distributions, as well as characteristics of vineyard and orchard activities within the North Coast Region. The exercise included evaluating the locations and sizes of the vineyards and orchards in the North Coast Region, as well as the similarities and differences between their land management practices, nutrient and pesticide application, water use, and other factors. Though the scope of the Permit is being assessed, there has been no change in Regional Water Board staff's approach to key program development concepts, which have previously been shared for discussion and input during Stakeholder Advisory Group meetings conducted from 2011-2014. These concepts include the potential development of water quality farm plans, implementation of best management practices to control discharges of waste, and reliance on third-party groups or programs to assist land managers and property owners in achieving compliance with the Permit.

The results and key findings provided by these analyses allowed staff to formulate recommendations for the scope of the permit, which were presented to Executive Management for approval. The details of staff's research task, data compiled and reviewed during this effort, summary of key findings, and permit scope recommendations are included in this document.

2.0 PERMIT SCOPING EXERCISE

2.1 Scoping Questions

This permit scoping exercise was designed to provide information for staff to define the scope and develop the content of the permit. Specifically, the objective of the exercise was to answer two main questions:

- 1) Does an assessment of readily available data confirm that the development of a single permit to address discharges of waste from both vineyards and orchards is appropriate?
- 2) Does an assessment of readily available data confirm that the development of a regionwide permit is appropriate?

These questions are pertinent because prior to conducting the analyses it was recognized that vineyard and orchard operations may differ enough to necessitate having different permit requirements or waste discharge control strategies for each commodity, and it was recognized that there may be enough differences in vineyard and orchard operations in different parts of the North Coast Region to necessitate geographically distinct permits.

2.2 Technical Assessment Questions

Staff established a list of technical assessment questions that identified the key information to be gathered and used to provide the necessary framework to successfully answer the two main scoping questions. The technical assessment questions are listed in Table 1, which also identifies which of the figures and tables included in this document were used to answer each of these questions.

Table 1: Technical Assessment Questions

No.	Question	Figure	Table
a	Where are the vineyards and what is their combined acreage?	F1	T3
b	Where are the orchards and what is their combined acreage?	F1	T3
c	What percentage of vineyards also have orchards?		T2
d	What are the water quality impairments for each watershed within the vicinity of vineyards and orchards?	F4	T5
e	Do the TMDL source analyses (where applicable) identify pollutant sources relevant to vineyards and orchards?		T5
f	What are the fertilizer and pesticide application rates and water use rates of vineyards and orchards?		T4
g	What is the rate of new vineyard and orchard development in the North Coast Region?		T2
h	Are vineyards and orchards located in areas that pose a high risk of erosion?	F2	
i	What is the average annual precipitation in areas where vineyards and orchards are located?	F3	
j	To what extent are vineyards and orchards located within the 100-year flood plain?		T2
k	Are vineyards and orchards regulated under other permitting programs?		T2

3.0 DATA COLLECTED AND ANALYZED

Data collected and analyzed during staff's research efforts were from multiple sources having varying degrees of accuracy. Each of the sources used to provide geospatial information and acreage statistics had its own limitations and these limitations have been taken into consideration during the interpretation of the data and when formulating answers to the technical assessment questions.

The three sources used to determine acreage totals and geospatial distributions of vineyard and orchard land use types within the Region include National, State, and local data sets. They are the United States Department of Agriculture (USDA) Cropscape Cropland Data Layer (CDL) data set, the California Department of Water Resources (CADWR) Crop Mapping data set, and County Crop Reports from the counties within the North Coast Region. The USDA Cropscape CDL is a product that the National Agricultural Statistics Service generates. It is a raster, geo-referenced, crop specific land cover data layer created annually for the continental United States using moderate resolution satellite imagery and extensive agricultural ground truth.² The CADWR Crop Mapping data set is from Land IQ's satellite and airborne remote sensing data.³ The most current County Crop reports included Del Norte County 2013, Humboldt County 2016, Lake County 2017, Mendocino County 2016, Siskiyou County 2017, and Sonoma County 2017. County crop reports are typically generated from census data as provided by land owners within each county.

The USDA Cropscape CDL was the chosen source to create the geographic information system (GIS) maps as it allowed for appropriate data formatting to provide the most useful visual representation of geospatial distributions for the regionwide maps given their large scale and the small proportion of orchard acreage density points as compared to vineyard acreage density points. Land use classes were aggregated from original Cropscape CDL classes and pixels were converted to point symbols with each point being equal to 900 m². Orchard symbols were enlarged for increased visibility.

Despite the utilization of the USDA Cropscape CDL for geospatial distribution patterns, the CADWR Crop Mapping data set was the chosen source for current crop type acreage totals discussed in the text, as this data set was the most consistent with current County Crop Report acreage totals. While County Crop Reports are the most accurate information, the fact that they were not available for all counties in the Region limited their utility for making regionwide comparisons and conclusions.

² USDA, 2018

³ Land IQ, 2018

4.0 FINDINGS AND RECOMMENDATIONS

4.1 Technical Assessment Question Answers

Answers to the technical assessment questions are presented in Table 2.

Table 2 – Technical Assessment Question Answers

No.	Question	Figure	Table	Answers
a	Where are the vineyards and what is their combined acreage?	F1	T3	<p>The majority of vineyards in the Region are found in Sonoma and Mendocino Counties.</p> <ul style="list-style-type: none"> • CADWR Crop Mapping data indicates there are 60,317 total vineyard acres, 99.7% found in these 2 counties. • USDA Cropscape data indicates there are 46,521 total vineyard acres, 99.9% found in these 2 counties. • County Crop Report data indicates there 62,466 total vineyard acres in Sonoma County and 17,250 total vineyard acres in Mendocino County.

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No.	Question	Figure	Table	Answers
b	Where are the orchards and what is their combined acreage?	F1	T3	<p>Two of the three data sources indicate that the majority of orchards in the Region are found in Sonoma and Mendocino Counties.</p> <ul style="list-style-type: none"> • CADWR Crop Mapping data indicates there are 3,266 total orchard acres, 98.8% found in these 2 counties. • USDA Cropscape data indicates there are 172 total orchard acres, 62% found in Siskiyou County, 34% found in Sonoma and Mendocino Counties, 2% found in Modoc County, and 2% found in Trinity and Humboldt Counties. • County Crop Report data indicates there are 2,571 total orchard acres in Sonoma County, 1,776 acres in Mendocino County, and 37 acres in Siskiyou County.
c	What percentage of vineyards also have orchards?			<p>Within Sonoma County, 14% of the total orchard acreage is located on parcels with planted vineyards.⁴ (Similar data was not readily available for other counties.) In Siskiyou County, some orchards are located on small truck farms producing multiple crops, though not generally wine grapes.</p>
d	What are the water quality impairments for each watershed within the vicinity of vineyards and orchards?	F4	T5	<p>The primary water quality impairments in watersheds in the North Coast with vineyards and orchards are due to sediment and temperature.</p>

⁴ County of Sonoma, 2017

No.	Question	Figure	Table	Answers
e	Do the TMDL source analyses identify pollutant sources relevant to vineyards and orchards?		T5	<p>The Navarro River Sediment and Temperature TMDL includes estimates of vineyard erosion as a source category: 7% of human-caused erosion. 80% of human caused erosion is estimated to come from roads, including those associated with vineyards. The sediment analysis for the Laguna de Santa Rosa (TMDL not complete yet) indicates 2% of upland sediment delivery comes from cropland, 10% from roads, 17% from soil creep and gullies, and 54% from channel incision and increases in peak flow. There is not yet a sediment analysis or TMDL for the larger Russian River Watershed. Sediment TMDLs generally identify roads as a key sediment source, while Temperature TMDLs generally identify the lack of riparian shade as the key cause of temperature impairments.</p>
f	What are the fertilizer and pesticide application rates and water use rates of vineyards and orchards?		T4	<p>Waste discharges associated with fertilizer and pesticide application on both vineyards and orchards pose a risk to water quality. On a per acre basis orchards utilize 150-200% more fertilizers and pesticides than vineyards. However, given that there are significantly more acres of vineyards than orchards in the North Coast Region, the potential cumulative impacts from fertilizer and pesticide applications on vineyards are greater compared to orchards. Water usage for vineyards and orchards depends on various factors but tends to be between 0.2 – 0.7 acre-ft/acre/year for vineyards and 1.5 – 2.5 acre-ft/acre/year for orchards. However, during periods of frost the water use rate for frost protection on vineyards can increase up to 3,000 gal/hr per acre.⁵</p>

⁵ Fish Friendly Farming Certifications, 2017

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No.	Question	Figure	Table	Answers
g	What is the rate of new vineyard and orchard development in the North Coast Region?			There has been an overall decrease in the acres of orchards in Sonoma and Mendocino Counties over the last 30 years from 14,600 acres down to 3,227 acres. ⁶ However, there has been an overall increase in vineyard acres in Sonoma and Mendocino Counties over the last 30 years from 41,050 acres to 60,111 acres. ⁷ Data was unavailable for other counties within the North Region.
h	Are vineyards and orchards located in areas that pose a high risk of erosion?	F2		<p>The soil erodibility and slope length-gradient combined soil loss potential is high to moderately high throughout most of the North Coast Region, except on the Modoc Plateau. While orchards are dispersed throughout the North Coast Region, vineyards are predominantly in the Russian River and Navarro River Watersheds.</p> <ul style="list-style-type: none"> • Russian River Watershed: moderately high soil loss potential, mainstem length of 110 miles, elevation ranging from 0 ft – 4,343 ft., watershed encompasses 1,485 square miles. • Navarro River Watershed: moderately high soil loss potential, mainstem length of 28.3 miles, elevation 0 ft – 269 ft., watershed encompasses 315 square miles. <p>Agricultural uses that are located on steeper slopes have a greater risk of erosion and a higher risk to water quality as compared to those that are located on flatter ground. In general, orchards in the North Coast Region tend to be located on flatter ground while vineyards can be found on both flat ground and steeper slopes. Additionally, the high annual precipitation rates in many areas of the North Coast Region increase the vulnerability to soil erosion, especially on steep slopes.</p>

⁶ County of Sonoma 1986; County of Mendocino 1986; CADWR, 2014

⁷ County of Sonoma 1986; County of Mendocino 1986; CADWR, 2014

No.	Question	Figure	Table	Answers
i	What is the average annual precipitation in areas where vineyards and orchards are located?	F3		The average annual precipitation for Sonoma and Mendocino Counties where the majority of vineyards and orchards are located ranges from 38-45 in/yr. Average annual precipitation for locations in Siskiyou County, where some orchards are, range from 57-60 in/yr.
j	To what extent are vineyards and orchards located within the 100-year flood plain?			Approximately 30% (993 ac) of orchards and 18% (10,725 ac) of vineyards are in the 100-yr flood plain. ⁸
k	Are vineyards and orchards regulated under other permitting programs?			Pesticide application on vineyards and orchards is regulated by the California Department of Pesticide Regulation and county agricultural commissioners. Pursuant to the Vineyard and Orchard Site Development Permit (also known as VESCO), vineyards and orchards in Sonoma County must obtain a permit to plant or replant more than 1 acre. The requirements of Sonoma County's VESCO apply for 3 years following site development and then expire. ⁹ No other county in the Region implements a county permit applicable to vineyards or orchards.

4.2 Summary of Findings and Recommendations

Scoping Question 1: Does an assessment of readily available data confirm that the development of a single permit to address discharges of waste from both vineyards and orchards is appropriate?

Within the North Coast Region there are 60,317 total vineyard acres and 3,266 total orchard acres (Figure 1 and Table 3). Approximately 99.7% of the vineyard acreage within the Region is located in Sonoma and Mendocino Counties, totaling 60,111 acres (Figure 1 and Table 3). The remaining 0.3% of vineyards, totaling 206 acres, are in Siskiyou, Trinity, and Humboldt Counties. The vineyards located in Sonoma and Mendocino Counties are largely located in the Russian River

⁸ CADWR, 2014

⁹ County of Sonoma, 2018

Watershed (Figure 1). There are some properties that include both vineyards and orchards, for example in Sonoma County 14% (235 acres) of orchards are located on properties that also contain vineyards.¹⁰ Orchards collectively comprise 5.1% of the total combined vineyard and orchard acreage within the Region and have declined significantly within the last 30 years from approximately 14,600 acres to 3,266 acres.¹¹ Currently, the group of pear orchards in Mendocino County combined with the seven commercial and multiple privately-owned orchards in Sonoma County total 3,227 acres, comprising 98.8% of all orchard acreage within the Region (Figure 1 and Table 3). The remaining orchards in Del Norte, Humboldt, Modoc, Siskiyou, and Trinity Counties comprise the remaining 1.2%, totaling 39 acres (Table 3).

The geographic location and siting of vineyards and orchards within a watershed influence their risk to water quality. Orchards are located throughout the Region resulting in diverse annual precipitation and soil loss potential among these operations, whereas vineyards are generally located in the southern portion of the Region, largely in the Russian River Valley, and have similar annual precipitation and soil loss potential (Figure 1, Figure 2, and Figure 3). The variability in climate and geology of the orchard locations will require tailoring permit requirements to the various areas of the Region to ensure that the required performance conditions and best management practices are effective in controlling discharges of waste. Agricultural uses that are located on steeper slopes have a greater risk of erosion and a higher risk to water quality as compared to those that are located on flatter ground. In general, orchards in the North Coast Region tend to be located on flatter ground while vineyards can be found on both flat ground and steeper slopes. Additionally, the high annual precipitation rates in many areas of the North Coast Region increase the vulnerability to soil erosion, especially on steeper slopes. Agricultural operations located within floodplains pose a potential risk to water quality due to their proximity to watercourses and potential for floodwaters to cause erosion and mobilization of pollutants, such as fertilizers and pesticides, into surface waters. Throughout the Region 30% (993 acres) of orchards and 18% (10,725 acres) of vineyards are located in the 100-year flood plain.¹²

Vineyards and orchards apply varying amounts of fertilizer and pesticides, and vineyards and orchards use varying quantities of water. Commercial orchards generally use more fertilizer per acre and typically report using larger amounts of pesticides than vineyards (Table 4). Water usage for vineyards varies depending on the size of the canopy and how well established the vine roots are, but tends to be between 0.2 – 0.7 acre-ft/acre/year (Table 4). Water usage for commercial orchards also varies depending on the size of the trees, but tends to be greater than the water usage for vineyards, ranging from 1.5 – 2.5 acre-ft/acre/year (Table 4).

Specifically considering the key inputs of water use and fertilizer and pesticide application rates, orchard management practices may pose a higher water quality risk than vineyards when evaluated on an individual, per acre basis. However, when looking at collective fertilizer, pesticide, and water use for the combined acreages for vineyards versus orchards, vineyards have a much larger potential cumulative impact on water quality in the North Coast. In total, approximately 1.2 million pounds of nitrogen fertilizer is applied annually to the 60,317 acres of vineyards in the North Coast, whereas orchards collectively (3,266 acres) apply about 98,000 pounds of nitrogen fertilizer per year (Table 4). Similarly, the total annual application of pesticides to all vineyards in the North Coast is approximately 2.2 million pounds, whereas orchards collectively apply approximately 230,000 pounds of pesticides annually (Table 4). While water use can vary

¹⁰ County of Sonoma, 2018

¹¹ County of Sonoma, 1986; County of Mendocino, 1986; CADWR, 2014

¹² CADWR, 2014

significantly from one operation to another, the total annual water consumption for all vineyards in the region is estimated to range from 12,000 – 45,000 ac-ft/yr as opposed to orchards, which collectively use approximately 5,000 – 10,000 ac-ft/yr (Table 4). Water demand for frost protection on vineyards can be high; a vineyard's water usage rate per acre can increase to 3,000 gal/hr during periods of water use for frost protection.¹³ Considering potential cumulative impacts, vineyards pose a greater potential risk to water quality than orchards in the North Coast Region.

This permit scoping exercise did not attempt to catalogue all of the management practices implemented on vineyards and orchards in the North Coast. Generally speaking vineyards and orchards employ similar best management practices to control discharges of waste. Best management practices applicable to both vineyards and orchards include, but are not limited to, minimizing fertilizer application rates according to crop needs, minimizing pesticide application rates and using integrative pest management practices, utilizing fertilizer and pesticide application methods that restrict discharge to surface waters and leaching to groundwater, good housekeeping such as fertilizer and pesticide storage to avoid spills and runoff, and soil stabilization and erosion control practices.

Staff Recommendation: Given the differences between vineyard and orchard operations, the relatively small number of properties with both vineyard and orchard operations, and the fact that there are significantly more acres of vineyards than orchards in the region, it is recommended that the current Permit development effort be limited to vineyards, and not include orchards. The large number of vineyard acres to be covered under a permit once developed will require a significant amount of staff time to ensure compliance with all permit conditions. Staff recommend that until a WDR or waiver specific to orchards can be developed in the future, potential discharges from these operations should be addressed on a case by case basis using a stewardship approach where appropriate or through enforcement where necessary. When the Regional Water Board develops an agricultural permit for the Tule Lake area, orchards located in Modoc and Siskiyou Counties could be included in that permit.

Scoping Question 2: Does an assessment of readily available data confirm that the development of a regionwide permit is appropriate?

Given the conclusions of scoping question 1, the discussion for scoping question 2 is focused on evaluating whether readily available data confirm that the development of a regionwide permit for vineyards is appropriate.

Approximately 99.7% of the vineyard acreage within the Region is located within Sonoma and Mendocino Counties, totaling 60,111 acres (Figure 1 and Table 3). The remaining 0.3% of vineyards, totaling 206 acres, are dispersed in Siskiyou, Trinity, and Humboldt counties. Despite the centralized location of the vineyards in the southern end of the Region, vineyard operations are similar and have comparable risks to water quality throughout the Region. Further, though sediment and temperature Total Maximum Daily Loads (TMDLs) have not been developed in the Russian River Watershed, the Navarro River Sediment and Temperature TMDL specifically cites vineyard erosion as a source category and all sediment TMDLs that have been completed in the North Coast Region identify roads as a primary source of the impairments (Table 5).

Of the counties where vineyards are located, only Sonoma County has specific regulations, which require activities to protect water quality during the construction or replanting of vineyards

¹³ Fish Friendly Farming Certifications, 2017

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greater than 1 acre.¹⁴ Outside of Sonoma County, there are no known local requirements applicable to new vineyard development or vineyard replanting. As shown in Figures 2 and 3, rainfall and erosion potential can be more significant in areas outside of Sonoma and Mendocino Counties, and should more vineyards expand northward, the water quality risks could be greater given the higher soil loss potential, existing sediment and temperature impairments, and lack of county regulations. Climate conditions are changing and may result in more vineyards outside of Sonoma and Mendocino Counties in the future.

Staff Recommendation: Develop a regionwide Vineyard Permit.

¹⁴ County of Sonoma, 2018

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6.0 FIGURES AND ADDITIONAL TABLES

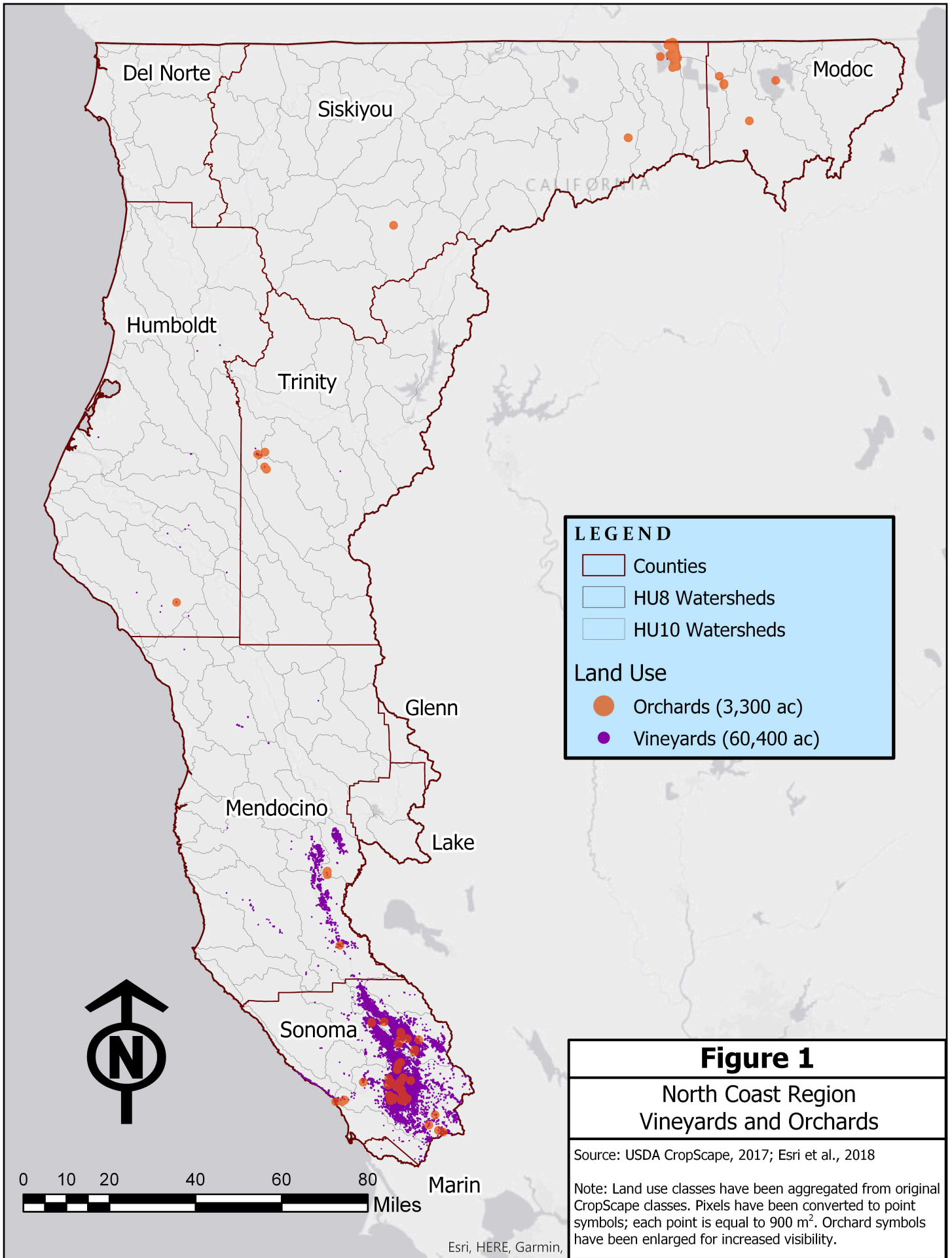
6.1 List of Figures

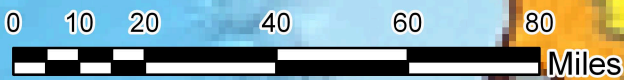
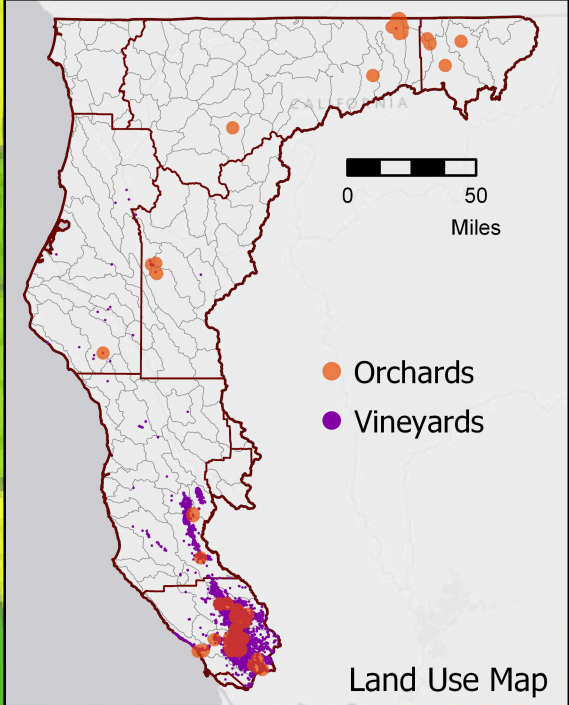
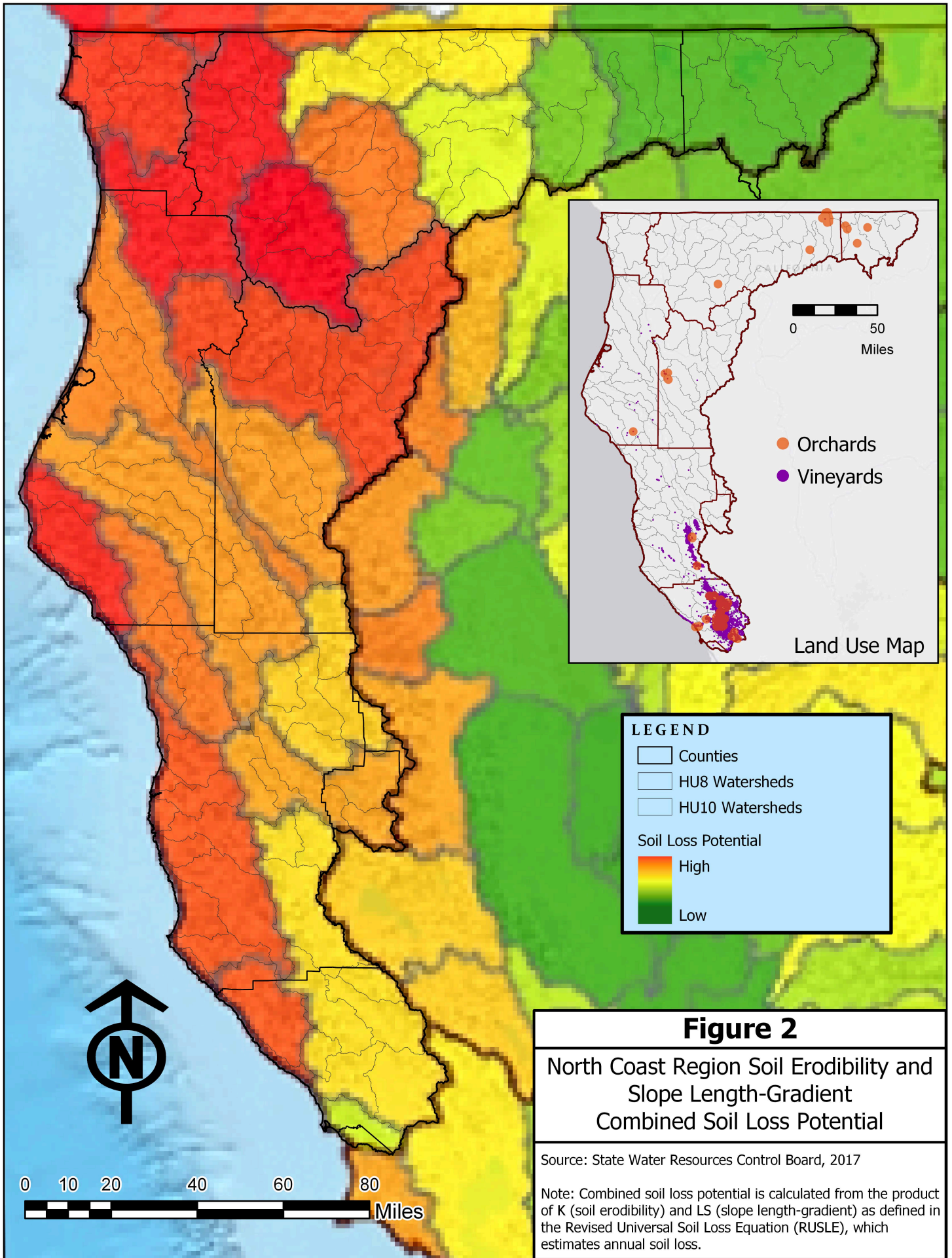
Figure 1: North Coast Region Vineyards and Orchards

Figure 2: North Coast Region Soil Erodibility and Slope Length-Gradient Combined Soil Loss Potential

Figure 3: North Coast Region 30-Year Normal Annual Precipitation

Figure 4: North Coast Region 303(d) Listings Map for Temperature, Sediment, Nutrients, Pesticides, Indicator Bacteria, Mercury, & Manganese by HUC 10 Watershed





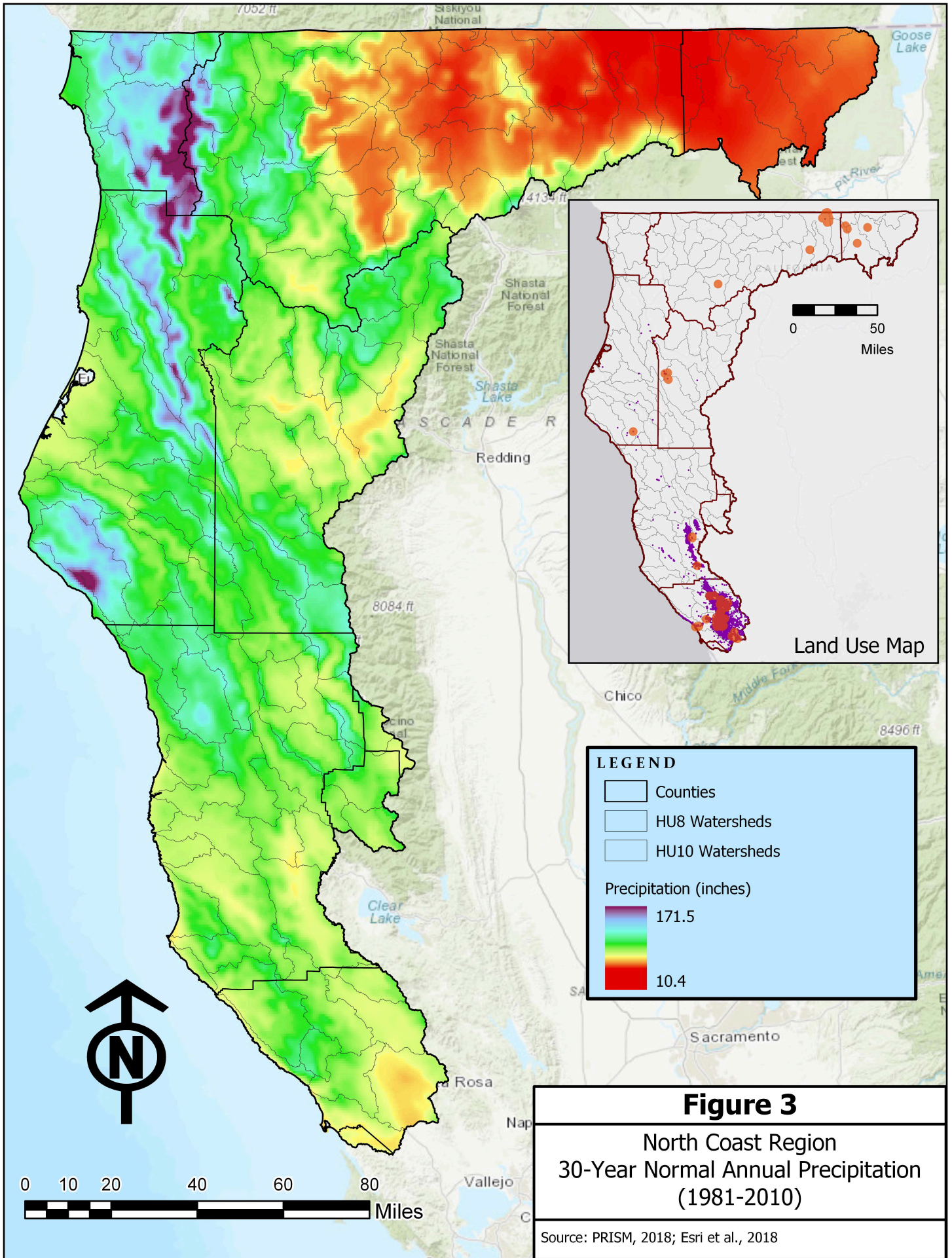
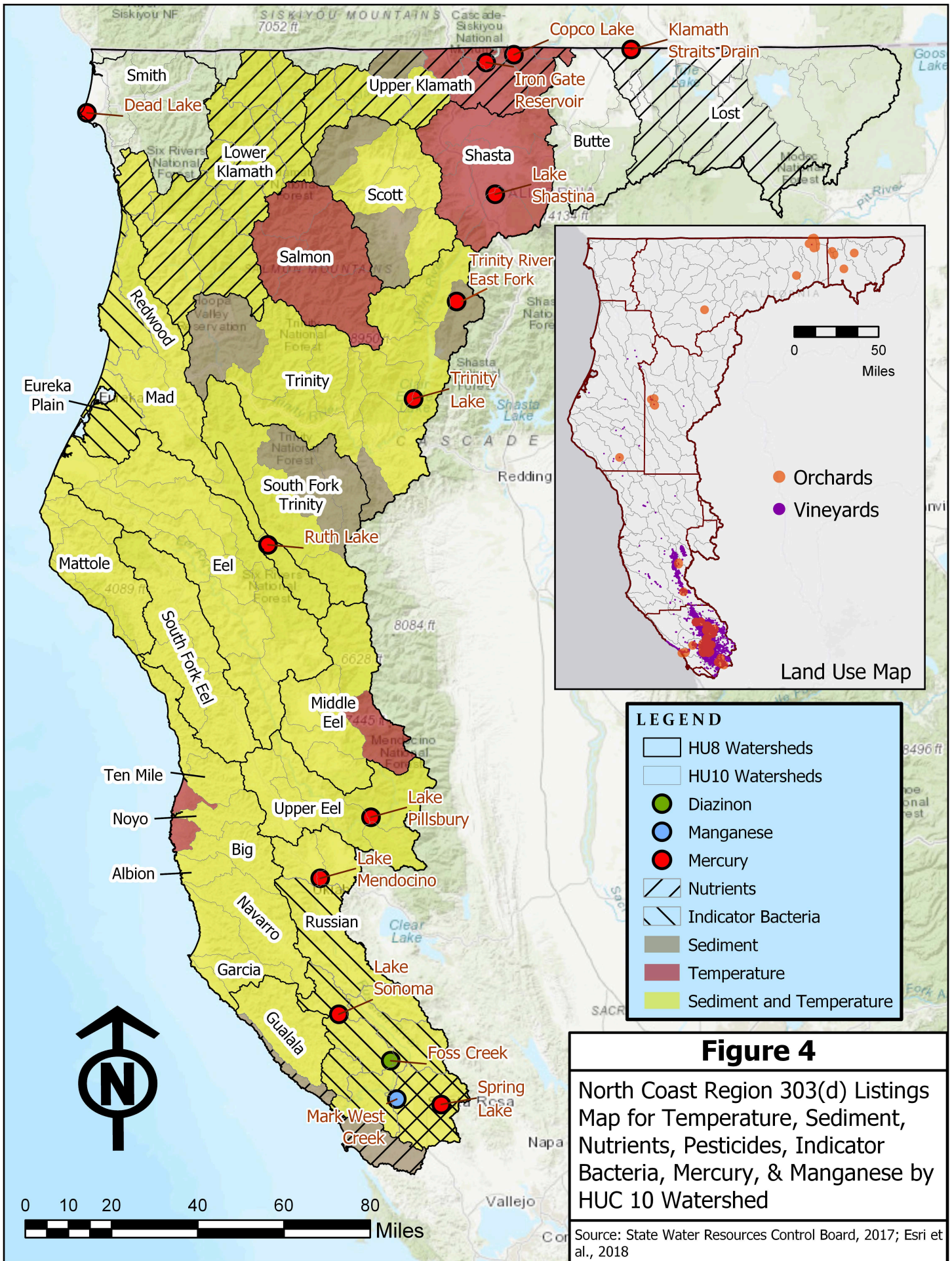


Figure 3
 North Coast Region
 30-Year Normal Annual Precipitation
 (1981-2010)
 Source: PRISM, 2018; Esri et al., 2018



6.2 List of Additional Tables

Table 3: North Coast Region Vineyard and Orchard Acres by County

Table 4: North Coast Region Vineyard and Orchard Management Practices Summary

Table 5: TMDL Source Assessment Summary

Table 3: North Coast Region Vineyard and Orchard Acres by County

County	Vineyards (acres)			Orchards (acres)		
	CADWR Crop Mapping Data (2014)	USDA Cropscape Data (2017)	County Crop Reports (2013-2017)	CADWR Crop Mapping Data (2014)	USDA Cropscape Data (2017)	County Crop Reports (2013-2017)
Sonoma	43,260	44,197	62,466	1,675	57	2,571
Mendocino	16,851	2,286	17,250	1,552	2	1,776
Humboldt	68	11	-	28	<1	-
Trinity	134	26	-	7	2	-
Siskiyou	4	<1	-	0	107	37
Modoc	0	0	-	0	3	-
Del Norte	0	0	-	4	0	-
Totals	60,317	46,521	79,716	3,266	172	4,384

Sources: USDA, 2017; CADWR, 2014; County of Del Norte, 2014; County of Humboldt, 2017; County of Lake, 2017; County of Mendocino, 2017; County of Siskiyou, 2017; County of Sonoma, 2018

Table 4: North Coast Region Vineyard and Orchard Management Practices Summary

Best Management Practices:

Orchards and vineyards are generally seen as a similar land use type because they employ similar management practices. Programs that provide water quality farm plans for landowners will typically utilize the same set of standards for vineyards as they do for orchards, as well as the same water quality farm plan template.¹ Best management practices applicable to both vineyards and orchards include, but are not limited to, minimizing fertilizer application rates according to crop needs, minimizing pesticide application rates and using integrative pest management practices, utilizing fertilizer and pesticide application methods that restrict discharge to surface waters and leaching to groundwater, good housekeeping such as fertilizer and pesticide storage to avoid spills and runoff, and soil stabilization and erosion control practices.² Cover crops and vegetative filter strips are recommended for both vineyards and orchards to prevent erosion and provide filtration of runoff.³ Replantings for vineyards, however, can be more frequent, occurring approximately every 5-10 years, as opposed to orchards that rarely replant.⁴ Below are comparisons of fertilizer, irrigation, and pesticide use for vineyards and orchards.

Vineyards (60,317 acres):

Orchards (3,266 acres):

*Fertilizer*⁵:

- 20-50 lb N/ac
- 30-100 lb N/ac

*Irrigation*⁶:

- 0.2-0.7 ac-ft/ac/yr
- 1.5-2.5 ac-ft/ac/yr

*Pesticides*⁷:

- 37 lb/ac
- 70 lb/ac

*Total Fertilizer (all North Coast acres)*⁸:

- 1.2 million lb N/yr
- 98,000 lb N/yr

*Total Irrigation (all North Coast acres)*⁹:

- 12,000 - 45,000 ac-ft/yr
- 5,000 – 10,000 ac-ft/yr

*Total Pesticides (all North Coast acres)*¹⁰:

- 2.2 million lb/yr
- 230,000 lb/yr

¹ Fish Friendly Farm Certifications, 2017;

² Fish Friendly Farm Certifications, 2017; O’Geen, 2006; OrangePippen.com, 2018

³ Bugg, 2001; Battany, 2007; Cady, 2009; O’Geen, 2006; Thomas, 2003; Vossen, 2002

⁴ Crassweller, 2017; Groworganic.com, 2018; Kurtural, 2008;

⁵ Crassweller, 2017; Fortier,1934; Groworganic.com, 2018; Kurtural, 2008; O’Geen, 2006

⁶ O’Geen, 2006; Peacock, 2006; Treeplantation.com, 2000; UCD, 2014

⁷ CDPR, 2016; Welty, 2016

⁸ CADWR, 2014; Crassweller, 2017; Fortier, 1934; Groworganic.com, 2018; Kurtural, 2008; O’Geen, 2006

⁹ CADWR, 2014; O’Geen, 2006; Peacock, 2006; Treeplantation.com, 2000; UCD, 2014

¹⁰ CADWR, 2014; CDPR, 2016; Welty, 2016

Table 5: TMDL Source Assessment Summary

TMDL	Source:								Pollutants:						
	Agriculture	Roads	Landslides	Timber	Fire	Mining	Grazing	Water Use	Sediment	Temp	DO	Nutrient/Nitrogen	Turbidity	CBOD	Microcystin
°Albion River		x	x	x					x						
°Big River		x	x	x					x	x					
°Eel River, North Fork		x	x	x			x		x	x					
°Eel River, Upper Main		x	x	x			x		x	x					
°Eel River, Middle Main		x	x	x			x		x	x					
°Eel River, Middle Fork		x	x	x					x	x					
°Eel River, Lower Main		x	x	x					x	x					
°Eel River, South Fork		x	x	x			x		x	x					
°Elk River		x	x	x					x						
°Garcia River	x	x	x	x		x	x		x						
°Gualala River		x	x	x					x	x					
°Klamath River	x	x	x	x			x	x		x	x	x			x
°Lost River, Lower	x	x	x					x			x	x		x	
°Mad River		x	x	x		x			x				x		
°Mattole River		x	x	x			x		x	x					
°Navarro River	x	x	x	x			x		x	x					
°Noyo River		x	x	x			x								
°Redwood Creek	x	x	x	x					x	x					
°Salmon River		x	x	x	x	x	x	x		x					
°Scott River	x	x	x	x		x	x	x	x	x					
°Shasta River										x	x				
°Stemple Creek	x	x	x				x		x	x	x				
°Ten Mile River		x	x	x			x		x						
°Trinity River		x	x	x		x			x						
°Trinity River, South Fork		x	x	x					x						
°Van Duzen River		x	x	x			x		x						

Sources: USEPA, 2018-1997; Pacific Watershed Associates, 2006; Waterboards.ca.gov, 2015-1994

	Dominant Factors Contributing to WQ Impairments
	Mention of Vineyards/Orchards In Implementation Plan