AQUATIC PESTICIDE APPLICATION PLAN

STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT FOR THE DISCHARGE OF AQUATIC PESTICIDES FOR AQUATIC WEED CONTROL IN WATERS OF THE UNITED STATES
GENERAL PERMIT NO. CAG990005

WATER QUALITY ORDER NO. 2013-0002-DWQ

July 21, 2022

Prepared by:
California Department of Fish and Wildlife

Submitted to:
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814
Attn: Gurgagn Chand

Contents

1. Description of the Water System

The mission of California Department of Fish and Wildlife (CDFW) is to manage the state's diverse flora and fauna resources, and the habitats on which they depend, for their ecological values and for their use and enjoyment by the public. Aquatic weed pests have the potential to cause serious environmental damage through native species displacement, degraded water quality, and clogged waterways, which in turn diminishes the ecological value and the public's enjoyment of the land.

The Integrated Pest Management (IPM) Unit of CDFW works in partnership with other cooperating governmental agencies, private landowners, and NGOs (non-government organizations) to control, if not eradicate, invasive species infestations.

Water bodies that may be present on the listed CDFW properties include: rivers, lakes, streams, creeks, ponds, irrigation ditches or canals, sloughs, and bays. Those water bodies that have the greatest potential to become infested and cause significant environmental and or recreational damage with aquatic weeds are described below.

a. Still Bodies of Water- Small (Ponds)

Ponds often receive and discharge water from similar sources; streams, either permanent or intermittent, or irrigation canals or flumes. During peak flow, there is the potential for infested ponds to become part of a larger body of water such as a lake or river. All ponds that are found to have populations of invasive aquatic weeds will be evaluated by the IPM unit and a determination of whether a threshold has been met will be made prior to treatment. In the development of a treatment plan, alternative methods will be considered and implemented if deemed appropriate. If it is determined that there will be any direct application of herbicides to the body of water, CDFW will identify and describe the body of water along with the treatment and application areas and any site specific BMPs. Potentially affected public agencies will be notified with this information at least 15 days prior to the first application of algaecides or aquatic herbicides. All information will be provided in the Annual Report and available upon request at any time.

b. Still Bodies of Water- Large (Lakes)

Lakes because of their high recreational use can be susceptible to the introduction of new aquatic weed infestations, or the spread of existing populations due to fragmentation of plant material or spread of seeds. Lake depth (stratification) and elevation will in part determine the likelihood of future infestations. All lakes that are found to have populations of invasive aquatic weeds will be evaluated by the IPM unit and a determination of whether a threshold has been met will be made prior to treatment. In the development of a treatment plan, alternative methods will

be considered and implemented if deemed appropriate. If it is determined that there will be any direct application of herbicides to the body of water, CDFW will identify and describe the body of water along with the treatment and application areas and any site specific BMPs. Potentially affected public agencies will be notified with this information at least 15 days prior to the first application of algaecides or aquatic herbicides. All information will be provided in the Annual Report and available upon request at any time.

c. Moving Bodies of Water- Small (Canals and streams)

In early spring, intermittent streams may experience heavy water flows that can move aquatic weeds downstream into uninfested areas. Canals have the potential to move aquatic weeds throughout their system affecting water conveyance ability, and ultimately wildlife habitat conditions, recreational opportunities and agricultural production. Small moving bodies of water that are found to have populations of invasive aquatic weeds will be evaluated by the IPM unit and a determination of whether a threshold has been met will be made prior to treatment. In the development of a treatment plan, alternative methods will be considered and implemented if deemed appropriate. If it is determined that there will be any direct application of herbicides to the body of water, CDFW will identify and describe the body of water along with the treatment and application areas and any site specific BMPs. Potentially affected public agencies will be notified with this information at least 15 days prior to the first application of algaecides or aquatic herbicides. All information will be provided in the Annual Report and available upon request at any time.

2. Description of the Treatment Area

CDFW manages properties designated as Wildlife Areas (WA) or Ecological Reserves (ER) throughout the state. The use of aquatic herbicides are needed to control and eradicate aquatic weed infestations. These aquatic weeds occur in the various types of water bodies described in the previous section. Responding early to weed infestations has the potential for eradication, reduced habitat disturbance, and less herbicide use in the future. Below is a table that lists the CDFW facilities where aquatic features are present and may require herbicide applications.

Table 1. List of CDFW facilities that may conduct herbicide applications at aquatic sites

Site Name	
Agua Hedionda Lagoon ER	Los Banos WA
Ash Creek WA	Mad River Slough WA
Ballona Wetlands ER	McClellan Mountain Peatland Reserve
Batiquitos Lagoon ER	Mendota WA
Bracut Tidelands	Mt. Shasta Fish Hatchery
Buena Vista Lagoon ER	Napa-Sonoma Marshes WA
Burton Mesa ER	North Grasslands WA
Butte Valley WA	Oroville WA
Canada de San Vicente ER	Petaluma Marshes WA
Cienega Springs ER	Rancho Jamul ER
Cosumnes River ER	San Dieguito Lagoon ER
Eel River WA	San Elijo Lagoon ER
Elk River WA	Shasta Valley WA
Fay Slough WA	Upper Butte Basin WA
Goleta Slough ER	Upper Newport Bay ER
Gray Lodge WA	Yolo Bypass WA
Grizzly Island WA	

3. Description of Weeds and Algae to be Controlled

The CDFW's water delivery system consisting of irrigation channels and associated natural waterways, as well as standing bodies of water such as ponds and lakes are prone to infestations by emergent, submerged and floating aquatic weeds such as water primrose (*Ludwigia* spp.), water hyacinth (*Eichhornia crassipes*), perennial pepperweed (*Lepidium latifolium*), Brazilian waterweed (*Egeria densa*), South American spongeplant (*Limnobium laevigatum*), parrotheather (*Myriophyllum aquaticum*), horned pondweed (*Zannichellia palustris*), curly-leaved pondweed (*Potamogetan crispus*), and filamentous algae/moss.

The presence of weeds, such as those listed, in the various bodies of water can cause obstruction of the water delivery control structures such as gates and pumps and displace more desirable aquatic flora thus, impacting the habitat quality and reducing water quality.

4. Aquatic Herbicides and Algaecides to be Used, Known Degradation Byproducts, Application Methods and Surfactants

Table 2 describes the various aquatic herbicides and compatible surfactants that may be employed by CDFW.

Table 2. Aquatic herbicides and surfactants that may be used by CDFW.

Herbicide (active ingredient)	Degradation Byproducts	Application Method(s)	Surfactant
2,4-D	None	Backpack, handgun, or boom sprayer	Various aquatic-labeled surfactants
Diquat Dibromide	None	Submersed boom, handgun or boom sprayer	Various aquatic-labeled surfactants
Glyphosate	Aminomethyl phosphonic acid, carbon dioxide	Backpack sprayer, handgun, boom sprayer, or aerial	Various aquatic-labeled surfactants
Imazapyr	Pyridine hydroxy-dicarboxylic acid, pyridine dicarboxylic acid and nicotinic acid	Backpack sprayer, handgun, boom sprayer, or aerial	Various aquatic-labeled surfactants
Imazamox	2,3,5-pyridine tricarboxylic acid, 2-carbamoyl-5-(ethoxy-methyl) nicotinic acid, 2-[(1-carbamoyl-1,2-dimethylpropyl)carbamoyl]-5-(methoxymethyl)nicotinic acid, 2-carbamoyl-3,5-pyradine dicarboxylic acid, 2-formyl-5-(methoxymethyl) nicotinic acid	Backpack sprayer, handgun, boom sprayer, or aerial	Various aquatic-labeled surfactants
Triclopyr triethylamine	3,5,6-trichloro-2 pyridinol	Backpack sprayer, handgun, boom sprayer, or aerial	Various aquatic-labeled surfactants
Fluridone	n-methyl formamide and 3-trifluoromthyl benzoic acid	Backpack sprayer, handgun, submersed boom, spreader or boom sprayer	None
copper ethylenediamine	None	Submersed boom, handgun or boom sprayer	Various aquatic-labeled surfactants

All herbicide applications are made according to product label specifications. When applicable to enhance the efficacy of an herbicide, surfactants labeled for aquatic use are utilized. All applications are performed using Best Management Practices (BMP's) by qualified personnel.

5. Factors Influencing the Decision to Use Aquatic Herbicides

CDFW utilizes an Integrated Pest Management (IPM) Program approach in the treatment of aquatic vegetation on its properties. One of the goals of this program is to establish a reasonable set of control measures that aid in the management of aquatic vegetation infestations. An action threshold level is the point at which action should be taken to control aquatic vegetation before any or all of the following occurs: the water conveyance system is appreciably impacted, water quality or habitat is degraded, and/or native species are displaced. One of the main functions of an IPM program is to determine when a control action is necessary, for the mere presence of some aquatic vegetation species may be an indicator of a flourishing ecosystem in a state of equilibrium. If the aquatic vegetation or algae is present in quantities sufficient to meet or exceed the action threshold, a control method is implemented. Control methods may include, mechanical, cultural, biological and/or chemical and the choice of options will be based on the feasibility, biological efficacy, environmental impacts, minimal public intrusiveness and availability of fiscal resources. An integrated pest management approach will be utilized whenever possible. Occasionally herbicide and algaecide applications may be made prior to threshold exceedance based on predicted aquatic vegetation growth rate and density, historical growth trends, weather, and water flow. Some aquatic weeds or algae may be treated shortly after emergence or when appropriate based on the herbicide to be used; especially since younger plants are more susceptible and less plant mass to target means a reduction in herbicide needed.

Part of CDFWs IPM approach is the evaluation of alternative control methods and these may be implemented as part of a test program. Alternative control methods tend to be more expensive, labor intensive, not as effective, spread algae or aquatic weeds and can cause temporary water quality degradation and therefore will be evaluated based on site and weed characteristics.

6. Gates and Control Structures

CDFW operates and maintains numerous water control structures on many of its properties. When appropriate, staff will close any control structures within or adjacent to the application or treatment areas during herbicide or algaecide applications, if there is a concern that receiving waters may be affected by herbicide or algaecide residues.

Control structures within the treatment area will be inspected prior to and during the herbicide application to evaluate for leaks. Should a leak develop on closed control structures, the application will be stopped as soon as practicable and repairs made before resuming treatment.

7. State Implementation Policy (Section 5.3) Exceptions

The proposed herbicides and surfactant are not priority pollutants, and therefore do not require an exception from Section 5.3.

8. Monitoring Program

Water monitoring studies are performed in compliance with the Monitoring and Reporting Program (MRP) for Water Quality Order NO 2013-0002-DWQ. Samples will be collected and analyzed per MRP guidelines as stated in the table below (Table 3).

Table 3. Monitoring requirements per NPDES General Permit.

Sample Type	Constituent/ Parameter	Units	Sample Method	Minimum Sampling Frequency	Sample Type Requirement	Required Analytical Test Method
Visual	1. Monitoring area description (pond, lake, open waterway, channel, etc.) 2. Appearance of waterway (sheen, color, clarity, etc.) 3. Weather conditions (fog, rain, wind, etc.)	Not applicable	Visual observation	1	Background, Event and Post-event monitoring	Not applicable
Physical	1. Temperature[2]	°F	Grab[3]	4	Background, Event and Post-event monitoring	5
	2. pH[6]	Number				
	3. Turbidity[6]	NTU				
	4. Electric Conductivity[6] @ 25°C	µmhos/cm				
Chemical	1. Active Ingredient[7]	µg/L	Grab[3]	4	Background, Event and Post-event monitoring	5
	2. Nonylphenol[8]	µg/L				
	3. Hardness (if copper is monitored)	mg/L				
	4. Dissolved Oxygen[2]	mg/L				

[1] All applications at all sites.
[2] Field testing.
[3] Samples shall be collected at three feet below the surface of the water body or at mid water column depth if the depth is less than three feet.
[4] Collect samples from a minimum of six application events for each active ingredient in each environmental setting (flowing and non-flowing water) per year, except for glyphosate. If there are less than six application events in a year, collect samples during each application event for each active ingredient in each environmental setting (flowing and non-flowing water). If the results from six consecutive sampling events show concentrations that are less than the receiving water limitations/trigger for an active ingredient in an environmental setting, sampling shall be reduced to one application event per year for that active ingredient in that environmental setting. If the yearly sampling event shows exceedance of the receiving water limitation/trigger for an active ingredient in an environmental setting, then sampling shall return to six application events for that active ingredient in each environmental setting. For glyphosate, collect samples from one application event from each environmental setting (flowing and non-flowing water) per year.
[5] Pollutants shall be analyzed using the analytical methods described in 40 C.F.R. part 136.
[6] Field or laboratory testing.
[7] 2,4-D, dissolved copper, diquat, fluridone, glyphosate, imazamox, imazapyr, and triclopyr.
[8] It is required only when a surfactant is used.

a. Monitoring Frequency and Locations

Monitoring locations will be selected to represent the variations in treatment that occur, which may include: environmental setting, impoundment or conveyance type, hydrology, aquatic herbicide use, seasonal and regional variations.

Monitoring frequency will follow the schedule set forth by the NPDES general permit and is summarized below:

i. Background Monitoring

Background monitoring samples shall be collected upstream at the time of the application event, or in the application area just prior to (up to 24-hours in advance of) the application event.

ii. Event Monitoring

Event monitoring samples shall be collected immediately downstream of the treatment area in flowing waters or immediately outside of the treatment area in non-flowing waters, immediately after the application event, but after sufficient time has elapsed such that treated water would have exited the treatment area.

iii. Post-event Monitoring

Post-event monitoring samples shall be collected within the treatment area within one week after application.

One full set of three samples (Background, Event and Post-Event) will be collected during each treatment from the representative site(s) treated within CDFW properties.

b. Sample Collection

For water depths of 6 feet or greater, the sample will be collected at a depth of three feet. If the water depth is less than six feet, the sample will be collected at the approximate mid-depth. A long-handled sampling pole may be used for locations that are difficult to access.

c. Field Measurements

In addition to the collection of water samples, visual parameters (water body description, appearance of waterway and weather conditions) and physical readings (with the exception of turbidity, which will be analyzed by a lab) will be done at the sampling sites and recorded on the field data form shown below (Figure 1). All field meters will be calibrated according to the manufacturer's specifications at the

recommended frequency and checked with a standard prior to the start of the sampling season.

d. Sample Analysis

All laboratory analysis shall be conducted at a laboratory certified for such analysis by the California Department of Health Services. All analyses shall be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" (Guidelines), promulgated by the USEPA (Title 40 CFR Part 136). Hardness shall be determined by the titration method (SM 2340C).

Table 4. NPDES Monitoring Data Sheet

NPDES Monitoring Data Sheet

Site Name:	Collector:	Target Veg:	Herbicide/Surfactant:

Background Monitoring: Upstream at time of the application event or in application area just prior to (up to 24 hours in advance of) the application event.

Date:	GPS/Waypt:		H_2O Spd (ft/sec)	%Veg	Photo
Time:	Altitude:				☐
OBSERVATIONS – Circle and provide description, if applicable					
Weather: Clear / Partly Cloudy / Cloudy / Overcast / Other: Wind:					
Water Clarity: Clear / Cloudy / Milky / Muddy / Other:					
Water Color: Clear / Brown / Red/ Green / Other:					
Visible: Films / Sheens / Coatings	Bottom Deposits: Yes / No		Fungi / Slimes / Objectionable Growth:		
Floating/ Suspended Material (algae, trash, etc.):					
Aquatic Life: Yes / No					
Potential Nuisance Conditions: Yes / No					
WATER TESTING					
Temp(°C):	DO(mg/L):	EC(µs/cm):	Sal (ppt):	pH:	

Event Monitoring: Immediately downstream of treatment area in flowing waters or immediately outside of treatment area in non-flowing waters.

Date:	GPS/Waypt:		H_2O Spd (ft/sec)	%Veg	Photo
Time:	Altitude:				☐
OBSERVATIONS – Circle and provide description, if applicable					
Weather: Clear / Partly Cloudy / Cloudy / Overcast / Other: Wind:					
Water Clarity: Clear / Cloudy / Milky / Muddy / Other:					
Water Color: Clear / Brown / Red/ Green / Other:					

Visible: Films / Sheens / Coatings	Bottom Deposits: Yes / No		Fungi / Slimes / Objectionable Growth:	
Floating/ Suspended Material (algae, trash, etc.):				
Aquatic Life: Yes / No				
Potential Nuisance Conditions: Yes / No				
WATER TESTING				
Temp(°C):	DO(mg/L):	EC(µs/cm):	Sal (ppt):	pH:

Post-Event Monitoring: Within the treatment area within one week after application

Date:	GPS/Waypt:	H_2O Spd (ft/sec)	%Veg	Photo
Time:	Altitude:			☐
OBSERVATIONS – Circle and provide description, if applicable				
Weather: Clear / Partly Cloudy / Cloudy / Overcast / Other: Wind:				
Water Clarity: Clear / Cloudy / Milky / Muddy / Other:				
Water Color: Clear / Brown / Red/ Green / Other:				

Visible: Films / Sheens / Coatings	Bottom Deposits: Yes / No		Fungi / Slimes / Objectionable Growth:	
Floating/ Suspended Material (algae, trash, etc.):				
Aquatic Life: Yes / No				
Potential Nuisance Conditions: Yes / No				
WATER TESTING				
Temp(°C):	DO(mg/L):	EC(µs/cm):	Sal (ppt):	pH:

e. Sample Preservation and Delivery

Samples will be collected in unpreserved containers. Should an analytical method require preservation, that will occur at the laboratory by the appropriate lab personnel. Once collected and labeled, samples will be immediately placed in a dark, cold (~4□C) environment, typically a cooler with ice. Delivery of samples to the laboratory needs to occur as soon as possible.

f. Annual Reporting

An annual report will be submitted to the appropriate Regional Water Quality Control Board (RWQCB) by March 1 of the year following treatment. If no algaecide or aquatic herbicide treatments are done that year, a letter stating no applications have been done will be sent to the appropriate RWQCB in lieu of an annual report.

9. How to Prevent Sample Contamination

Samples shall be, if possible, collected upwind and not in close proximity to application equipment. There shall not be any contact with algaecide or aquatic herbicide application equipment, containers or personal protective equipment.

When done sampling in a given location, the equipment will be cleaned with a non-phosphate cleaner and triple-rinsed with distilled water. Once at a new sampling location, the equipment will be rinsed once with the water being sampled prior to collection. Gloves will be changed between collection sites.

Samples will be tightly sealed at the point of collection and placed upright within an ice chest used solely for sample transport.

10. Description of BMPs to be Implemented

CDFW has identified several best management practices (BMPs) to be implemented in conjunction with the planned herbicide applications.

a. Aquatic Herbicide Spill Prevention and Containment

All herbicide applications will be supervised by a California Department of Pesticide Regulation-certified applicator who has received training specific to the herbicide and surfactant/adjuvant products to be used. Label language is followed to ensure safe handling and loading of herbicides. Application equipment is routinely maintained and checked to identify and/or minimize the possibility of leak development or failure that might lead to a spill. Tank mixing and filling will be done well away from all surface waters. In the unlikely event of an aquatic herbicide or algaecide spill, the material will be prevented from entering any water bodies to the extent practicable. CDFW staff is trained to contain spilled herbicide products, apply absorbent material, and remove products to a proper disposal location. Label instructions will be followed and reporting as required by local, state, and federal laws will be done for all spills.

Drift will be avoided by following pesticide label guidance specific to the product(s) applied and application method. When conducting aerial applications, sprayers will be properly calibrated according to the label and target species sensitivity. The largest nozzle size will be used that will ensure adequate coverage while also reducing drift, and tank mixes may also be amended with a drift control agent. Herbicide applications will not occur when winds are above 10 mph or when inversion conditions exist.

b. Appropriate Application Rate

i. Site Evaluation

CDFW's Pest Control Adviser (PCA) and/or qualified staff will evaluate sites presenting algal or aquatic weed populations to determine if thresholds have or likely will be exceeded. Thresholds relate to the ability of the

water conveyance system to move water, the native species being negatively impacted, and/or the degradation of water quality. If it is determined that a threshold has or likely will be exceeded, an algaecide or aquatic herbicide application is considered; and barring any concerns of water quality degradation, an application plan will be initiated.

ii. Applications Made According to Label and PCA Recommendation

All algaecide and aquatic herbicide applications are to be made according to the product label in accordance with regulations of the U.S. EPA, CalEPA, Cal OSHA, DPR and the local Agricultural Commissioner. Prior to application, the PCA will prepare a written recommendation that specifies rates of application and any warnings or conditions that limit the application so that non-target flora and fauna are not negatively affected.

iii. Applications Made by Qualified Personnel

Algaecide and aquatic herbicide applications will be made by CDFW personnel holding a valid Qualified Applicator Certificate (QAC) or Qualified Applicator License (QAL), or staff under the supervision of QACs or QALs. Aerial applications by helicopter require an FAA commercial pilot's license and medical certification, as well as a Manned Pest Control Aircraft Pilot Certificate from DPR. Unmanned Aerial applications require FAA certification or authorization to operate an unmanned aircraft system approved by the FAA to conduct pest control, as well as an Unmanned Pest Control Aircraft Pilot Certificate from DPR. These applicators will have the training necessary to utilize proper equipment loading, nozzle selection, calibration, and operation to ensure that drift or spills are minimized, only target vegetation is treated, and precise application rates are made according to the label.

c. Plan for Educating Applicators on Avoiding Adverse Effect from Pesticide Applications

All pesticide handlers, including those without certifications, are required to participate in an annual one-hour minimum handler safety training, thus ensuring that all staff that may come into contact with herbicides are up-to-date on the latest pest control regulations, best management practices, and safety requirements. Pesticide applicators with QACs or QALs must complete 20 hours of continuing education, including at least 4-hours of Laws and Regulations training, every 2 years to remain licensed. PCAs must complete 40 hours of continuing education every 2 years, including at least 8-hours of Laws and Regulations training.

d. Plan on Informing Landowners and Agencies Who Have Water Rights on the Receiving Waters

Appropriate gates, weirs, etc. will be closed to prevent discharge of residual algaecide or aquatic herbicide into receiving waters of adjacent landowners (private or public). Additionally, water users potentially affected by any water use restrictions will be notified prior to an application being made, per the algaecide and aquatic herbicide label.

e. Preventing Fish Kills

All herbicide applications will be supervised by a California Department of Pesticide Regulation-certified applicator who has received training specific to the herbicide and surfactant products to be used. The PCA written recommendation will include rates of application and any warnings or conditions that limit the application so that fish are not adversely affected. All manufacturers label instructions for rates and mixing and precautions to prevent fish kills will be followed. Additionally, all aquatic applications will be made from the downstream end of a project to the upstream end to avoid a buildup of product in the flowing water.

11. Evaluation of Alternative Control Methods

a. Other Management Options

CDFW utilizes an Integrated Pest Management (IPM) Program approach in the treatment of aquatic weeds on its properties. One of the goals of this program is to establish a reasonable set of control measures that aid in the management of aquatic weed infestations. An action threshold level is the point at which action should be taken to control aquatic weeds before any or all of the following occurs: the water conveyance system or native habitat is appreciably impacted, native species displaced, water quality is degraded. One of the main functions of an IPM program is to determine when a control action is necessary, for the mere presence of some aquatic vegetation species may be an indicator of a flourishing ecosystem in a state of equilibrium. If the aquatic vegetation or algae is present in quantities sufficient to meet or exceed the action threshold, a control method is implemented. Control methods may include, mechanical, cultural, biological and/or chemical and the choice of options will be based on the feasibility, biological efficacy, environmental impacts, minimal public intrusiveness and availability of fiscal resources. An integrated pest management approach will be utilized whenever possible. Occasionally herbicide and algaecide applications may be made prior to threshold exceedance based on predicted aquatic vegetation growth rate and density, historical growth trends, weather, and water flow. Some aquatic weeds or algae may be treated shortly after emergence or when appropriate based on the herbicide to be used; especially since younger plants are more susceptible and less

plant mass to target means a reduction in herbicide needed.

b. No Action

When feasible, this option is utilized. Once a threshold is reached however, consideration of other control methods needs to be initiated. This alternative would allow the continued spread of the pest species resulting in increased difficulties managing water conveyance and ultimately degrading the environment.

c. Prevention

Many aquatic weed or algal infestations within the natural waterways on CDFW lands are the result of infestations further upstream on private landowner or other governmental properties. Informing the upstream owners as to the presence of aquatic weed infestations on their properties and presenting eradication and/or control methods would help prevent future infestations. In addition, opportunities for coordinated and cooperative eradication efforts could be implemented in these situations.

In the case of hunting and fishing activities on CDFW lands, educational material could be presented and closure of those bodies of water (or portions of them) could prevent the inadvertent spread of target weeds.

Utilization of foreign materials such as plastic liners or concrete within drainage or irrigation channels do have the potential to keep submersed weeds under control for a short period of time. However, sediment build-up within these channels will occur over time and will require manual removal. This technique is very costly to implement and maintain and will most likely will cause increased sediment loads downstream, degrade water quality over time and destroy wildlife habitat.

d. Mechanical Method

This alternative may provide some temporary control of the target species, but it cannot provide the desired long-term reduction of target species biomass, and therefore cannot accomplish the desired management goals. Further, this alternative will produce a large number of plant fragments that can rapidly spread infestations. Harvesting in dense stands also presents the risk of significant by-catch of non-target animals including fish, amphibians and reptiles.

e. Cultural Methods

Cultural management relies heavily on altering environmental factors related to pest population size. Common methods include burying (or filling in), lining (with plastic, cement or asphalt) drawing down or draining the water body. These methods can be

effective in controlling invasive aquatic weed populations, but each of these carries the risk of damaging other native populations and wildlife habitat.

f. Biological Control

This method uses biological organisms to reduce the number or density of pests within a given pest population. Although goats, sheep and cattle are frequently used in terrestrial settings they would not be effective in controlling submerged vegetation; and the potential for degrading the water quality, makes this a poor option. Natural predators of the aquatic weeds and algae occur in their home environment, but may cause more damage to the environment than the target weeds.

g. Pesticide Control

The decision to use an algaecide or aquatic herbicide is based on the recommendation of CDFW's PCA. The selection of an appropriate algaecide or aquatic herbicide, in additional to the inclusion of other control methods (mechanical, cultural, biological) will be based on feasibility, biological efficacy, environmental impacts and availability of fiscal resources.

h. Using the Least Intrusive Method of Weed Control

CDFW evaluates each treatment area to determine the least intrusive method of treatment. The decision as to which delivery system (backpack sprayers, trucks, all-terrain vehicles trailers, helicopter, drone etc.) will be based on terrain; the ability to hold, safely transport and properly apply herbicide, and lowest impact to the environment.

i. Applying a Decision Matrix Concept for Choosing the Most Appropriate Formulation

CDFW's PCA or designee will evaluate the area(s) to be treated prior to herbicide application to verify the presence and the extent of the target algae and aquatic weeds. Algaecide or aquatic herbicide labels will be checked for control efficacy, proper dosage and the required amount necessary for application. A written recommendation which will include the rate of application and any warnings or conditions that will limit the application will be rendered by the PCA. A recommendation to include an adjuvant/surfactant to enhance the efficacy of the algaecide or aquatic herbicide may also be made by the PCA.

Appendix: Maps of CDFW Sites

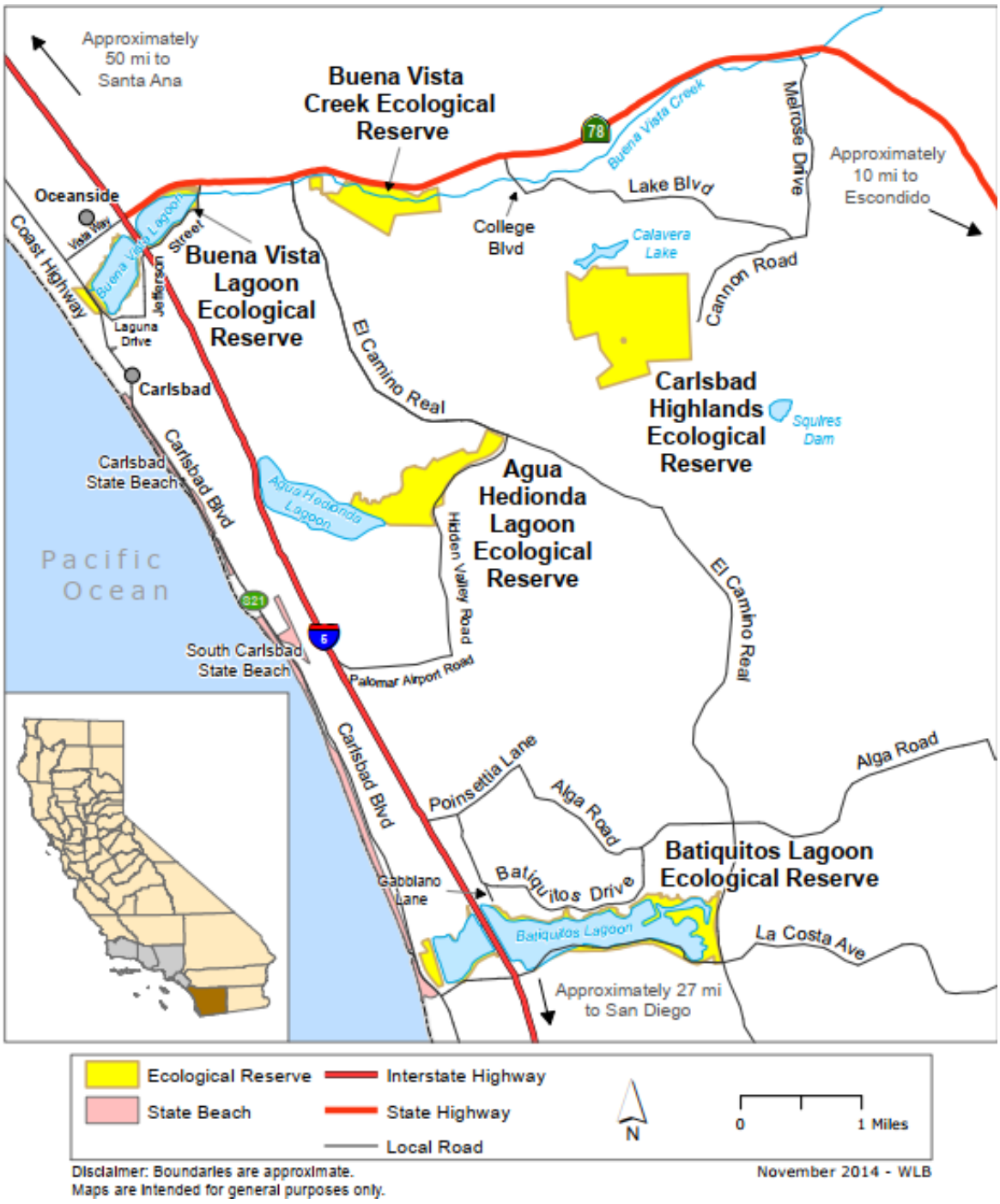

Figure 1. Agua Hediona Lagoon ER, Batiquitos Lagoon ER, Buena Vista Creek ER

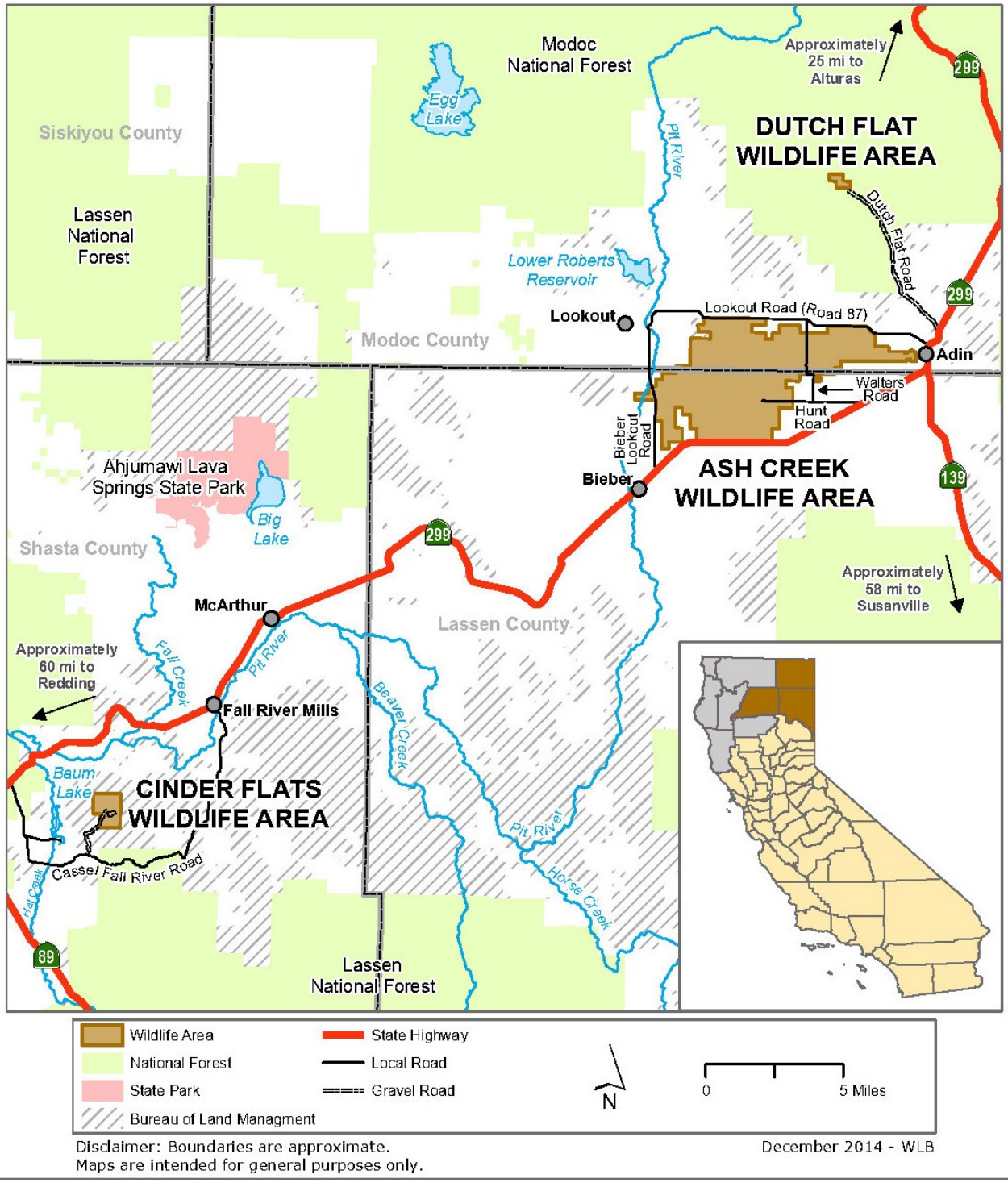

Figure 2. Ash Creek WA

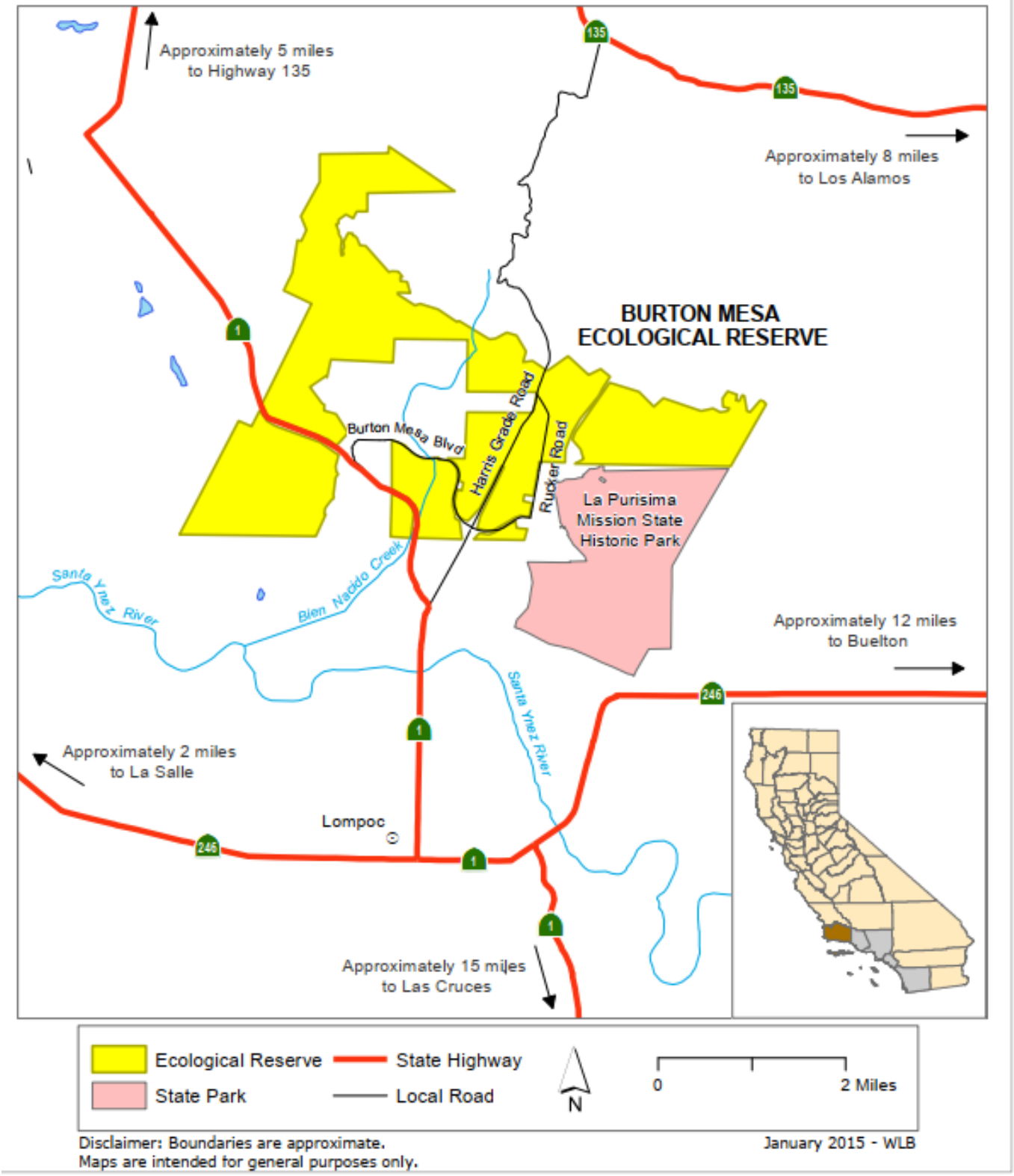

Figure 3. Ballona Wetlands ER, Burton Mesa ER

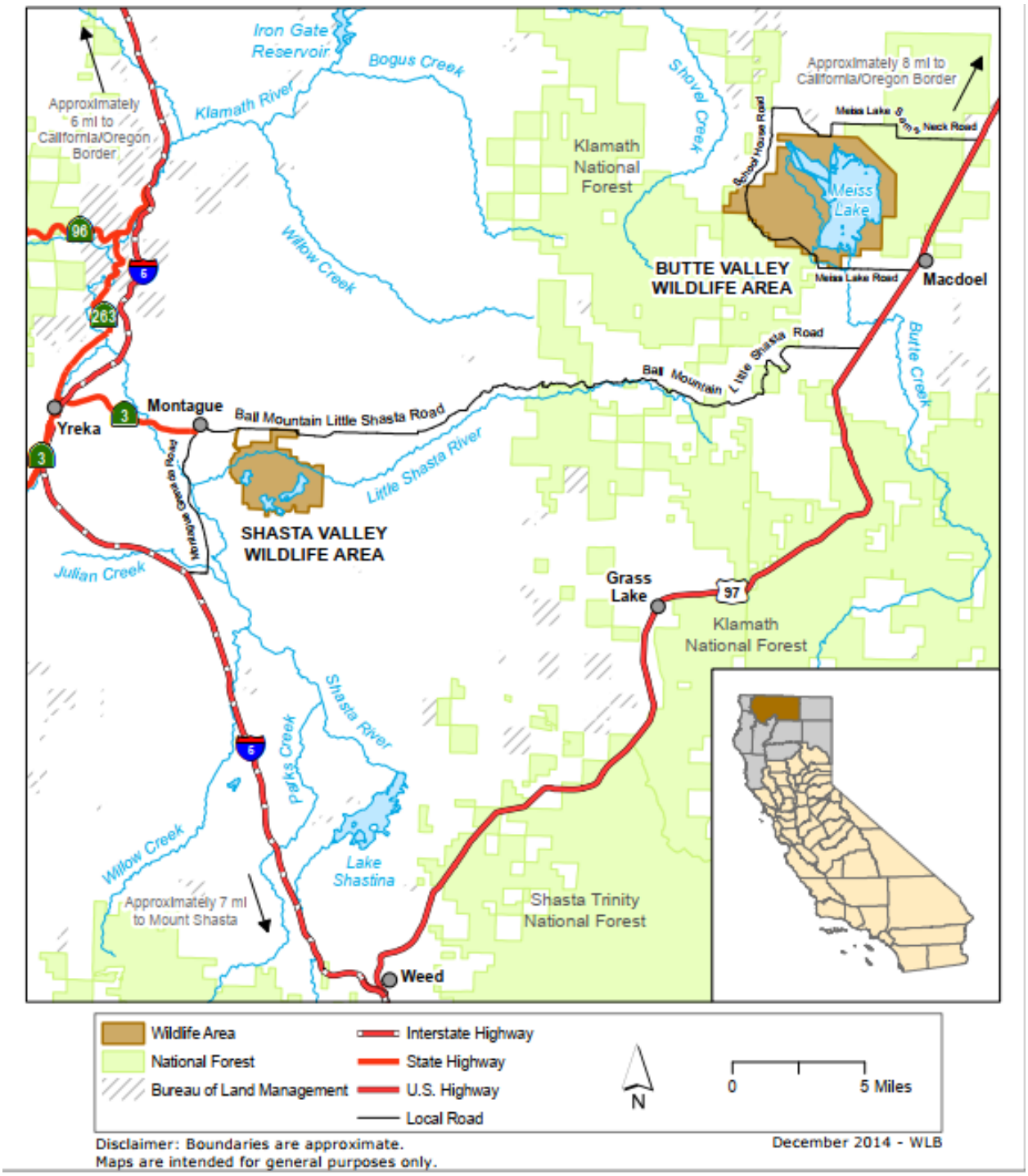

Figure 4. Butte Valley WA, Shasta Valley WA

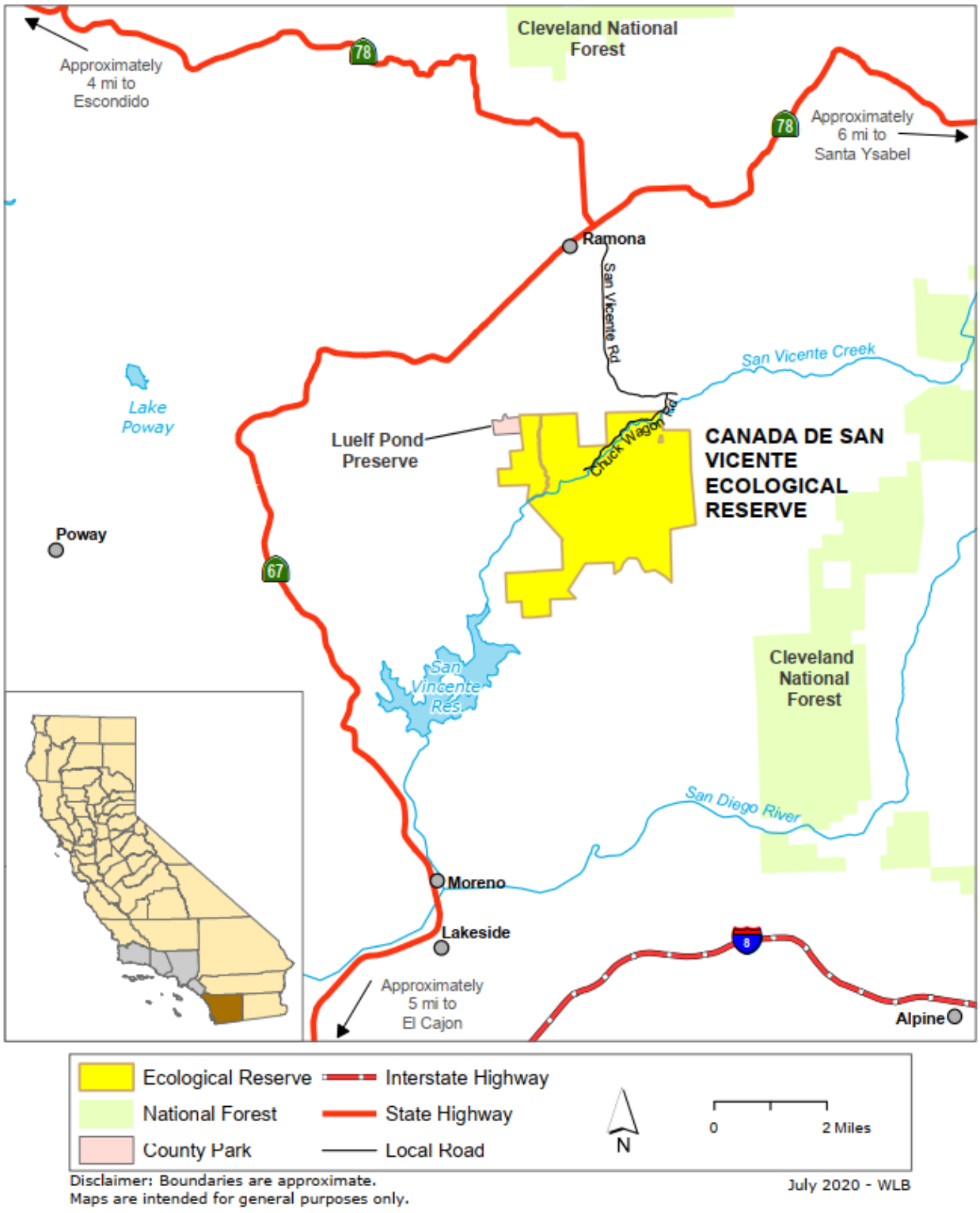

Figure 5. Canada De San Vicente ER

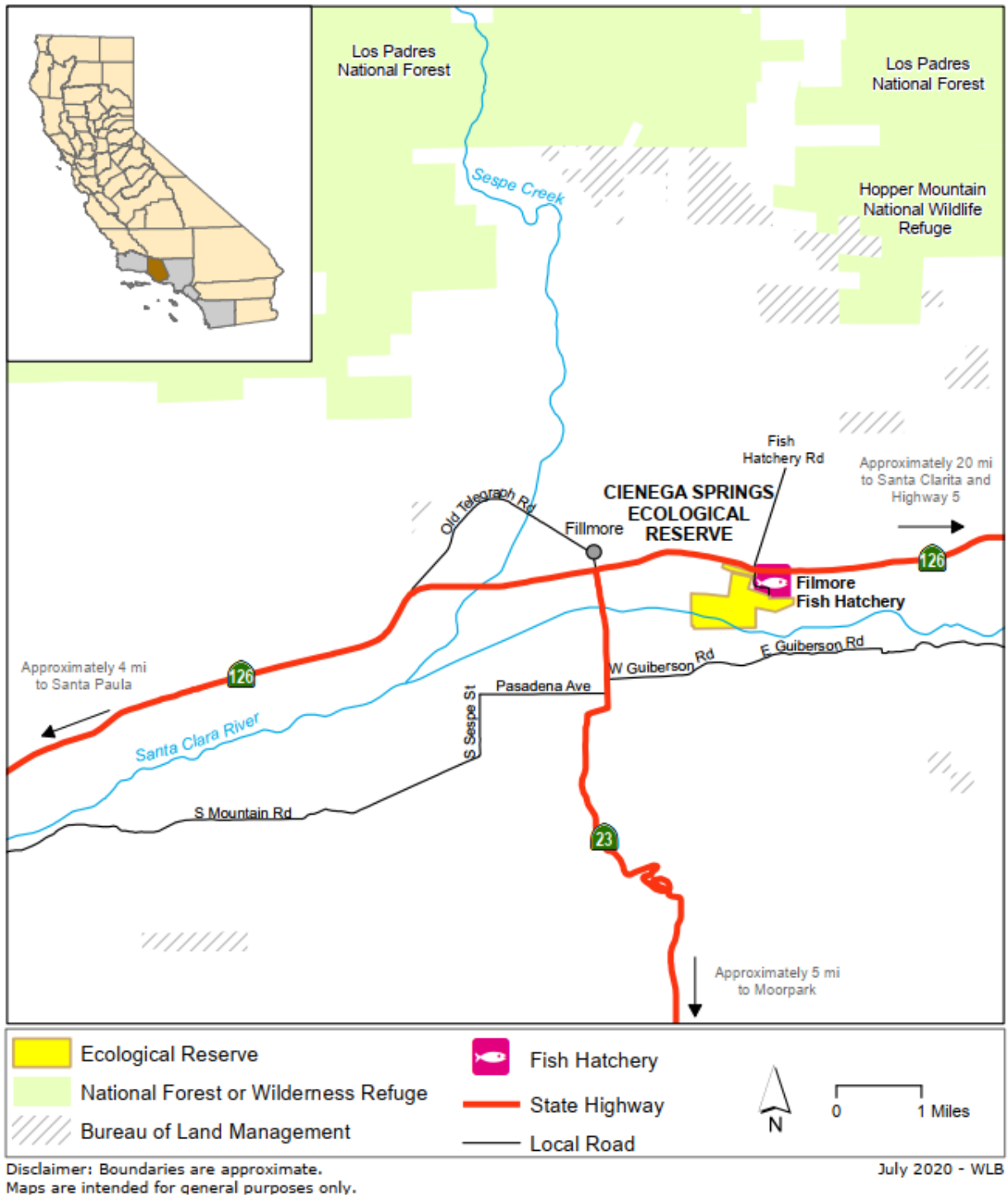

Figure 6. Cienega Springs ER

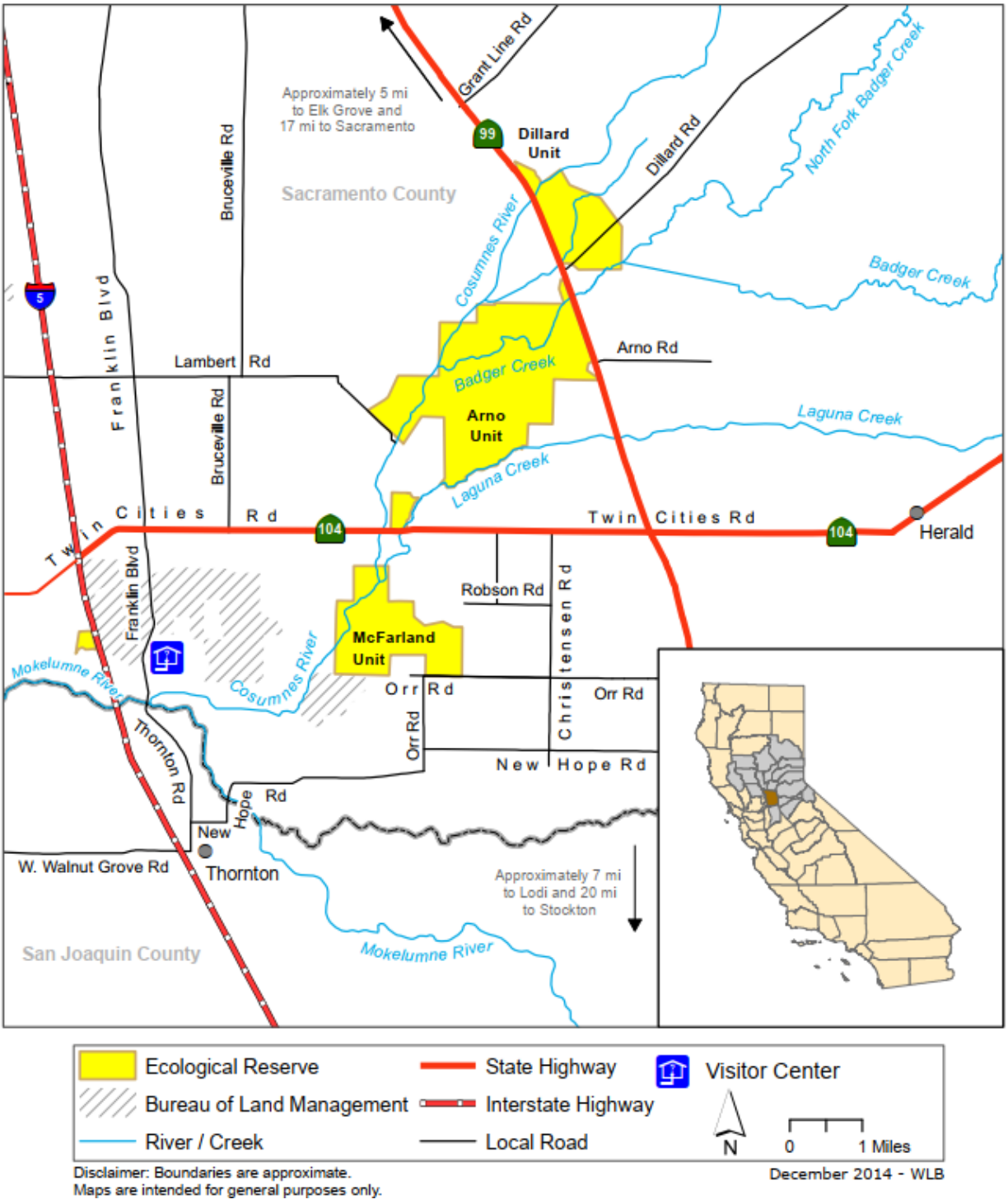

Figure 7. Cosumnes River ER

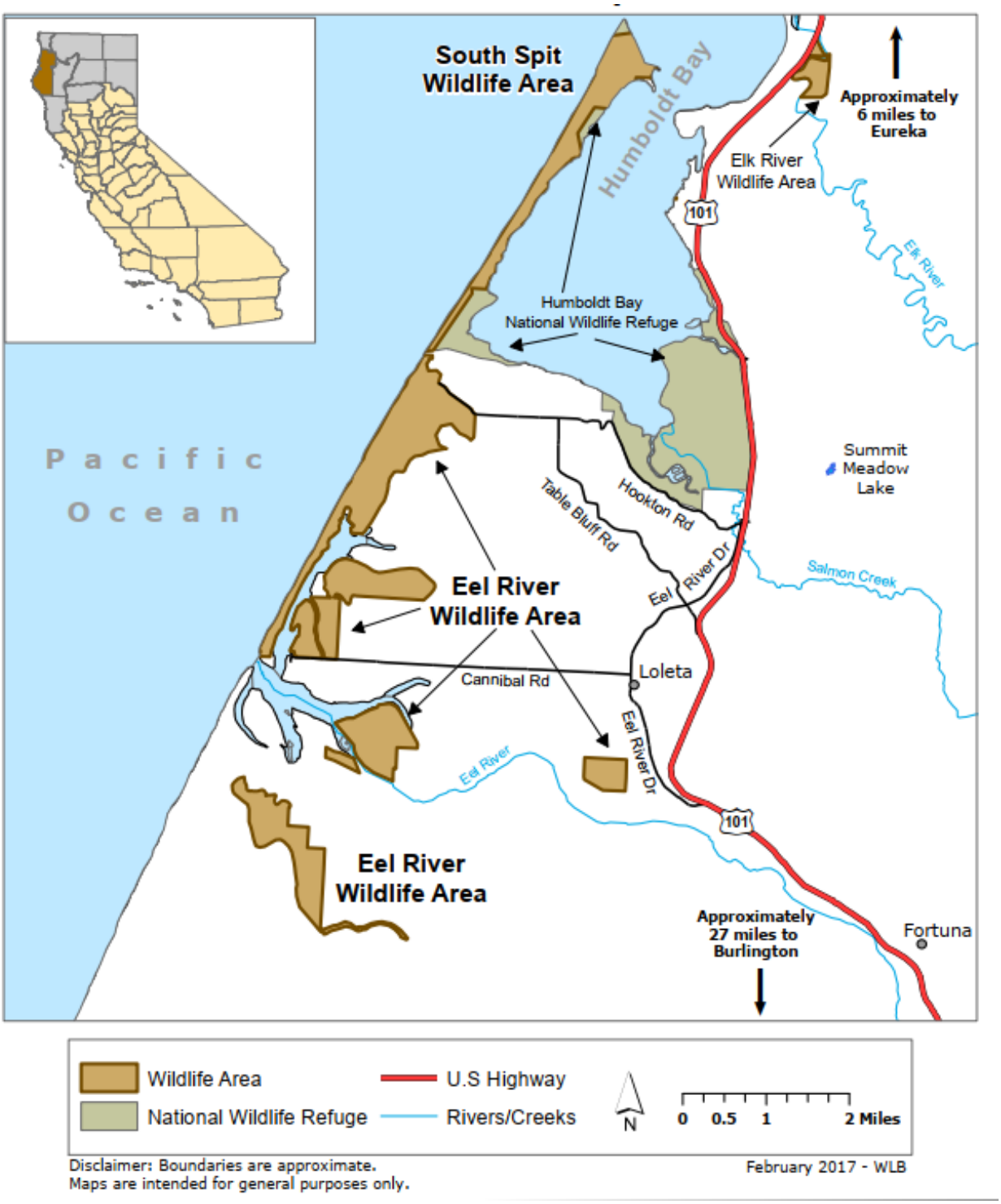

Figure 8. Eel River WA

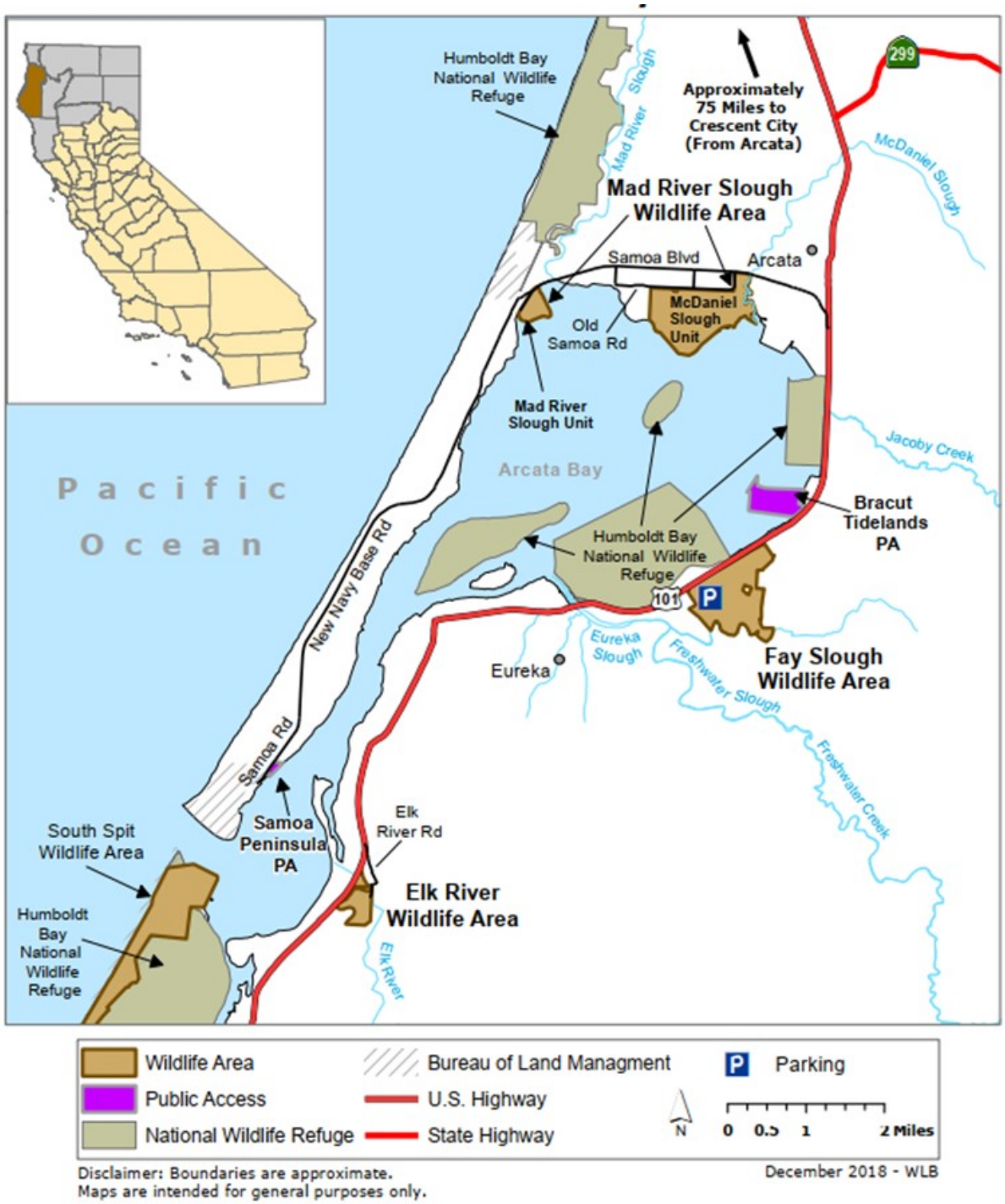

Figure 9. Elk River WA, Bracut Tidelands, Fay Slough WA, Mad River Slough WA

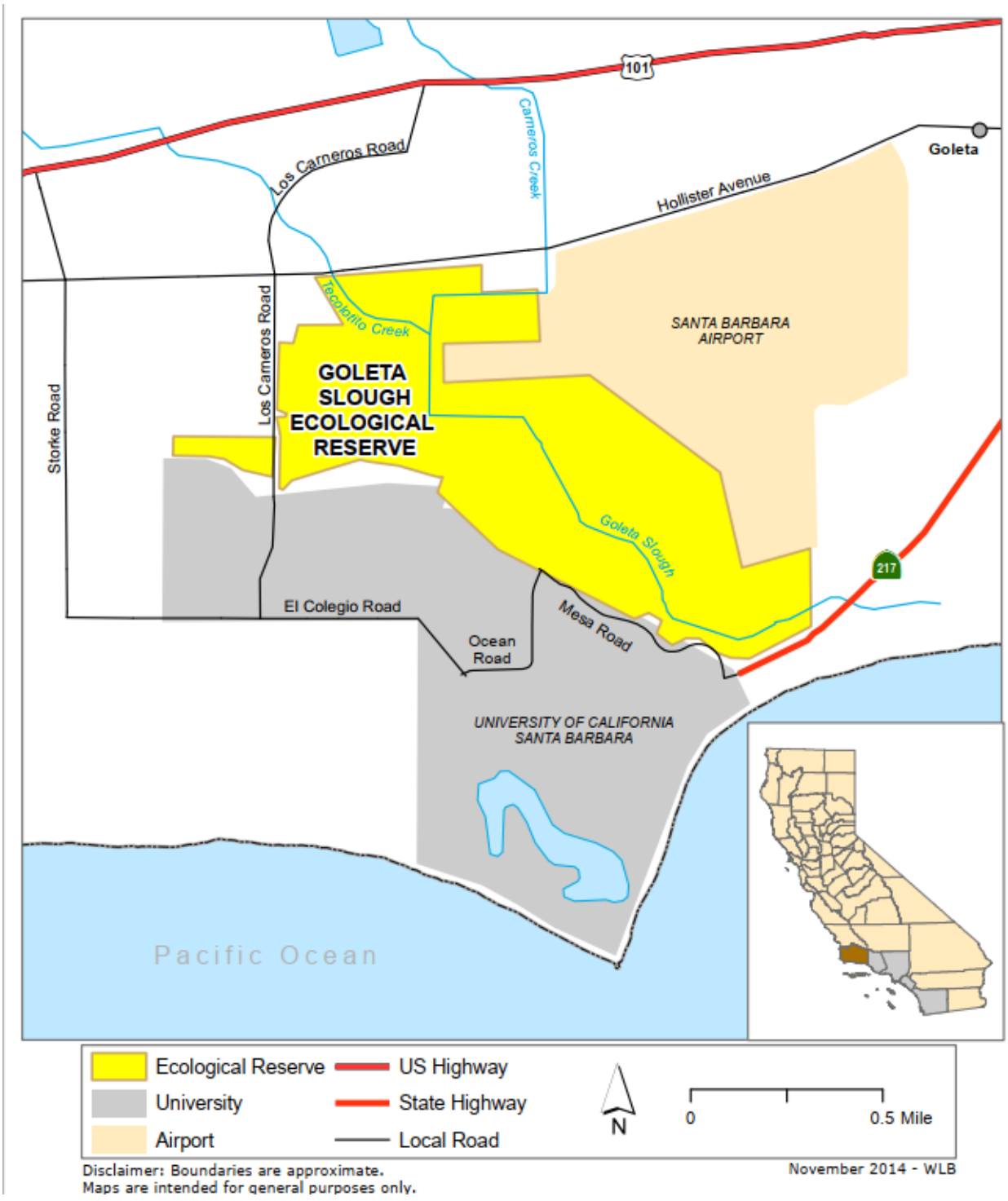

Figure 10. Goleta Slough ER

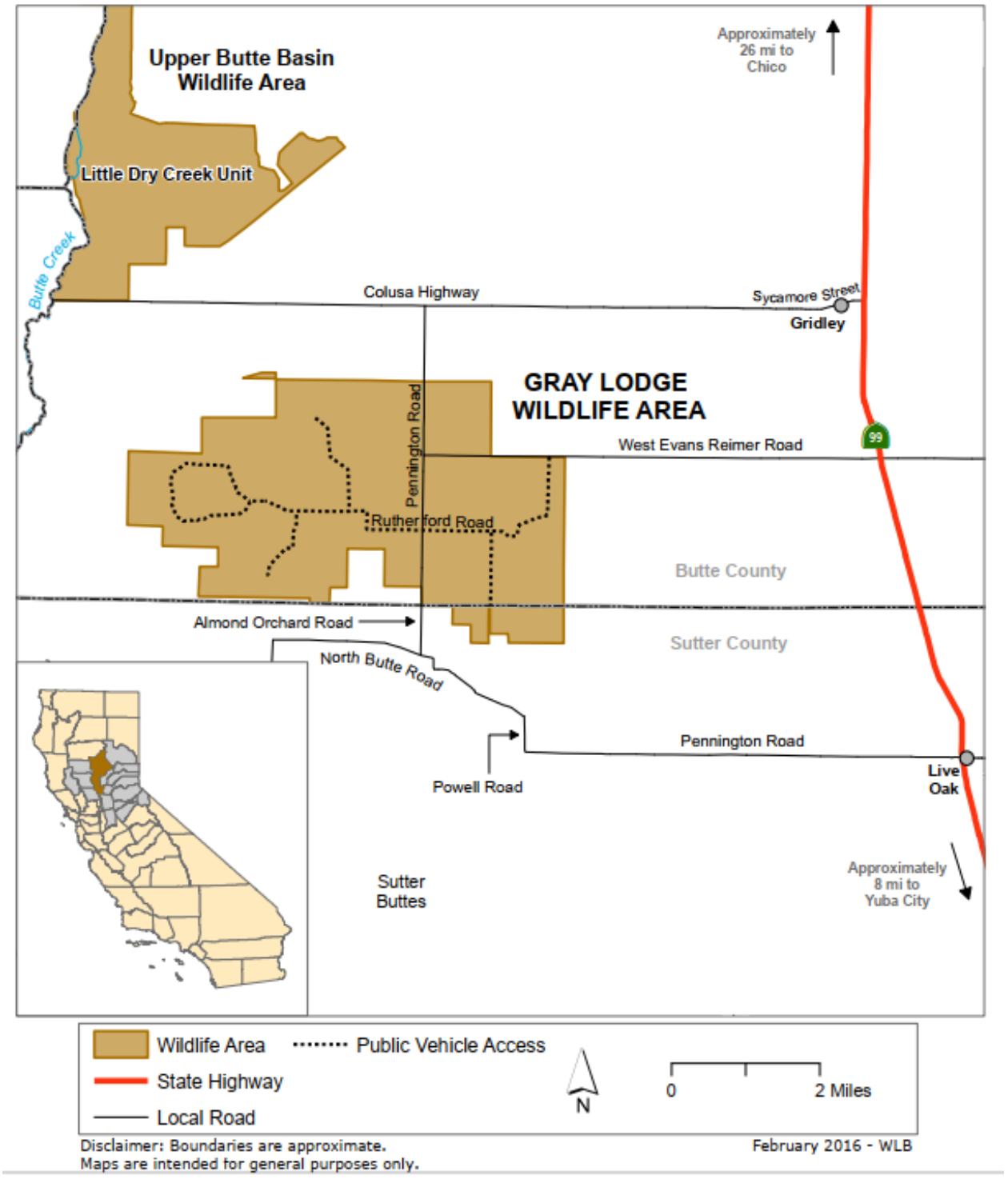

Figure 11. Gray Lodge WA

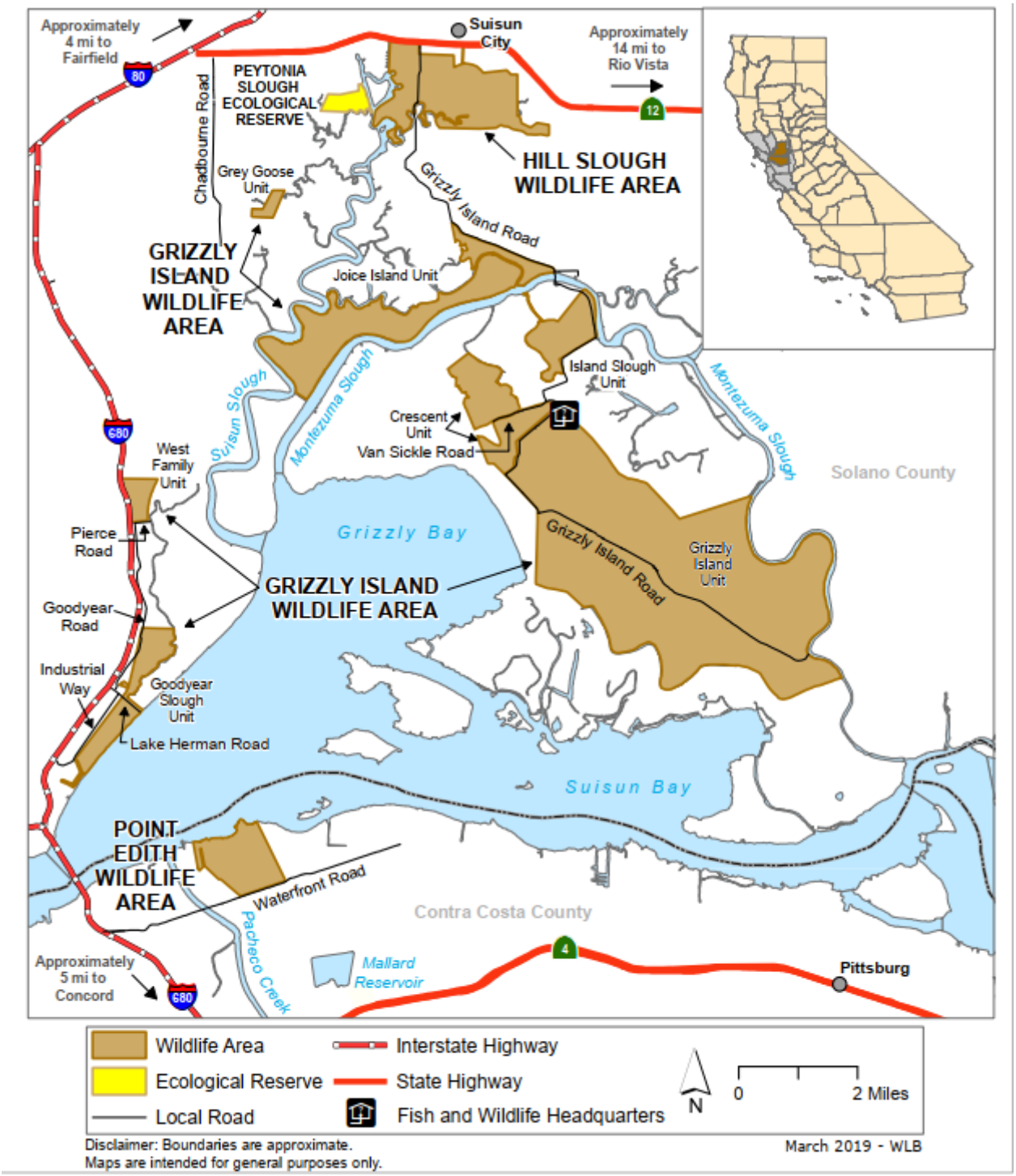

Figure 12. Grizzly Island WA

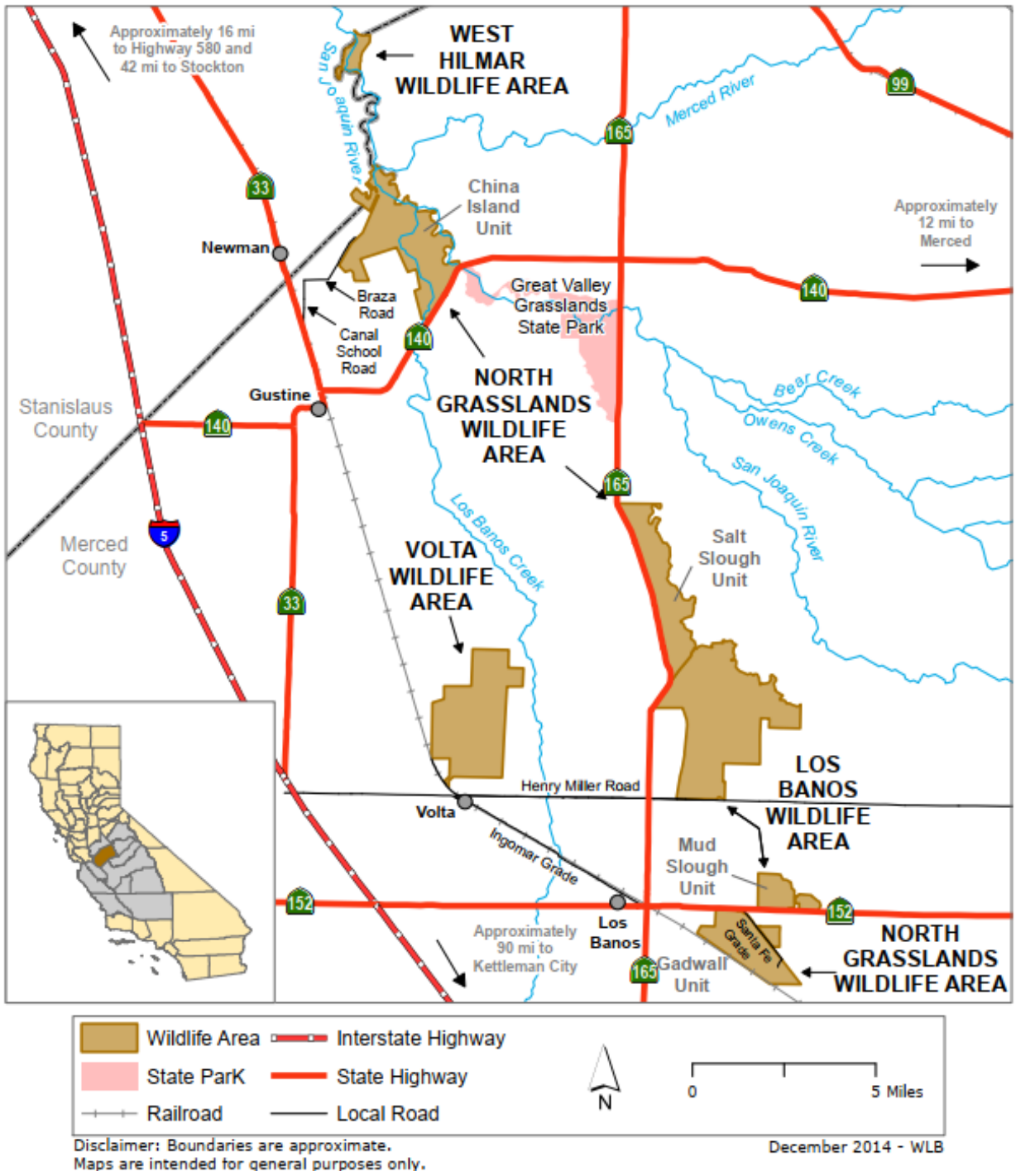

Figure 13. Los Banos WA, North Grasslands WA

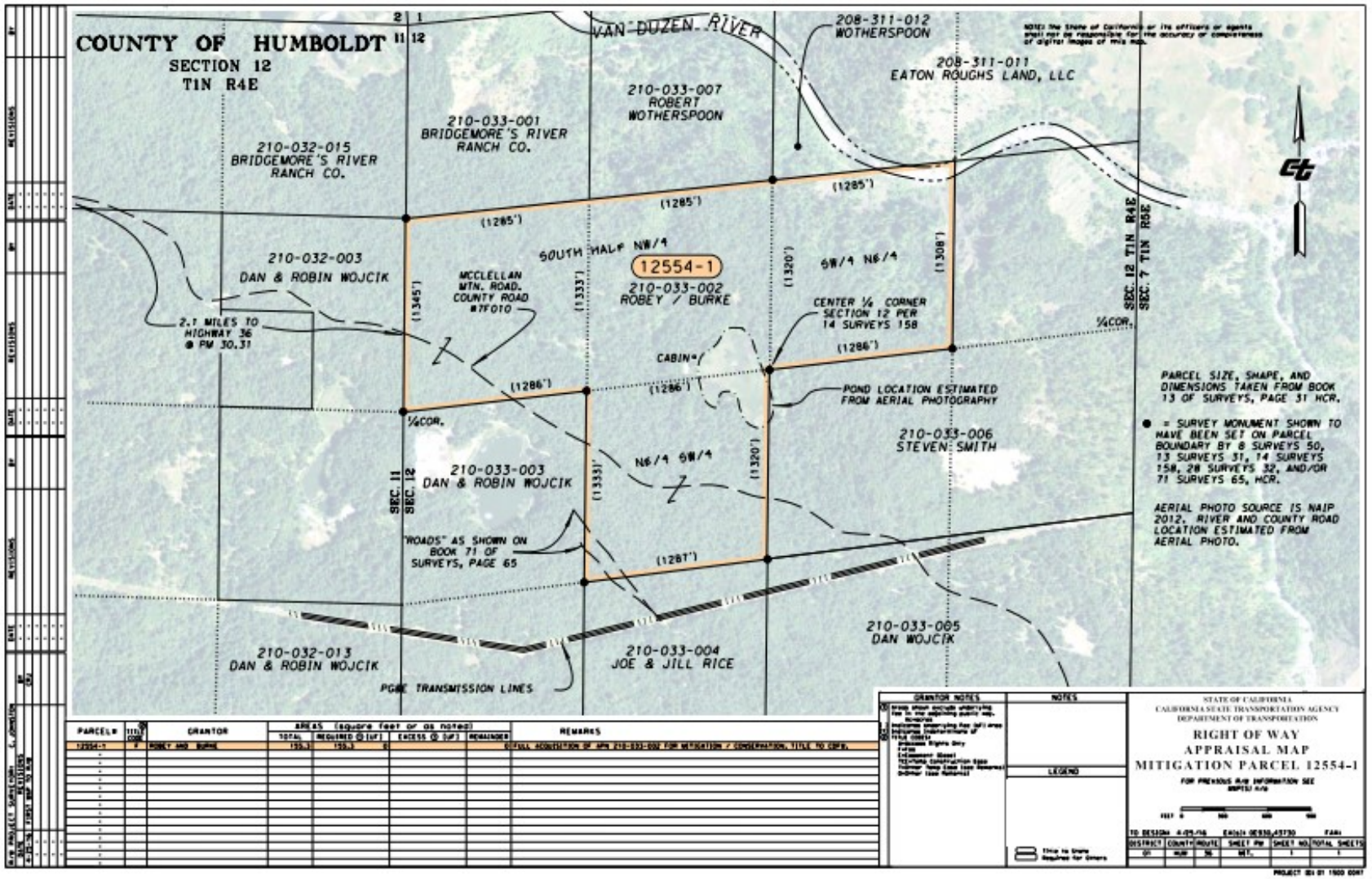

Figure 14. McClellan Mountain Peatland Reserve

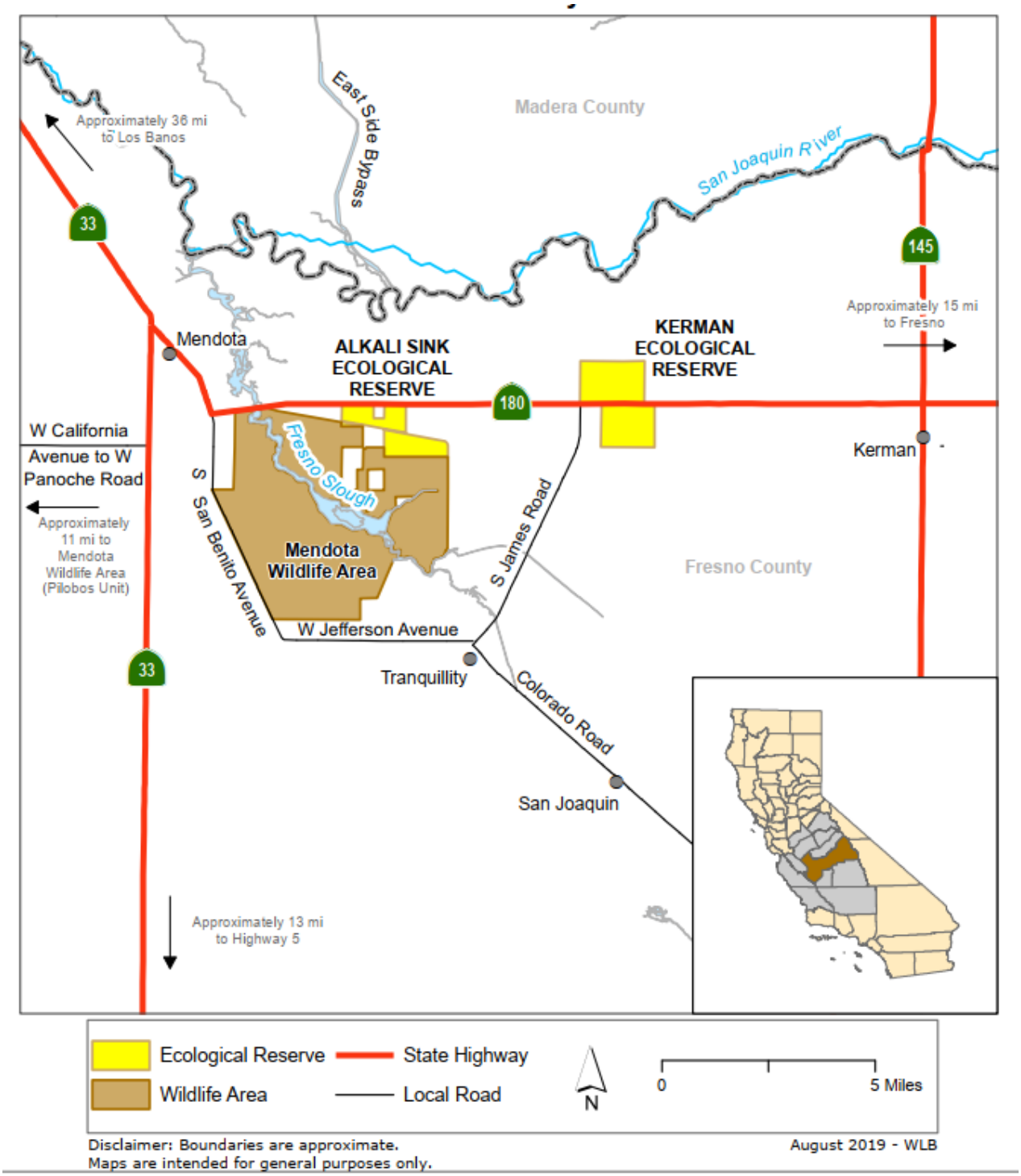

Figure 15. Mendota WA

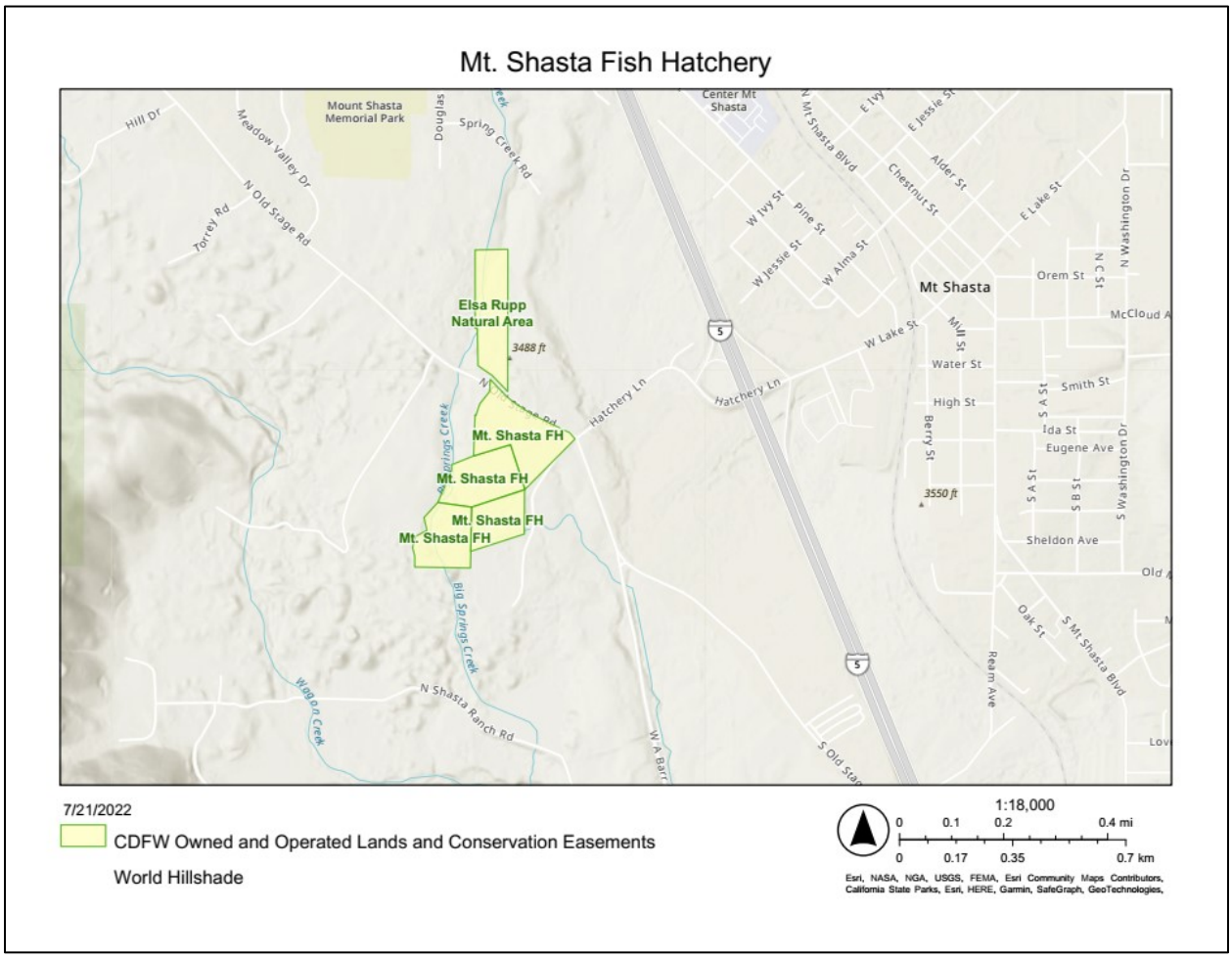

Figure 16. Mt. Shasta Fish Hatchery

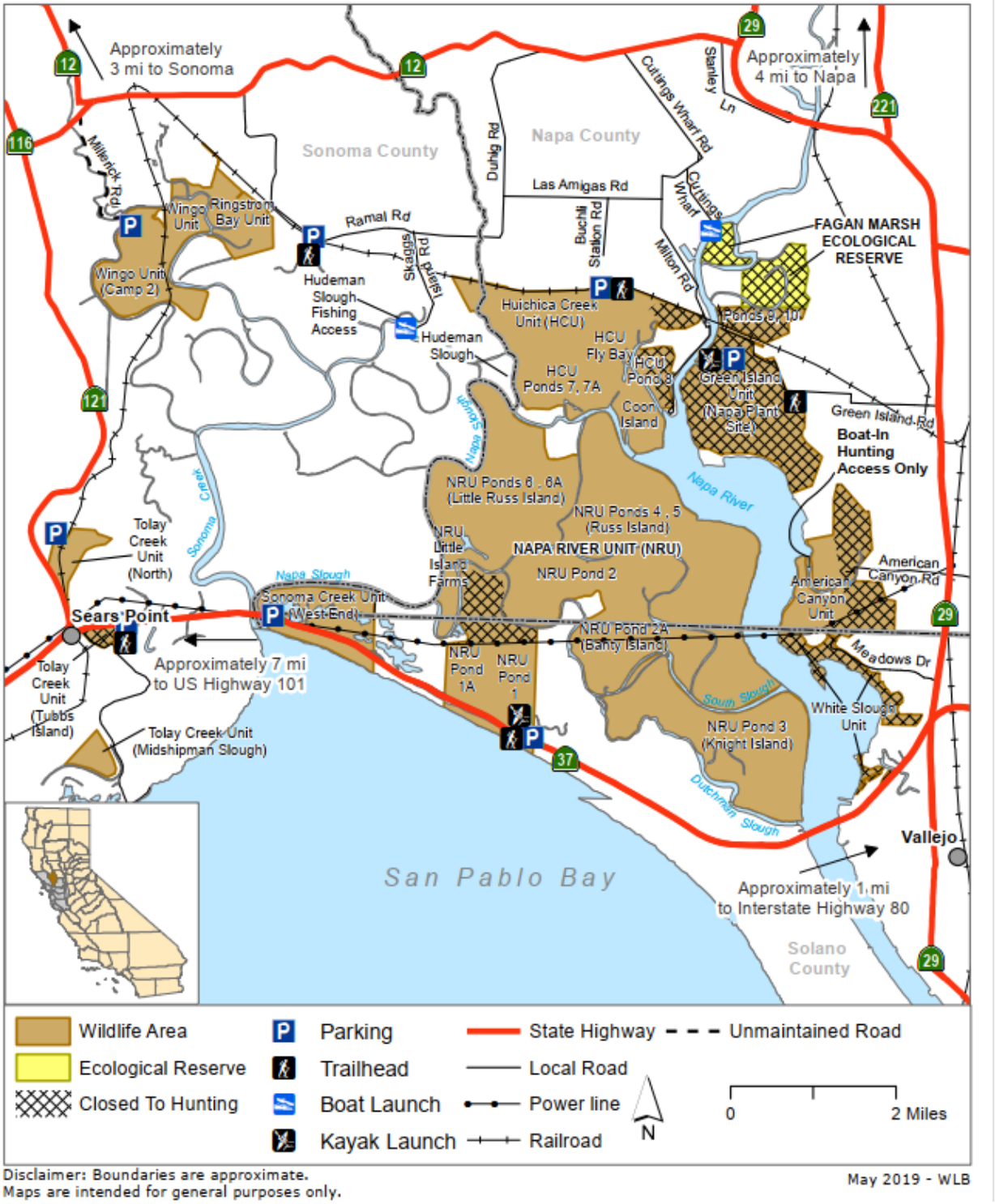

Figure 17. Napa-Sonoma Marshes WA

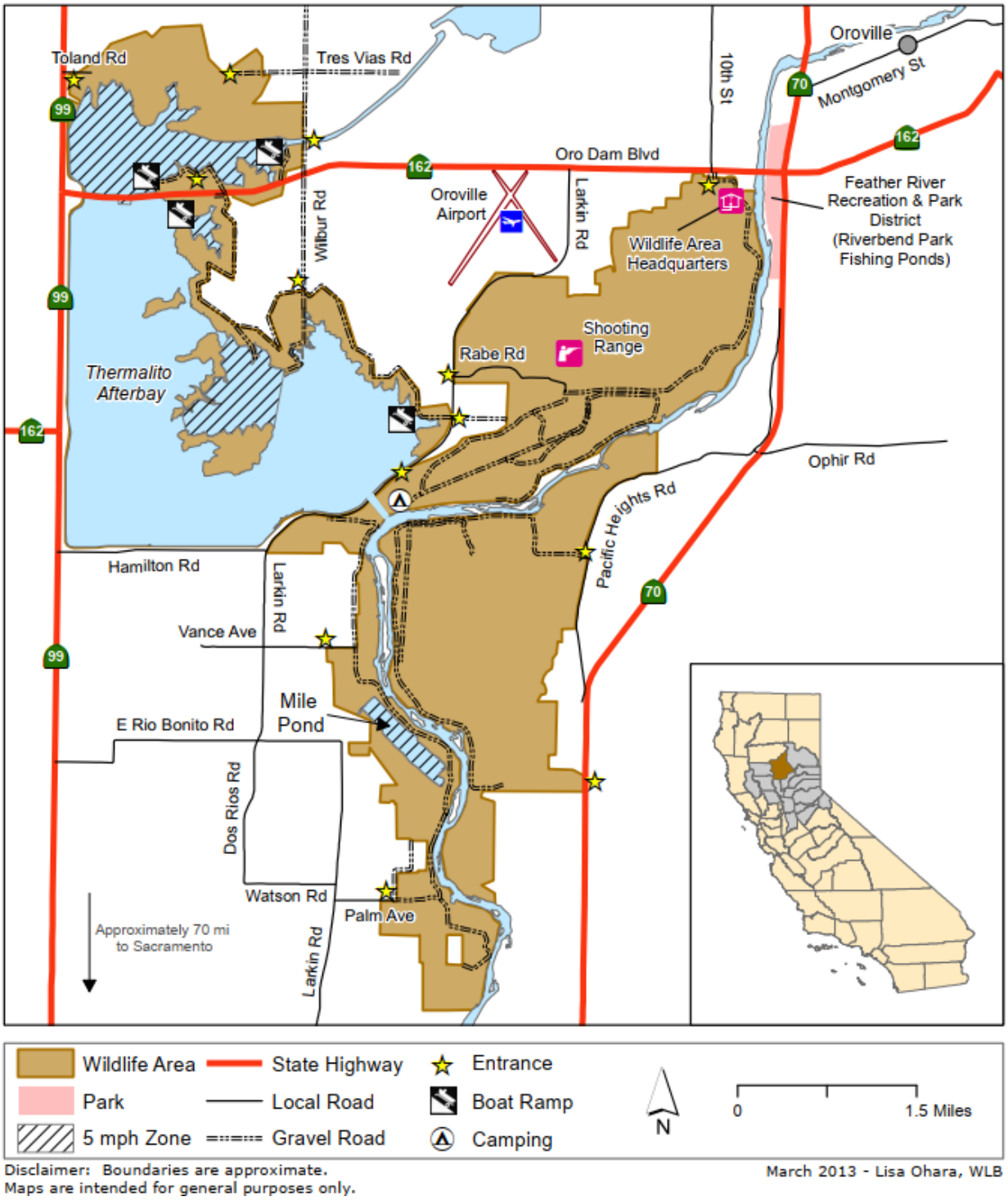

Figure 18. Oroville WA

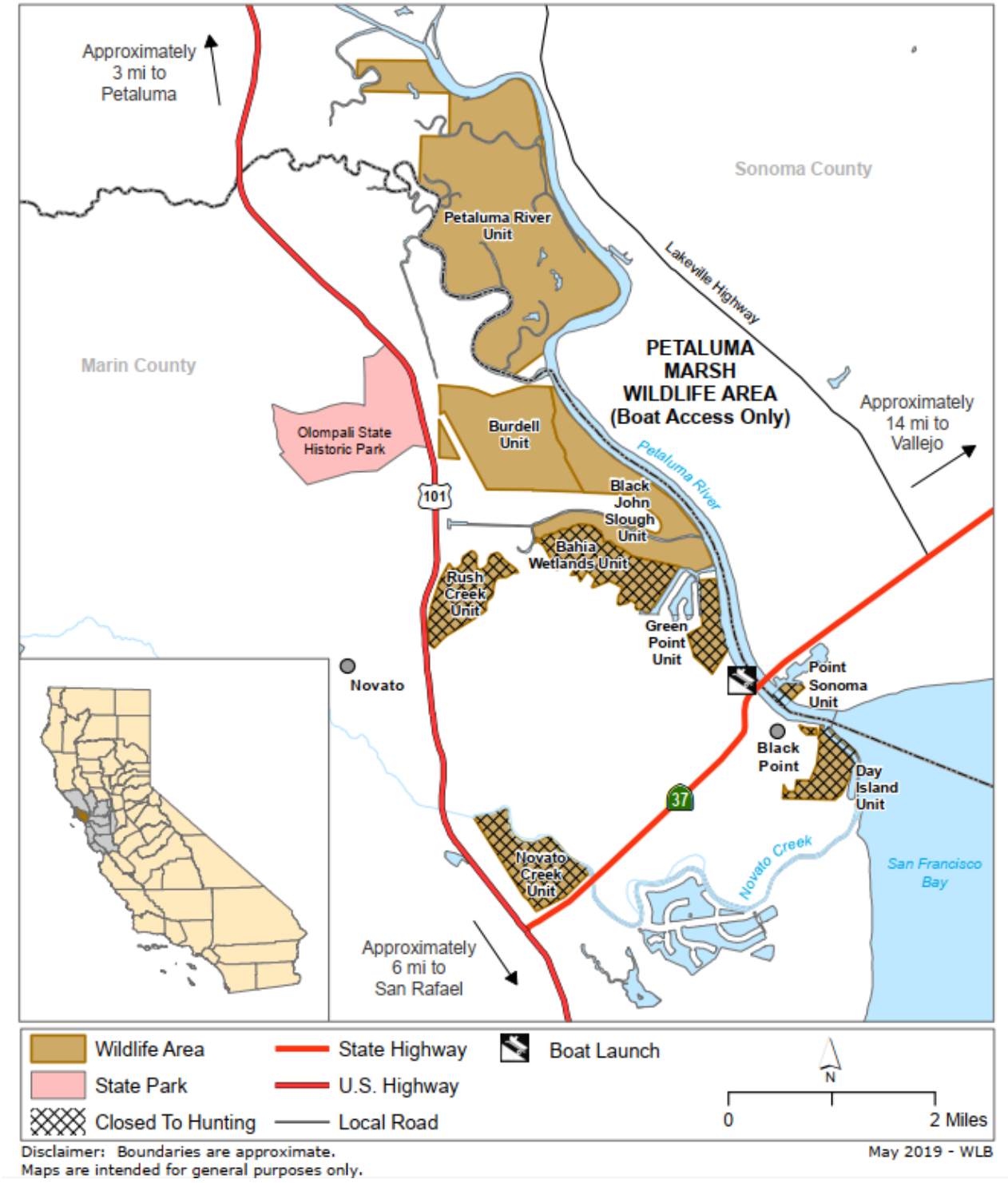

Figure 19. Petaluma Marshes WA

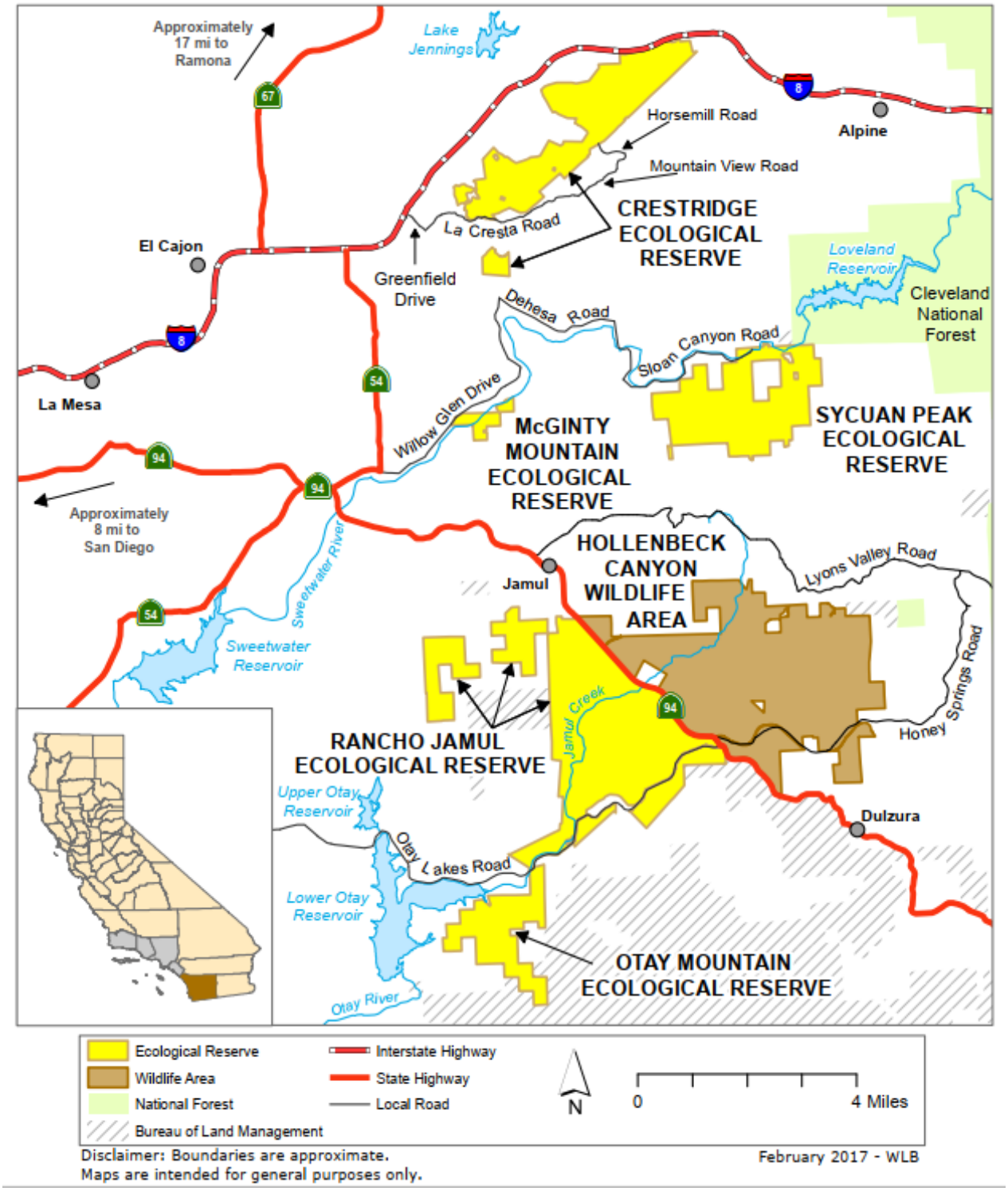

Figure 20. Rancho Jamul ER

Figure 21. San Dieguito Lagoon ER

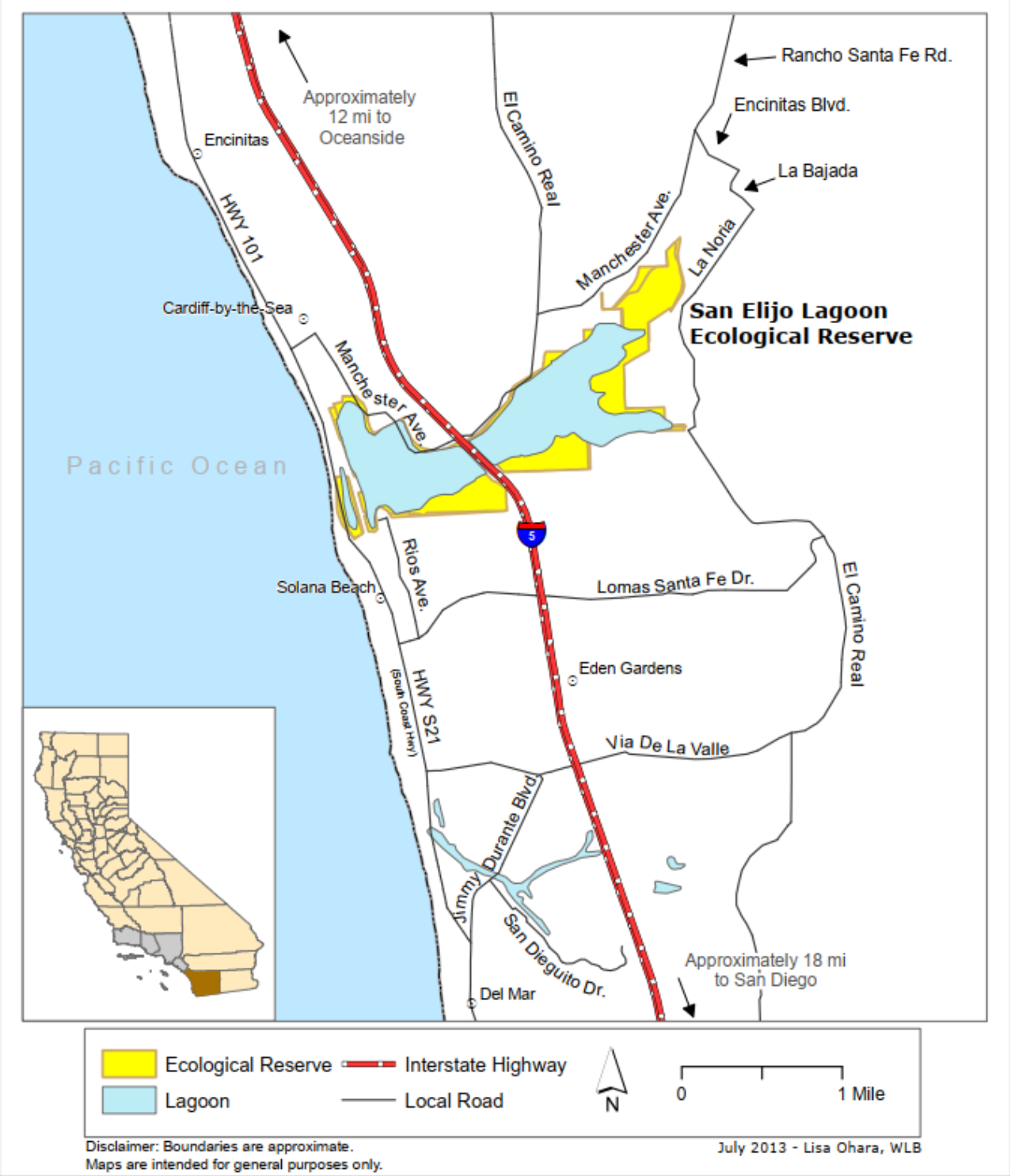

Figure 22. San Elijo Lagoon ER

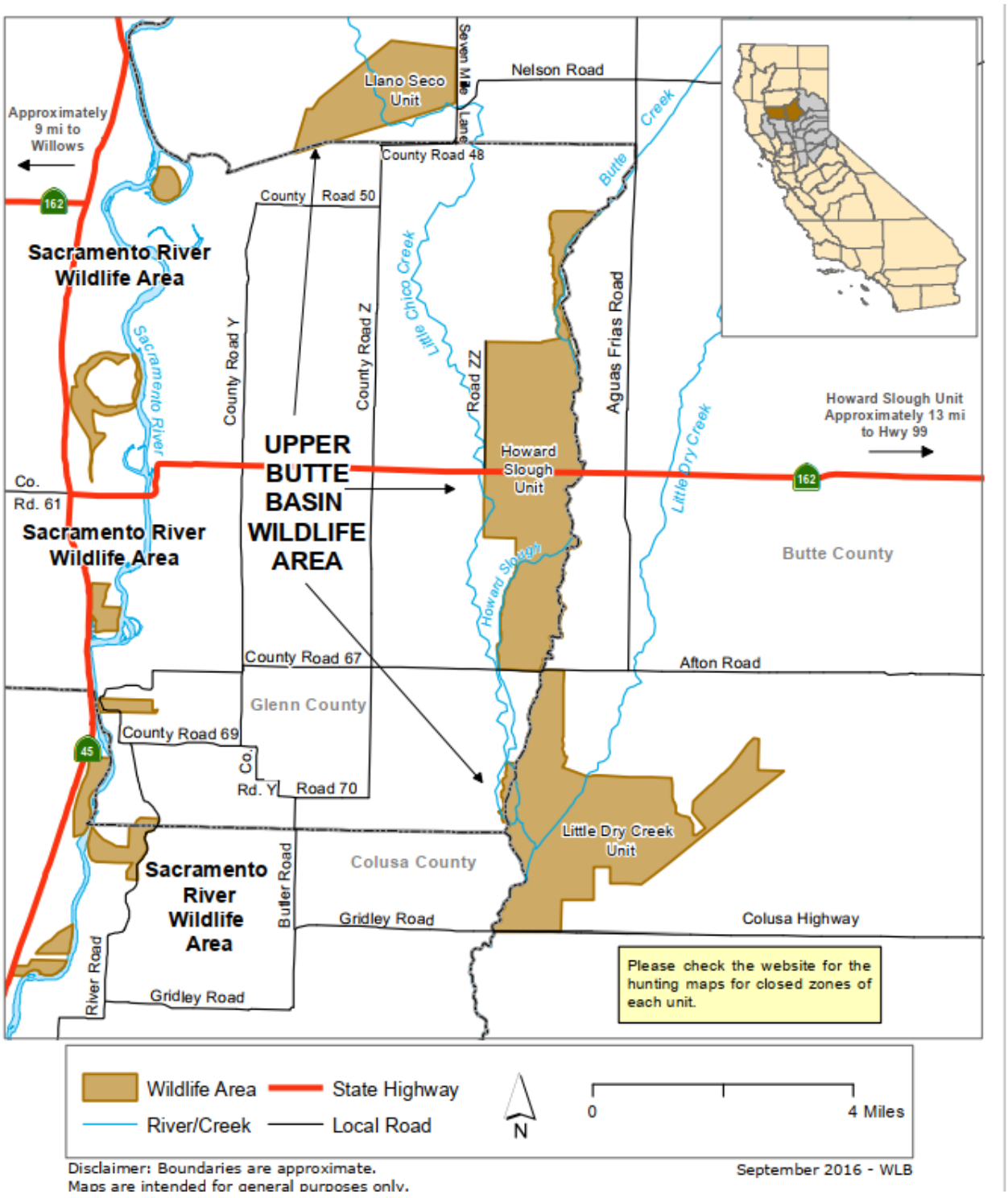

Figure 23. Upper Butte Basin WA

Figure 24. Upper Newport Bay ER

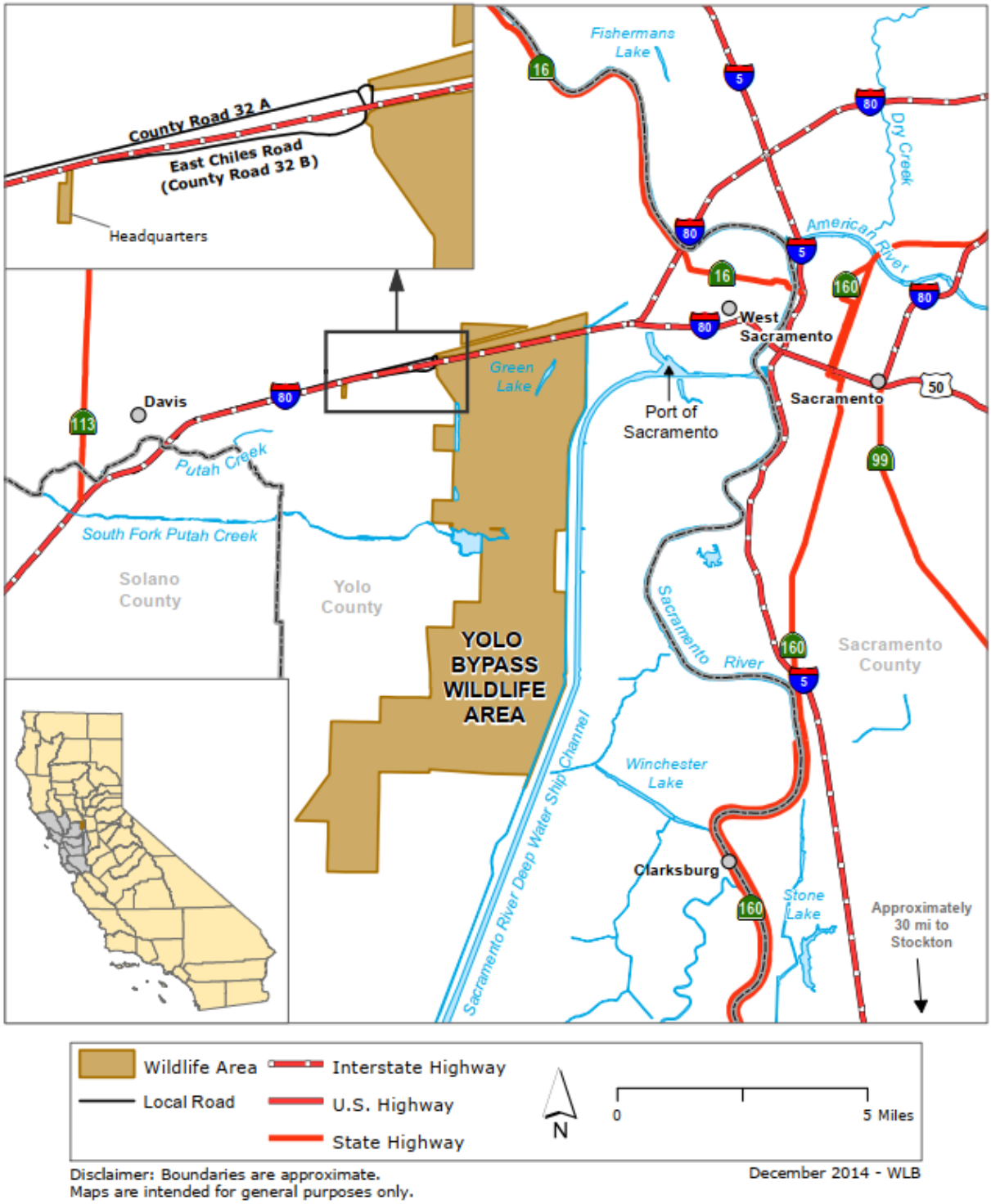

Figure 25. Yolo Bypass WA