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ADDENDUM TO SEDIMENT DISCHARGE AND EROSION ASSESSMENT REPORT – WORKPLAN TO ADDRESS PROXIMITY TO SURFACE WATERS

SACRAMENTO VALLEY WATER QUALITY COALITION ORDER R5-2014-0030

Prepared for:
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MAY 31, 2016

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1.0 INTRODUCTION

Applied Engineering and Geology, Inc. (AEG) has prepared this *Addendum to Sediment Discharge and Erosion Assessment Report – Workplan to Address Proximity to Surface Waters* (Addendum) for the Sacramento Valley Water Quality Coalition (SVWQC) at the request of the Northern California Water Association (NCWA). This Addendum was prepared to provide additional information related to surface water proximity as recommended in the Central Valley Regional Water Quality Control Board's (Regional Board) August 14, 2015 *Conditional Approval of Sacramento Valley Water Quality Coalition's Sediment Discharge and Erosion Assessment Report* (Conditional Approval).

2.0 IDENTIFYING PARCELS THAT MAY BE REQUIRED TO PREPARE A SECP

The goal of the Sediment Discharge and Erosion Assessment Report (SDEAR) was to determine which irrigated agricultural areas within the Sacramento River Watershed are subject to erosion and have the potential to discharge sediment that may degrade surface waters. The Regional Board acknowledged the SDEAR identifies areas that have the potential for erosion and sediment discharge, but relying solely on the RUSLE modeling results did not provide a comprehensive assessment of the watershed. The Regional Board recommended the SVWQC develop an approach to evaluate areas in close proximity to surface water for the potential for erosion and discharge of sediment due to irrigation practices.

This Addendum establishes the criteria for determining the relative **probability** that an agricultural parcel has a high risk of discharging sediment. These criteria are discussed in the following sections. Agricultural parcels known to erode and discharge sediment, or that have been identified as high risk for the relative probability to cause erosion and discharge sediment, will require the preparation and implementation of a certified Sediment and Erosion Control Plan (SECP).

Additionally, this Addendum establishes criteria for identifying additional parcels based on proximity to surface waters and the potential for irrigation/tailwater discharge to surface water bodies where irrigated lands enrolled in the SVWQC are present.

If a parcel meets certain criteria detailed in **Section 3.0** the Member will not be required to complete a SECP since there is reduced risk of irrigation runoff and/or tailwater discharge that would cause erosion and sediment discharge.

2.1 Farm Evaluation Based Category

Members are required to complete a Farm Evaluation Survey which includes information relevant to sediment discharge risk. The Regional Board stated in its Conditional Approval that "parcels where a grower self-reported a potential to discharge sediments to surface waters should complete a SECP, even if the parcels are in a 'low-risk' area based on the RUSLE output". The Regional Board recommendations also stated that "parcels determined by Farm Evaluations alone to have the potential to discharge sediment should not be included in the SDEAR as an area susceptible to erosion and sediment discharge based on the assessment of regional properties". If a Member has indicated on their Farm Evaluation Survey or subsequent questionnaires that their irrigated lands are known to discharge sediment off of the parcel, then the Member will be subject to the SECP requirements per the Waste Discharge Requirements General Order R5-2014-0030 (WDRs), if the parcel meets the criteria described in **Section 3.0**.

2.2 RUSLE Based Category

The SVWQC has prepared a SDEAR, dated June 5, 2015, that utilizes the Revised Universal Soil Loss Equation (RUSLE) as directed by the Regional Board. The RUSLE model parameter values used at the direction of the Regional Board, such as assuming bare ground conditions, result in a very conservative approach to estimate the rate of erosion by region. Based on the outputs of the RUSLE model, regions that show a rate of erosion at or above a Regional Board established value of 5 tons/acre/year are considered to be at high risk for causing erosion and sediment discharge that could degrade surface waters (see Figure 9 of the SDEAR in **Appendix A**).

Members with parcels shown to be located in a region where the rate of erosion is at or above 5 tons/acre/year will be subject to the SECP requirements per the WDRs, if the parcel meets the criteria described in **Section 3.0**.

2.3 Surface Water Proximity Based Category

Heavy rainfall and excessive irrigation runoff can cause certain exposed soil to erode and become mobile. Mobilization of soil from rain events and irrigation does not result in discharge to surface water unless there is a physical pathway to surface water that does not impede water and sediment movement. Natural landscape features, such as hydraulic isolation of land, can prevent the movement of discharged water and any sediment carried in the water. Unless a management practices either eliminates discharge, or "treats" water as it leaves the parcel (ex. vegetative filter strips that trap sediment before it can move to surface water), mobilized sediment will follow the path of least resistance. Irrigated lands within close proximity to surface waters may be at higher risk for discharging sediment into surface water unless mitigating measures are in place (ex. Natural Resource Conservation District [NRCS] practices as described in the *Management Measure for Sediment and Erosion Control* presented by the State Water Resources Control Board's Non-point Source Program [NPS], and approved by the United States Environmental Protection Agency [US EPA]). The following surface water definition and proximity criteria will be used when evaluating Member parcels.

2.3.1 Surface Waters to be Included in Proximity Evaluations

The following approach to identifying of surface waters will be used in the evaluations for surface water proximity:

1) Identify SVWQC Member parcels along large tributaries (e.g., Sacramento, Feather, Yuba, Bear, Cosumnes, Fall and Pit Rivers) using the named surface water bodies shown on USGS Topographic Maps
    a) The most current version of the Topographic Maps for an area are to be used
    b) Only those surface water bodies that are named on the Topographic Maps will be included
2) Identify SVWQC Member parcels along secondary tributaries (e.g., Cache Creek, Willow Slough, Dry Creek, Laguna Creek, Coon Creek, Pine Creek, Honcut Creek, Walker Creek, Freshwater Creek, North Canyon Creek, Coon Hollow Creek, Middle Creek, Anderson Creek, and Ulatis Creek) using the named surface water bodies shown on USGS Topographic Maps
    a) The most current version of the Topographic Maps for an area are to be used
    b) Only those surface water bodies that are named on the Topographic Maps will be included
3) Identify SVWQC Member parcels along remaining water bodies (e.g.Man-made / man-operated aboveground water delivery channels with unique names/identifiers/designators (ex. canals operated by the Nevada Irrigation District)
    a) Channels without names, or that are only named by category, are excluded

USGS Topographic Maps can be downloaded from:

http://store.usgs.gov/b2c_usgs/usgs/maplocator/%28ctype=areadetails&xcm=r3standardpitrex_prd&carea=$root&layout=6_1_61_48&uiarea=2%29/.do

There are also several online map viewers that can be used to browse topographic maps. One such viewer can be found at: http://www.mytopo.com/maps/index.cfm

2.3.2 Define Proximity Criteria

The following surface water proximity criteria will be used in the evaluations: all Member parcels adjacent to surface waters (as defined herein) will be subject to the SECP requirements per the WDRs, if they meet the criteria detailed in **Section 3.0**.

2.4 Priorities in Identifying Parcels That Will Be Required to Prepare a SECP

In combination with the tiers of water bodies described in **Section 2.3.1**, the SVWQC will identify Member parcels that are being required to prepare and implement a certified SECP per the WDRs based on high, medium, and low priority. These priority levels will be based on a combination of the parcel's crop type, irrigation type, region, and results of the Updated RUSLE model (discussed in **Section 5.0**). As an example, a parcel adjacent to a large tributary with high ratings in all four categories would have the highest possible priority, while the same parcel with low ratings in all four categories would still be in the large tributaries group, but would have the lowest possible priority within that group. Related to the tributaries, large tributaries will be evaluated first, with the smaller tributaries following. Within the tributary groups, Member parcels with the highest priority level will be evaluated first, followed by medium and low priority levels.

As the SVWQC includes a large number of Member parcels, determining which member parcels will require a SECP is expected to take a fair amount of time to complete. Due to this, the SVWQC intends to evaluate Member parcels along large tributaries first, then secondary tributaries, and lastly along all other waterbodies as described in **Section 2.3.1**.

2.4.1 Crop Types

High, medium, and low priority Member parcels will be identified based on crop type as shown below:

High Priority – Row crops, vineyards without ground cover, orchards without ground cover, and berry crops without ground cover.

Medium Priority – Field crops that require regular plowing.

Low Priority – No till crops and all other crop types.

2.4.2 Irrigation Types

High, medium, and low priority Member parcels will be identified based on irrigation type as shown below:

High Priority – All flood irrigation.

Medium Priority – Center-pivot, lateral-moving, and solid set sprinklers irrigation systems.

Low Priority – Subsurface, drip systems, micro-sprinkler, and all other irrigation types.

2.4.3 Regions

High, medium, and low priority Member parcels will be identified based on region as shown below:

High Priority – Counties with the highest annual average rainfall (more than 40 inches per year).

Medium Priority – Counties with the medium ranges of annual average rainfall (30 to 40 inches per year).

Low Priority – Counties with low ranges of annual average rainfall (less than 30 inches per year).

2.4.4 Results from Updated RUSLE Model

High and low priority Member parcels will be identified based on results from the updated RUSLE model (results are shown on **Figure A4**) as shown below:

High Priority – Member parcels in areas estimated to have a rate of erosion at or above 5 tons/ac/year in the updated RUSLE model.

Low Priority – Member parcels in areas estimated to have a rate of erosion below 5 tons/ac/year in the updated RUSLE model.

3.0 SUMMARY OF CRITERIA FOR SECP REQUIREMENTS

As described in **Section 2.0**, the SVWQC will evaluation Member parcel conditions to determine if the combination of proximity to surface waters, irrigation practices, crop type, and region create a relative probability of erosion and sediment discharge. A flood/furrow irrigated field/row crop proximate to a surface water body in a high rain region would be the SVWQC's highest priority. Based on the criteria discussed below, parcels will be subject to specific SECP requirements. However, if the parcel meets certain criteria covered in this section, the parcel may not require a SECP since there would be a reduced risk of irrigation runoff and/or tailwater discharge that would cause erosion and sediment discharge.

The criteria and their associated SECP requirements are summarized in **Table 3-1**. In addition to these specific criteria, this Addendum sets a Maximum Design Storm Event (10-year 24-hour storm) for use when considering the SECP requirements.

Table 3-1
Summary of Parcel Criteria and SECP Requirements

Parcel Criteria Name	SECP Requirements
County Agricultural Erosion Ordinances	SECP required, can be self-certified without training
Wetlands and/or Refuges	No SECP required
Hydraulic Barriers	Exempt from surface water proximity category, Farm Evaluation and RUSLE model categories can still require a SECP
Riparian Vegetation	Exempt from surface water proximity category, Farm Evaluation and RUSLE model categories can still require a SECP
Approved NRCS Practices	SECP required, can be self-certified without training
AG Operations Similar to Wetlands	No SECP required
Ground Cover or No Till Cover Crop	Exempt from RUSLE model and surface water proximity categories, Farm Evaluation category can still require a SECP
Maximum Design Storm Event	Any storm above a 10-year, 24-hour event is excluded
Parcel in Seasonal Water Way	No SECP required
Parcel is Isolated Hydraulically and/or Topographically	No SECP required
Negligible Soil Exposure to Rainfall and Macro-Irrigation	No SECP required
Those parcels that do not qualify for the above listed criteria, but are in one or more of the Farm Evaluation, RUSLE model, and surface water proximity categories	SECP required

Additional information is included in **Appendix B**.

4.0 SCHEDULE TO PREPARE SECPS

The schedule to implement this Addendum and prepare SECPs is shown in **Table 4-1**. Please note that two items in the schedule have qualifiers that will change the schedule if their deadlines are not met. The implementation of this schedule will primarily be carried out by the SVWQC and individual Members, while two items require actions by the Regional Board.

Table 4-1
Timeline to Implement Addendum and Prepare SECPs

Activity	Complete By
Addendum is Submitted to the Regional Board	**June 1, 2016**
Regional Board Approves Addendum Note: If this deadline is not met, the remainder of this schedule will be moved back by the duration of the delay (at a minimum).	**July 29, 2016**
Identify Parcels with a High Risk of Sediment Discharge • *Identify Member Parcels for Whether They Require SECPs – Large Tributaries* • *Identify Member Parcels for Whether They Require SECPs – Secondary Tributaries* • *Identify Member Parcels for Whether They Require SECPs – All Other Waterbodies*	 *December 2, 2016* *April 3, 2017* *March 3, 2018*
SECP Self-Certification Training (Approved by Regional Board) Will Be Available to SVWQC Members Note: If this deadline is not met, the remainder of this schedule will be moved back by the duration of the delay (at a minimum).	**January 1, 2017**
Prepare SECPs for High Risk Parcels • *SECPs Due for Member Parcels – Large Tributaries* • *SECPs Due for Member Parcels – Secondary Tributaries* • *SECPs Due for Member Parcels – All Other Waterbodies*	 *March 3, 2017* *March 3, 2018* *March 3, 2019*

Identifying parcels with high risk of sediment discharge is an in depth process, given the variety of different criteria. To assist with this identification, AEG has prepared a SECP Required Decision Logic Flow Chart (see **Appendix E**). This flow chart can be used as a guide while identifying parcels, but it is not linear. Additionally, using the flow chart requires an understanding of the SECP requirement criteria and a degree of familiarity with the parcel to be used properly.

Per the WDRs, one of the acceptable methods of preparing a SECP, and commonly the most economical, is:

> *The Sediment and Erosion Control Plan must be prepared and self-certified by the Member, who has completed a training program that the Executive Officer concurs provides necessary training for sediment and erosion control plan development.*

The SVWCQ has concluded that preparing SECPs before the self-certification training is available is inefficient for Members. Members being required to consult with registered/certified professionals to stay in compliance with the WDRs every time they intend to make changes to a parcel is not a feasible or economical way to operate agricultural businesses. Therefore, the availability of SECP self-certification training has been included in the schedule as a prerequisite to proceed with the preparation of SECPs.

As discussed in **Section 2.4**, determining which member parcels will require a SECP and preparing the SECPs are expected to take a fair amount of time to complete. Therefore, the SVWQC intends to separate member parcels into three groups and work on the groups sequentially when evaluating parcels and preparing the SECPs. This will allow the SVWQC to prioritize parcels that are considered more likely to require a SECP, as well as, simplifying the logistics of complying with the SECP requirements on such a large number of parcels.

5.0 ACTUAL CONDITIONS RUSLE MODEL

AEG prepared an updated RUSLE model for the SVWQC to more accurately reflect actual conditions. This updated RUSLE model differs from the model included in the *Sediment Discharge and Erosion Assessment Report* (SDEAR), dated June 5, 2015, in that it includes representative Cover Management Factor (C-Factor) values, whereas the original model had all C-Factor values set to one (assuming bare ground conditions), as directed by the Regional Board. Adding C-Factor values that represent actual conditions results in a model that is significantly more representative of actual sediment erosion rates than the original model. Note: the Support Practice Factor (P-Factor) has been excluded from both models (set to 1).

The updated RUSLE model was prepared by obtaining 2015 vegetation data for California, assigning C-Factor values by type of vegetation, and re-running the RUSLE calculations with the new C-Factor values included. Aside from adding C-Factor values, this updated RUSLE model was prepared in the same manner as discussed in the *Sediment Discharge and Erosion Assessment Report*.

The vegetation data was obtained from the United Stated Department of Agriculture National Agricultural Statistics Service CropScape. The dataset used was the 2015 Cropland Data Layer for California, which includes surface classifications of various types, such as: various crop types, open water, forest, developed land, etc. A map showing the 2015 cropland data for Northern California is included in **Appendix F**. Additionally, the interactive CropScape map can be found at:

https://nassgeodata.gmu.edu/CropScape/

AEG could not locate any crop C-Factor value references for the State of California. However, several C-Factor references were located for regions of other states and countries. AEG set C-Factor values for each surface type classification in the CropScape data set based on the available references. The C-Factor values were set using the following criteria:

- Values equal to or above 0.1 were rounded to the tenths place.
- Values below 0.1 were rounded to the hundredths place.
- The minimum value used (when not approximating zero) was 0.01.
- Values that would be zero (such as pavement) were approximated as 0.001 (to preserve integrity of the model).
- A default value of 0.4 was set to unquantifiable areas (such as the no data category). This value was the highest AEG used for any crop categories, so was also set as the default.
- Where ranges of values for a crop were found in reference documents, AEG set a value in the middle of the range.
- Where only a single value for a crop was found in reference documents, AEG set that value.
- Where no references for a crop were found, but similar crops had reference values (ex. cantaloupe and watermelon), AEG set the value based on similar crops.
- When no references were found that were relevant to a crop, AEG set a value that was considered reasonable.

The C-Factor values assigned to vegetation categories are shown in **Table 5-1**.

Table 5-1
C-Factor Values Assigned to Vegetation Categories

Surface Classification (from CropScape)	C-Factor Value Assigned	Surface Classification (from CropScape)	C-Factor Value Assigned
Background	0.4*	Clouds/No Data	0.4*
Corn	0.2	Developed	0.001
Cotton	0.2	Water	0.001
Rice	0.1*	Wetlands	0.01*
Sorghum	0.2	Nonag/Undefined	0.4*
Soybeans	0.2	Aquaculture	0.001
Sunflower	0.4	Open Water	0.001
Peanuts	0.2	Perennial Ice/Snow	0.001
Tobacco	0.2	Developed/Open Space	0.01*
Sweet Corn	0.3	Developed/Low Intensity	0.001
Pop or Orn Corn	0.2	Developed/Med Intensity	0.001
Mint	0.1*	Developed/High Intensity	0.001
Barley	0.1	Barren	0.3
Durum Wheat	0.07	Deciduous Forest	0.01
Spring Wheat	0.07	Evergreen Forest	0.01
Winter Wheat	0.07	Mixed Forest	0.01
Other Small Grains	0.07	Shrubland	0.05

Table 5-1
C-Factor Values Assigned to Vegetation Categories

Surface Classification (from CropScape)	C-Factor Value Assigned	Surface Classification (from CropScape)	C-Factor Value Assigned
Dbl Crop WinWht/Soybeans	0.07	Grass/Pasture	0.08
Rye	0.04	Woody Wetlands	0.01*
Oats	0.1	Herbaceous Wetlands	0.01*
Millet	0.1	Pistachios	0.2
Speltz	0.1	Triticale	0.07
Canola	0.1*	Carrots	0.4
Flaxseed	0.1*	Asparagus	0.2
Safflower	0.2*	Garlic	0.3
Rape Seed	0.1*	Cantaloupes	0.2
Mustard	0.1*	Prunes	0.2
Alfalfa	0.07	Olives	0.2
Other Hay/Non Alfalfa	0.02	Oranges	0.2
Camelina	0.1*	Honeydew Melons	0.2
Buckwheat	0.1*	Broccoli	0.3*
Sugarbeets	0.2	Peppers	0.3*
Dry Beans	0.2	Pomegranates	0.2
Potatoes	0.2	Nectarines	0.2
Other Crops	0.4*	Greens	0.3*
Sugarcane	0.2	Plums	0.2
Sweet Potatoes	0.2	Strawberries	0.3*
Misc Vegs & Fruits	0.4*	Squash	0.2
Watermelons	0.2	Apricots	0.2
Onions	0.3	Vetch	0.2*
Cucumbers	0.3	Dbl Crop WinWht/Corn	0.1*
Chick Peas	0.3*	Dbl Crop Oats/Corn	0.2*
Lentils	0.3*	Lettuce	0.2*
Peas	0.3*	Pumpkins	0.2*
Tomatoes	0.2	Dbl Crop Lettuce/Durum Wht	0.2*
Caneberries	0.2	Dbl Crop Lettuce/Cantaloupe	0.3*
Hops	0.2*	Dbl Crop Lettuce/Cotton	0.2*
Herbs	0.2*	Dbl Crop Lettuce/Barley	0.2*
Clover/Wildflowers	0.01	Dbl Crop Durum Wht/Sorghum	0.1*
Sod/Grass Seed	0.2*	Dbl Crop Barley/Sorghum	0.1*
Switchgrass	0.2	Dbl Crop WinWht/Sorghum	0.1*
Fallow/Idle Cropland	0.5	Dbl Crop Barley/Corn	0.2
Forest	0.01	Dbl Crop WinWht/Cotton	0.1*
Shrubland	0.05	Dbl Crop Soybeans/Cotton	0.2*
Barren	0.3	Dbl Crop Soybeans/Oats	0.2
Cherries	0.2	Dbl Crop Corn/Soybeans	0.2
Peaches	0.2	Blueberries	0.2

Table 5-1
C-Factor Values Assigned to Vegetation Categories

Surface Classification (from CropScape)	C-Factor Value Assigned	Surface Classification (from CropScape)	C-Factor Value Assigned
Apples	0.2	Cabbage	0.2
Grapes	0.4	Cauliflower	0.3*
Christmas Trees	0.01	Celery	0.3*
Other Tree Crops	0.2	Radishes	0.4
Citrus	0.2	Turnips	0.4
Pecans	0.2	Eggplants	0.3*
Almonds	0.2	Gourds	0.2
Walnuts	0.2	Cranberries	0.001
Pears	0.2	Dbl Crop Barley/Soybeans	0.2*

* Default value used (0.4) or no reference materials were found that were relevant to this vegetation category

Maps showing the C-Factor value inputs (**Figure A1**) and erosion outputs from the updated RUSLE model, are included in **Appendix F**. Additionally, maps showing erosion outputs from the original RUSLE model are included in **Appendix A**.

5.1 Comparison of Original and Updated RUSLE Models

Several erosion output maps were created from the updated RUSLE model. These maps were setup so they could be easily comparted to erosion output maps that were prepared from the original RUSLE model. Specifically, **Figure A2** shows erosion rates for most of Northern California using a color spectrum, **Figure A3** shows erosion rates for most of the SVWQC using a red/green break at 5 tons per acre per year (tons/ac/yr), and **Figure A4** shows erosion rates for Member parcels using a red/green break at 5 tons/ac/yr.

When looking at Northern California, the difference in the percentage of land below 5 tons/ac/yr of erosion is drastic. Where roughly ¾ of the land in the original model was above 5 tons/ac/yr, less than ¼ of the land in the updated model is above 5 tons/ac/yr. Additionally, the maximum estimated rate of erosion is significantly lower in the updated model (369 tons/ac/yr down from 1338 tons/ac/yr).

When looking at the SVWQC coverage area, the original model showed only two regions with substantial areas below the 5 tons/ac/yr erosion rate, the Sacramento Valley and the northeast corner of the SVWQC. The updated model shows nearly all of the SVWQC to have less than 5 tons/ac/yr erosion. Where the original model showed nearly all of the Tahoe National Forest area at elevated erosion rates, the updated model shows a scattering of elevated erosion rates within this area, with the majority of the area being shown to have erosion rates below 5 tons/ac/yr.

When looking at only the Member parcel areas, the original model showed large areas with elevated erosion rates and obvious tracts with elevated erosion rates. The updated model shows scattered small areas with elevated erosion rates, several clusters with elevated erosion rates, and far fewer elevated erosion rates overall. A good example of this can be found around Clear Lake, where the original model showed nearly all of the Member parcel areas with elevated erosion rates, while the updated model shows one cluster and a scattering of elevated erosion rate areas, with the majority of the areas being below 5 tons/ac/yr.

Overall, the updated RUSLE model appears to represent actual conditions much more closely than the original RUSLE model.

APPENDIX A

Select Figures from SDEAR

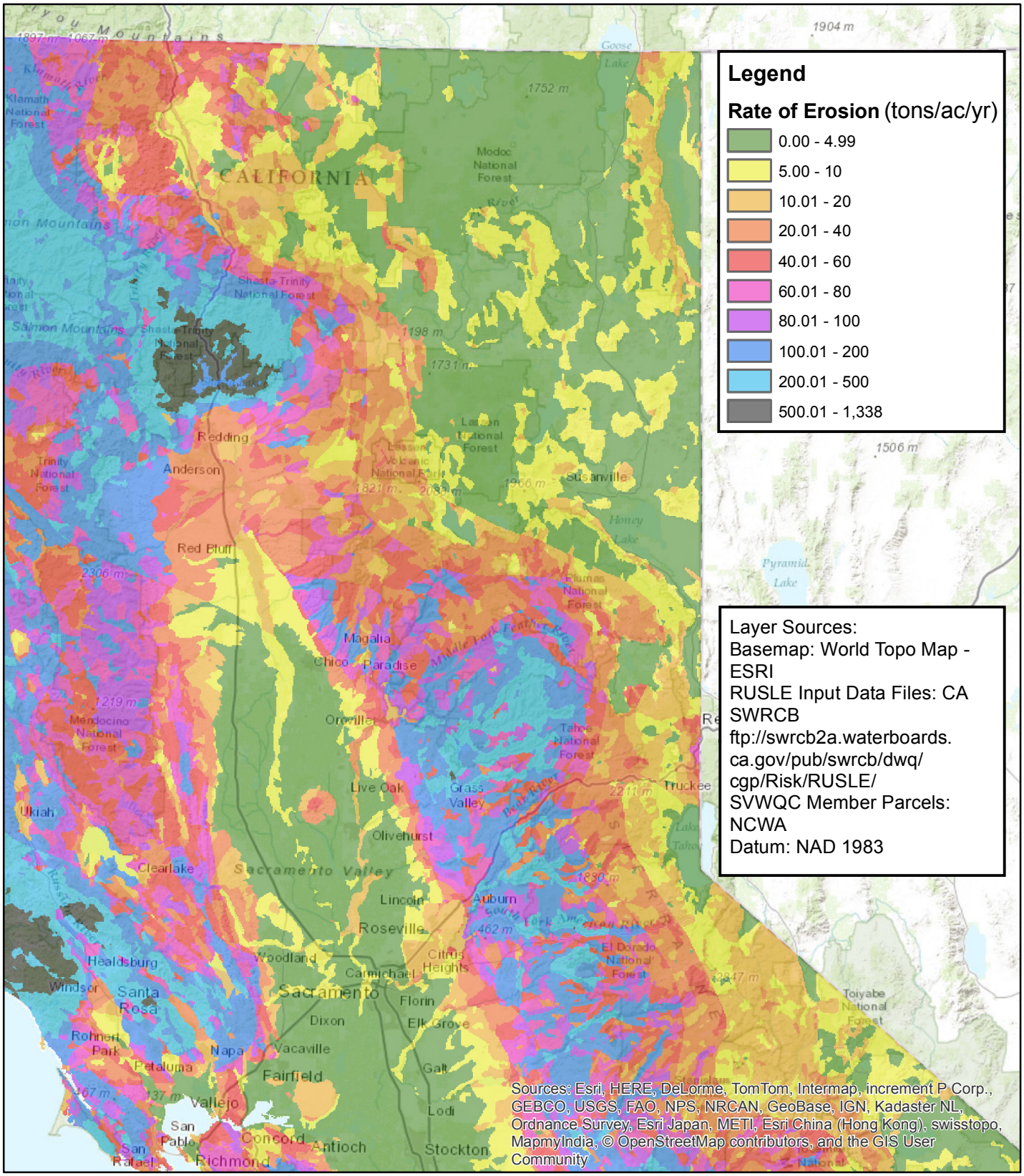

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Figure 6

From SDEAR, June 5, 2015

0 10 20 40 60 80 Miles

N

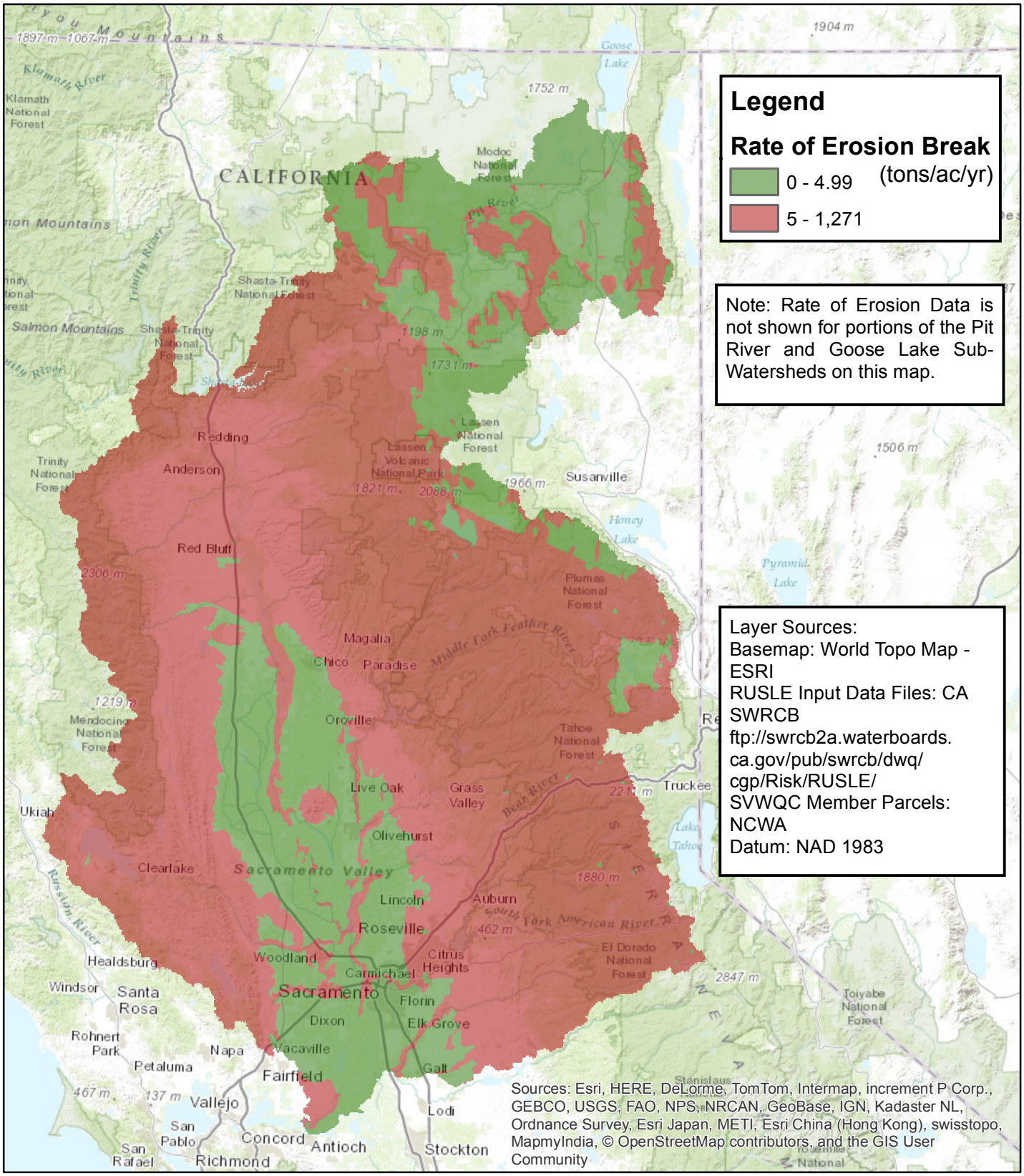

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Figure 7

From SDEAR, June 5, 2015

0 10 20 40 60 80 Miles

N

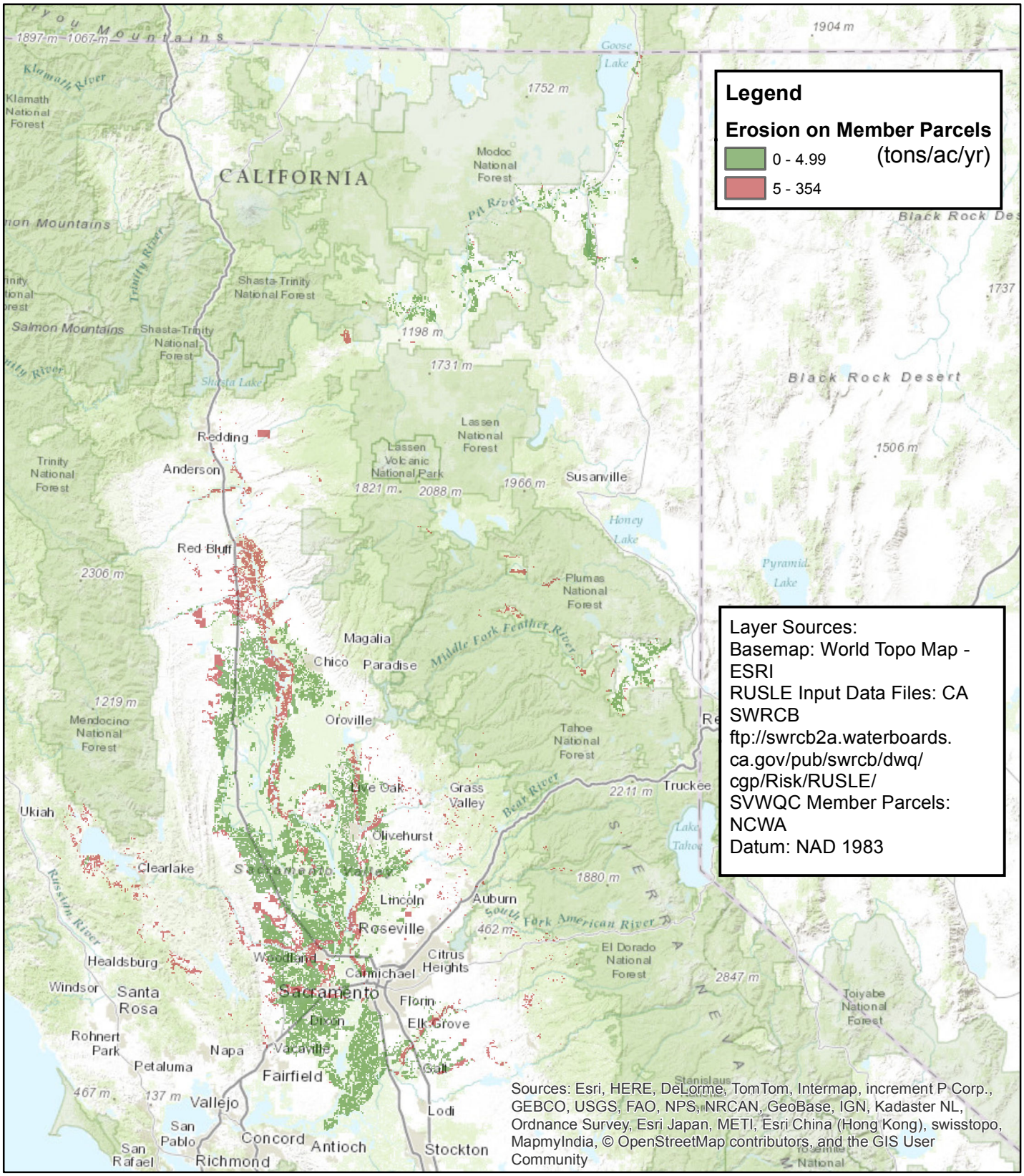

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Figure 9

From SDEAR, June 5, 2015

0 10 20 40 60 80 Miles

N

APPENDIX B

Details of Criteria for SECP Requirements

B.0 DETAILS OF CRITERIA FOR SECP REQUIREMENTS

Definitions of, and details on, the criteria for SECP requirements are shown below.

B.1 County Erosion Ordinances

Napa County, Lake County, and El Dorado County have existing agricultural erosion control and grading ordinances with requirements that are equivalent to or exceed those of the WDRs for erosion controls. Therefore, Member parcels located within these Counties, which are subject to the SECP requirements, can have SECPs that have been self-certified by the parcel owner/operator, regardless of whether the owner/operator has received training on self-certifying the SECP.

A map showing these Counties and Member parcel erosion rate areas is included in **Appendix C**.

B.2 Wetlands and Refuges

Wetlands and refuges have been used for agriculture for many centuries because they provide fertile soils and reliable supplies of good quality water. These areas act as natural management practices for contaminants by filtering out suspended sediments and nutrients before they reach streams and lakes, as well as providing wildlife habitat. As such, typical erosion and sediment control management practices cannot be used in these areas. For use in this criteria, wetlands and refuges are defined as the following:

Wetlands are defined as lands that are covered with water, or water is present in soil at or near the surface all year, or for varying periods of time during the year, including during the growing season. Wetlands include, but are not limited to, lakes, rivers, swamps, marshes, wet grassland, peatlands, oases, estuaries, deltas, tidal flats, and human-made sites such as fishponds, rice paddies, reservoirs, and salt pans. An interactive map showing the U.S Fish and Wildlife Service National Wetlands Inventory can be found at (this map may not be all inclusive):

http://www.fws.gov/wetlands/Data/Mapper.html

Refuges are defined as areas dedicated to wildlife conservation, but with full consideration to optimum agricultural use that is consistent therewith. A map showing the U.S Fish and Wildlife Service National Wildlife Refuge System can be found at (this map may not be all inclusive):

http://www.fws.gov/refuges/maps/NWRS_National_Map.pdf

Member parcel areas that use wetlands and refuges for agriculture shall not be subject to the SECP requirements.

B.3 Hydraulic Barriers to Surface Waters (ex. Levees)

Agricultural operations are often protected by hydraulic barriers which prevents the possibility for erosive sediment to be discharged into a water way. For use in this criteria, a hydraulic barrier is defined as any circumstance or obstacle that prevents sediment laden discharge water from reaching a surface water body. Please note that a maximum design storm event (10-year 24-hour) has been set in **Section B.6** of this Addendum.

A structural hydraulic barrier can be naturally occurring or artificially constructed, such as a levee, dike, embankment, floodbank, stopbank, or berm. A hydraulic barrier can also consist of circumstances, such as topography.

There will be two methods for identify parcels that are protected by a hydraulic barrier:

1. Member parcels that are situated within a Leveed Area as established by the U.S. Army Corp of Engineers.
2. A Member has indicated on their Farm Evaluation Survey, or subsequent questionnaire, that their parcel is protected by a hydraulic barrier or is hydraulically disconnected and is prevented from discharging sediment into a water way.

An interactive map showing the USACE National Levee Database can be found at (Note: this database is flagged as being incomplete): http://nld.usace.army.mil/egis/f?p=471:1:

Additionally, a map showing the USACE Leveed Areas and Member parcel erosion rate areas is included in **Appendix C**.

Member parcels that are protected by a hydraulic barrier shall not be subject to the surface water proximity category of the criteria for determining if a parcel requires a SECP.

B.4 Riparian Vegetation, Approved NRCS Practices, & AG Operations Similar to Wetlands

Riparian Vegetation

Riparian vegetation is defined as vegetated areas along watercourses or water bodies that extends outward from the water body. Riparian vegetation acts as a buffer to filter out sediment, organic material, fertilizers, pesticides, and other pollutants that may impact water bodies. Minimum requirements for riparian vegetation to be used for SECP criteria will consist of the following:

- Begins at the water line or at the top of the banks and extends continuously a minimum of 35 feet, measured horizontally on a line perpendicular to the water body;

- Must consist of one or more of the following:

    - ☐ Riparian trees such as Redwood, Cedar, Fir, Spruce, Cottonwood, Sycamore, Alder, Maple, Cherry, Willow, Oak, Aspen, Laurel, and Dogwood;

- ☐ Riparian shrubs such as Vine Maple, Gooseberries, Currants, Swamp Rose, Cluster Rose, Snowberry, Douglas Spirea, Blackberry, raspberries, Thimbleberry, Salmonberry, Western Azalea, Devil's Club, Indian Plum, Osoberry, Twinberry, Red-osier Dogwood, and Willows; or

- ☐ Riparian grasses, grass-like plants, and/or forbs.

- Vegetation must have been established in the location for a minimum of one year

An example of Riparian Vegetation that would qualify for this criteria. Source: NRCS Plants for Riparian Buffers Document

An example of Riparian Vegetation that would <u>not</u> qualify for this criteria. Source: Google Earth Pro

Member parcels that are protected by riparian vegetation between their field(s) and surface water, shall not be subject to the surface water proximity category of the criteria for determining if a parcel requires a SECP.

<u>Approved NRCS Practices</u>

As a leading Federal agency for assisting in restoring watershed health on private land, the Natural Resource Conservation Service (NRCS) provides farmers with both technical and financial assistance for implementing conservation practices and management strategies that benefit water quality and improve water management. These conservation and management practices have been developed and supported by the NRCS Science and Technology Divisions, National Technical Support Centers, and the Wetland Team. For use in the evaluations, approved NRCS practices are defined as the following:

Approved NRCS practices are erosion and sediment conservation practices and management strategies established by the Natural Resource Conservation Service designed to benefit water quality and improve water management. A detailed list of these Approved NRCS Practices can be found in the *California, Your Farm and Agricultural Water Quality* booklet (included in **Appendix D**).

Member parcels that have approved NRCS conservation and management practices, can have SECPs that have been self-certified by the parcel owner/operator, regardless of whether the owner/operator has received training on self-certifying the SECP.

Agricultural Operations Similar to Wetlands

Agricultural operations similar to wetlands provide valuable ecosystem services and habitat for wetland-dependent protected species, as well as provide critical food production. These type of agricultural operations are also very efficient at retaining soil and cycling nutrients throughout the seasons.

Agricultural operations similar to wetlands are defined as agricultural operations that take place in any artificial ecosystem consisting of a shallow basin that supports hydrophytic vegetation. These locations have physical characteristics that are similar to those of wetlands, but have not necessarily been classified as wetlands. Agricultural operations similar to wetlands may be found in turloughs, fens, swamps, callows, marshes, wet grasslands, ponds, or other similar type of saturated terrain.

Those portions of Member parcels that are in an artificial ecosystem similar to wetlands shall not be subject to the SECP requirements.

B.5 Heavy Ground Cover or No Till Cover Crop Exists Year Round

Heavy ground cover or no till cover crop can be naturally occurring (such as irrigated pasture) or a planted crop (such as alfalfa) and is one of the most widespread forms of soil stabilization. For use in this criteria, heavy ground cover or no till cover crop is defined as:

1. Vegetation that stabilizes soil to a level equivalent to or better than naturally occurring grasslands of a region, or vegetation that has previously been shown to provide strong soil stabilization;
2. Vegetation exists year round;
3. Vegetation is not tilled following initial planting; and,
4. Vegetation must have been established in the location for a minimum of one year.

Member parcels that have heavy ground cover or no till cover crop year round shall not be subject to the RUSLE model category or surface water proximity category of the criteria for determining if a parcel requires a SECP.

B.6 Maximum Design Storm Event

A Maximum Design Storm Event is defined as a theoretical storm event with typical characteristics for storms in a given region, which sediment and erosion control measures have been designed for. A design storm event has two components, the total depth of rain fall expected to occur over a given time period, and a recurrence interval (i.e. a 100-year storm occurs on average of once every 100 years).

The Maximum Design Storm Event for compliance with the sediment and erosion discharge requirements of Order R5-2014-0030 will be set at a 10-year 24-hour storm event. Maximum design storm event rainfall data can be found on NOAA's National Weather Service Precipitation Frequency Data Server at the following link or on a Map included in **Appendix C**:

http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca

Storm events, and their effects, that exceed the Maximum Design Storm Event shall not be subject to the WDRs or considered when complying with the WDRs.

B.7 Special Cases Criteria

Special Cases Criteria are criteria that are based on unusual circumstances that cause sediment discharge potential to be essentially zero, and/or that cause erosion control measures to be infeasible or impossible to implement. The special cases criteria are not expected to apply to many parcels, but the parcels that could qualify for them are expected to present significant difficulties when trying to apply the WDRs and SECP requirements.

Due to the special cases nature of these criteria, and the unusual circumstances that they are associated with, explicit definitions for these criteria have not been included. Instead, general descriptions have been used to allow for a greater degree of flexibility in the application of these criteria.

B.7.1 Parcel in Seasonal Water Way

This criteria applies to parcels, or those portions of parcels, that are located in a seasonal water way where the water typically flows over the parcel for a portion of each year. The Yolo Bypass Wildlife Area is an example of this, as it is typically under water each wet season and farmed each dry season. As these types of parcels have surface water flowing over them for part of each year, any commonly used erosion control measures would be subject to significant damage or destruction annually, which makes their use infeasible.

Those portions of Member parcels that are located in a seasonal water way shall not be subject to the SECP requirements.

B.7.2 Parcel is Isolated Hydraulically and/or Topographically

This criteria applies to parcels, or portions of parcels, that are not capable of discharging sediment due to being isolated hydraulically and/or topographically. Please note that a maximum design storm event (10-year 24-hour) has been set in **Section B.6** of this Addendum. Three examples of parcels that would qualify for this criteria are:

- A parcel is at a lower elevation than all surrounding parcels, so all surrounding parcels drain onto the qualifying parcel
- A parcel is enclosed by a moat or closed loop channel that would not discharge from a maximum design storm event
- A parcel is enclosed by levees that would not discharge from a maximum design storm event

As parcels that qualify for this criteria have essentially zero sediment discharge potential, the preparation/implementation of a SECP is not warranted.

The Member parcels that are isolated hydraulically and/or topographically shall not be subject to the SECP requirements.

B.7.3 Negligible Soil Exposure to Rainfall and Macro-Irrigation

This criteria applies to parcels, or portions of parcels, that have negligible soil exposure to rainfall and macro-irrigation. For the purpose of this section, macro-irrigation is defined as any form of irrigation where application rates are high enough to mobilize sediment (drip and micro-sprinkler irrigation would not qualify as macro-irrigation). Measures implemented specifically to reduce or prevent erosion are not considered qualifiers for this criteria; however, measures that have been implemented for other reasons, but do reduce or prevent erosion, would qualify. An example of parcels that would qualify for this criteria are:

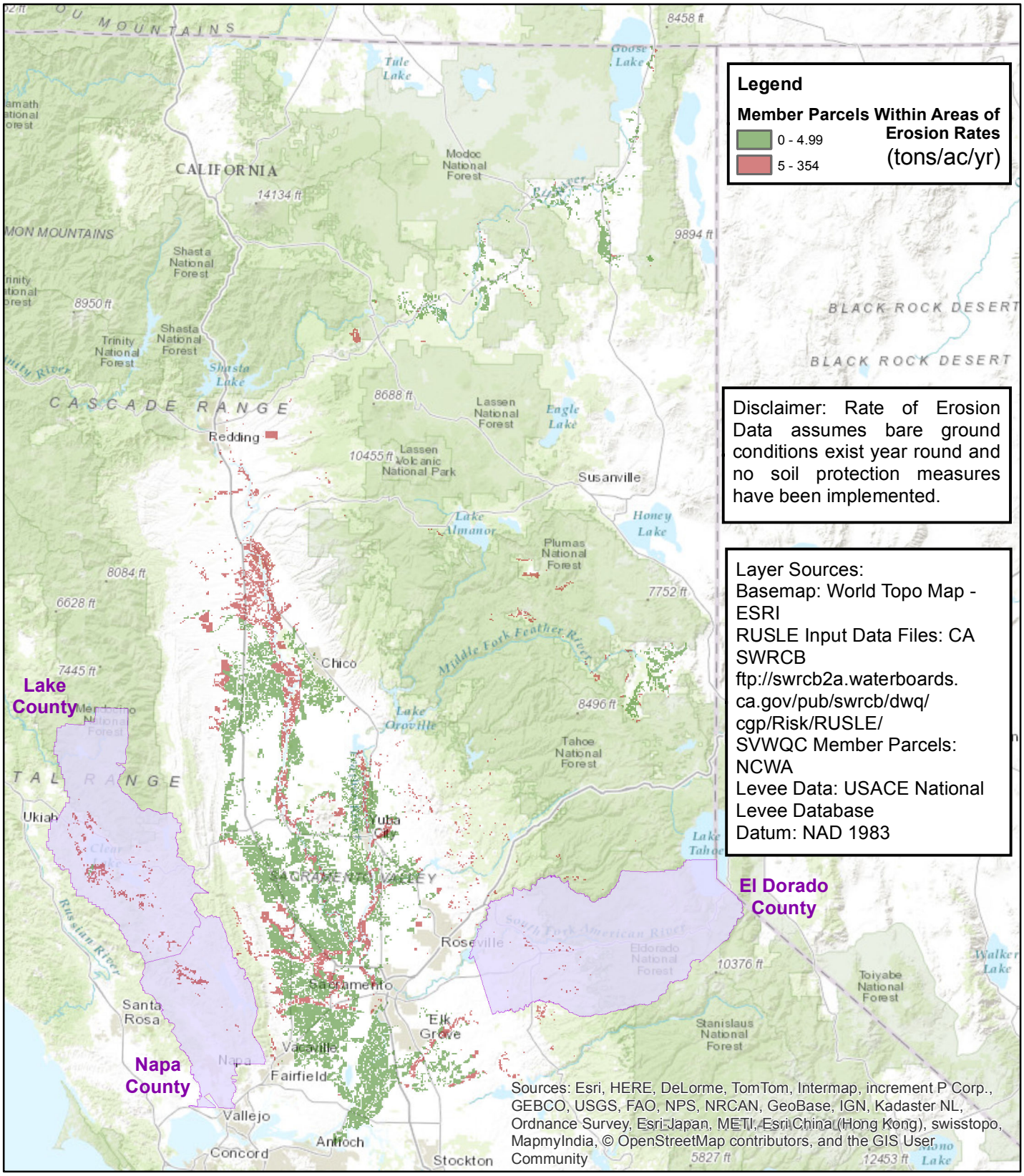
- A parcel that has raised growing beds covered by roofs where drip irrigation is used

As parcels that qualify for this criteria have essentially zero sediment discharge potential, the preparation/implementation of a SECP is not warranted.

The Member parcels that have negligible soil exposure to rainfall and macro-irrigation shall not be subject to the SECP requirements.

APPENDIX C

Reference Map



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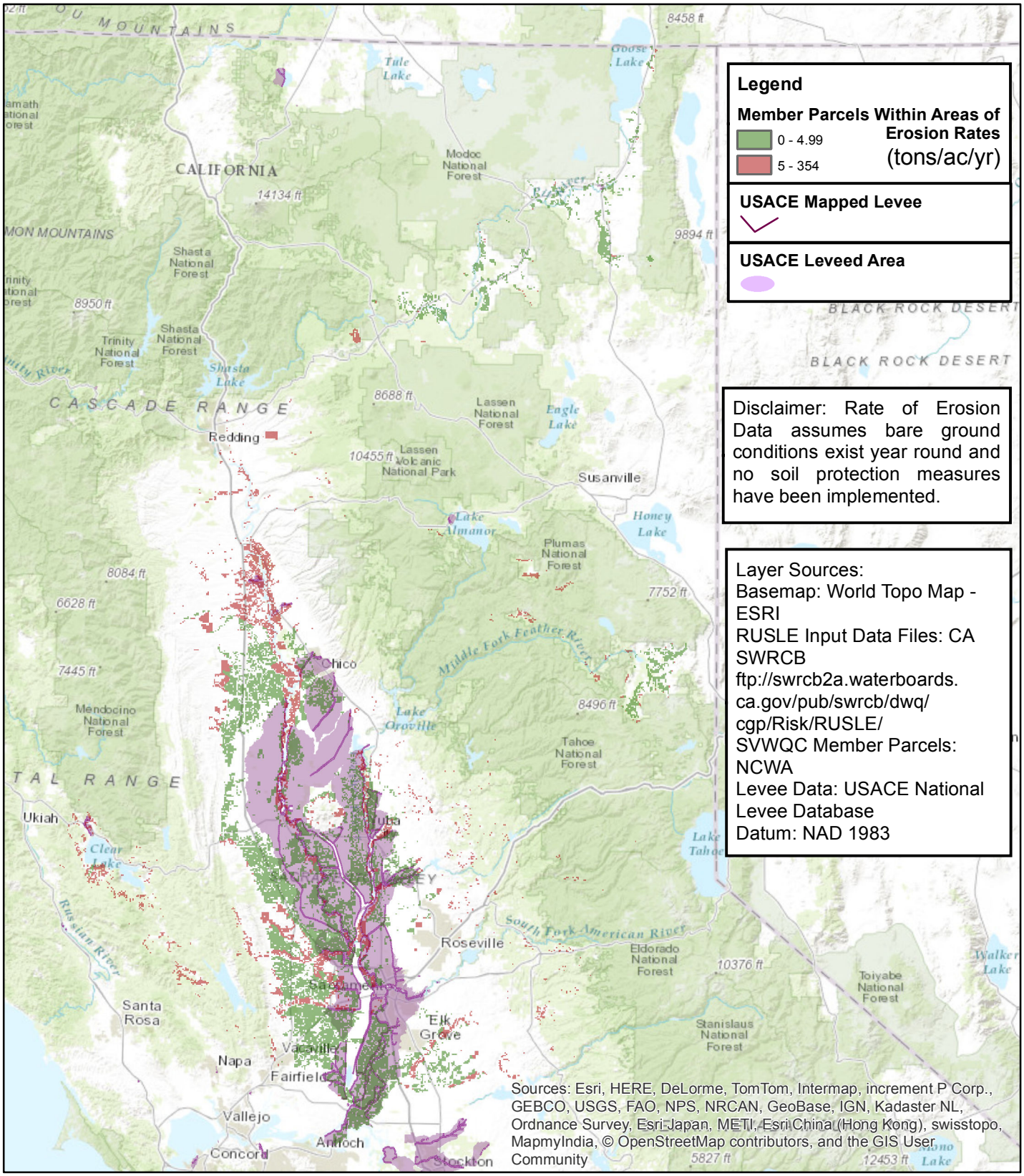
Member Parcel Erosion Rates With Lake, Napa, & El Dorado Counties

0 10 20 40 60 80 Miles

N



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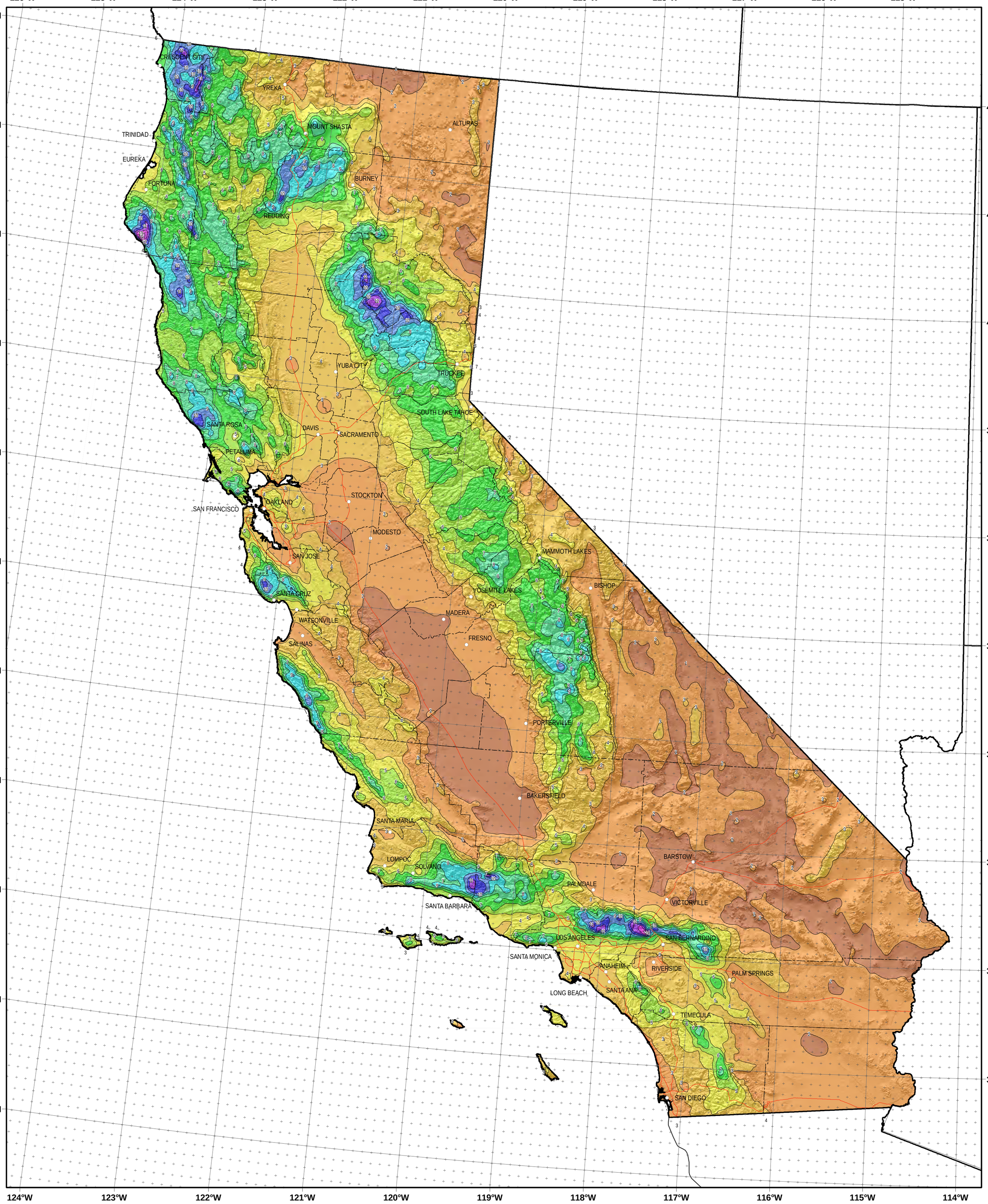
Member Parcel Erosion Rates With USACE Mapped Levees & Leveed Areas

0 10 20 40 60 80 Miles

N



CALIFORNIA

Isopluvials of 10-year 24-hour precipitation in inches

- 0.70 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 4.00
- 4.01 - 5.00
- 5.01 - 6.00
- 6.01 - 7.00
- 7.01 - 8.00
- 8.01 - 9.00
- 9.01 - 10.00
- 10.01 - 11.00
- 11.01 - 12.00
- 12.01 - 13.00
- 13.01 - 14.00
- 14.01 - 14.53

NOAA Atlas 14, Volume 6, Version 2
California

Prepared by U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
OFFICE OF HYDROLOGIC DEVELOPMENT
HYDROMETEOROLOGICAL DESIGN STUDIES CENTER
April 2011

N

SCALE 1:2,500,000

0 10 20 30 40 50 Miles

0 5 10 20 30 40 50 60 70 Kilometers

Projection: Lambert Conformal Conic; Datum NAD83; Standard Parallels: 38˚ and 45˚; Central Meridian 112˚.

APPENDIX D

NRCS Your Farm and Agricultural Water Quality Booklet

California

United States
Department of
Agriculture

USDA

Your Farm and Agricultural Water Quality

Natural Resources Conservation Service

"Helping People Help the Land"

NRCS

The USDA Natural Resourses Conservation Service (NRCS) and Our Role In Water Quality

As the leading Federal agency for assisting in restoring watershed health on private land, NRCS provides technical and financial assistance to producers who implement conservation practices and management strategies that benefit water quality and improve water management. The science behind the implementation of these conservation practices and management strategies is developed and supported by the NRCS Science and Technology Divisions, National Technical Support Centers, the Water and Climate Center, and the Wetlands Team. Technical specialists are continually developing new tools to improve current conservation practice technology, improve models to track nutrients, and improve irrigation efficiency. Agricultural producers using these tools and practices can more efficiently use water, increase water storage, and protect water quality by minimizing the potential loss of sediment and nutrients from their operations.

How To Use This Booklet

As farmers increasingly need solutions to preserve and improve water quality in conjunction with their farm management practices, NRCS conservation planning and conservation practices can be helpful in accomplishing this goal.

Use this booklet to self-assess your property and your particular situation, to determine any specific water quality concerns, to begin seeing what conservation practices may work for you, and to begin collecting information that will help develop a conservation plan.

This booklet contains:

- Background on water quality and conservation practices in California
- Information on the water quality parameters most associated with agriculture in California
- A list and description of the most useful conservation practices for water quality improvements relating to these parameters
- Information on the NRCS Water Quality Index tool for self-assessment and evaluation
- A list of potential or actual items from the Irrigated Lands Regulatory Program and how NRCS may be able to assist
- A form where you can enter information about your property that will help begin to develop a self-assessment or conservation plan

Water Quality Practices for Irrigated Agriculture in California

Background

The 2000 National Water Quality Inventory reported that nonpoint source pollution from agricultural runoff is the leading source of impacts on the nation's rivers and lakes. As water moves, over or through the soil, it picks up and carries natural and human-made pollutants, transporting them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water. Some of the agricultural activities that lead to negative water quality impacts are tilling too often or at the wrong time and improper, excessive, or poorly timed application of pesticides, irrigation water, and fertilizer.

Pollutants that result from farming and ranching include sediment, nutrients, pathogens, pesticides, metals, and salts.

Impacts from agricultural activities on surface water and ground water can be minimized by using conservation practices that are adapted on a site-by-site basis. Many practices designed to reduce pollution also increase productivity and save farmers and ranchers money in the long run.

Across California, Regional Water Quality Boards are implementing the Irrigated Lands Regulatory Program (ILRP) that require landowners to manage their irrigated cropland and stormwater discharges to surface and ground waters. While each Regional Board's regulations are based on their particular region's climate, terrain, agricultural related impairments to water quality, and crops, there are similarities in what is expected of all growers in the future. These expectations determine what is necessary for California growers to meet any new requirements.

Examples of Regional Board's requirements include: conducting self- assessments, continued monitoring (possibly as a joint effort through existing coalitions); tiered levels of regulation; on-farm water quality management plans or other specific plans; a new emphasis on stormwater runoff; and the implementation of conservation practices for both surface water and ground water quality improvement.

The ***United States Department of Agriculture's Natural Resources Conservation Service***, local Resource Conservation Districts (RCDs), California State Water Resources Control Board, University of California Cooperative Extension agents, County Agricultural Commissioners, water quality coalitions, and other agricultural partners have the expertise to assist growers in achieving water quality improvements around the state and are working together as a team to find realistic solutions.

Conservation Planning

The NRCS provides voluntary conservation planning and technical assistance to clients (individuals, groups, and units of government). These clients help develop and implement their conservation plans to protect, conserve, and enhance natural resources (soil, water, air, plants, and animals) and energy. During the course of developing a conservation plan, an inventory of the resource conditions on the farm is produced, including the soil types and characteristics, the slope and slope lengths of each field, crop types and rotations, and other significant items necessary for maintaining soil health, water quality, and farm productivity.

(Conservation Planning continued)

An NRCS assisted conservation plan provides a professional analysis of a landowner's natural resources and helps owners/managers craft alternatives based on their goals and budget. The alternatives can include engineering, agronomic, soils and biological solutions to address problems such as erosion, polluted water, dust, pesticide and nutrient runoff, and more. Plans can also be developed to further enhance already-healthy land or to augment land for habitat beneficial to fish and wildlife.

Conservation Practices

Conservation practices are specific structural, managerial, or cultural treatments of natural resources commonly used to meet specific needs in planning and maintaining the quality and quantity of water, soil, air, plant, and animal resources. NRCS conservation practices have decades of rigorous standards and specifications proving their effectiveness for site specific solutions. These standards and specifications can be found on the electronic ***Field Office Technical Guide*** at the California NRCS web site:
http://www.ca.nrcs.usda. gov.

NRCS conservation practices, working singly or in combination, can reduce negative impacts of erosion, sedimentation, nutrients, pesticides, stormwater runoff, increased temperatures, and pathogens while improving your soil and water resources and habitat values on your property.

Conservation practices ranking high specifically for the water quality resource concerns are described in this booklet.

Water Quality Effects

Effects of chronic pollution on natural resources are more subtle and gradual than those associated with an accidental spill. In most cases, the loss of fish or wildlife occurs over a long period of time as a result of a decline in water quality. The end result is much more serious since the ability of water to support life may be virtually destroyed.

The quality of water affects the economic well being, health, and recreational opportunities available to the public. To protect the beneficial uses of the water, water quality standards have been established. These standards specify concentrations of constituents which, if not exceeded, are expected to result in continued beneficial uses of that water.

For water quality problems to exist, the water must be impaired for a designated beneficial use. This indicates that a standard has not been met and there has been an "exceedance" of at least one constituent. The water is then considered contaminated for that constituent. Water pollution is defined as "contamination or alteration of the physical, chemical, or biological properties of the water…which will or can reasonably be expected to create a public nuisance or render such water harmful, detrimental or injurious to public health, safety, or welfare, or other legitimate beneficial uses".

The most common causes of water quality degradation are sediment, nutrients, and pesticides. Pathogens, high temperatures, bacteria, stormwater runoff and naturally occurring metals also cause problems.

SEDIMENT

Sediment deposition can have both beneficial and detrimental effects on a water system. Nutrients and soil particles vital to a highly productive ecosystem, such as an estuary, can be replenished annually by soils eroded from the upper watershed. Excessive erosion and sedimentation, however, can cause physical damage to the aquatic habitat, increase maintenance of canals and ditches, decrease the carrying capacity of water bodies and result in an excessive amount of phosphorus in the water system as almost all the phosphorus lost from agricultural lands is associated with sediment. Fish and wildlife can be impacted by reducing the visibility of water and reducing food production, impairing respiration, covering eggs, and impairing reproduction.

Sediment may also cause damage through chemical means, as some pesticides attach to fine-grained soil particles and, upon reaching waterways, may settle out and become bedload sediment. Any adsorbed pollutants, such as pesticides, will be taken up by the benthic organisms and find their way into the food chain. Bedload sediment can also change stream habitat through scour, abrasion, and deposition.

Do you notice erosion or sediment on your property from:

Irrigation	☐ yes	☐ no
Stormwater	☐ yes	☐ no
Pasture, Range	☐ yes	☐ no

If you answered yes, consider using NRCS practices *Irrigation Water Management* (449), *Conservation Cover* (327), *Cover Crop* (340), *PAM* (450), *Critical Area Planting* (342), *Residue and Tillage Management* (329, 344, 345, 346) and others.

Do you notice streambank erosion or murky water in on-farm or adjacent ditches or streams?

Sides of streams or ditches are eroding.
☐ yes ☐ no

Water in ditches or streams or other water bodies is muddy or looks like chocolate milk.
☐ yes ☐ no

Water in ditches or streams may be clear, but silt has settled on the bottom.
☐ yes ☐ no

If you answered yes, consider using NRCS practices *Streambank Protection* (580), *Fence* (382), *Filter Strip* (393) and others.

NUTRIENTS

Nitrogen and phosphorus are the major nutrients from agricultural land that can degrade water quality. While all plants require nutrients for growth, excessive nutrients introduced into surface water bodies can dramatically increase the presence of algae and other aquatic vegetation.
This increased growth can:

- *increase the level of turbidity and color reducing fish populations*
- *increase treatment costs by municipalities and industries*
- *decay, thereby creating unpleasant odors*
- *decrease the dissolved oxygen supply available for aquatic species*
- *interfere with recreational activities such as swimming and boating.*

NITROGEN AND NITRATES

There are several forms of nitrogen that can contribute to water quality problems. Ammonium, another form of nitrogen, becomes adsorbed by the soil and may be carried off with eroding sediment. Nitrates in drinking water are potentially life threatening, especially to newborn infants. Dissolved ammonia at elevated concentrations can be toxic to fish. Nitrogen compounds contribute in increasing the amount of plant matter in a water body, leading to eutrophication.

Agricultural nitrogen is added to the soil primarily by applying commercial fertilizers or manure.

PHOSPHORUS AND PHOSPHATES

Commercial fertilizers and manure are added to soil to increase the level of available phosphorus for promoting plant growth. Phosphorus generally becomes adsorbed to the soil. Runoff and erosion from irrigation and storm events can carry unutilized phosphorus to nearby water bodies. This sediment attached phosphorus may settle on the bottom of a lake or stream and be released later under anaerobic conditions, creating water quality problems. Phosphorus is not toxic to aquatic organisms, but can contribute to eutrophication of water bodies.

Is there a noticeable greenish color in your ditches/streams/ponds?
☐ Yes ☐ No

Do you notice algae, plants or mosses in your waterways?
☐ Yes ☐ No

If you answered yes, you might consider *Cover Crop* (340), *Vegetated Drainage Management* (554), *Filter Strip* (393), *Irrigation Water Management* (449), *Nutrient Management* (590), *Riparian Buffer* (391), and others.

Have any wells on your property tested for high concentrations of nitrates?
☐ Yes ☐ No

If you answered yes, you might consider *Agrichemical Handling Facility* (309), *Nutrient Management* (590), *Well Decommissioning* (351), and others.

PESTICIDES

Pesticides have documented benefits for use in agriculture, but may also impair surface and ground water quality. Pesticides can be lost from agricultural fields by leaching and removal in irrigation and storm runoff water. The effect of a pesticide depends on its individual properties; the amount, method, and timing of its application; and the intensity of the storm event or amount of irrigation following application.

Pesticides may harm the environment by eliminating or reducing populations of desirable organisms. The pesticide or its degradation products may persist and accumulate in aquatic systems, impacting ecosystem health by inhibiting species reproduction, altering physical aspects of species, and accumulating in the food chain. The longer it persists in the soil, the greater the opportunity for it to be transported from the crop area to receiving waters or groundwater.

Herbicides can destroy food sources for higher organisms and increase the amount of decaying plant matter leading to a reduction of dissolved oxygen. Aquatic species may be killed or altered or the food chain may be disrupted. Land species may also be exposed, resulting in death or deformities. Pesticides reaching ground water may contaminate drinking wells, rendering them unsuitable for domestic use.

Are the costs and risks of pesticides significant to you?
☐ Yes ☐ no

Do you notice fish kills or erratic behavior of aquatic species in nearby streams?
☐ Yes ☐ no

If so, you might consider *Vegetated Drainage Management* (554), *Cover Crop* (340), *Filter Strip* (393), *Integrated Pest Management* (595), *Irrigation Water Management* (449), *Riparian Buffer* (391), and others.

Have any nearby tested wells showed positive results for pesticides?
☐ Yes ☐ no

If so, you might consider *Agrichemical Handling Facility* (309), *Integrated Pest Management* (595), *Well Decommissioning* (351), and others.

PATHOGENS

Pathogens in water may cause multiple concerns - from illnesses in humans from ingestion or direct contact through swimming to outbreaks of illness or death from contaminated crops. Sources are as varied as livestock and domestic animals, septic systems, wildlife and agricultural and urban runoff.

Many things affect the levels and behavior of pathogens in the environment: weather, stream flows, water temperature, distance form pollution sources, wildlife activity, and rainfall.

Has water on your property ever tested positive for bacteria or other pathogens?

☐ Yes ☐ No

If you answered yes, consider using NRCS practices *Access Control* (472), *Conservation Cover* (327), *Constructed Wetland* (656), *Fence* (382), *Filter Strip* (393), and others.

TEMPERATURE

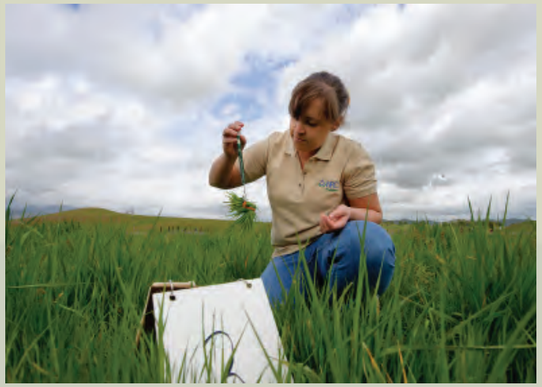
Stream, pond, and lake temperatures can affect the lifecycles of aquatic biological communities. Increased temperature can negatively impact growth, migration, spawning, egg incubation, and food sources. The state of California has water quality objectives to ensure proper temperatures are maintained based on the designated beneficial uses.

Runoff from irrigated agriculture can raise stream temperatures to lethal ranges for aquatic life. Streams without vegetative canopies or banks add to the problem.

Do water bodies on your property show increased temperatures?

☐ Yes ☐ No

If you answered yes, consider using NRCS practices *Filter Strip* (393), *Irrigation Water Management* (449), *Riparian Buffers and Cover* (391 or 390), *Streambank Improvement* (385), and others.



GROUNDWATER

Recent studies show that the quality of groundwater in California's agricultural regions has degraded, threatening the drinking water quality of privite and municipal wells, mainly from nitrates used in fertilizers and found in animal waste. Many people in the state rely on groundwater as their drinking water source so millions of people may be impacted by contaminated water sources. High nitrate levels have been linked to cancer and reproductive disorders and can be lethal to infants.

Nitrate and pesticide levels in groundwater can be caused by over-irrigating, over application of pesticides, or a lack of knowledge of soil types and the proper management methods needed to reduce contributions to groundwater.

Has your, or your community's, water tested positive for nitrates or pesticides?

☐ Yes ☐ No

If you answered yes, then consider using NRCS practices *Irrigation Water Management (449), Agrichemical Handling Facility* (309), *Nutrient Management* (590), *Integrated Pesticide Management* (595), *Well Decommissioning* (351), and others.

STORMWATER RUNOFF

Stormwater runoff from agricultural land is included as a concern in state water quality regulations. Pesticides used prior to rainfall events or bare ground susceptible to erosion allow stormwater runoff to carry contaminants to nearby streams and other waterways.

The effects of storm runoff containing sediment, nutrients, bacteria, or pesticides is the same as irrigated runoff containing these contaminants.

Do you notice erosion and sedimentation occurring on your property during storm events?

☐ Yes ☐ No

Do you use pesticides during the fall/winter months?

☐ Yes ☐ No

If you answered yes, please consider using *Conservation Cover* (327), *Drainage Management* (554), *Filter Strip* (393), *Integrated Pest Management* (595), *Nutrient Management* (590), *Residue and Tillage Management* (329, 344, 345, 346), and others.

CONSERVATION PRACTICES FOR WATER QUALITY IMPROVEMENTS

	sediment	nutrients	pesticides	pathogens	temperature	ground water	stormwater runoff
ACCESS CONTROL (472) Excluding animals, people, or vehicles from an area to protect, maintain, or improve the quantity and quality of the natural resources in an area.	✓	✓	✓	✓	✓		
AGRICHEMICAL HANDLING FACILITY (309) Structure with an impervious surface that provides an environmentally safe area for storing, mixing, loading, and cleaning up on-farm agrichemicals and equipment.	✓	✓	✓			✓	
ANIONIC POLYACRYLAMIDE APPLICATION (PAM) (450) Application of water-soluble Anionic Polyacrylamide to reduce irrigation induced soil erosion and sedimentation and improve water quality.	✓	✓	✓				
CONSERVATION COVER (327) Establish and maintain perennial vegetative cover to protect soil and water resources on land retired from agricultural production or other lands needing permanent protective cover.	✓	✓	✓	✓			✓
CONSTRUCTED WETLAND (656) Artificial ecosystem consisting of a shallow basin established with hydrophytic vegetation that is constructed to intersect and treat the flow of a waste stream or contaminated runoff. Used to treat waste water and contaminated runoff from agricultural facilities or for improving the quality of storm water or other water flows lacking specific water quality discharge criteria.	✓	✓	✓	✓		✓	

CONSERVATION PRACTICES FOR WATER QUALITY IMPROVEMENTS

	sediment	nutrients	pesticides	pathogens	temperature	ground water	stormwater runoff
COVER CROP (340) Growing a crop of grass, small grain, or legumes on cropland, orchards, and vineyards. Used to control erosion, add fertility and organic material to the soil, improve soil tilth, and increase infiltration and aeration of the soil.	✓	✓	✓			✓	✓
CRITICAL AREA PLANTING (342) Planting vegetation on critically eroding areas that require extraordinary treatment to protect land and water quality.	✓	✓				✓	✓
DRAINAGE DITCH VEGETATION Reducing nutrients, pesticides, sediment in runoff through the use of vegetated drainage ditches.	✓	✓	✓				✓
FENCE (382) A constructed barrier to livestock, wildlife, or people. Applied to any area where livestock and/or wildlife control is needed or where access to people is to be regulated to minimize erosion and keep nutrients and other contaminants out of water bodies.	✓	✓	✓	✓	✓		✓
FIELD BORDER (386) Strips of permanent vegetation established at the edge or around the perimeter of a field that reduce erosion and protect water quality.	✓	✓	✓	✓		✓	✓

CONSERVATION PRACTICES FOR WATER QUALITY IMPROVEMENTS

FILTER STRIP *(393)*

Area of vegetation established for the purpose of removing sediment, organic material, and other pollutants from runoff and wastewater.

INTEGRATED PEST MANAGEMENT *(595)*

Using a combination of pest prevention, pest avoidance, pest monitoring, and pest suppresion strategies to manage weeds, insects, and diseases.

IRRIGATION LAND LEVELING *(464)*

Reshaping the surface of irrigated land to planned grades to permit uniform and efficient application of surface irrigation water without significant erosion, loss of water quality, or damage to soil and crops from waterlogging.

IRRIGATION SYSTEM - MICROIRRIGATION *(441)*

Also known as drip or trickle irrigation, is used for distribution of water directly to the plant root zone by means of surface or subsurface applicators to efficiently and uniformly apply irrigation water and/or chemicals directly to the plant root zone.

IRRIGATION SYSTEM-SPRINKLER *(442)*

System in which all necessary equipment and facilities are installed for efficiently applying water by means of nozzles operated under pressure for efficient and uniform application of irrigation water to maintain adequate moisture for plant growth and production without causing excessive water loss, erosion, or water quality impairment.

	sediment	nutrients	pesticides	pathogens	temperature	ground water	stormwater runoff
FILTER STRIP (393)	✓	✓	✓	✓	✓		✓
INTEGRATED PEST MANAGEMENT (595)	✓	✓	✓	✓		✓	✓
IRRIGATION LAND LEVELING (464)	✓	✓	✓	✓			
IRRIGATION SYSTEM - MICROIRRIGATION (441)	✓	✓	✓	✓			
IRRIGATION SYSTEM-SPRINKLER (442)	✓	✓	✓				

CONSERVATION PRACTICES FOR WATER QUALITY IMPROVEMENTS

	sediment	nutrients	pesticides	pathogens	temperature	groundwater	stormwater runoff
IRRIGATION SYSTEM - TAILWATER RECOVERY (447) Facilities utilized for the collection, storage, and transportation of irrigation tailwater for reuse to conserve irrigation water supplies and reduce transport of contaminants offsite.	✓	✓	✓				
IRRIGATION WATER MANAGEMENT (449) Determining and controlling the rate, amount, and timing of irrigation water in a planned and efficient manner to minimize soil erosion, minimize leaching of plant nutrients, and protect both the quantity and quality of water resources.	✓	✓	✓	✓	✓		
NUTRIENT MANAGEMENT (590) Managing the source amount, placement, and timing of plant nutrients to obtain optimum yields and minimize the risk of surface and ground water pollution.		✓				✓	✓
RESIDUE MANAGEMENT (329, 345, 346) Leaving crop residue on the soil surface to reduce erosion, conserve moisture, and maintain or improve soil health.	✓	✓	✓	✓			✓
RIPARIAN FOREST BUFFER (391) Area of trees and/or shrubs located adjacent to a body of water extending outward from the water body that are designed to create shade, and act as a buffer to filter out sediment, organic material, fertilizer, pesticides, and other pollutants that may adversely impact the water bodies.	✓	✓	✓	✓	✓		✓

CONSERVATION PRACTICES FOR WATER QUALITY IMPROVEMENTS

	sediment	nutrients	pesticides	pathogens	temperature	ground water	storm water runoff
RIPARIAN HERBACEOUS COVER (390) Establishment and maintenance of grasses, grass-like plants, and forbs that are managed in the transitional zone between terrestrial and aquatic habitats that serve to reduce low quality runoff and stabilize streambanks and shorelines.	✓	✓	✓	✓	✓		✓
SEDIMENT BASIN (350) Constructed basin designed to collect and store water-borne debris or sediment that serves to prevent excessive down-slope deposition and reduce or abate damage to natural resources from pollution or deposition of sediment.	✓	✓	✓	✓			✓
STREAMBANK AND SHORELINE PROTECTION (580) Stabilization and protection of streambanks, constructed channels, and shorelines of lakes, reservoirs, or estuaries, reducing the offsite or downstream effects of sediment resulting from bank erosion.	✓				✓		✓
STREAM HABITAT IMPROVEMENT AND MANAGEMENT (385) Maintenance, improvement, and restoration of physical, chemical, and biological functions of a stream to help maintain water quality.	✓				✓		✓
TREE/SHRUB ESTABLISHMENT (612) Establishment or natural regeneration of woody plants by planting seedlings, cuttings, direct seeding resulting in erosion control and acting as a chemical/nutrient sink for water quality improvements.	✓	✓	✓	✓			✓

Water Quality Index - An Assessment for Runoff Water from Agricultural Fields

The NRCS Water Quality Index (WQI) is a science based assessment tool to evaluate the potential for agricultural runoff to contain nutrients, pesticides, or sediment. The WQI uses the following factors to characterize the relative quality of runoff from a field:

1. Field characteristics: Field characteristics play an important role in runoff generation and transport. The higher the slope, the more susceptible it is to generate runoff and soil erosion. The slope interacts with the soil's runoff potential (hydrologic group), natural erodibility (k factor), soil organic matter content, rainfall and vegetative cover.

2. Nutrient management factors: Nutrient management components that affect runoff water quality from a field include: rate, form, timing and method of application of fertilizers. Many landowners apply fertilizers based on State Land Grant University (LGU) recommendations. These recommendations balance crop production with environmental concerns.

3. Tillage management factors: There is a direct correlation between soil tillage and soil erosion. The more soil is tilled, the more susceptible it is to erosion. The WQI can be evaluated for tillage by farm management practices or use of the Soil Tillage Intensity Rating (STIR) tool used by NRCS.

4. Pest management factors: Integrated Pest Management (IPM) approaches incorporate crop rotations, scouting, cultural practices, crop selection, and their practices to prevent pest problems with minimum risk to the environment.

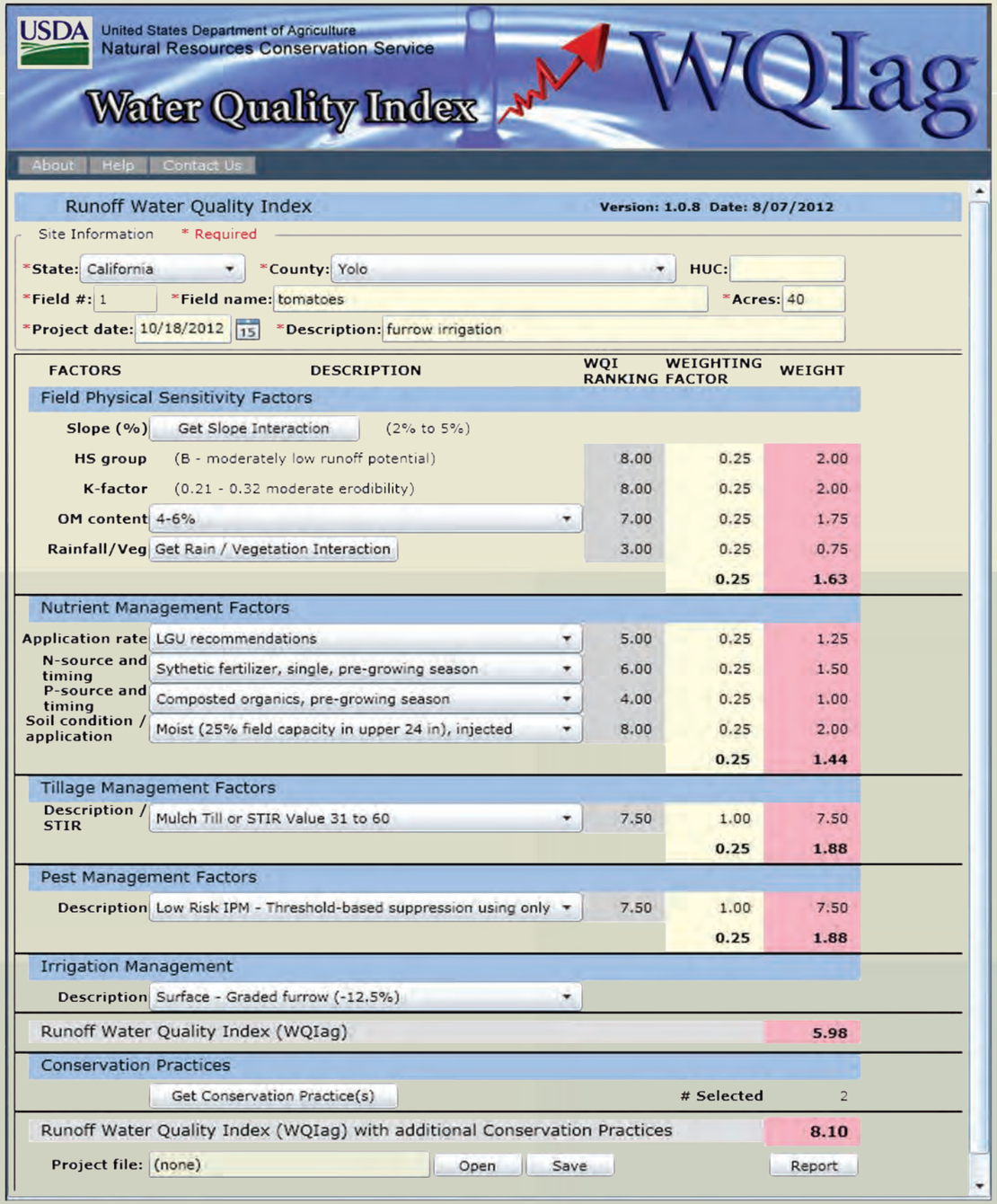
5. Irrigation management: Irrigation method can influence runoff and its quality. Drip irrigation may have significantly less runoff than furrow irrigation and may see a reduced amount of sediment in the runoff as a result. The irrigation component of the WQI provides values for selected irrigation methods.

Next, the WQI provides a drop down box to select up to three NRCS conservation practices to determine the potential effect on runoff quality. Finally, the impacts of changing nutrient, tillage, or pesticide management may be adjusted for further analysis and decision making.

An example assessment is shown on the next page. The results of this sample show a WQI ranking of 5.98. This is a good result, but adding a filter strip and sediment basin improve the ranking to a score of 8.10 predicting improved quality of the runoff.

The online version of the WQI may be located at: http://199.133.175.81/WQIndex/.

Water Quality Index Assessment (Sample Form)



USDA United States Department of Agriculture
Natural Resources Conservation Service

Water Quality Index WQIag

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Runoff Water Quality Index — Version: 1.0.8 Date: 8/07/2012

Site Information * Required

*State: California *County: Yolo HUC:
*Field #: 1 *Field name: tomatoes *Acres: 40
*Project date: 10/18/2012 *Description: furrow irrigation

FACTORS	DESCRIPTION	WQI RANKING	WEIGHTING FACTOR	WEIGHT
Field Physical Sensitivity Factors				
Slope (%)	Get Slope Interaction (2% to 5%)			
HS group	(B - moderately low runoff potential)	8.00	0.25	2.00
K-factor	(0.21 - 0.32 moderate erodibility)	8.00	0.25	2.00
OM content	4-6%	7.00	0.25	1.75
Rainfall/Veg	Get Rain / Vegetation Interaction	3.00	0.25	0.75
			0.25	1.63
Nutrient Management Factors				
Application rate	LGU recommendations	5.00	0.25	1.25
N-source and timing	Sythetic fertilizer, single, pre-growing season	6.00	0.25	1.50
P-source and timing	Composted organics, pre-growing season	4.00	0.25	1.00
Soil condition / application	Moist (25% field capacity in upper 24 in), injected	8.00	0.25	2.00
			0.25	1.44
Tillage Management Factors				
Description / STIR	Mulch Till or STIR Value 31 to 60	7.50	1.00	7.50
			0.25	1.88
Pest Management Factors				
Description	Low Risk IPM - Threshold-based suppression using only	7.50	1.00	7.50
			0.25	1.88
Irrigation Management				
Description	Surface - Graded furrow (-12.5%)			
Runoff Water Quality Index (WQIag)				5.98
Conservation Practices				
	Get Conservation Practice(s)		# Selected	2
Runoff Water Quality Index (WQIag) with additional Conservation Practices				8.10

Project file: (none) Open Save Report

California State Water Quality Regulations

Depending on where you farm, your Regional Board may require specific water quality regulations. The NRCS is not a regulatory agency, and operates purely on a voluntary basis, but NRCS may be of assistance in meeting some, or all, of these regulatory needs.

If your Regional Board mandates:

- ***A Farm Water Quality Management Plan:***
  - See your local NRCS office, Resource Conservation District (RCD), or other local entity for a conservation plan or other plan that could assist you

- ***A Nutrient Management Plan:***
  - Consider NRCS conservation practice Nutrient Management (590) or the conservation practices in this booklet that help reduce nutrients in water

- ***A Buffer Plan:***
  - See your local NRCS office, Resource Conservation District (RCD), or other local entity for a conservation plan or other plan that could assist you
  - Consider the NRCS conservation practices in this booklet that may help your particular situation

- ***A self-assessment:***
  - Take a look at the NRCS Water Quality Index online or stop by your local office for assistance
  - Talk to your local NRCS office about other assessment tools available

- ***A Groundwater Management Plan:***
  - Consider the conservation practices in this booklet that help reduce nutrients and pesticides in groundwater
  - Talk to your local NRCS office about Well Decommissioning (351) if you need assistance sealing and closing an inactive, abandoned, or unusable water well

- ***You are responsible for the quality of runoff from your property from rainfall/stormwater:***
  - See your local NRCS office, Resource Conservation District (RCD), or other local entity for a conservation plan or other plan that could assist you
  - Consider the NRCS conservation practices in this booklet that may help you improve the quality of your runoff

- ***You are responsible for the quality of irrigation runoff from your property:***
  - See your local NRCS office, Resource Conservation District (RCD), or other local entity for a conservation plan or other plan that could assist you
  - Ask about NRCS conservation practice Irrigation Water Management (449)
  - Consider the NRCS conservation practices in this booklet that may help you improve the amount and quality of your runoff

You are invited to visit your local NRCS/RCD office to discuss conservation planning and practices.

You may find this form useful to collect and condense the information needed for working towards the development of a conservation plan. A map of the property with fields, drainages, nearby water bodies, and other pertinent information clearly marked is also helpful.

PRODUCER NAME: _____

PRODUCER CONTACT INFORMATION:

HOME PHONE: _____

CELL PHONE: _____

EMAIL ADDRESS: _____

PROPERTY NAME: _____

LOCATION OF PROPERTY: _____

PROPERTY ACREAGE: _____

CROPS GROWN OR TYPICAL CROP ROTATION: _____

_____

_____

TYPE OF IRRIGATION SYSTEMS: _____

_____

_____

LOCATION AND NAME OF ANY WATER BODIES RUNNING THROUGH, OR ADJACENT TO, PROPERTY (INCLUDE APPROXIMATE DISTANCE FROM FIELD TO WATER BODY): _____

_____

_____

_____

CONSERVATION PRACTICES ALREADY IMPLEMENTED FOR EACH FIELD: _____

_____

_____

ANY CONCERNS THAT NRCS COULD HELP ADDRESS THROUGH CONSERVATION PLANNING OR PRACTICE IMPLEMENTATION: _____

_____

_____

_____

For more information, contact your local NRCS office or visit the web at: http://www.ca.nrcs.usda.gov

United States Department of Agriculture

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January 2013

NRCS

Natural Resources Conservation Service

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APPENDIX E

SECP Required Decision Logic Flow Chart

Sediment and Erosion Control Plan Required Decision Logic Flow Chart (Note: text shown on this page may be an abbreviation)

Prepared by:

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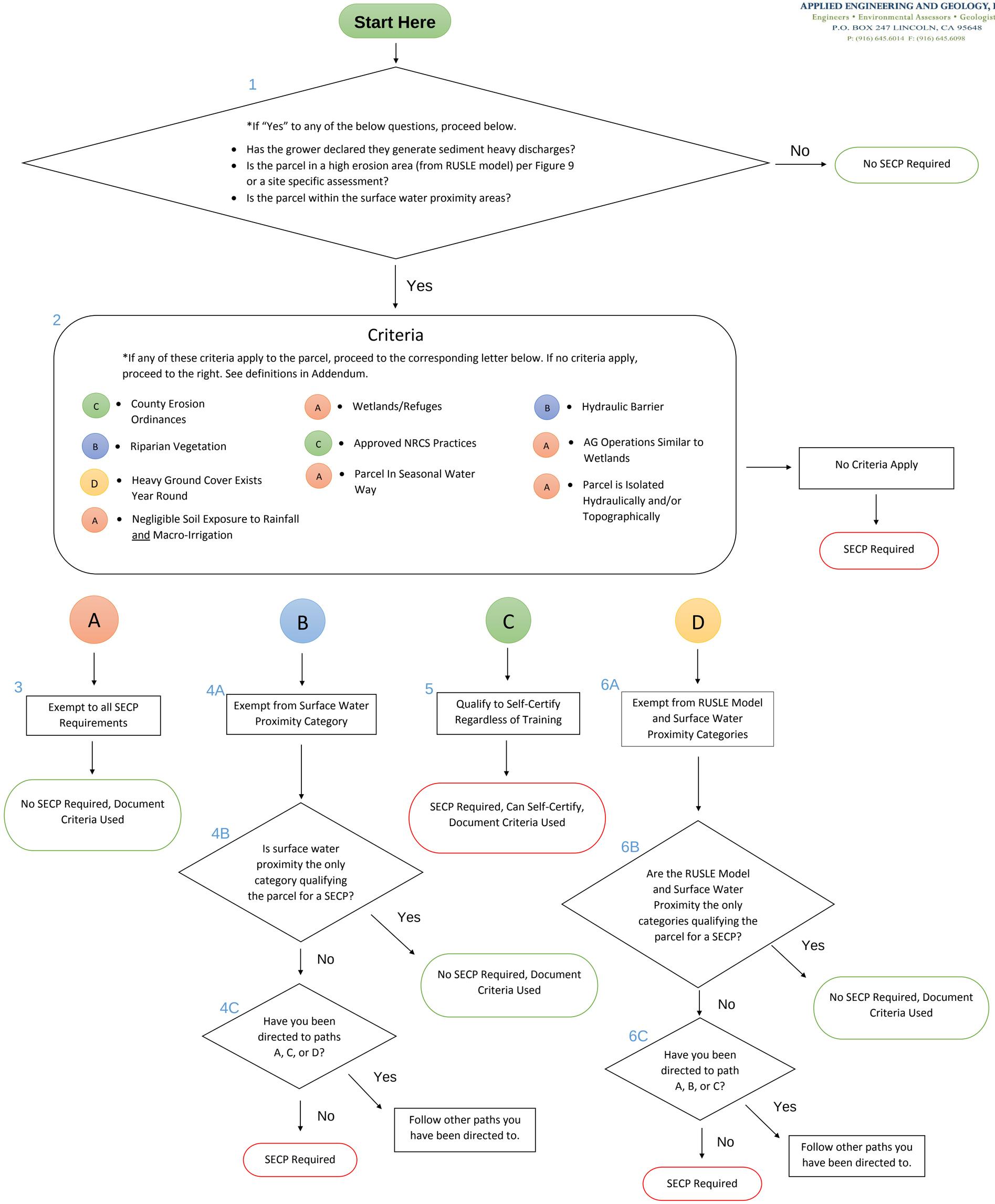
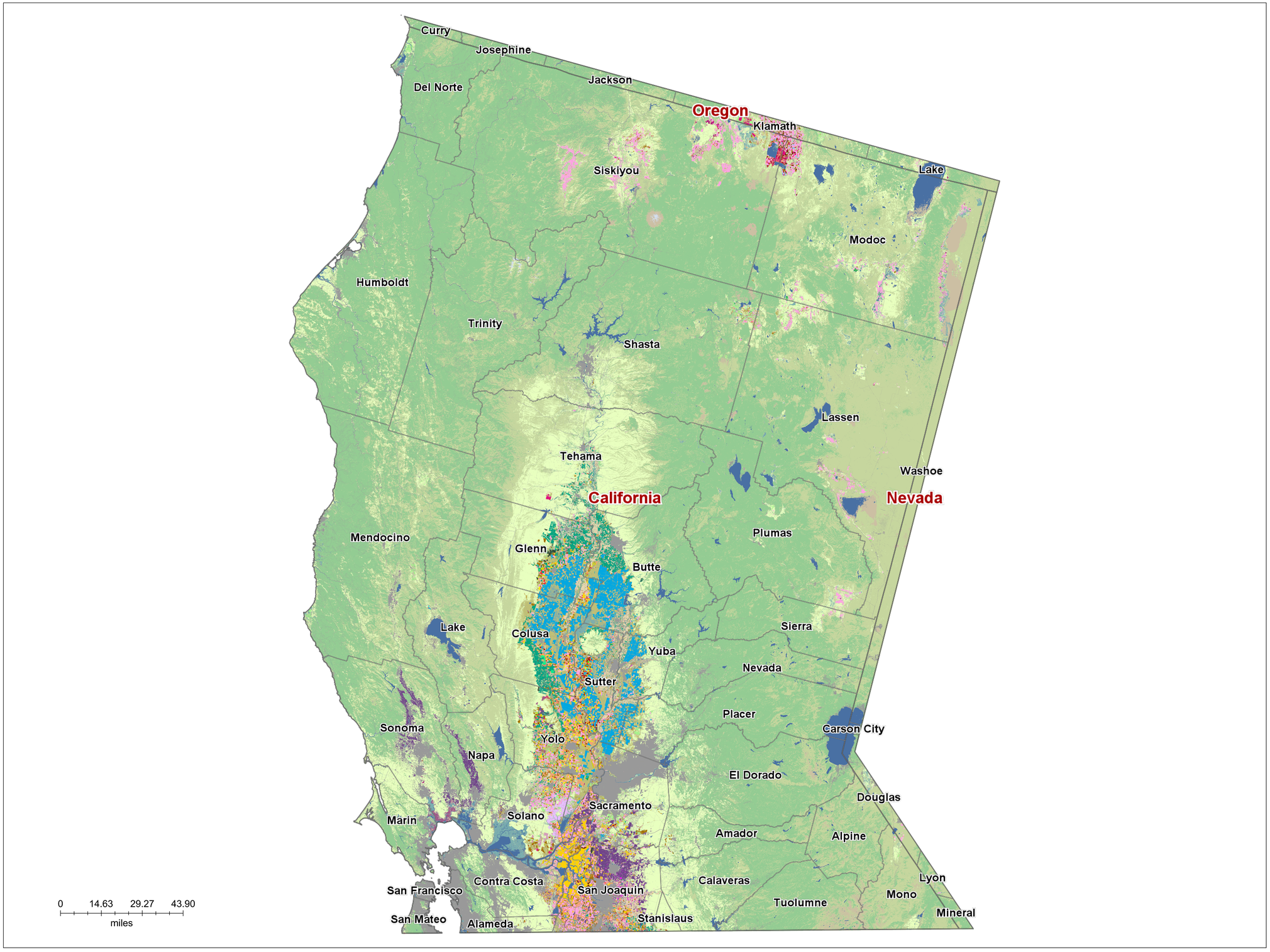


APPENDIX F

Updated RUSLE Model Maps

CropScape 2015 Cropland Data - Northern California



Land Cover Categories

(by decreasing acreage)

AGRICULTURE*

- Grass/Pasture
- Fallow/Idle Cropland
- Alfalfa
- Rice
- Walnuts
- Almonds
- Grapes
- Other Hay/Non Alfalfa
- Tomatoes
- Winter Wheat
- Corn
- Oats
- Clover/Wildflowers
- Sunflowers
- Triticale
- Safflower

NON-AGRICULTURE**

- Evergreen Forest
- Shrubland
- Developed/Open Space
- Open Water
- Mixed Forest
- Developed/Medium Intensity

culture categories are listed.

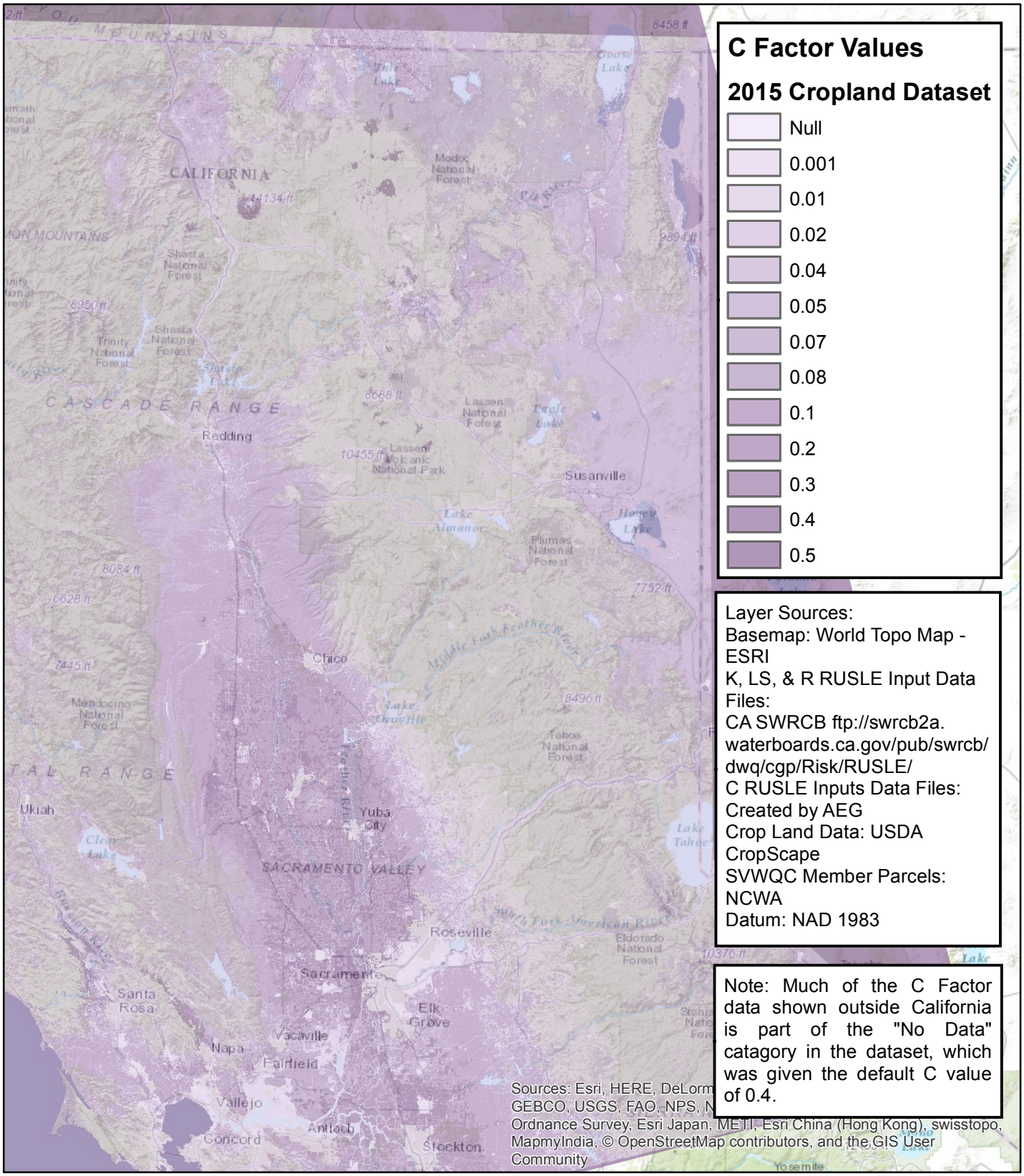


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Figure A1 - C Factor Values by Vegetation Categories

0 10 20 40 60 80 Miles

N

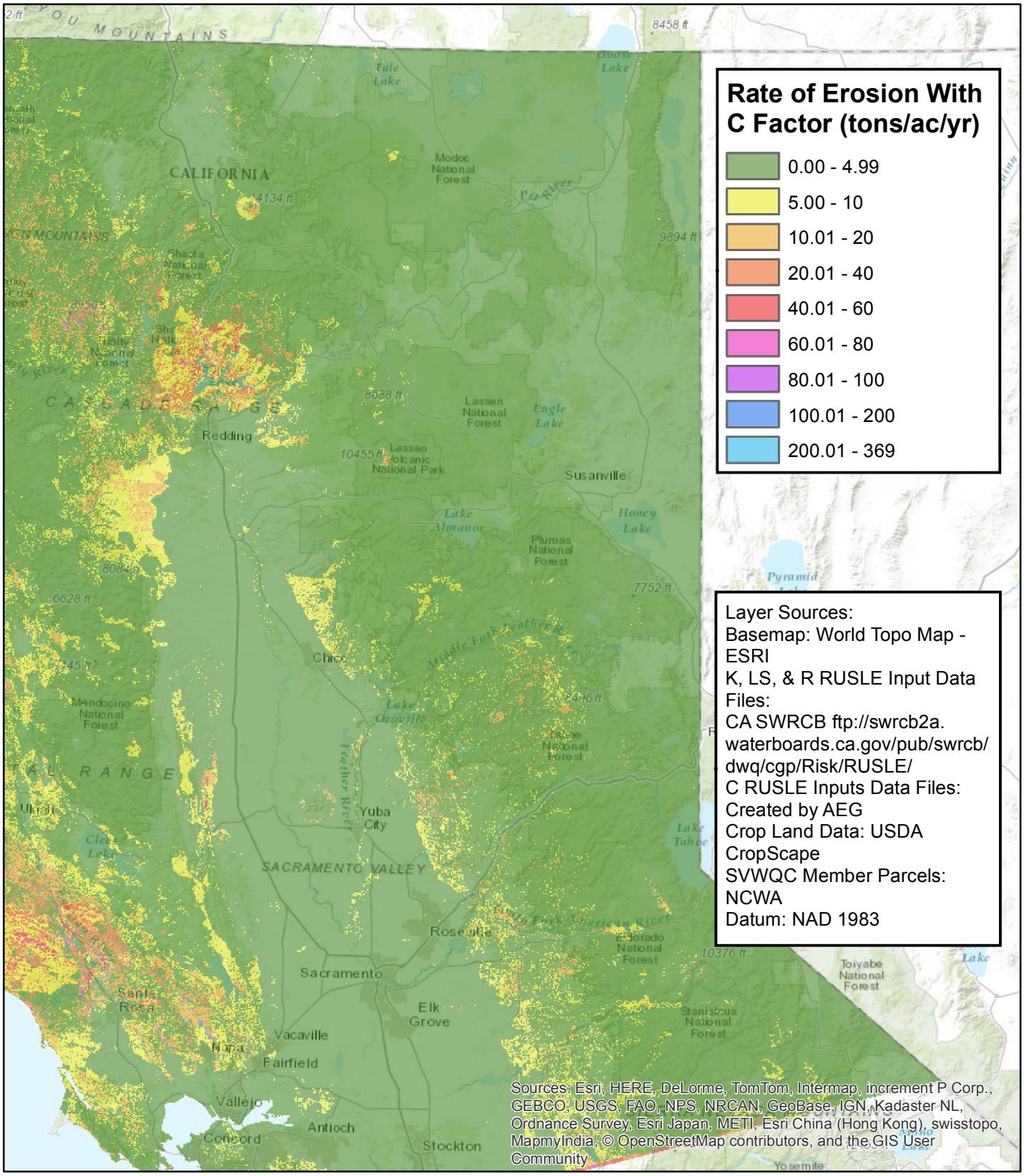

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Figure A2 - Rate of Erosion With C Factor Included

0 10 20 40 60 80 Miles

N

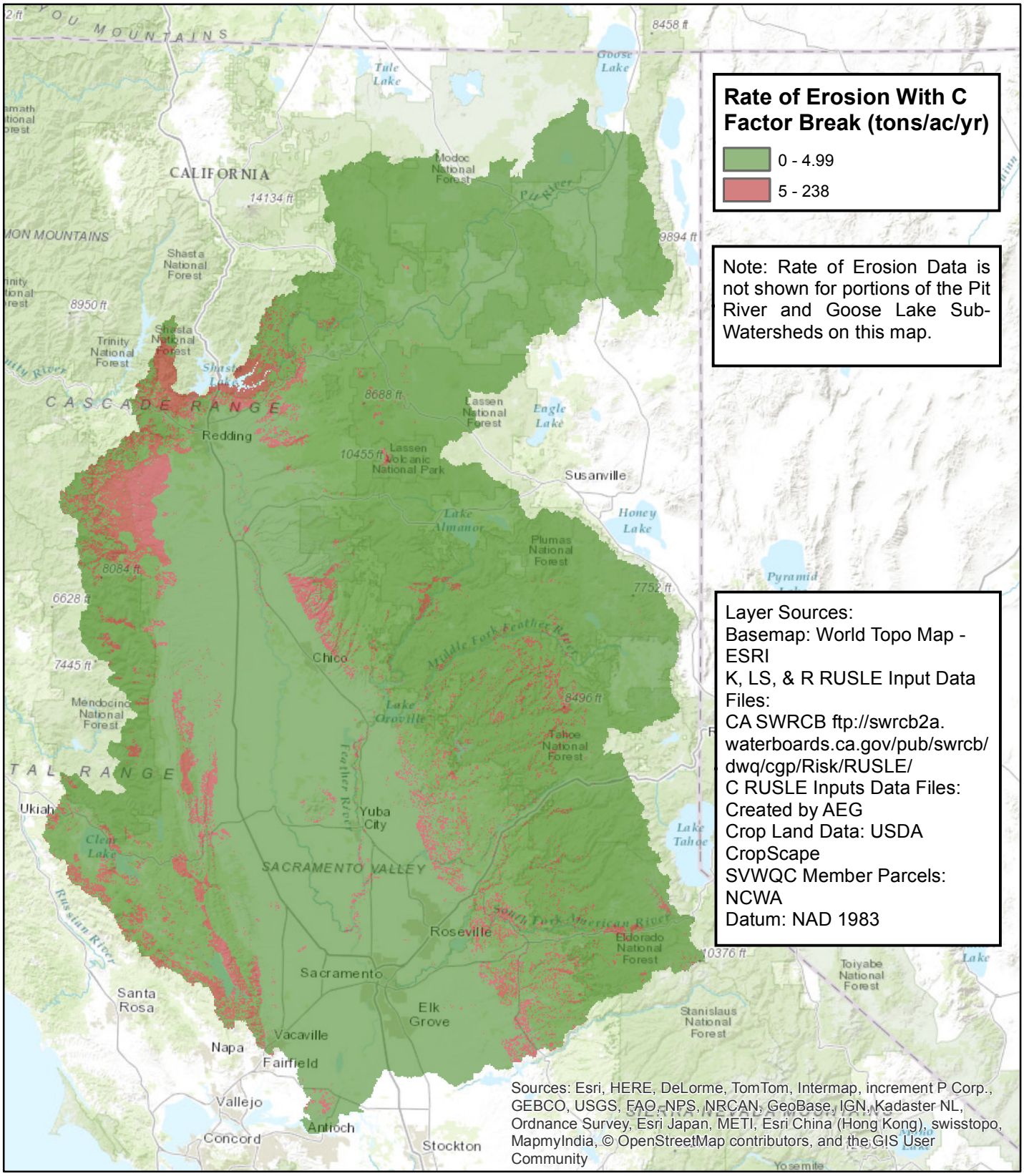

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Figure A3 - Rate of Erosion With C Factor Included Red/Green Break for SVWQC

0 10 20 40 60 80 Miles

N

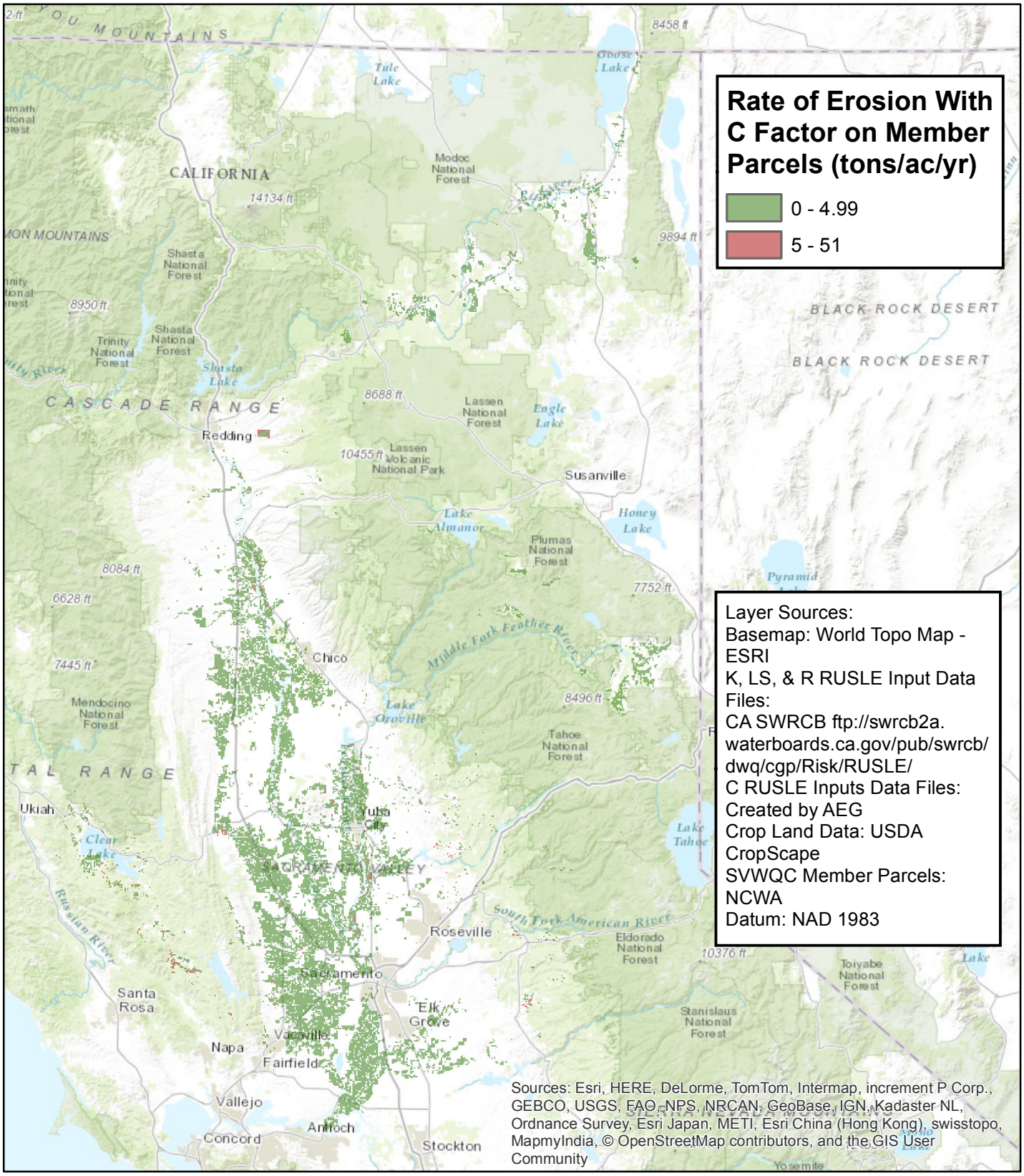

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Figure A4 - Rate of Erosion With C Factor Included for Member Parcels

0 10 20 40 60 80 Miles

N