East San Joaquin Water Quality Coalition

Semi-Annual Monitoring Report

June 30, 2008

Above photo from www.livingstoncity.com

Prepared by
Michael L. Johnson LLC

Table of Contents

List of Tables

List of Figures

Table of Appendices

List of Acronyms

BMP	Best Management Practice
BOD	Biological Oxygen Demand
BU	Beneficial Use
CDPR	California Department of Pesticide Regulation
CEDEN	California Environmental Data Exchange Network
COC	Chain of Custody
CURES	Coalition for Urban and Rural Environmental Stewardship
CVRWQCB	Central Valley Regional Water Quality Control Board
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DF	Dilution factor
DFG	California (Department of Fish and Game)
DHS	(California) Department of Health Services
DI	Deionized
DO	Dissolved Oxygen
DQO	Data Quality Objective
DWR	(California) Department of Water Resources
E	Environmental sample
EC	Specific Conductance
EC_{50}	Effective Concentration of 50% of the measured endpoint
EPA	Environmental Protection Agency
ESJWQC	East San Joaquin County Water Quality Coalition
FB	Field Blank
FD	Field Duplicate
HDPE	High density polyethylene
ILRP	Irrigated Land and Regulatory Program
IPM	Integrated Pesticide Management
IRIS	Integrated Risk Information System
K_{oc}	Organic Carbon Partitioning Coefficient
LABQA	Laboratory Quality Assurance
LC_{50}	Lethal Concentration at 50% mortality
LCS	Laboratory Control Spike
MCL	Maximum Contaminant Level
MLJ-LLC	Michael L. Johnson, LLC
MPN	Most Probable Number
MRP	Monitoring and Reporting Program Order No. R5-2005-00833
MS	Matrix Spike
MUN	Municipal and Domestic Supply (beneficial use)
NA	Not Applicable

ND	Not Detected
NiCd	Nickel-cadmium
NM	Normal Monitoring
NONAG	The sample was provided by a project other than the Coalition to the laboratory and was included in the QC report from the laboratory to meet their QC requirements.
OP	Organophosphate
PCA	Pesticide Control Advisor
pH	Power of Hydrogen
PR	Percent Recovery
PTFE	Polytetraflouroethylene (Teflon™)
PUR	Pesticide Use Report
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RfD	Reference Dose
RL	Reporting Limit
RPD	Relative Percent Difference
RS	Resample
SAMR	Semi-Annual Monitoring Report
SG	Statistically significantly different from control; Greater than 80% threshold
SL	Statistically significantly different from control; Less than 80% threshold
SOP	Standard operating procedure
SPE	Solid Phase Extraction
SWAMP	Surface Water Ambient Monitoring Program
TDS	Total Dissolved Solids
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TRS	Township, Range, Section
UC	University of California
USEPA	United States Environmental Protection Agency
VOA	Volatile Organic Analyte
WER	Watershed Evaluation Report
WQG	Water Quality Guidelines
WQTL	Water Quality Trigger Limit

List of Units

cfs	cubic feet per second
L	Liter
lbs	pounds
mg	milligram
NTU	Nephelometric Turbidity Units
sec	second
TUa	Toxic Unit (acute)
µg	microgram

List of Terms

Agricultural Commissioner – County Agriculture Commissioner

ArcGIS – Geographic Information Systems mapping software

Central Valley or Valley – California Central Valley

Coalition – East San Joaquin Water Quality Coalition

Coalition/ESJWQC region – The region within the Central Valley that is monitored by the East San Joaquin Water Quality Coalition.

drainage –water that moves horizontally across the surface or vertically into the subsurface from land

landowners – one or more persons responsible for the management of the irrigated land

Regional Board – Central Valley Regional Water Quality Control Board

site subwatershed – Starting from the sampling site, all water bodies that drain, directly or indirectly, into the water body before the point where sampling occurs.

subwatershed – The topographic perimeter of the catchment area of a stream tributary. (EPA terms of environment: (http://www.epa.gov/OCEPAterms/sterms.html)

Waiver – Central Valley Regional Water Quality Control Board Coalition Group Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands, Order No. R5-2006-0077, amending Order No. R5-2006-0053.

water body –standing or flowing water of any size that may or may not move into a larger body of water, including lakes, reservoirs, ponds, rivers, streams, tributaries, creeks, sloughs, canals, laterals and drainage ditches.

watershed – The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point. (EPA terms of environment: http://www.epa.gov/OCEPAterms/wterms.html)

Executive Summary

The East San Joaquin Water Quality Coalition (ESJWQC) region includes the counties of Stanislaus, Merced, Madera, Tuolumne, and Mariposa and the portion of Calaveras County that drains into the Stanislaus River. Apart from the San Joaquin River which forms the south and east boundary of the Coalition, there are five major rivers in the watershed: the Fresno River, Chowchilla River, Merced River, Tuolumne River and Stanislaus River. In addition, the Eastside Bypass is considered a major water body. These east side tributaries of the San Joaquin River drain the Sierra Nevada range from east to west. Irrigated agriculture is the predominant land use in the Coalition area although the growing urban areas in the Central Valley are also a significant land use. Other non-irrigated land uses include dairies with some acreage in feedlots.

Water quality monitoring was conducted from two storm events in January and February 2008. Sediment was sampled during March 2008. Several sites were dry during both monitoring trips. The primary objective was to characterize discharge from agriculture during the storm season. Field data were recorded during each sampling event unless otherwise noted and ambient water samples were analyzed for pesticides, *E. coli*, metals, bacteria, inorganic and organic parameters, as well as toxicity to three test species: *Ceriodaphnia dubia, Pimephales promelas, and Selenastrum capricornutum*. During sediment sampling events field parameters were measured and toxicity samples were collected to test for *Hyalella azteca* toxicity. All water and sediment sample analyses are based on requirements specified in Table 1 of the ILRP Monitoring and Reporting Program (MRP). For samples that experienced toxicity, follow-up sampling occurred within 48 hours from the time that the laboratory reported the toxicity.

Samples collected during the 2008 storm season experienced 25 exceedances of pesticides including chlorpyrifos (9), diazinon (2), diuron (7), simazine (6), and methidathion (1). Water column toxicity was experienced in 21 samples. All sites showing toxicity were resampled to determine the persistence of the toxicity. Of the 21 samples that experienced toxicity, five were toxic to *Ceriodaphnia*, three to *Pimephales* and 13 to *Selenastrum*. Seven sediment samples were found to be toxic to *Hyalella*.

As in the previous irrigation season, exceedances of Specific Conductance (EC) and Total Dissolved Solids (TDS), both measures of salts in the water, often co-occurred during the storm monitoring events when both parameters were measured. In total, there were six exceedances of TDS and seven exceedances of EC. There were 6 exceedances of Dissolved Oxygen (DO), four exceedances of pH, and 19 exceedances of the color water quality objective. There were 17 exceedances of the *E. coli* water quality objective. Four metals, cadmium (9), copper (12), lead (11), and nickel (3) were found at concentrations above water quality objectives in water samples. Among the four metals, only copper is currently used by agriculture within the Coalition region. The

increase in cadmium exceedances is due to a reduction of the concentration of the WQTL. Cadmium is a common detection in the region but the source of the cadmium is unknown. Peat soils (http://www.speclab.com/elements/cadmium.htm), industrial emissions (i.e. burning of fossil fuels) and agriculture (i.e. phosphate base fertilizers) potentially contribute cadmium to aquatic systems. Sources are distinguishable using stable isotopes but the cost of the analyses is substantial and the Coalition does not anticipate using this technique to identify the source(s).

One TIE was supposed to be performed from the second storm event for samples collected at Dry Creek @ Rd 18 but was not conducted due to an oversight at the lab. There was no resample at Dry Creek @ Rd 18 for the first storm event due to a miscommunication from the laboratory. A Communication Report for field exceedances from the sediment sampling event was not provided to the Regional Board. Eight nitrate samples were analyzed out of hold time due to an instrument malfunction at the laboratory. One sample was analyzed for color out of hold time due to laboratory error.

In an effort to understand the source(s) of discharges to Coalition water bodies, the Coalition entered into an agreement with the Stanislaus County Agricultural Commissioner to walk the creeks and identify points where discharges enter from pipes, culverts, and ditches. Dry Creek @ Wellsford Road, Prairie Flower Drain @ Crows Landing Road, Highline Canal @ Hwy 99, and Duck Slough @ Gurr Road were all walked in November and December of 2007. All discharge points were located using a GPS unit, photographed, and plotted using GIS. All discharge points were identified by parcel and owner and all received a communication from the Coalition informing them that the discharge may be illegal and requesting their attendance at a meeting on June 18, 2008. Although outside of the time period for this report, the June meeting is summarized because the next monitoring report will not be delivered to the Regional Board until March 2009. Coalition representatives presented results of the storm season monitoring and provided management practices that could eliminate exceedances. Further creek walks are planned for Coalition site subwatersheds in Merced and Madera counties.

Over the 2008 storm season, the Coalition was able to meet its monitoring program objectives by determining the concentration and load of waste in discharges to surface waters, evaluating compliance with existing narrative and numeric water quality triggers to determine if implementation of additional management practices is necessary to improve and/or protect water quality and assessing the impact of storm water discharges from irrigated agriculture to surface water. The Coalition is currently developing a strategy for determining the degree of implementation of management practices to reduce discharge of specific wastes that impact water quality in receiving waters of the Coalition region, and developing strategies to reduce discharges of wastes that impact water quality.

The Coalition is creating a strategy to document and evaluate current management practices within the Coalition area and will initially focus on priority subwatersheds: Dry

Creek @ Wellsford Rd, Highline Canal @ Highway 99, Prairie Flower Drain @ Crows Landing Road, and Duck Slough @ Gurr Road. It is the goal of the Coalition to link past water quality exceedances within these subwatersheds with crop types and inform growers of management practices that can be implemented for the specific crops thought responsible for the exceedance. Although the Coalition conducted BMP surveys in 2007, the Coalition plans to supplement that information with more detailed information obtained from individual grower contacts starting with priority subwatersheds.

In response to repeated exceedances in watersheds in the Coalition region, the Coalition entered into a contract with the Stanislaus County Agricultural Commissioner to conduct a series of "creek walks." These walks involved walking upstream from the Coalition sample point, locating all pipes or conveyances that could deliver discharge, recording the location with a GPS instrument, and photographing the pipes for documentation. Pipes were located that could convey discharge from irrigated agriculture as well as nonagricultural discharges including local residential dwellings. Plotted in a GIS, the discharge points were matched to individual parcels and the owners were identified and contacted. A meeting was held on June 18 in Modesto to discuss the exceedances in the watersheds and provide additional information on management practices. Regional Board staff were present to discuss enforcement activities. Several growers had already plugged their pipes from the field end, and other growers, e.g., Gallo Farms, were in the process of removing pipes. These activities should result in improvements in water quality in both the irrigation season as well as the storm season.

Outreach and education activities continue to be a central component of the Coalition monitoring program. The Coalition provides information and notification of exceedances in person during grower meetings, through the Coalition website, and by mail. The Coalition website (www.esjcoalition.org) includes a general description of the Coalition's mission, member information, recommended best management practices, a schedule of Coalition meetings and presentations, Coalition news and newsletters, maps of sample sites and subwatersheds, and links to other sources of relevant information. A meeting was held specifically for the exceedance of chlorpyrifos in the Merced River @ Santa Fe on February 29, 2008. Discussions with the grower will result in a change of management practices, most probably, a change in product or no dormant spray on the almonds. Meetings to review storm season exceedances and present management practices that can be effective during storm season will be offered just prior to the 2009 storm season. At that point, growers will be focused on applications during the winter and will be in a position to apply the management practices presented by Coalition representatives. As it moves into the next storm season, the Coalition recommends examining PUR reports from previous years to identify parcels that have been associated with repeated exceedances of pesticides, associating exceedances of pesticides with crops known to use the products to further refine the search for sources, if applicable, following the Management Plan monitoring plan by adding upstream sites to identify potential sources, and focusing outreach on small groups of growers identified as potential sources.

Introduction

This document is being submitted by the East San Joaquin Water Quality Coalition to the Central Valley Regional Water Quality Control Board (CVRWQCB or Regional Board) as required by the Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands Resolution No. R5-2003-0105 (Order), Monitoring and Reporting Program Order No. R5-2005-0833, amended by Monitoring and Reporting Program Order No. R5-2006-0053 and Monitoring and Reporting Program Order No. R5-2006-0077 (hereafter referred to as the Irrigated Lands Regulatory Program or ILRP). The document herein reports on the Coalition monitoring program and covers activities associated with the 2008 storm season monitoring, reporting, outreach and education.

Data that are too substantial to include in the body of this report are located in separate appendices. Where appropriate, Semi-Annual Monitoring Report (SAMR) sections refer readers to the appendices relevant to that section.

Description of Watershed

The East San Joaquin Water Quality Coalition (ESJWQC) area includes Stanislaus, Merced, Madera, Tuolumne, and Mariposa Counties and the portion of Calaveras County that drains into the Stanislaus River (Table 1). The region that drains into the Coalition area is bordered by the crest of the Sierra Nevada on the east and the San Joaquin River on the west, the Stanislaus River on the north to the San Joaquin River on the south. The southern portion of the Coalition area has been expanded to now include the area that was formerly within the Root Creek Coalition area. Additionally, there are landholdings in the vicinity of the Lone Willow Slough watershed (west of the Eastside Bypass) that have joined the Westside Coalition.

The only surface water export from the Coalition area is northward via the San Joaquin River. This river drains watersheds on the east and west side of the California Central Valley (Valley), though only east side watersheds are relevant with respect to the Coalition area. San Joaquin River water is eventually either exported to the San Francisco Bay through the Delta, or conveyed southward via the State Water Project and the Delta Mendota Canal. The Coalition area also includes within its boundaries portions of all six irrigation districts: Oakdale Irrigation District, Merced Irrigation District, Turlock Irrigation District, Modesto Irrigation District, Chowchilla Irrigation District and Madera Irrigation District. Water bodies may have both irrigation district and Coalition involvement only when they convey both irrigation supply and agriculture return water. Irrigation districts are covered by individual waivers.

Apart from the San Joaquin River, there are five major rivers in the watershed: the Fresno River, Chowchilla River, Merced River, Tuolumne River and Stanislaus River. In addition, the Eastside Bypass is considered a major water body. These east side tributaries of the San Joaquin River drain the Sierra Nevada range from east to west. Typically, only the Stanislaus, Merced, and Tuolumne Rivers maintain flows during the summer months. Flow in the Chowchilla and Fresno Rivers are intermittent to nonexistent as the irrigation season progresses into the fall and remain dry unless major storm events produce sufficient precipitation in the immediate vicinity of the rivers. Intermediate sized water bodies in the Coalition area (e.g. Dry Creek, Duck Slough, and Highline Canal) originate either in the Sierra Nevada foothills or the Valley itself and are tributaries to the major rivers. The remaining water bodies are small in size (e.g. Silva Drain, Mustang Creek) and are primarily agricultural canals and ditches that convey water to one of the larger rivers or intermediate-sized creeks/sloughs.

Although exact acreage is difficult to estimate due to rapidly changing land use, the Coalition area contains 1,186,889 acres that are considered irrigated agriculture (Table 1). For Stanislaus, Merced, Mariposa, Tuolumne, and Madera Counties, the Coalition used the Department of Water Resources (DWR) land use estimates for irrigated

agriculture to determine total acreage. DWR does not provide land use data for Calaveras County. Instead, the Coalition used data from the County Agricultural Commissioner's office.

Table 1. Acreage of irrigated land in ESJWQC counties.

Acreage shown for Stanislaus, Merced, Madera, Tuolumne, Calaveras and Mariposa Counties. Data from 2001 California Department of Water Resources (http://www.landwateruse.water.ca.gov/annualdata/landuse/2001/landuselevels.cfm)

County	Irrigated Land Area (acres)
Calaveras	976
Madera	295,000
Mariposa	297
Merced	510,500
Stanislaus	378,700
Tuolumne	1,416
Total	***1,186,889***

Note that the estimates of irrigated acres may differ from previous estimates. The Coalition anticipates that as urban development increases over the next several years, the estimates will continue to change.

Land Use

Irrigated agriculture is the predominant land use in the Coalition area although growth of the urban areas in the San Joaquin Valley has been a significant factor impacting water quality. Non-irrigated land uses include urban and dairy with some acreage in feedlots and impoundments.

A variety of crops are grown and are often found in regions specific to microclimate, soil type, and local farming history. A more detailed discussion of crop type occurs in this report within the Sampling Sites Description section. Over 50 types of commercial crops are produced within the Coalition area (Table 2). The most common crops by acres are almonds, tomatoes, hay, sweet potatoes, cotton, silage, beans, wheat, peaches, melons, and grapes. In general agriculture varies geographically as one travels from the north to south and from east to west. In the eastern foothills, deciduous orchards and grapes are the dominant crops, though there are also considerable amounts of irrigated pastures and dairy farms. Crop type is more diverse in the northern Coalition area and includes row crops (e.g. tomatoes, sweet potatoes, melons, and leafy green vegetables), alfalfa hay, and orchards. In the relatively drier southern area dominate crops include cotton, vineyards, and orchards (almonds and pistachios).

A map of land use in the Coalition region is provided in Figure 1, and the legend for the map is provided in Figure 2. Information was obtained from the California Department of Pesticide Regulation database which is current through 2004 (http://calpip.cdpr.ca.gov/cfdocs/calpip/prod/main.cfm). The map shown in Figure 1 is provided as a jpeg file; however, due to the size of the Coalition area, the map does not support a reasonable level of detail in this document. ArcGIS coverage has previously been provided, and can be referred to for more detail on coverage.

Table 2. Crops grown and monthly pesticide use in the ESJWQC region.

Crop information was developed from Pesticide Use Reports from the 2004 CDPR PUR database. An X in the month column specifying that there were pesticide use permits filed in those months indicating that applications of chemicals to those crops occurred.

COUNTY NAME	CROP	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
CALAVERAS													
	APPLE			x			x						
	BLUEBERRY		x		x						x	x	
	CHERRY			x	x		x		x			x	
	GRAPES, WINE	x	x	x	x	x	x	x	x			x	x
	NECTARINE		x										
	N-OUTDR CONTAINER/FLD GRWN PLANTS		x	x	x	x	x	x		x			
	OATS, GENERAL	x	x	x									
	OLIVE (ALL OR UNSPEC)	x		x			x	x	x	x			x
	PASTURES (ALL OR UNSPEC)		x	x	x	x							
	PEACH		x										
	PISTACHIO (PISTACHE NUT)			x	x	x		x	x				
	VEGETABLES (ALL OR UNSPEC)			x									
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)		x	x	x	x	x	x	x	x			
MADERA													
	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	x	x	x	x	x	x	x	x	x	x	x	x
	ALMOND	x	x	x	x	x	x	x	x	x	x	x	x
	APPLE		x	x	x	x	x	x	x				
	APRICOT	x	x	x	x	x							x
	BARLEY (FORAGE - FODDER)	x	x	x									
	BARLEY, GENERAL	x	x	x									
	BEANS (ALL OR UNSPEC)						x	x	x				
	BEANS, DRIED-TYPE	x					x	x	x				
	BLUEBERRY											x	
	BOYSENBERRY (BOYSENS)												x
	CARROTS, GENERAL		x	x		x	x	x					
	CHERRY	x	x	x	x	x	x	x			x	x	x
	CHRISTMAS TREE PLANTATIONS					x							
	CITRUS FRUITS (ALL OR UNSPEC)		x			x		x		x		x	
	CORN (FORAGE - FODDER)			x	x	x	x	x	x	x		x	
	CORN, HUMAN CONSUMPTION		x	x		x	x	x					
	COTTON, GENERAL	x	x	x	x	x	x	x	x	x	x	x	x
	FIG	x	x	x	x	x	x	x	x	x		x	x
	GARLIC	x		x	x	x							
	GRAPES	x	x	x	x	x	x	x	x	x	x	x	x
	GRAPES, WINE	x	x	x	x	x	x	x	x	x	x	x	x
	KIWI FRUIT	x	x	x		x		x	x	x			

COUNTY NAME	CROP	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
	MELONS			x									
	NECTARINE	x	x	x	x	x	x	x	x	x	x	x	x
	N-GRNHS GRWN CUT FLWRS OR GREENS	x	x	x	x	x	x	x	x	x	x	x	x
	N-GRNHS GRWN PLANTS IN CONTAINERS						x				x		
	N-OUTDR CONTAINER/FLD GRWN PLANTS	x	x	x		x	x	x	x	x	x	x	x
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL		x	x	x	x	x	x	x	x			
	OATS (FORAGE - FODDER)	x	x	x									x
	OATS, GENERAL	x	x	x									x
	OLIVE (ALL OR UNSPEC)	x	x	x		x	x	x	x	x	x	x	x
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)			x	x						x	x	
	ORANGE (ALL OR UNSPEC)	x	x	x	x	x	x	x	x	x	x	x	x
	PASTURES (ALL OR UNSPEC)		x	x								x	x
	PEACH	x	x	x	x	x	x	x	x	x	x	x	x
	PEAR	x		x				x				x	
	PECAN			x		x		x				x	
	PERSIMMON			x		x		x	x	x			
	PISTACHIO (PISTACHE NUT)	x	x	x	x	x	x	x	x	x	x	x	x
	PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)	x	x	x	x	x	x	x	x	x	x	x	x
	POMEGRANATE (MISCELLANEOUS FRUIT)				x	x		x	x	x			x
	PRUNE	x	x	x	x	x	x	x		x	x		x
	SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBEDS, ETC.)	x	x	x	x	x	x		x	x	x	x	x
	STONE FRUITS (ALL OR UNSPEC)		x							x			
	STRAWBERRY (ALL OR UNSPEC)	x			x							x	
	SUGARBEET, GENERAL	x		x	x	x	x	x	x	x			x
	TANGELO		x	x	x	x	x	x	x	x	x	x	x
	TANGERINE (MANDARIN, SATSUMA, MURCOTT, ETC.)			x	x	x		x		x	x	x	
	TOMATO			x				x	x	x	x		
	TOMATOES, FOR PROCESSING/CANNING	x		x	x	x	x	x	x		x	x	
	UNCULTIVATED AGRICULTURAL AREAS (ALL OR UNSPECIFIED)	x	x	x	x	x	x	x	x		x	x	x
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	x	x	x	x	x	x	x	x	x		x	
	WATERMELONS					x							
	WHEAT (FORAGE - FODDER)	x	x	x			x	x	x	x			x
	WHEAT, GENERAL	x	x	x	x							x	x
MARIPOSA													
	APPLE			x	x	x							
	GRAPES, WINE		x	x	x	x	x	x	x				
	N-OUTDR CONTAINER/FLD GRWN PLANTS	x	x	x	x	x	x	x	x	x	x	x	x
MERCED													

COUNTY NAME	CROP	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	x	x	x	x	x	x	x	x	x	x	x	x
	ALMOND	x	x	x	x	x	x	x	x	x	x	x	x
	APPLE	x						x					x
	APRICOT	x	x	x	x	x	x	x	x		x		
	ASPARAGUS (SPEARS, FERNS, ETC.)				x			x	x		x		
	BARLEY (FORAGE - FODDER)												x
	BARLEY, GENERAL	x	x	x									x
	BEANS, DRIED-TYPE		x		x	x	x	x	x	x	x		
	BEANS, SUCCULENT (OTHER THAN LIMA)				x	x	x	x	x	x	x		
	BLUEBERRY		x	x	x		x	x			x	x	
	BOYSENBERRY (BOYSENS)				x		x						
	BROCCOLI										x	x	
	CANTALOUPE			x		x	x	x	x	x		x	x
	CAULIFLOWER							x	x	x			
	CHERRY	x	x	x	x	x		x				x	x
	CHICORY (ALL OR UNSPEC)				x				x	x	x		
	CHINESE CABBAGE (NAPPA, WON BOK, CELERY CABBAGE)				x						x		
	CHINESE GREENS, CHINESE LEAFY VEGETABLES					x							
	CHRISTMAS TREE PLANTATIONS	x	x					x					
	CITRUS FRUITS (ALL OR UNSPEC)	x				x							x
	COLE CROPS (ALL OR UNSPEC)												x
	CORN (FORAGE - FODDER)	x	x	x	x	x	x	x	x	x	x	x	x
	CORN, HUMAN CONSUMPTION	x	x	x	x	x	x	x	x	x			x
	COTTON, GENERAL	x	x	x	x	x	x	x	x	x	x	x	x
	CUCUMBER (PICKLING, CHINESE, ETC.)	x			x				x	x			
	FIG		x	x	x	x	x	x	x	x		x	x
	FORAGE - FODDER GRASSES (ALL OR UNSPEC) (HAY)	x	x	x									
	GRAPES		x	x	x	x	x	x					
	GRAPES, WINE	x	x	x	x	x	x	x	x	x	x	x	x
	LEAFY VEGETABLES (ALL OR UNSPEC)								x	x	x	x	
	LETTUCE, HEAD (ALL OR UNSPEC)				x								
	MELONS							x	x				
	MUSTARD, GENERAL									x			
	NECTARINE	x	x	x	x	x	x	x				x	
	N-GRNHS GRWN PLANTS IN CONTAINERS	x	x	x	x	x	x	x	x	x	x		
	N-OUTDR CONTAINER/FLD GRWN PLANTS	x	x	x	x	x	x	x	x	x	x	x	x
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	x	x	x	x	x	x	x	x		x	x	x
	OATS (FORAGE - FODDER)	x	x	x	x	x			x	x		x	x
	OATS, GENERAL	x	x	x								x	
	OLIVE (ALL OR UNSPEC)											x	

COUNTY NAME	CROP	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)		x	x	x	x						x	x
	ORNAMENTAL TURF (ALL OR UNSPEC)	x	x	x	x		x	x	x	x		x	
	PASTURES (ALL OR UNSPEC)	x	x	x	x	x	x	x	x		x		
	PEACH	x	x	x	x	x	x	x	x	x	x	x	x
	PEAR	x			x		x	x					
	PEAS, GENERAL	x	x	x									
	PECAN					x	x	x		x			
	PEPPERS (CHILI TYPE) (FLAVORING AND SPICE CROP)			x	x	x		x	x	x	x	x	
	PEPPERS (FRUITING VEGETABLE), (BELL, CHILI, ETC.)	x		x	x	x	x	x	x	x	x		
	PISTACHIO (PISTACHE NUT)	x	x	x	x	x	x	x	x	x	x	x	x
	PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)	x	x	x	x	x		x	x	x		x	x
	PRUNE	x	x	x		x	x	x	x	x			x
	PUMPKIN						x	x	x	x			
	RADISH					x		x					
	RICE (ALL OR UNSPEC)					x	x	x	x				
	RYE (ALL OR UNSPEC)		x										
	SAFFLOWER, GENERAL	x											
	SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBEDS, ETC.)	x	x	x								x	x
	SORGHUM (FORAGE - FODDER) (SORGO, ETC.)						x		x	x			
	SQUASH (ALL OR UNSPEC)							x	x				
	SQUASH (WINTER) (HUBBARD SQUASH, CALABAZA, ETC.)							x	x	x			
	STONE FRUITS (ALL OR UNSPEC)			x									
	STRAWBERRY (ALL OR UNSPEC)	x	x	x	x		x	x	x				x
	SUDANGRASS (FORAGE - FODDER) (SORGHUM SUDANESE)					x	x	x	x	x			
	SUGARBEET, GENERAL	x	x	x	x	x	x	x	x	x	x		
	SWEET POTATO	x	x	x	x	x	x	x	x	x		x	x
	TOMATILLO						x	x					
	TOMATO	x	x	x	x	x	x	x	x	x	x	x	x
	TOMATOES, FOR PROCESSING/CANNING	x	x	x	x	x	x	x	x	x	x	x	x
	UNCULTIVATED AGRICULTURAL AREAS (ALL OR UNSPEC)	x	x	x	x					x	x	x	x
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	x	x	x	x	x	x	x	x	x	x	x	x
	WATERMELONS			x	x	x	x	x	x		x	x	
	WHEAT (FORAGE - FODDER)	x	x	x							x	x	x
	WHEAT, GENERAL	x	x	x	x		x			x		x	x
STANISLAUS													
	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	x	x	x	x	x	x	x	x	x	x	x	x
	ALMOND	x	x	x	x	x	x	x	x	x	x	x	x
	APPLE	x	x	x	x	x	x	x	x	x	x	x	x

COUNTY NAME	CROP	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
	APRICOT	x	x	x	x	x	x	x	x	x	x	x	x
	ARRUGULA (ROQUETTE, ROCKET SALAD)							x					
	ASPARAGUS (SPEARS, FERNS, ETC.)						x		x				
	BARLEY (FORAGE - FODDER)		x										
	BARLEY, GENERAL										x		x
	BASIL (BUSH, GARDEN, SWEET)		x	x	x	x	x	x	x	x	x	x	
	BEANS, DRIED-TYPE	x	x	x	x	x	x	x	x	x	x	x	
	BEANS, SUCCULENT (OTHER THAN LIMA)			x	x	x	x	x	x	x			
	BEETS, GENERAL	x	x	x	x	x	x	x	x	x	x	x	x
	BOK CHOY (WONG BOK)	x	x	x	x	x	x	x	x	x	x	x	x
	BOYSENBERRY (BOYSENS)	x		x		x		x				x	
	BROCCOLI	x		x	x	x	x	x	x	x	x	x	x
	CABBAGE	x	x	x	x	x	x	x	x	x	x	x	x
	CANTALOUPE			x		x	x	x	x	x			
	CAULIFLOWER			x		x		x	x	x	x		
	CELERIAC (CELERY ROOT)	x	x					x	x	x		x	
	CELERY, GENERAL		x	x	x	x	x	x	x	x	x	x	x
	CHERRY	x	x	x	x	x	x	x	x	x	x	x	x
	CHESTNUT		x		x	x	x	x	x		x		x
	CHICORY (ALL OR UNSPEC)	x							x	x	x	x	
	CHINESE GREENS, CHINESE LEAFY VEGETABLES										x	x	
	CHINESE RADISH/DAIKON (LOBOK, JAPANESE RADISH)	x	x	x	x	x	x	x	x	x	x	x	x
	CILANTRO (CHINESE PARSLEY, CORIANDER LEAVES)	x	x	x	x	x	x	x	x	x	x	x	x
	CITRUS FRUITS (ALL OR UNSPEC)		x	x	x	x	x	x	x		x	x	
	COLLARDS	x	x	x	x	x	x	x	x	x	x	x	x
	CORN (FORAGE - FODDER)		x	x	x	x	x	x	x	x	x		x
	CORN, HUMAN CONSUMPTION						x	x				x	
	COUNTY AG. COMM. SALES											x	
	CUCUMBER (PICKLING, CHINESE, ETC.)			x	x	x	x	x	x				
	DANDELION (CHINESE DANDELION, GOW GAY)	x	x	x	x	x	x	x	x	x	x	x	x
	DILL	x	x	x	x	x	x	x	x	x			x
	ENDIVE (ESCAROLE)	x								x		x	
	FENNEL (ALL OR UNSPEC)		x	x	x	x	x	x	x	x			
	FIG										x		
	FLAVORING AND SPICE CROPS (ALL OR UNSPEC)				x		x		x		x		
	FORAGE - FODDER GRASSES (ALL OR UNSPEC) (HAY)	x		x									
	GRAPES	x		x	x	x	x	x	x		x	x	x
	GRAPES, WINE	x	x	x	x	x	x	x	x	x	x	x	x
	KALE	x	x	x	x	x	x	x	x	x	x	x	x
	KIWI FRUIT		x	x		x			x	x			

COUNTY NAME	CROP	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
	KOHLRABI	x	x	x	x	x	x	x	x	x	x	x	x
	LEEK			x	x	x	x	x	x	x	x	x	
	LETTUCE, LEAF (ALL OR UNSPEC)	x	x	x	x	x	x	x	x	x	x	x	x
	MELONS						x	x	x			x	
	MINT (ALL OR UNSPEC)	x		x	x	x	x	x	x	x	x	x	
	MUSTARD, GENERAL	x	x	x	x	x	x	x	x	x	x	x	x
	NECTARINE	x	x	x	x	x	x	x		x	x	x	x
	N-GRNHS GRWN PLANTS IN CONTAINERS	x	x	x	x	x	x	x	x	x	x	x	x
	N-GRNHS GRWN TRNSPLNT/PRPGTV MTRL	x	x	x	x	x	x	x	x	x			
	N-OUTDR CONTAINER/FLD GRWN PLANTS	x	x	x	x	x	x	x	x	x	x	x	x
	N-OUTDR GRWN CUT FLWRS OR GREENS												x
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	x	x	x	x	x	x	x	x	x	x	x	x
	OATS (FORAGE - FODDER)	x	x	x	x		x	x			x	x	x
	OATS, GENERAL		x	x									
	OLIVE (ALL OR UNSPEC)					x	x	x	x	x			
	ORNAMENTAL TURF (ALL OR UNSPEC)	x	x	x	x	x	x	x	x	x			
	PARSLEY (LEAFY VEGETABLE)	x	x	x	x	x	x	x	x	x	x	x	x
	PASTURES (ALL OR UNSPEC)	x	x	x	x	x	x	x	x	x	x		x
	PEACH	x	x	x	x	x	x	x	x	x	x	x	x
	PEAR		x					x			x	x	x
	PEAS, GENERAL	x	x	x									
	PECAN			x	x	x		x					x
	PEPPERS (FRUITING VEGETABLE), (BELL, CHILI, ETC.)	x		x	x	x							
	PERSIMMON		x	x		x		x			x		
	PISTACHIO (PISTACHE NUT)	x	x		x	x	x	x	x				x
	PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)	x	x	x	x	x	x	x	x		x	x	x
	POMEGRANATE (MISCELLANEOUS FRUIT)							x			x		
	PRUNE	x	x									x	x
	PUMPKIN						x	x	x	x			
	QUINCE											x	
	RICE (ALL OR UNSPEC)			x	x	x	x	x					
	RYE (ALL OR UNSPEC)		x										
	RYEGRASS, PERENNIAL (FORAGE - FODDER)		x										
	SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBEDS, ETC.)		x										
	SORGHUM (FORAGE - FODDER) (SORGO, ETC.)								x				
	SPINACH	x	x	x	x	x	x	x	x	x	x	x	x
	STRAWBERRY (ALL OR UNSPEC)		x	x	x			x	x	x			x
	SUDANGRASS (FORAGE - FODDER) (SORGHUM SUDANESE)							x	x				

COUNTY NAME	CROP	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
	SUGARBEET, GENERAL			x	x	x	x		x	x			
	SWEET POTATO	x		x	x	x							x
	SWISS CHARD (SPINACH BEET)	x	x	x	x	x	x	x	x	x	x	x	x
	TOMATO				x	x	x	x	x	x	x	x	
	TOMATOES, FOR PROCESSING/CANNING	x	x	x	x	x	x	x	x	x	x		x
	TURNIP, GENERAL	x	x	x	x	x	x	x	x	x	x	x	x
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	x	x	x	x	x	x	x	x	x	x	x	x
	WATERMELONS				x	x	x	x	x	x			
	WHEAT (FORAGE - FODDER)	x	x	x	x							x	x
	WHEAT, GENERAL	x	x	x	x								
TUOLUMNE													
	APPLE		x	x	x	x	x	x					
	BLACKBERRY				x								
	BOYSENBERRY (BOYSENS)		x	x	x								
	CHERRY		x	x	x								
	GRAPES						x						
	GRAPES, WINE					x							
	NECTARINE				x								
	N-OUTDR CONTAINER/FLD GRWN PLANTS	x	x	x	x	x	x						
	N-OUTDR GRWN CUT FLWRS OR GREENS			x			x						
	PASTURES (ALL OR UNSPEC)			x	x	x	x	x					
	PEACH		x	x		x	x						

Figure 1. Agriculture lands in the ESJWQC region.

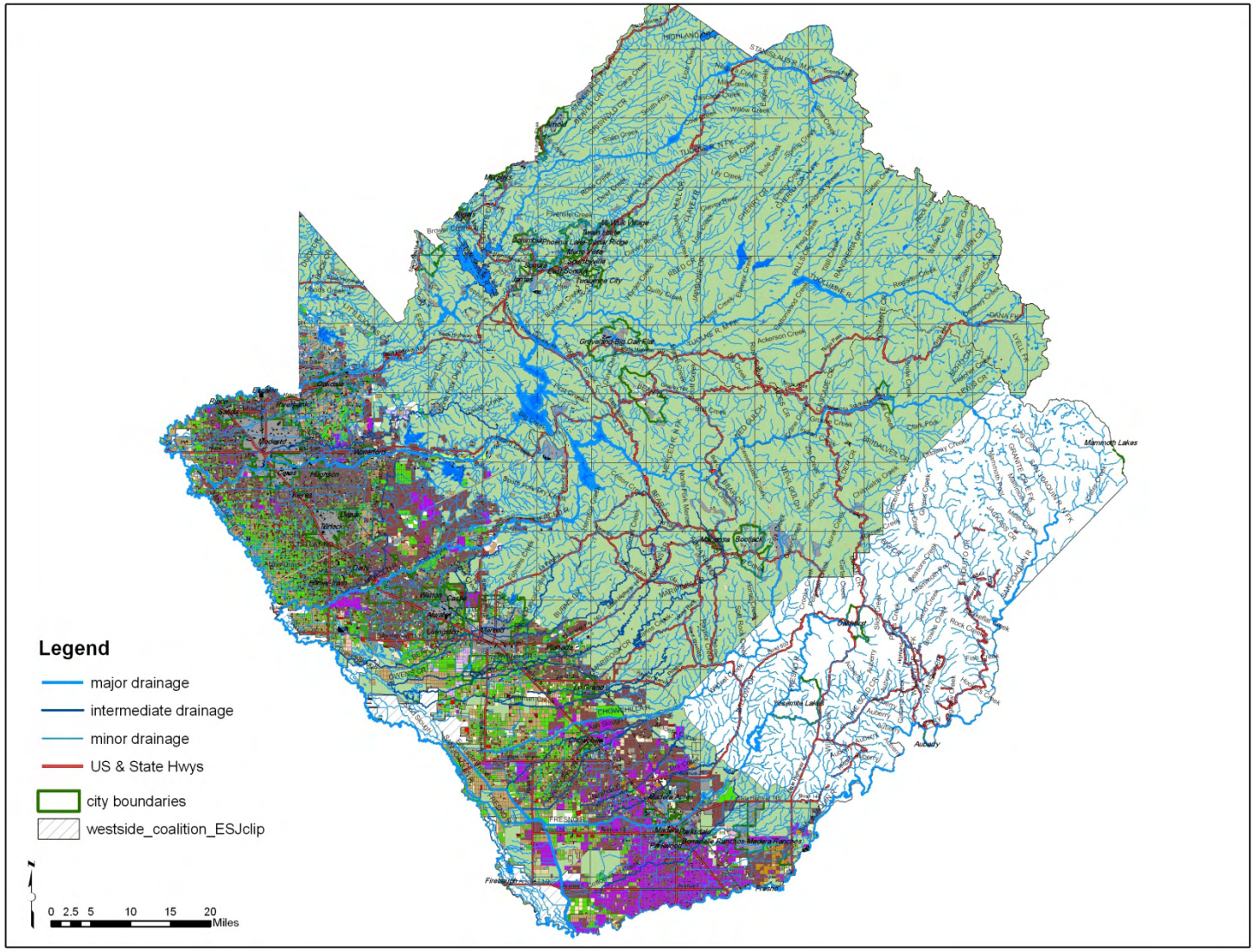


Figure 2. Legend for agriculture lands in the ESJWQC region.

Climate

Summer temperatures are usually hot in the San Joaquin Valley, ranging from the mid 80's to mid 90's (^{o}F) for average daily high temperatures and the mid to upper 50's for average summer daily low temperatures. In the summer the northern area is subject to pulses of cool coastal air that can provide relief from summertime highs and allow for the farming of crops requiring cooler temperatures. The upland areas are slightly cooler at night but generally remain hot throughout the summer. In the winter, temperatures are usually moderate with average daily high temperatures in the mid to upper 50's and average daily low temperatures in the low 40's. Freezing is common; this generally prevents farming of perennial crops susceptible to frost. Annual precipitation on the San Joaquin Valley floor in the Coalition area is variable, averaging 13-15 inches per year (City of Merced). Rainfall occurs predominantly during the winter and is heterogeneously distributed throughout this period (typical for a Mediterranean climate). Winter seasons are characterized by several small storms with one or two major events (increased rain due to several larger storms) providing the bulk of the precipitation. December, January and February are historically the months with greatest precipitation. There appears to be no discernible pattern as to when during the winter these large storms occur.

Soils

Soils maps reveal a complicated mosaic of soil types in the Coalition area. Generally, the Coalition area has sandy, well-drained soils. Soil type interacts with other factors such as slope, soil saturation, rainfall/irrigation water amount, and drainage patterns to control runoff. Soils maps and ArcGIS soils coverages have been delivered to the Central Valley Regional Water Quality Control Board (CVRWQCB) previously and will not be provided as part of this document.

Hydrology

As indicated above, there are several main rivers that cross the Coalition area from east to west. These rivers have complex hydrologic systems due to both seasonal influence of precipitation, and management systems for water use (reservoirs, basin transfers, hydropower, municipal and irrigation supply, and anadromous fisheries). In general, flows are greatest during the winter and spring due to winter precipitation and subsequent spring snowmelt. Summertime flows are now greater than flows were historically due to reservoir releases during this period. The numerous small creeks that have their headwaters in the foothills and western portion of the Sierra Nevada mountain range are primarily ephemeral with no flow from early summer through the first rains of the winter. Later discussion of hydrology will be specific to each subwatershed.

There is an increased propensity for runoff with increased slope, soil water saturation, and volume of water, conditions that arise primarily due to large amounts of rainfall and are more likely in the relatively greater sloped valley margins. During the winter, runoff is drained through the myriad of creeks, rivers, and drains for flood management and may be subject to efforts of larger geographic flood control programs. Runoff can also occur during the irrigation season if water entering the field is greater than the amount that can infiltrate the soil. Recent sampling efforts indicate that many of the drainages in the southern portion of the Coalition region do not always carry runoff even during substantial rainfall events. Immediately after a storm in March of 2005, Ash Slough did not maintain sufficient flows to be sampled even when adjacent orchards were flooded. Also, the watersheds throughout the Coalition region tend to be "flashy" in that water from runoff events moves through the systems very quickly leaving very little flow shortly after the storm ends. For example, there was no flow remaining when crews visited the site for persistence sampling in the Lone Willow Slough watershed approximately a week after a winter 2005 storm event.

A complex system for water transfer, use, and re-use is utilized for irrigation purposes. Without precise methods of applying water for irrigation purposes some water may return to the source after being used on the field. In some cases, the volume of water applied to a field for irrigation may represent not only what is needed by the vegetative crop, but also a greater quantity used either to push the water over the field, or as a method of reducing the negative effects of evapotranspiration and consequent accumulation of salts. The system is designed to allow downstream irrigators to reuse water that was previously used upstream.

Valuable Aquatic Resources

Aquatic resources for water bodies within the Coalition area have been defined in part as those assigned a beneficial use (BU) by the CVRWQCB. Using the tributary rule, BUs were applied to upstream tributaries based on the currently assigned BU (Table 3) in downstream water bodies. Important aquatic resources exist in the Coalition area, including cold water and warm water stream aquatic habitat, wetlands and fisheries resources.

Wetlands are an important aquatic resource within the Coalition area. These habitats are associated with riparian areas along many of the water bodies in the region (particularly in the Sandy Mush Country area of southern Merced County) and savannah step region of the lower Sierra Foothills. Because vernal pools are isolated mini-watersheds they are found heterogeneously distributed across the Coalition in upland areas. They receive winter rains and require an aquatard to maintain their characteristic pools into the spring. These wetlands maintain a unique flora and fauna and are protected by the Clean Water Act. Generally, vernal pools and irrigated agriculture are not found together, although there are exceptions.

Several fisheries are considered important in the Coalition area. Steelhead trout (*Oncorhynchus mykiss*) were common in the region prior to the construction of dams on

all of the major tributaries of the San Joaquin River. Once the dams were built, historic spawning grounds were eliminated and with them, most of the wild salmonids in the San Joaquin Valley. Currently, no permanent steelhead stocks exist in the drainages of the San Joaquin Valley despite occasional reports of fish in the Tuolumne and Merced Rivers. The California Department of Fish and Game considers the Tuolumne River to have suitable habitat to support a steelhead run if one could become established.

Chinook salmon (*Oncorhynchus tshawytscha*) are present in the San Joaquin system and are found in all major tributaries in the region. All of the major tributaries are considered to be impaired for salmonid spawning and/or migration habitat as is the main stem of the San Joaquin River (Table II-1 of the Sacramento/San Joaquin River Basin Plan).

Table 3. Primary water bodies that drain directly into the major rivers of the ESJWQC region and the beneficial use for each of the major river reaches.

A list of beneficial uses is listed below the table. Water bodies that were sampled during the 2008 storm season are bolded. For water bodies that may exist in multiple counties, the county is specified in parenthesis.

Water Body	Immediate Downstream Water Body	Beneficial Use of Immediate Downstream Water Body *
Root Creek @ Rd 35 **	San Joaquin River[1]	1-4, 7-15
Cottonwood Creek (Madera County)**	None[6]	-
Ash Slough**	San Joaquin River[2]	1-4, 7-9, 11-15
Cottonwood Creek (Stanislaus County)		
Bear Creek**		
Dry Creek (Madera County)**		
Duck Slough		
Mattos Drain		
Black Rascal Creek		
Berenda Slough		
Miles Creek		
Mariposa Creek		
Deane Drain		
Owens Creek		
Dutchman Creek		
Berenda Creek**		
Deadman Creek		
Livingston Drain		
Mustang Creek	San Joaquin River[3]	1-4, 7-9, 11-13, 15
August Rd. Drain[7]		
Highline Canal		
Hilmar Drain		
Cavill Drain		
Prairie Flower Drain		
Hatch Drain		
Western States Drain		
Westport Drain		
Dry Creek (Stanislaus County)	Tuolumne River[4]	1-3, 7-10, 12-15
Jones Drain	Merced River[5]	1, 3-15
Highline Canal		
Merced River		
Silva Drain		
South Slough		

[1] Friant Dam to Mendota Pool reach
[2] Sack Dam to Merced River reach (all waterbodies that drain to this reach enter via the East Side Bypass with the exception of Livingston Drain)
[3] Merced River to Delta reach
[4] New Don Pedro Reservoir to San Joaquin River reach
[5] McSwain Reservoir to San Joaquin River reach
[6] There is no natural course by which Cottonwood Creek flows to the San Joaquin River. Its course is diverted in any number of ways, generally through canals or to open areas for percolation, depending upon the current situation

[7] August Rd. Drain @ Crows Landing subwatershed has been removed from the sampling plan due to safety concerns for the sampling crews

** Surface water flow in these water bodies terminates in subterranean flow except for periods of increased runoff during large winter storms

* Beneficial Use code list:

1 - Municipal and Domestic Supply
2 - Agriculture Supply (irrigation)
3 - Agriculture Supply (stock watering)
4 - Industrial Process Supply
5 - Industrial Service Supply
6 - Hydropower Generation
7 - Water Contact Recreation
8 - Non-contact Water Recreation
9 - Warm Freshwater Habitat
10 - Cold Freshwater Habitat
11 - Migration of Aquatic Organisms (warm)
12 - Migration of Aquatic Organisms (cold)
13 - Spawning, Reproduction, and/or Early Development (warm)
14 - Spawning, Reproduction, and/or Early Development (cold)
15 - Wildlife Habitat

ESJWQC Subwatersheds and Water Bodies

There are approximately 215 water bodies in the Coalition area (Table 5a-5c, East San Joaquin Water Quality Coalition Watershed Evaluation Report, Third Revised Report) that are classified into four categories (large, intermediate, small, or lake/reservoir) based on water flow and water body size. The seven large water bodies within the Coalition region are the Chowchilla River, Eastside Bypass, Fresno River, Merced River, San Joaquin River, Tuolumne River and Stanislaus River. With the exception of the Merced River, none of the large rivers are sampled. The Merced River is sampled but relatively high in the watershed to allow the integration of the sampling results from smaller water bodies that drain into the river upstream. Though the amount of irrigated agriculture within these watersheds is similar or even less than some of the watersheds classified as medium sized, water flow in these relatively larger watersheds is primarily a function of source water originating upstream of irrigated agriculture. These rivers have relatively greater base water flow due to snowmelt and reservoir releases. There are 16 intermediate sized water bodies in the Coalition Region. These are primarily natural creeks and sloughs that drain a large portion of the Coalition area. The 164 smaller water bodies in the Coalition area are small-sized natural creeks, agriculture canals, and/or drains. Current, past or potential monitoring sites are provided in Table 4Table 4 below. The site subwatershed size (listed as irrigated acres) may have changed due to updated information on the boundary of each subwatershed.

Table 4 contains what have been designated as site subwatersheds. The “site subwatershed” is the watershed formed from the location of the sample site, not the location where the subwatershed has its confluence with a downstream water body. Consequently, site subwatersheds may be smaller than the subwatershed in which they are found. For example, Black Rascal Creek @ Yosemite Road is a small site subwatershed although Black Rascal Creek is classified as an intermediate sized water body. (See glossary of terms for full definition.) Some watersheds do not connect to

downstream water bodies except under exceptional conditions such as major flood events.

Table 4. Site subwatersheds within the ESJWQC area listed by size designation (small, intermediate, and large).

Site Subwatershed	Size Designation	Size (Irrigated Acres)
Ash Slough @ Avenue 21	Intermediate	27,704
Bear Creek @ Kibby Rd	Intermediate	6,715
Berenda Creek @ Road 19	Intermediate	25,006
Berenda Slough along Road 18 ½ [2]	Intermediate	19,834
Cottonwood Creek @ Road 20	Intermediate	40,699
Deadman Creek @ Gurr Road	Intermediate	52,091
Deadman Creek @ Highway 59	Intermediate	38,231
Dry Creek @ Road 18	Intermediate	23,299
Dry Creek @ Wellsford Road	Intermediate	23,339
Duck Slough @ Gurr Road	Intermediate	28,712
Duck Slough @ Hwy 99 [3]	Intermediate	15,622
Dutchman Creek @ Highway 99	Intermediate	8,734
Highline Canal @ Hwy 99	Intermediate	35,003
Highline Canal @ Lombardy Ave	Intermediate	29,941
Mustang Creek @ East Ave	Intermediate	12,400
Merced River @ Santa Fe	Large	27,796
August Rd Drain @ Crows Landing Road[1]	Small	1,467
Black Rascal Creek @ Yosemite Rd [4]	Small	744
Cavill Drain @ McGee Road	Small	13,751
Cottonwood Creek @ Six Mile road	Small	442
Deane Drain @ Gurr Road	Small	4,701
Hatch Drain @ Tuolumne Ave	Small	553
Hilmar Drain @ Central Ave	Small	2,106
Jones Drain @ Oakdale Road	Small	2,817
Livingston Drain @ Robin Ave	Small	3,656
Mariposa Creek @ Simonson Way	Small	496
Mattos Drain @ Range Road	Small	1,130
Miles Creek @ Reilly Rd	Small	664
Owens Creek @ Kibby Road	Small	4,828
Prairie Flower Drain @ Crows Landing Road	Small	4,080
Root Creek @ Rd 35	Small	8,378
Silva Drain @ Meadow Drive	Small	69
South Slough @ Quinley Ave	Small	1,137
Western States Drain @ Central Ave	Small	6,109
Westport Drain @ Vivian Road	Small	1,474

[1] August Rd. Drain @ Crows Landing subwatershed has been removed from the sampling plan due to safety concerns for the sampling crews.

[2] Site subwatershed was previously named Berenda Slough @ Dairyland Road

[3] Site subwatershed was previously named Duck Slough @ Pioneer Rd
[4] Site subwatershed was previously named Black Rascal Creek @ Kibby Road

Watershed Drainage Maps

An overall map detailing the Coalition drainage designation for all site subwatersheds is provided in Figure 3. Maps showing drainage designation for each of the subwatersheds in the Merced, Madera and Stanislaus counties are provided in Figure 4-Figure 6.

Figure 3. Site subwatershed size designation for all subwatersheds in the Coalition region

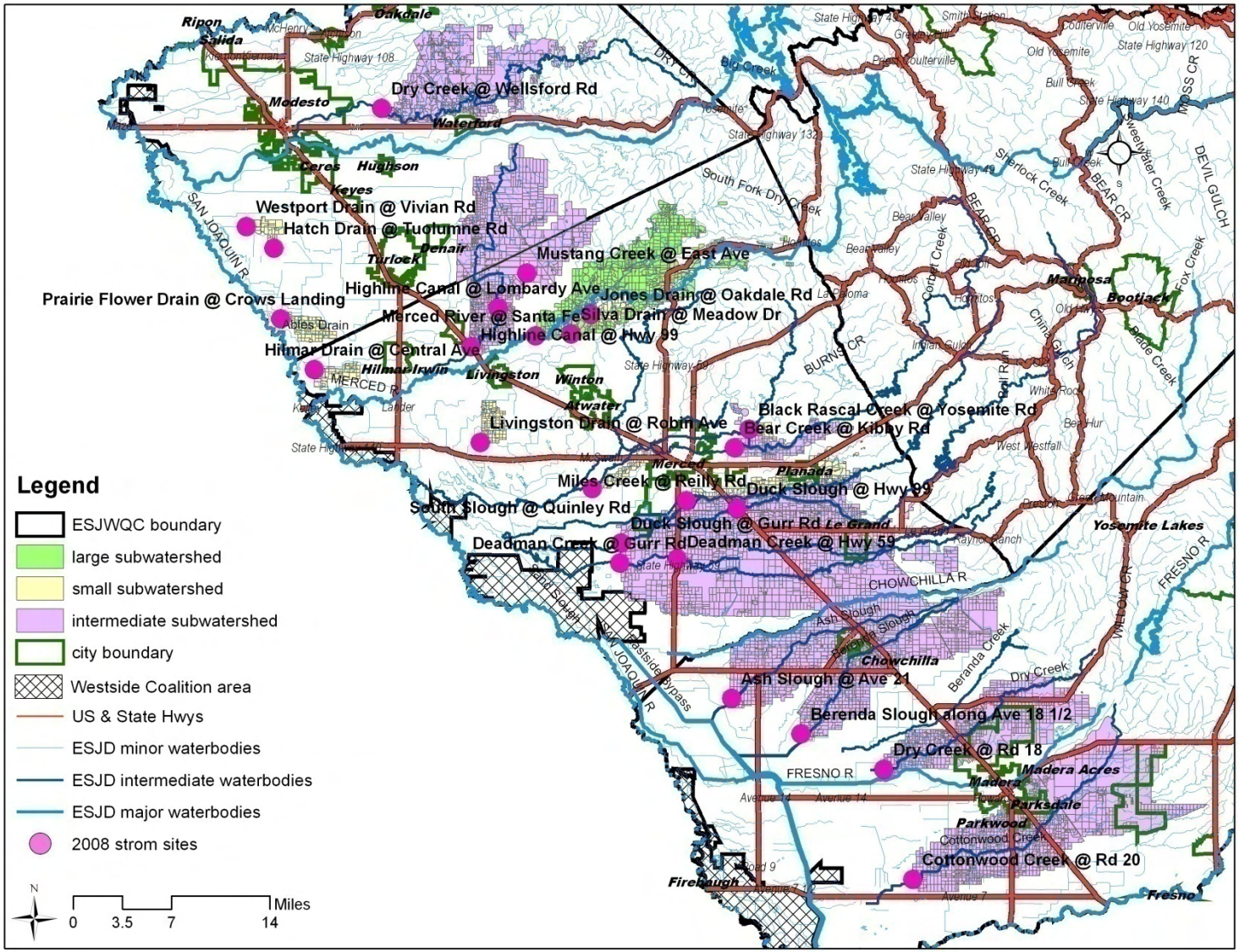


Figure 4. Site subwatershed size designation for Stanislaus County.

A size designation legend is included in Figure 3.

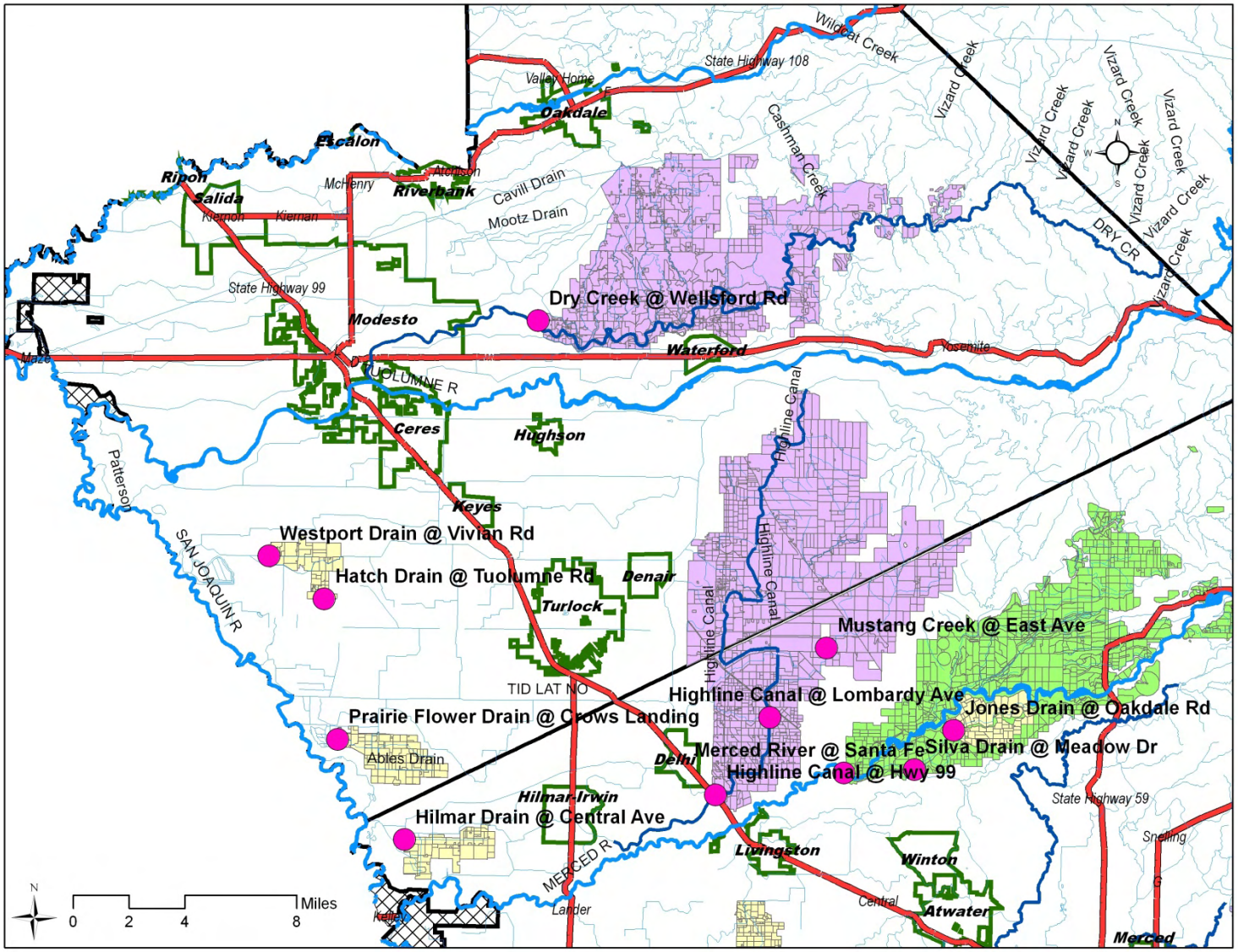


Figure 5. Site subwatershed size designation for Merced County.

A size designation legend is included in Figure 3.

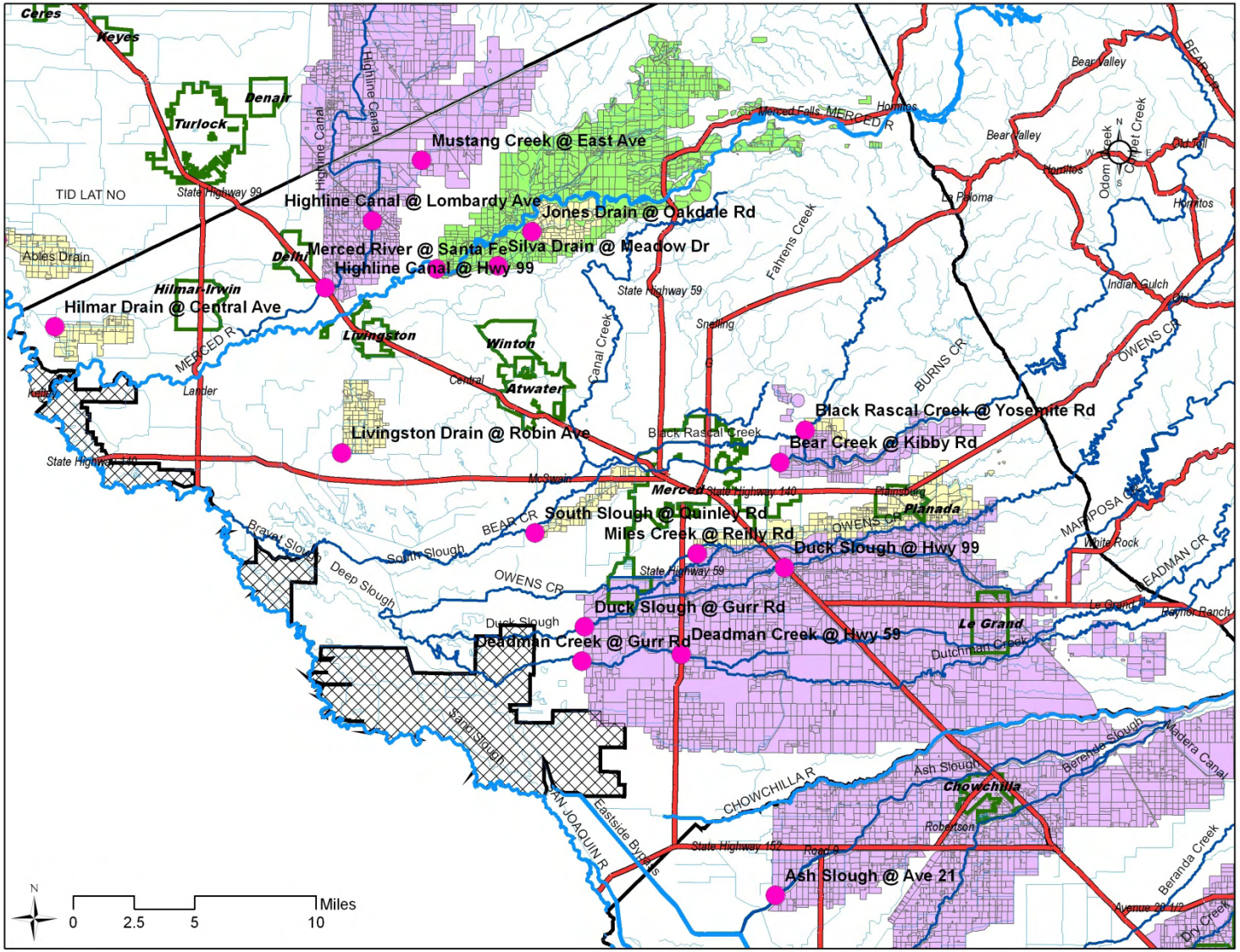
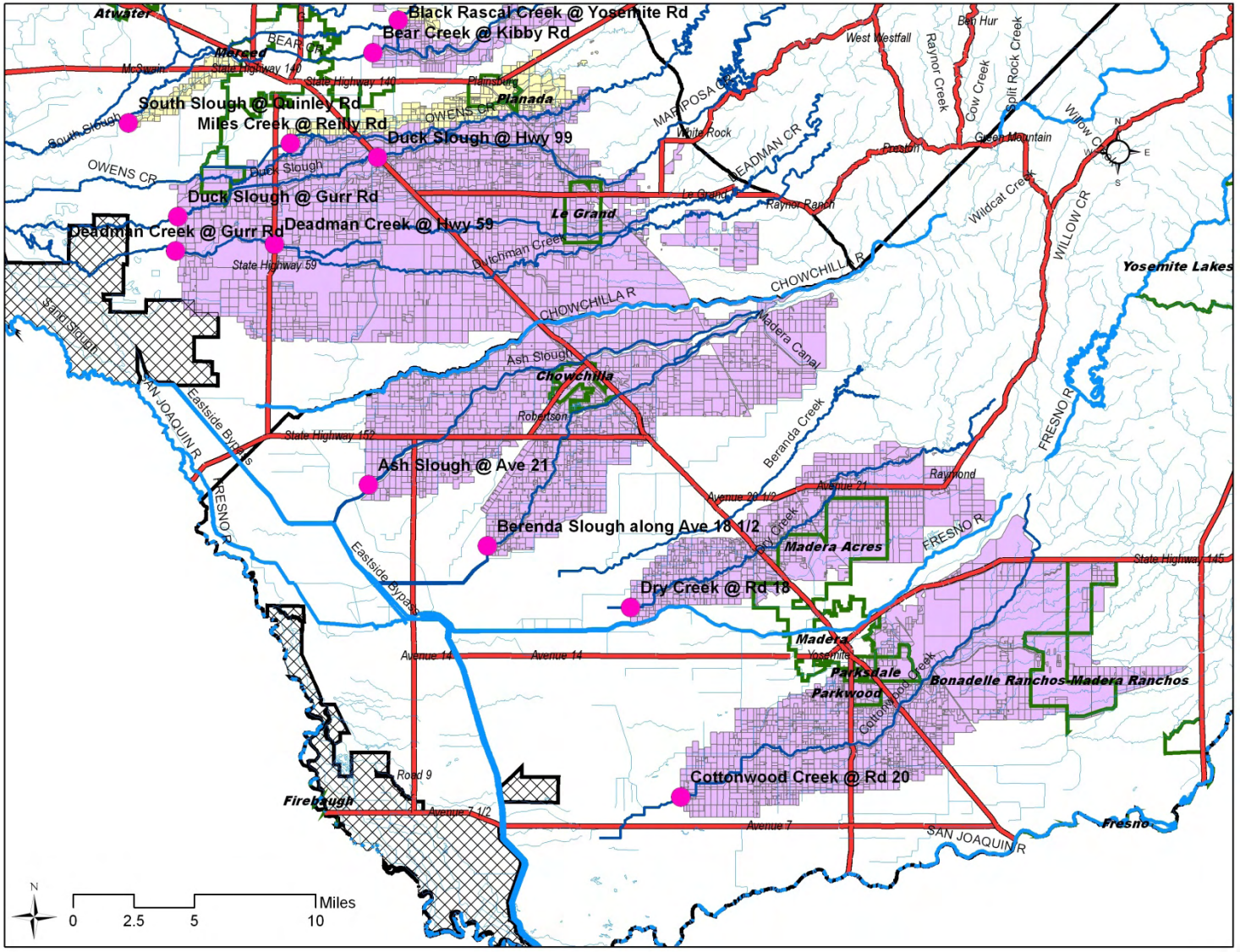


Figure 6. Site subwatershed size designation for Madera County.

A size designation legend is included in Figure 3.



Monitoring Objectives

History of Coalition Monitoring

Coalition ambient water and sediment quality monitoring has been conducted in the ESJWQC region since the inception of the Irrigated Lands Program in 2003. Each year both the number of sites monitored and the constituents analyzed have grown. In 2004 samples were collected from four sites and were sent to laboratories to test for nine total constituents/analytes as well as toxicity testing. By 2007, 24 monitoring sites were sampled and over 50 total analytes tested in addition to toxicity. Table 5 illustrates the sites monitored during each the storm and irrigation seasons across years of sampling.

Table 5. Sample sites and years monitored.

A blank cell indicates that no sampling occurred at that site during the specified season. "Dry" indicates that the site was dry during one or more events during the specified monitoring season.

Station Name	2004	2005		2006		2007		2008
	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm
Ash Slough @ Ave 21			x	x	x	Dry	Dry	Dry
August Road Drain upstream of Crows Landing Bridge (Hogin Rd)	x							
Bear Creek @ Kibby Rd		x	x	x	x	x	x	x
Berenda Slough along Ave 18 1/2					x	Dry	x	x
Black Rascal Creek @ Yosemite Rd					x	x	x	x
Cottonwood Creek @ Rd 20		x	x	x	x	Dry	x	x
Deadman Creak @ Hwy 59					x	x	x	x
Deadman Creek (Dutchman) @ Gurr Rd	x				x	x	x	x
Dry Creek @ Rd 18			x	Dry	x	x	x	x
Dry Creek @ Wellsford Rd		x	x	x	x	x	x	x
Duck Slough @ Gurr Rd	x	x	x	x	x	x	x	x
Duck Slough @ Hwy 99		x	x	x	x	x	x	x
Highline Canal @ Hwy 99			x	x	x	x	x	x
Highline Canal @ Lombardy Ave		x	x	x	x	x	x	x
Hilmar Drain @ Central Ave		x	x	x	x	x	x	x
Jones Drain @ Oakdale Rd		x	x	x	x	x	x	
Lone Willow Slough @ Madera Ave		x	x					