

Meeting Agenda

Yolo Storm Water Resources Plan

Working Group Meeting 4

Handouts and Meeting Materials Available on Yolo WRA Website:
http://www.yolowra.org/projects_swrp.html

Location: Yolo County Flood Control and Water Conservation District Boardroom,
 34274 State Highway 16, Woodland 95695
 Call-In Number: (855) 813-2486; Access Code: 2714#
 Date/Time: 01 June 2017, 8:30 AM

1	Review Agenda and Safety Moment	5 minutes
2	Summary of Last Meeting (May 4, 2017)	5 minutes
3	Continued from 5/4/17 Quantitative Methods Pt 1 – Example Output <ul style="list-style-type: none"> • Simple Method - http://www.stormwatercenter.net/monitoring%20and%20assessment/simple%20meth/simple.htm#limitations 	10 minutes
4	Continued from 5/4/17 -Identification of DACs/EDAs for additional outreach <ul style="list-style-type: none"> • DAC/EDA mapping <ul style="list-style-type: none"> ○ https://gis.water.ca.gov/app/dacs/ ○ https://gis.water.ca.gov/app/edas/ • Participants <ul style="list-style-type: none"> ○ Madison, Esparto, Knights Landing, others? ○ Community groups? 	15 minutes
5	Start of Call for Projects – due July 28, 2017 <ul style="list-style-type: none"> • Current project list • Call for projects form • Project Discussion 	20 minutes
6	SWRP Sections <ul style="list-style-type: none"> - Comments on Draft Section 1: Introduction and SWRP Objectives - Draft Section 2: Watershed Identification - Draft Section 3: Water Quality Compliance 	15 minutes
7	Other Discussion	5 minutes

**Yolo Storm Water Resources Plan
Working Group Meeting 4**
01 June 2017

8	<p>Next Meeting – July 6, 2017, 10:30 am, Yolo County Flood Control and Water Conservation District Boardroom, 34274 State Highway 16, Woodland 95695</p> <p>Potential Topics:</p> <ul style="list-style-type: none"> - Projects discussion/support, case studies - DAC Outreach Meetings 	5 minutes
9	<p>Handouts – Available on Yolo WRA IRWMP website: http://www.yolowra.org/projects_swrp.html</p> <ol style="list-style-type: none"> 1. Westside Sac IRWM Project Form + SWRP Projects Addendum (Draft) 2. Project List 3. Draft SWRP Sections 2 and 3 4. Draft Project review and prioritization process 	

Handout 1

Yolo County SWRP Current Project List Implementation Projects

Lead Agency Organization	Name of Primary Contact	Email	Project Title
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	505-East Channel Restoration
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Apricot Draw Bank Stabilization
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Putah Creek Interdam Reach Invasive Weed Control
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Thompson Canyon Bank Stabilization Design and Permits
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Warren Weed Control
Cache Creek Conservancy	Lynnel Pollock	lpollock@cachecreekconservancy.org	Implementation of the Cache Creek Resources Management Plan
City of Davis	Michael Lindquist	mlindquist@cityofdavis.org	Wastewater Treatment Plant Secondary and Tertiary Improvements
Yolo County Flood Control and Water Conservation District	Tim O'Halloran	tohalloran@ycfcwcd.org	Winters Main Canal Modernization Project: Integrated Precision Water Mgmt.
Yolo County Flood Control and Water Conservation District	Max Stevenson	mstevenson@ycfcwcd.org	Abandoned Well Incentive Program
Yolo County Service Area #6	Regina Espinoza	Regina.Espinoza@yolocounty.org	County Service Area (CSA) #6 Levee Repair Project
Knights Landing Ridge Drainage District	Lewis Bair	lbair@rd108.org	Mid Valley, Knights Landing Repair Project
Woodland-Davis Clean Water Agency	Lynanne Mehlhaff, WDCW	LMEHLHAFF@WDCWA.com	Davis-Woodland Water Supply Project
West Sacramento Area Flood Control Agency	Michael Bessette, P.E.	michaelb@cityofwestsacramento.org	Sacramento River Levee Repair
West Sacramento Area Flood Control Agency	Michael Bessette, P.E.	michaelb@cityofwestsacramento.org	Sacramento River Recreational Trail
West Sacramento Area Flood Control Agency	Michael Bessette, P.E.	michaelb@cityofwestsacramento.org	Sacramento Bypass-Yolo Bypass Levee Repair Phase II
Yolo County Flood Control and Water Conservation District	Tim O'Halloran	tohalloran@ycfcwcd.org	Conjunctive Water Use Program
Yolo County Resource Conservation District	Jeanette Wrynski	wrynski@yolorcd.org	Implementation of the Cache Creek Watershed Invasive Weed Management Plan
Yolo County Resource Conservation District	Jeanette Wrynski	wrynski@yolorcd.org	Agricultural Drain, Slough and Canal Riparian Habitat Enhancement
Putah Creek Council	Libby Earthman	libby@putahcreekcouncil.org	Native Plant Nursery to Support Putah-Cache Ecotype Restoration
City of Woodland	Tim Busch	tim.busch@cityofwoodland.org	Well 29 ASR Project
Yolo County Flood Control and Water Conservation District	Tim O'Halloran	tohalloran@ycfcwcd.org	Regional Drought Preparedness through Increased Groundwater Recharge
City of Davis	Dawn Calciano	dcalciano@cityofdavis.org	Parks and Greenbelts Irrigation and Landscape Upgrades
City of Davis	Martin Jones	mjones@cityofdavis.org	Russel Boulevard Demonstration LID Project
Davis Joint Unified School District	George Parker	gparker@djud.net	Harper Junior High Water Conservation Improvements
City of Winters	Carol Scianna	carol.scianna@cityofwinters.org	North Area Stormwater/ Flood Control /Groundwater Recharge/Habitat Development Project
City of Winters	Carol Scianna	carol.scianna@cityofwinters.org	Winters Outflow Bio Swales Project
UC Davis	Lisa Moretti	lmoretti@ucdavis.edu	Arboretum Waterway Wetland Restoration and Enhancement
City of Woodland	Chris Fong	chris.fong@cityofwoodland.org	North Regional Pond and Pump Station
City of Woodland	Chris Fong	chris.fong@cityofwoodland.org	North Canal Pump Station
Madison Community Services District	Leo Refsland	lrefmcsd.st@yahoo.com	Camp Well

Handout 1

Yolo County SWRP Current Project List Conceptual/Planning Projects

Lead Agency Organization	Name of Primary Contact	Email	Project Title
West Sacramento Area Flood Control Agency	Michael Bessette, P.E.	michaelb@cityofwestsacramento.org	Bees Lakes Preserve
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Dry Creek Wildlife Migration Corridor Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Duncan-Giovannoni Channel Restoration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Glide Ranch Channel Restoration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Lower McNamara Pool Channel Reconfiguration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	MacQuiddy Channel Reconfiguration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Mace to Road 106A Channel Restoration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Nishikawa Channel Restoration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Old Davis Road to Mace Channel Restoration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Olmo-Hammond-UCD Channel Restoration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Restoria Channel Restoration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Road 106A to Yolo Bypass Channel Restoration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Russell Ranch Channel Restoration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Stevenson Bridge Channel Restoration Feasibility Study
Lower Putah Creek Coord. Committee	Rich Marovich	rmarovich@scwa2.com	Upper McNamara Pool Channel Reconfiguration Feasibility Study
Solano County Water Agency	Alexander A. Rabidoux	arabidoux@scwa2.com	Research on Hydrodynamics and WQ Interactions in the Delta.
Solano County Water Agency	Alexander A. Rabidoux	arabidoux@scwa2.com	Risk Assessment of Delta Water Supplies
Solano County Water Agency	Alexander A. Rabidoux	arabidoux@scwa2.com	Source water protection for Delta water sources
Solano County Water Agency	Alexander A. Rabidoux	arabidoux@scwa2.com	Source water protection for Putah Creek watershed
RWVG with selected Lead Agency			Regional Invasive Plants, Aquatic and Terrestrial Weeds Management Plan
Solano County Water Agency	Alexander A. Rabidoux	arabidoux@scwa2.com	Wetland Restoration Research and Impacts to Source Water Quality.
City of Woodland / floodSAFE Yolo Pilot Program	Mark Cocke	Mark.Cocke@cityofwoodland.org	Lower Cache Creek Flood Risk Reduction Project
RWVG with selected Lead Agency			Regional Invasive Mussels Management Plan
Tuleyome, Inc.	Bob Schneider	bschneider@tuleyome.org	Comprehensive Mercury Assessment and Implementation for the Westside Region
West Sacramento Area Flood Control Agency	Dave Shpak	daves@cityofwestsacramento.org	Lower Sacramento and Delta North Regional Flood Management Plan
Lake County Water Resources Dept	Gary Hansen	Gary.Hansen@lakecountyca.gov	Increase Cache and Putah Creek Watershed Education and Outreach
Lake County Water Resources Dept	Gary Hansen	Gary.Hansen@lakecountyca.gov	Form Task Force/Subcommittee to strategize and implement Watershed Education and Outreach
West Sacramento Area Flood Control Agency	Michael Bessette, P.E.	michaelb@cityofwestsacramento.org	Deep Water Ship Channel East Levee Repair
West Sacramento Area Flood Control Agency	Michael Bessette, P.E.	michaelb@cityofwestsacramento.org	Deep Water Ship Canal Navigation Levee Repair
West Sacramento Area Flood Control Agency	Michael Bessette, P.E.	michaelb@cityofwestsacramento.org	Port of West Sacramento North and South Levee Repair
West Sacramento Area Flood Control Agency	Michael Bessette, P.E.	michaelb@cityofwestsacramento.org	West Sacramento South Cross Levee Repair
Yolo County	Wes Ervin	wes.ervin@yolocounty.org	Yolo County Airport Drainage Plan

Handout 1

Yolo County SWRP Current Project List Conceptual/Planning Projects

Lead Agency Organization	Name of Primary Contact	Email	Project Title
Yolo County	Cindy Tuttle	cindy.tuttle@yolocounty.org	Analysis of BDCP's Yolo Bypass Conservation Measure and Other Measures
Yolo County, Natural Resources Division	Cindy Tuttle	cindy.tuttle@yolocounty.org	Cache Creek Parkway Plan
Yolo County	Cindy Tuttle	cindy.tuttle@yolocounty.org	Clarksburg Flood Protection Feasibility Study
Yolo County Parks	Jen Santos	jennifer.santos@yolocounty.org	Lower Cache Creek Campground and Habitat Restoration
Yolo County	Cindy Tuttle	cindy.tuttle@yolocounty.org	Methylmercury Impacts Analyses for the Yolo Bypass
Putah Creek Council	Libby Earthman	libby@putahcreekcouncil.org	Pollution Prevention and Watershed Education Project
Yolo Basin Foundation	Robin Kulakow 530-756-72	robin@yolobasin.org; abrice@yolobasin.org	Lower Putah Creek Restoration from Toe Drain to Putah Creek Diversion Dam (Yolo Bypass Wildlife Area Element)
Reclamation District 2035	Regina Cherovsky	regina@conawayranch.com	Tule Canal Habitat Enhancement & Sediment Removal
Reclamation District 2035	Regina Cherovsky	Regina@conawayranch.com	Levee Repairs/Maintenance- Segments 150, 173 and 297
Reclamation District 2035	Regina Cherovsky	regina@conawayranch.com	Floodway Corridor Project
Reclamation District 2035	Regina Cherovsky	regina@conawayranch.com	Cross Bypass Canal Modernization
Reclamation District 2035	Regina Cherovsky	regina@conawayranch.com	Conjunctive Use Study
RWMG with selected Lead Agency			Regional Capital Improvement Plan
Reclamation District 999	Bob Weber	recdist999@sprintmail.com	Elk Slough Groundwater Quality Improvement and Flood Protection Project
City of Davis	Rhys Rowland	rrowland@cityofdavis.org	Drainage Channel Feasibility Study
City of Davis	Rhys Rowland	rrowland@cityofdavis.org	Retention Pond Feasibility Study
City of Davis - Public Works and Parks Department	Dawn Calciano	dcalciano@cityofdavis.org	Bike Tunnel Landscaping Redesign for Stormwater Quality Improvement
City of Davis	Dawn Calciano	dcalciano@cityofdavis.org	Hardscape conversion to pervious pavement
City of Davis	Dawn Calciano	dcalciano@cityofdavis.org	Rocky Swale to Bioswale Conversion
City of Davis	Dawn Calciano	dcalciano@cityofdavis.org	Covell Drainage Channel Redesign
City of Davis	Dawn Calciano	dcalciano@cityofdavis.org	Feasibility Study for Stormwater Trash Control Measures
UC Davis	Lisa Moretti	lmoretti@ucdavis.edu	Agricultural Field Tailwater/Stormwater Basins and Wildlife Corridors
City of Woodland	Chris Fong	chris.fong@cityofwoodland.org	North Urban Area Storm Drain Facilities Master Plan Update
City of Woodland / State of California	Chris Fong	chris.fong@cityofwoodland.org	Outfall Channel Culvert Replacement Through to Yolo Bypass @ West Levee
City of Woodland	Chris Fong	chris.fong@cityofwoodland.org	West Regional Pond Expansion
City of Woodland	Chris Fong	chris.fong@cityofwoodland.org	South Regional Detention Pond
City of Woodland	Chris Fong	chris.fong@cityofwoodland.org	MS4 Trash Amendment Compliance
City of Woodland	Chris Fong	chris.fong@cityofwoodland.org	Storm Water System Improvements, Maintenance, and Repairs
Madison Community Services District	Leo Refsland	lrefmscd.st@yahoo.com	Willow Slough/ Madison Storm Drain Relief basin
Madison Community Services District	Leo Refsland	lrefmscd.st@yahoo.com	Storm water maintenance area
Madison Community Services District	Leo Refsland	lrefmscd.st@yahoo.com	Madison Rock Wall

Section 2: Watershed Identification

As introduced in Section 1, development of the SWRP boundary started with the Westside IRWM Planning Region, and based on stakeholder interest, was focused to the drainages within Yolo County. Although there is no formalized analysis of countywide water inventories for land use planning, Water Resources Association of Yolo County (Yolo WRA) is the primary forum for collaboration among water managers in Yolo County. The Yolo WRA, a member of the Westside RWMG, provides a regional forum to coordinate and facilitate solutions to water challenges and opportunities in Yolo County, including storm water management. The Yolo WRA currently has 10 member agencies, which include agricultural water suppliers, urban water suppliers, groundwater managers, and flood protection providers (RWMG, 2013). Through focused meetings, these agencies can effectively interact and make key decisions to facilitate storm water management efforts within the Yolo County watersheds.

Yolo County makes up about 1,034 square miles of the Sacramento Hydrologic Region in northern California. It is also underlain completely by the Sacramento Valley Groundwater Basin. This section describes the SWRP Planning Area water resources and provides context for watershed management issues that should be addressed through implementation of this SWRP, the Westside IRWMP, or other county-wide or regional efforts.

2.1 Surface Water Resources

As shown in Figure 2-1, Yolo County is located within the Sacramento Hydrologic Region as defined by DWR and includes the lower portions of both the Putah Creek and Cache Creek watersheds, as well as the surrounding low-lying drainage basins in the region, including the Colusa Basin drain (a portion of the Sacramento-Stone Corral watershed) and Lower Sacramento watershed.

2.1.1 Hydrologic Boundary

The SWRP watershed delineation is based on the 12-digit (most detailed) United States Geological Survey (USGS) Watershed Boundary Dataset for subwatersheds. The key water features as indicated by the USGS subbasin boundaries (using Hydrologic Unit Code Level 8) are Cache Creek (which captures the Cache Creek watershed), Putah Creek (which captures

the Putah Creek watershed), and the Sacramento River (which captures the Sacramento-Stone Corral and Lower Sacramento watersheds). The Yolo Bypass is used to manage the much larger Sacramento River watershed flood flows.

While the actual Cache and Putah Creek watersheds account for only a small percentage of the lower land area of the SWRP Area, water from Cache Creek and Putah Creek comprise a majority of the water entering Yolo County. Direct discharges to the Sacramento River from Cache and Putah Creeks are limited to larger, more significant flood events, which historically had to overtop the broad natural levees adjacent to the river. Currently, water from Cache and Putah Creek continue to pond during flood events, but the water is also managed through a series of facilities that can convey flows to the Sacramento River during high-runoff events (RWMG, 2013).

2.1.1.1 Cache Creek Watershed

The Cache Creek watershed encompasses approximately 1,165 square miles, and about 248 square miles of the watershed is located in Yolo County (approximately 21 percent). Cache Creek provides numerous benefits, including habitat and water supply. YFCWCDC owns the Cache Creek Dam, located on Cache Creek approximately 5 miles downstream of Clear Lake outlet, and operates both Cache Creek Dam and Clear Lake in accordance with the Solano and Gopcevic Decrees. The North Fork Cache Creek subwatershed drains the area north of Clear Lake and includes Long Valley Creek, Wolf Creek, and Bartlett Creek. YFCWCDC owns and operates the Indian Valley Dam on the North Fork Cache Creek, which forms the Indian Valley Reservoir. Indian Valley Reservoir has a total storage capacity of 300,600 AF, of which 40,000 AF is dedicated to flood control. Bear Creek drains the area to the east of the North Fork Cache Creek, and its watershed lies entirely within Colusa County. Bear Creek flows into the main stem of Cache Creek at the border of Colusa and Yolo Counties (RWMG, 2013).

After Cache Creek flows into Yolo County, it continues through the agriculturally intensive Capay Valley until it reaches the Capay Diversion Dam, where some flows are diverted into YCFCWCD's irrigation system. Cache Creek continues downstream of Capay Dam, where it terminates in an area known as the Cache Creek Settling Basin, just upstream of the Yolo Bypass. Cache Creek is considered an intermittent stream, in that flows in the creek are inconsistent, and there are periods particularly during the summer when no streamflow is present (RWMG, 2013).

The Cache Creek Settling Basin is a component of the Sacramento River Flood Control Project. It was designed to trap sediments carried by Cache Creek and prevent them from being deposited in the Yolo Bypass, thereby maintaining the flood capacity of the Yolo Bypass. The settling basin has an overflow into the Yolo Bypass, which allows flow to enter the Sacramento River upstream of Rio Vista in Solano County (RWMG, 2013).

2.1.1.2 Putah Creek Watershed

The Putah Creek watershed encompasses approximately 654 square miles and is 50 miles wide, extending from Cobb Mountain (elevation 4,700 feet) in Lake County to the Yolo Bypass (elevation a few feet above sea level). About 48 square miles of the watershed is located in Yolo County (approximately 7 percent). Tributaries to Putah Creek within Lake County include Harbin Creek, Big Canyon Creek, St. Helena Creek, Dry Creek, Coyote Creek, and Soda Creek. From Lake County, Putah Creek flows into Napa County and Lake Berryessa. The major tributaries within Napa County include Pope Creek, Chiles Creek, Capell Creek, and Eticuera Creek. Lake Berryessa has a storage capacity of 1,602,000 AF and is regulated by Monticello Dam, which is owned by USBR and operated by Solano County Water Agency. From the outlet of Monticello Dam, Putah Creek flows into Solano County, where it eventually discharges to the Yolo Bypass (RWMG, 2013).

The South Fork of Putah Creek is an artificial channel constructed over a period of several decades, beginning in the 1870s. It departs from the natural creek channel about 1 mile upstream of Interstate 80 and flows directly east to the Yolo Bypass (Brice, 1998). The creek eventually abandoned its original channel (the North Fork) entirely and was named the South Fork Putah Creek for practical purposes. In the 1940s, the U.S. Army Corps of Engineers constructed levees along the lowermost 9 miles of the South Fork channel as part

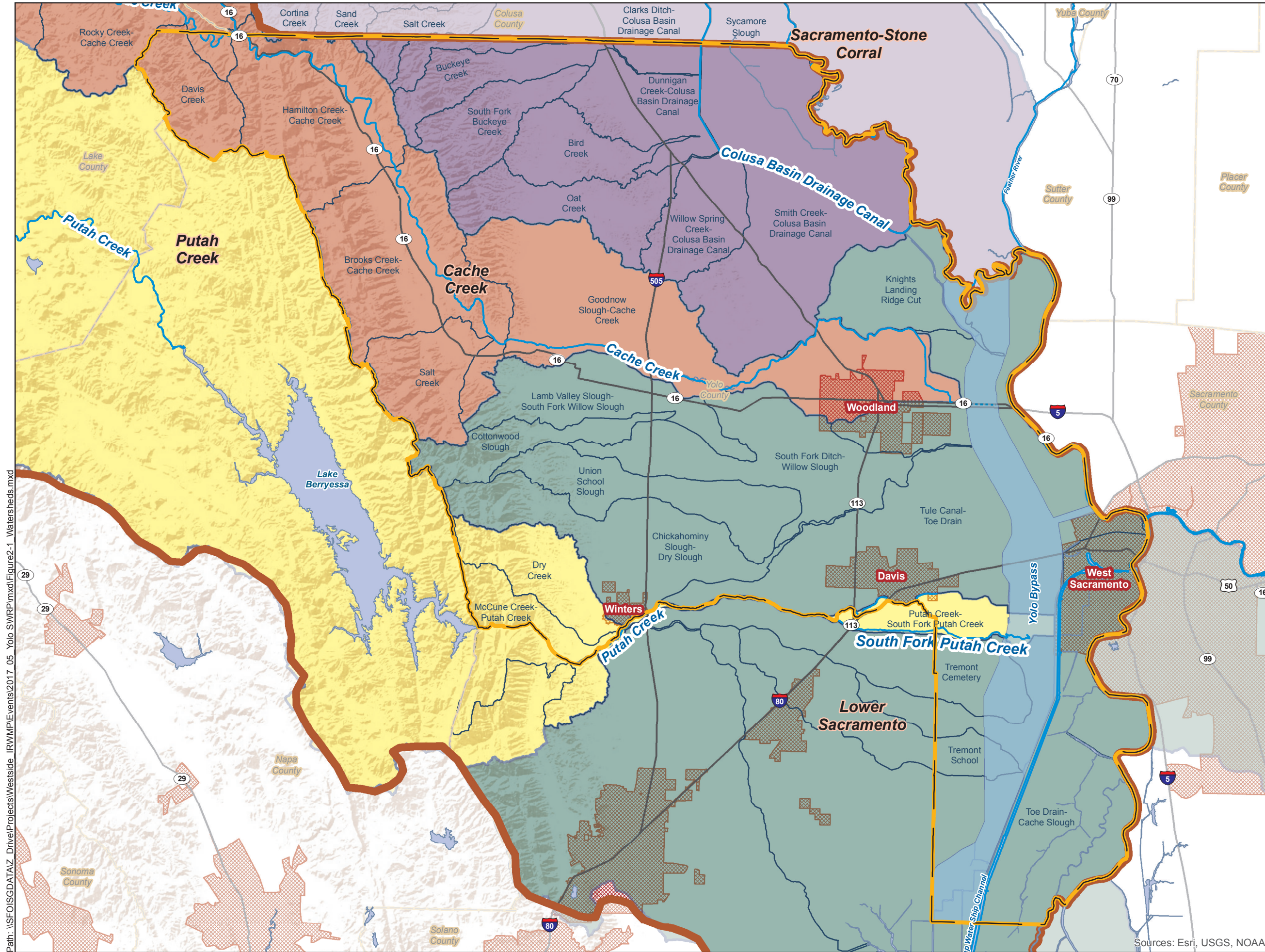
of the Sacramento River Flood Control Project (U.S. Fish and Wildlife Service, 1992).

2.1.1.3 Sacramento-Stone Corral Watershed

The Sacramento-Stone Corral watershed encompasses 1,884 square miles, most of which is located outside of Yolo County. Flows in the watershed generally travel from the coastal ranges in the west towards the Sacramento River. The majority of water from the watershed is discharged to the Sacramento River outside the region; however, the southernmost portion of the watershed flows into the county via the Colusa Basin Drain. This drain is a man-made channel designed to convey irrigation drainage and storm runoff from 32 ephemeral streams to the Knights Landing outfall gates for discharge into the Sacramento River. Seven of these streams originate in the Dunnigan Hills of Yolo County (RWMG, 2013). The Sacramento-Stone Corral watershed comprises nearly 1,884 square miles in the Sacramento Valley and includes portions of Glenn, Colusa, and Yolo Counties. About 250 square miles of the watershed is located in Yolo County (approximately 13 percent).

2.1.1.4 Lower Sacramento River Watershed

The Sacramento River forms the easterly border of the County. The entire Sacramento River watershed covers approximately 27,000 square miles in Northern California, of which the Lower Sacramento River watershed makes up 1,229 square miles (approximately 4.6 percent). Yolo County, which lies near the downstream end of the Sacramento River, encompasses around 39 percent (approximately 476 square miles) of the Lower Sacramento River watershed. Because of its location and relatively small drainage area, the portion of the Sacramento River located within the county is influenced heavily by the areas outside it.



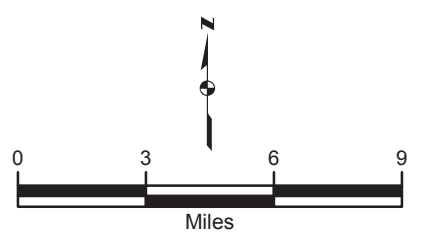
Legend

- City Boundaries
- County Boundaries
- Westside Region
- Streams
- Projected Flow Pathway
- Water Bodies

Watersheds

- Lower Sacramento
- Sacramento-Stone Corral
- Cache Creek
- Putah Creek
- Subwatersheds

Source:
National Watershed Boundary Dataset.
U.S. Geological Survey, 04/01/2009



Kennedy/Jenks Consultants

Watersheds

K/J 1770002.00
May 2017

Figure 2-1

Path: \\SFOISGDATA\Z Drive\Projects\Westside IRWMP\Events\2017_05_Yob SWRP\mxd\Figure2-1_Watersheds.mxd

Sources: Esri, USGS, NOAA

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2.2 Groundwater Resources

Groundwater makes up approximately 33 percent of the water supply for users in Yolo County in an average water year, and for many agricultural users and municipalities, groundwater is the only source of water supply. Some agricultural areas are fully reliant on groundwater. Municipalities such as the cities of Woodland and Davis currently obtain their drinking water supplies from well water pumped from the deeper Tehama formation. Water from the Tehama formation is of high quality, but water managers are uncertain about the sustainable yield of the aquifer.

Water stored in groundwater aquifers serve as a key water supply source in Yolo County. Thousands of groundwater wells exist within the county, and most of these groundwater wells are used to supply individual domestic demands or small agricultural operations. Some of the larger towns and cities also operate municipal wells to meet or help meet urban, municipal, and industrial demands. Some of the communities within the county such as Davis, UC Davis, and Woodland currently rely on groundwater as their sole supply source. Maintaining sustainable groundwater aquifers that yield high quality groundwater will be crucial to meet the long-term water demands within the county.

Yolo County primarily encompasses the Yolo Subbasin of the Sacramento Valley groundwater basin as designated by DWR Bulletin 118 (2016 Update) as shown in Figure 2-2. A small portion of Yolo County intersects the Solano Subbasin to the south. The water bearing formations of this basin generally have very high storage capacity and are essentially contained within two stratigraphic units: (1) the deeper older thick alluvial and river sediments of the Tehama formation, and (2) the younger shallower sediments, floodplain deposits, and stream channel deposits that overlie the Tehama formation (DWR B118, 2016). The sustainable yield of the Yolo Subbasin is not yet fully understood, but the DWR Bulletin 118 has not identified the subbasin as in an overdraft condition.

Groundwater quality concerns in the region relate to drinking water and irrigation uses. Constituents of concern within Yolo County include: arsenic, boron, chromium, salinity, iron, magnesium, nitrate, selenium, and total dissolved solids (TDS). In general, based on the measured levels of these constituents in wells within the county, groundwater quality meets agricultural quality

standards but are exceeding or just below maximum contaminant levels (MCLs) set for drinking water.

2.3 Land Use Description

The County encompasses more than 322,000 acres (504 square miles) of land, which is dominated by agriculture and open space (with native vegetation). Agriculture makes up approximately 49 percent of the total land area, whereas urban and community developments represent only 5 percent of the total land area. Open space (44 percent of the county), provides essential habitat for native species and broad-ranging opportunities for recreation. Tourists and residents are attracted to the region's lakes, waterways, and lands for recreational activities like boating, fishing, hiking, camping, and hunting. These lands are managed by local and private entities as well as federal and state agencies such as the Bureau of Land Management (BLM), the U.S. Forest Service (USFS), and California Department of Fish and Game (CDFG). Table 2-1 summarizes the existing land use classifications in the SWRP Area, and Figure 2-3 illustrates the distribution of land uses throughout the county. Figure 2-4 shows the land management agencies within Yolo County, including municipalities and tribal entities discussed in the following subsection.

Table 2-1: Yolo County Land Use Distribution

Land Use Category	Total Acres	Percent of Total
Agricultural	322,224	49.4
Communities	33,074	5.1
Water Surface	10,481	1.6
Native Riparian/Vegetation	256,920	43.7
Barren/Unclassified	1,218	<1
Total Acres	623,917	100

Source: California Department of Water Resources, Land Use Survey, Yolo County, 2008.

2.3.1 Communities

The major communities and tribal areas within the county are shown in Figure 2-4. The Yooha Dehe Wintun tribal area is located at the western side of the county. The four incorporated cities within the county are Davis, West Sacramento, Winters, and Woodland. Other unincorporated communities scattered throughout the county include Esparto, Knights Landing, Dunnigan, Monument Hills, Clarksburg, Madison, Yolo, Zamora.

2.3.2 Water and Wastewater Service Providers

The county includes 45 major municipalities, special districts, and agencies with water supply, wastewater management, flood control, and other water or resource management responsibilities. It includes 14 agencies that are strictly wholesale or retail water suppliers and 5 agencies providing both water and wastewater services. There are 2 agencies that provide only flood control services and 11 reclamation districts that provide flood control and storm drain maintenance services. There are 5 agencies that provide other water resource coordination, and the remaining 8 agencies provide some combination of the above services. Figure 2-5 identifies the service areas and agency boundaries for the municipalities and agencies where data are available. See Appendix B for a listing of the water and wastewater service agencies within Yolo County, as well as brief overviews for each system.

Of the 23 county agencies that currently deliver water, 11 pump groundwater, 7 divert surface water, and 5 supply a combination of groundwater, surface water, and other water supply.

There are also 80 minor water systems within the county, of which 75 use groundwater as their sole source of water supply, and the remaining using either surface water or non-potable water.

2.3.3 Other Land Use Agencies

Local, state, and federal land management agencies in the county are shown in Figure 2-4 and include the following:

- Yolo County
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- U.S. Fish and Wildlife
- U.S. Forest Service
- California Department of Fish and Wildlife
- State Lands

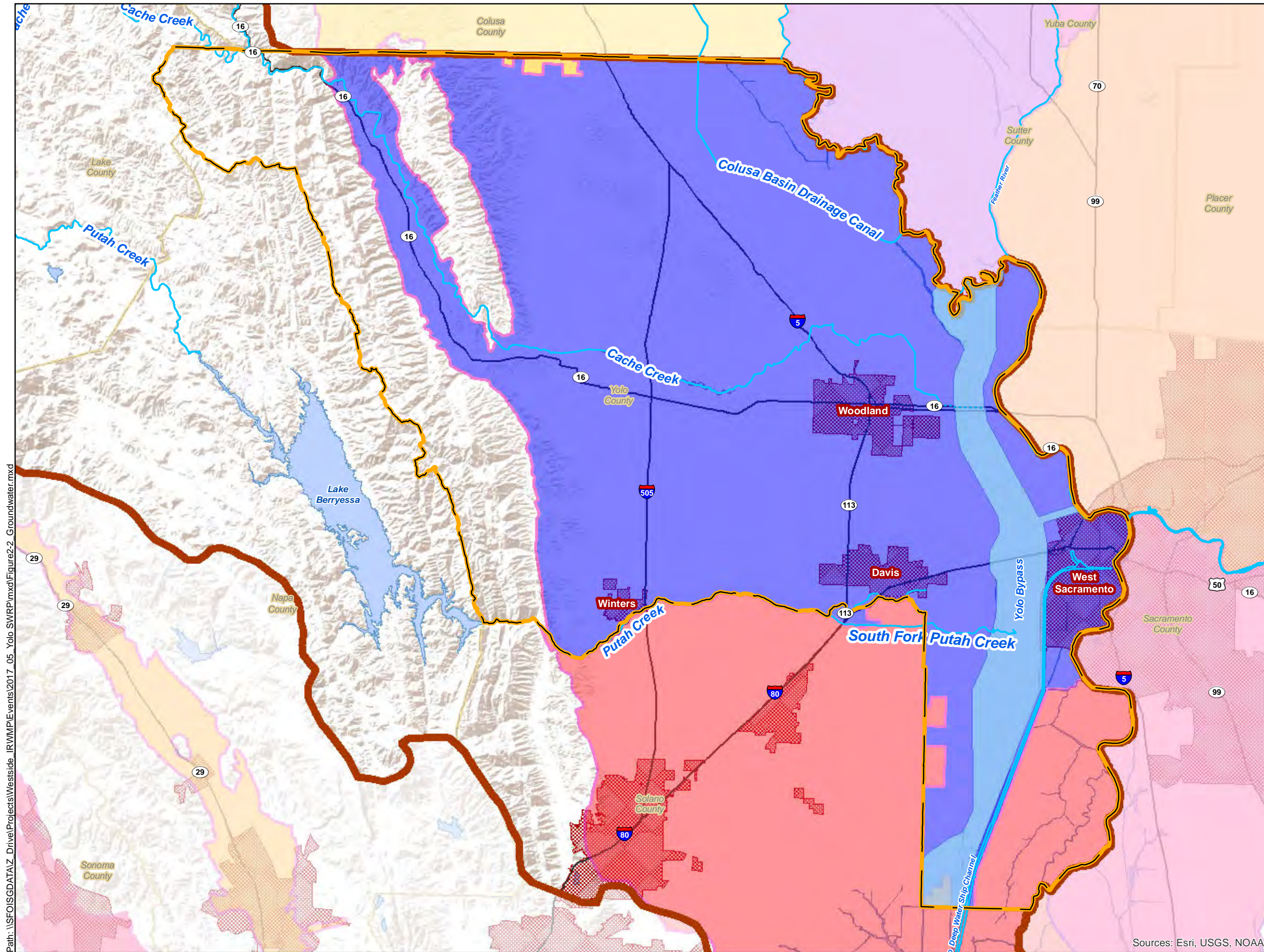
2.4 Watershed Management Issues

The SWRP presents an opportunity to address the issues identified in the Westside IRWMP specific to storm water resource management in Yolo County. Challenges identified in the IRWMP related to storm water management include: Habitat and Invasive Species, Infrastructure Protection, Flood Management and Other Natural Disasters, Climate Change, Water Quality, Sustaining Groundwater Resources, and Land Use.

2.4.1 Habitat and Invasive Species

The lakes, creeks, wetlands, sloughs, and other water features throughout the region provide key habitat for many of California's well-known fish and wildlife species (see Figure 2-6). Anadromous fish migrate into the region and use its waterways for spawning. Resident and migratory waterfowl rely on the lakes and wetlands for food and nesting habitat. Changes to the landscape from agriculture, development, and flood control projects have diminished aquatic and riparian habitat over the last 150 years (RWMG, 2013).

Regional conservation areas, such as the Yolo Bypass Wildlife Area and Cache Creek Natural Area/Cache Creek Wilderness Area have been established to protect important habitats and species. Cache Creek is designated as a California Wild and Scenic River. This designation for more than 31 miles of the creek is aimed at maintaining free-flowing conditions and preserving its aquatic and riparian environment (RWMG, 2013).



Legend

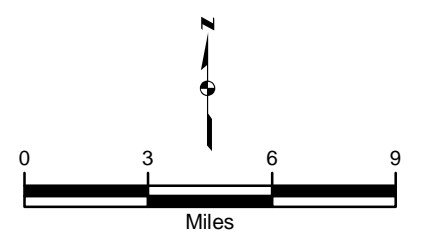
- Yolo County SWRP Boundary
- City Boundaries
- County Boundaries
- Westside Region
- Streams
- Projected Flow Pathway
- Water Bodies

B 118 Groundwater Basins

Subbasin Name

- Colusa
- Napa Valley
- North American
- Solano
- Sonoma Valley
- South American
- South Yuba
- Sutter
- Yolo

Source: Bulletin 118-Groundwater Basins, California Department of Water Resources (DWR), 2003



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 Storm Water Resource Plan
 For Yolo County

DWR BULLETIN 118
 GROUNDWATER BASINS
 AND SUBBASINS

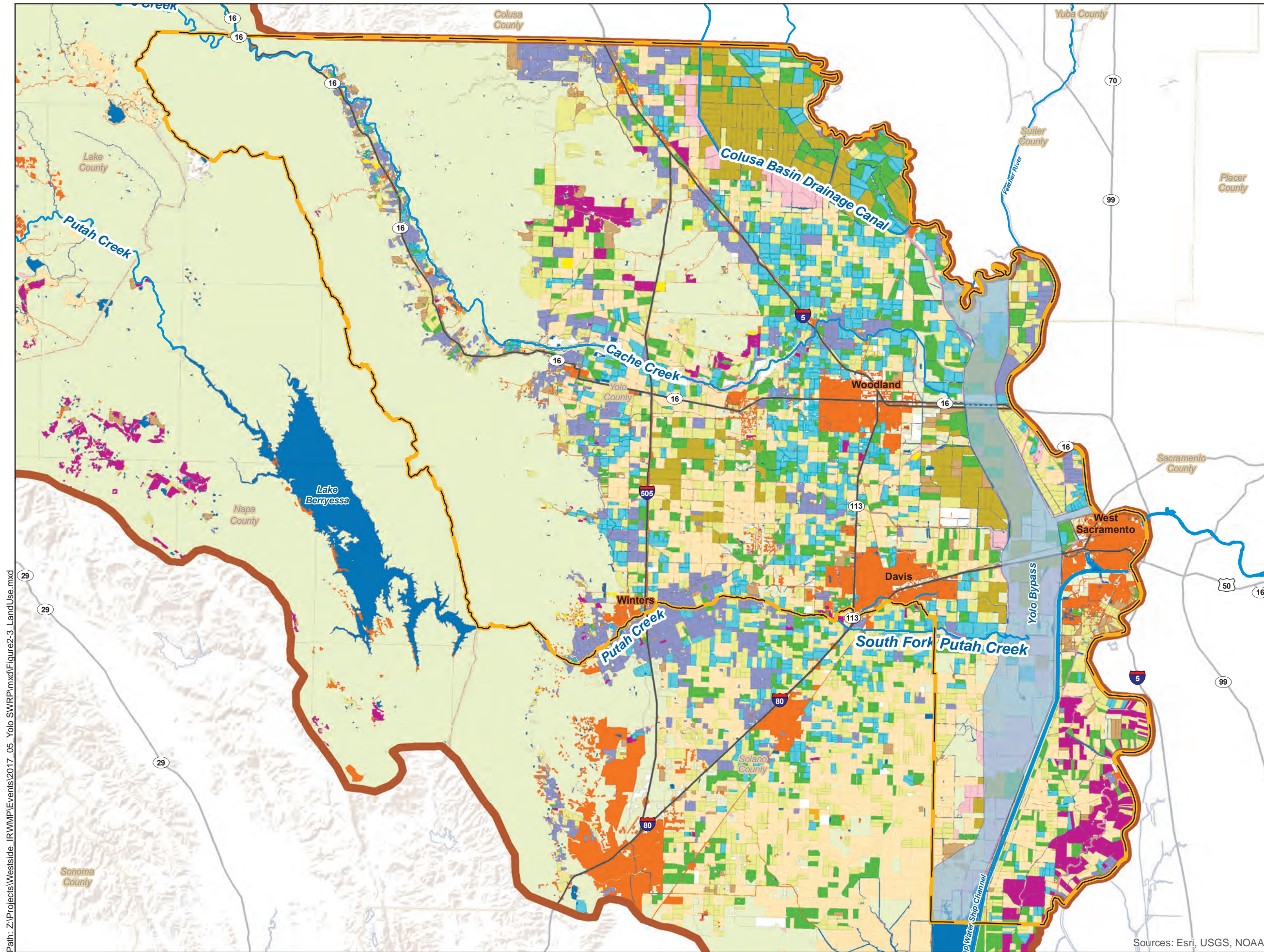
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 May 2017

Figure 2-2

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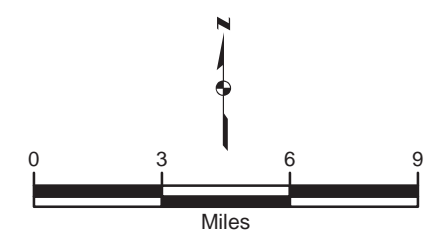
Sources: Esri, USGS, NOAA

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- Legend**
- County Boundaries
 - Westside Region
 - Streams
 - Projected Flow Pathway
 - Water Bodies
- Land Use Designation**
- Communities
 - Native
 - Riparian
 - Water
 - Not Surveyed
- Agricultural Classes**
- Grain and Hay Crops
 - Rice
 - Field Crops
 - Pasture
 - Truck, Nursery and Berry Crops
 - Deciduous Fruits and Nuts
 - Citrus and Sub-Tropical
 - Vineyards
 - Idle
 - Semi-Agricultural

Source:
 Land Use Survey, DWR, (Lake 2006; Colusa 2003;
 Solano 2003; Yolo 2008; Napa 1999)



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LAND USE

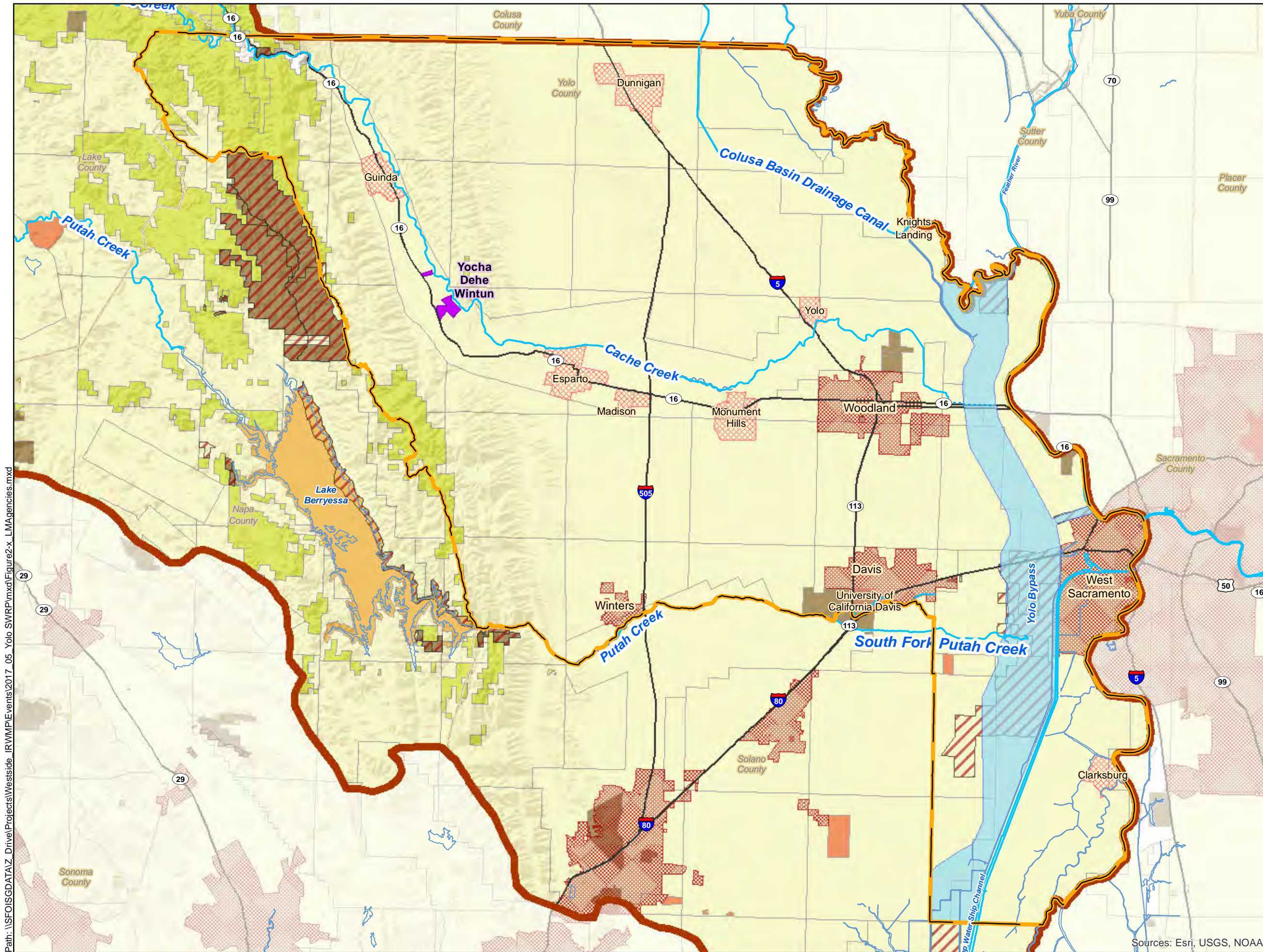
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Figure 2-3

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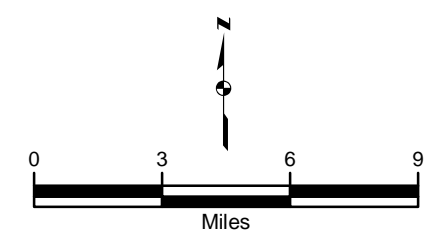
Sources: Esri, USGS, NOAA

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- Legend**
- Yolo County SWRP Boundary
 - City Boundaries
 - Tribal Lands
 - Unincorporated Communities
 - County Boundaries
 - Westside Region
 - Streams
 - Projected Flow Pathway
 - Water Bodies
- Land Management Agencies**
- Bureau of Land Management
 - Bureau of Reclamation
 - Military
 - Other State Lands
 - US Forest Service
 - Other/Private Owned
 - CA Dept. of Fish and Wildlife

Source: Bulletin 118-Groundwater Basins, California Department of Water Resources (DWR), 2003



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LAND MANAGEMENT AGENCIES,
CITIES, AND TRIBAL LANDS

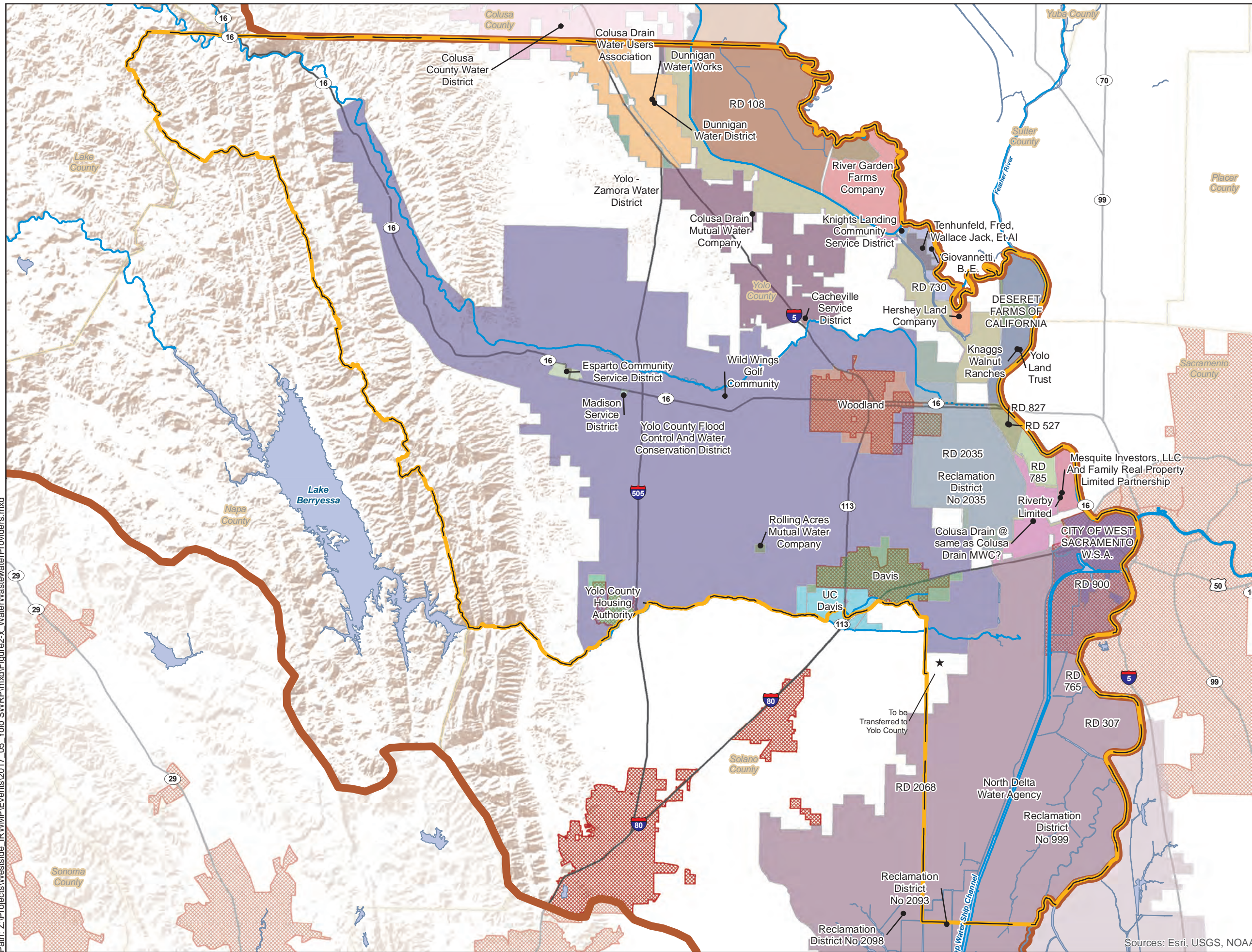
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Figure 2-4

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Sources: Esri, USGS, NOAA

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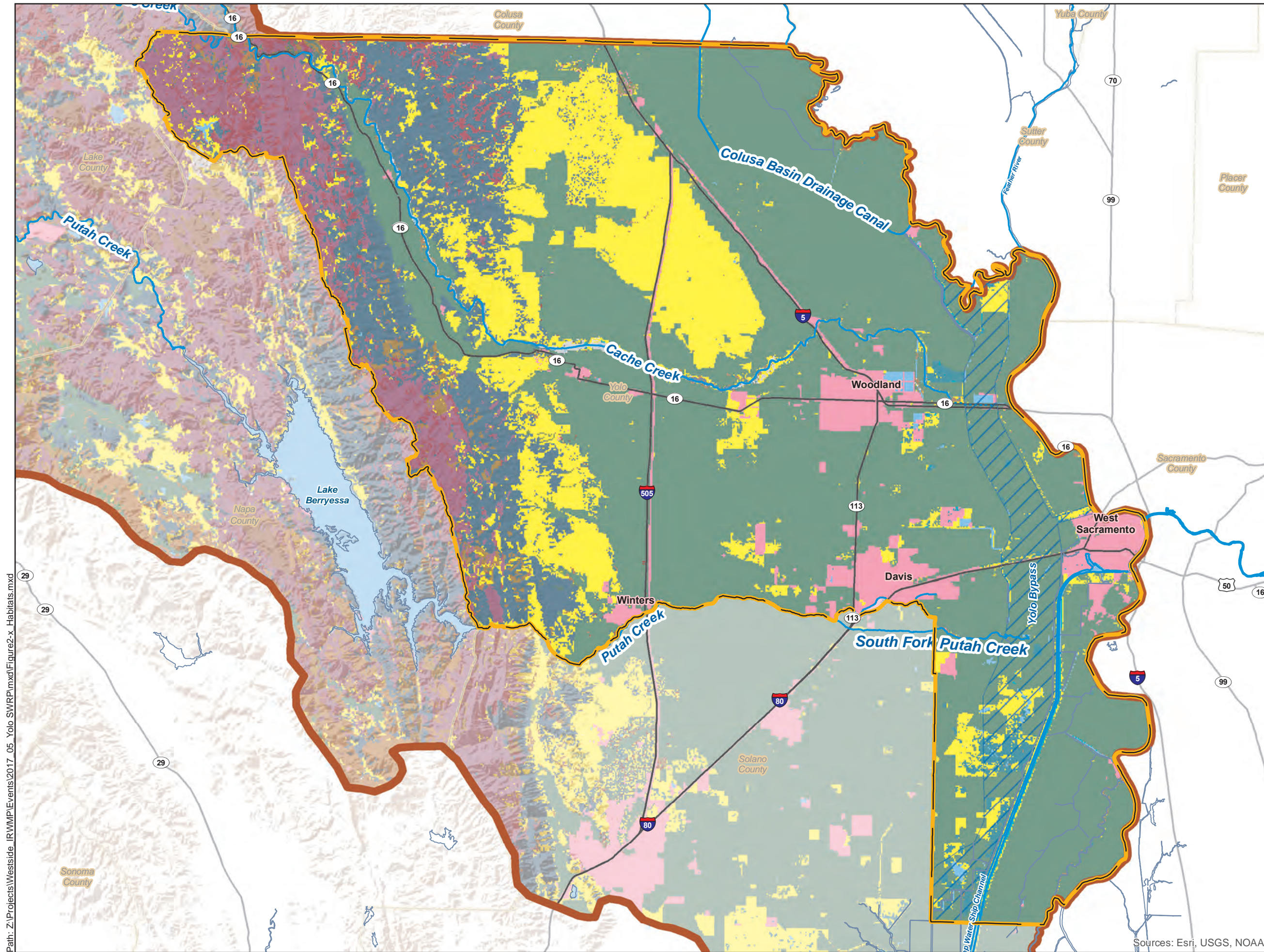
- City Boundaries
- County Boundaries
- Westside Region
- Streams
- Projected Flow Pathway
- Water Bodies
- To be Transferred to Yolo County

Source:
 Land Status, Bureau of Land Management, 2011;
 California Department of Fish and Game (DFG) Owned
 and Operated Lands, CA Dept. of Fish and Game, 2011.

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For Yolo County

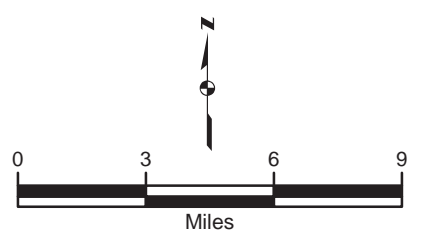
WATER DISTRICTS

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- Legend**
- County Boundaries
 - Westside Region
 - Streams
 - Projected Flow Pathway
 - Water Bodies
- Habitats**
- Agriculture
 - Annual Grassland
 - Barren
 - Blue Oak Woodland
 - Blue Oak-Foothill Pine
 - Chamise-Redshank Chaparral
 - Eucalyptus
 - Freshwater Emergent Wetland
 - Lacustrine
 - Mixed Chaparral
 - Montane Hardwood
 - Montane Hardwood-Conifer
 - Perennial Grassland
 - Riverine
 - Unknown Shrub Type
 - Urban
 - Valley Foothill Riparian
 - Valley Oak Woodland
 - Water

Source: CNDDB, 2012; USFWS, 2012; ESRI, 2012; and ESA, 2012



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For Yolo County

HABITATS

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Figure 2-6

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Sources: Esri, USGS, NOAA

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These conservation areas and designation, however, do not cover the entire county, and additional work is necessary to improve special status and endangered species habitat including the following objectives (RWMG, 2013):

- Increase productive floodplain connectivity,
- Improve overall fish passage,
- Expand contiguous extent of riparian canopy,
- Establish and manage additional reserves and preserves, and
- Protect vernal pools and migratory bird wintering areas.

Invasive plants present a significant challenge to the management of the county's water resources. Hence, addressing the spread of invasive species is an important component of maintaining the natural diversity of the region and helping to protect water (RWMG, 2013).

From the late 19th century to today, development of urban communities, agriculture conducted across large areas, and disturbance of the stream channels as a result of mining and construction of infrastructure has altered riparian habitat throughout the region. This disturbance has led to increased intrusion of invasive species in both terrestrial and aquatic areas, which can cause widespread impacts through the watershed. A number of invasive plants and animal species either already occur in or threaten to invade the region (RWMG, 2013). Invasive plant species of concern in the county include, distaff thistle (*Carthamus lanatus*), purple loosestrife (*Lythrum salicaria*), ravenna grass (*Saccharum ravennae*) and yellow flag iris (*Iris pseudacorus*).

The major risks to the watersheds from the spread of invasive aquatic and terrestrial plant species include (RWMG, 2013):

- Water quality impacts resulting from temperature changes due to alterations in river shading and chemical processes (increased nutrient loading, increased pH, and decreased dissolved-oxygen content)
- Water supply impacts, including reduced local availability of surface water and groundwater due to excessive evapotranspiration needs of invasive species and obstructions to water supply infrastructure due to the unmanaged growth of invasive plant communities

- Flooding risks as a result of alterations to the stream channel conveyance capacity and raised water levels during high flows
- Increased erosion as a result of decreased bank stability due to weaker root structures of invasive plant species, causing undercutting and bank collapse. Erosion also results from changes in flow patterns due to invasive plant obstructions within waterways, which can cause constrictions, higher flow velocities in certain areas, and potentially increased erosion.
- Increased fire hazards resulting from the dense growth patterns of some invasive plants, which present a significant fuel source in upland areas and decrease the ability of riparian areas to serve as natural firebreaks. Native riparian areas tend to be open networks of plants and steep and lightly vegetated banks that are poor fire fuel.
- Displacement of native habitats and associated wildlife due to water quality changes from invasive species and as a result of the species' ability to outcompete native plants, leading to the loss of food and habitat for native wildlife
- Hindered navigation for recreational activities as a result of invasive species obstructions to waterways and upland areas.

2.4.2 Infrastructure Protection

One of the ongoing challenges facing water suppliers and wastewater management agencies is aging and inadequate infrastructure. Much of the water storage and conveyance infrastructure, including the dams, canals, pipelines, and pump stations throughout the county, was built in the 1960s or earlier and could be nearing the end of its useful life. Some of the water supply systems may also require technological updates to keep pace with modern regulatory requirements and other drivers. Production groundwater wells also have a limited useful life, and groundwater producers must periodically drill replacement wells. Further, increasingly stringent water treatment requirements have required many existing and new wells to be retrofitted with groundwater treatment systems to remove contaminants and undesirable constituents such as arsenic, iron, and manganese. Many communities in the county are facing similar needs for investment in wastewater treatment facilities, and several are seeking to upgrade their flood protection infrastructure (RWMG, 2013).

As a result of the combination of aging infrastructure and rising expectations, water managers within the county

must determine how they can make the significant investments required to replace and modernize aging infrastructure (RWMG, 2013).

2.4.3 Flood Management and Other Natural Disasters

Much of Yolo County is a natural floodplain. Three geographic regions with flooding issues include: Cache Creek basin/Woodland, Sacramento River corridor, Western Yolo floodplain (Madison, Esparto, Airport Slough, etc.) and Yolo County land west of the un-leveed part of the Yolo Bypass south of Putah Creek. The unincorporated area of Yolo County near Cache Creek, as well as parts of the City of Woodland, have only 10-year flood protection according to the Federal Emergency Management Agency (FEMA; Yolo WRA, 2007).

Yolo County contains 2015 miles of levees as part of the Sacramento River Flood Control Project, including the Yolo Bypass. The Yolo Bypass does not, and has not, functioned at design flow capacity for many years. This poses a threat to the citizens of Yolo, Solano, and Sacramento Counties if future flood events exceed the capacity of the Bypass. Geotechnical studies are necessary to determine whether some of the Yolo County's Sacramento River levees are subject to under-seepage or other potential causes of levee failure (Yolo WRA, 2007).

Some of the issues surrounding flood management and storm drainage within Yolo County include:

- Through seepage and under-seepage threats to Sacramento River levees
- Erosion threats to Sacramento River levees
- Inadequate funding for geotechnical studies to determine erosion, stability, and seepage threats to Sacramento River levees and subsequent repair projects
- Inadequate public outreach (need for flood insurance, understanding of evacuation plans, etc.)
- Inadequate emergency preparedness plans for levee failures
- Need to evaluate development in the floodplain (the more development, the greater the risk to public safety)
- Inadequate compensation to Yolo County for providing the City of Sacramento with flood protection. Failure of the federal and state

governments to equitably address the Sacramento River Flood Control Project induced flood risks within and adjacent to the Yolo Bypass.

- Inadequate flood protection from existing Cache Creek levees.
- Erosion of existing Cache Creek levees
- Inadequate vegetation removal on Cache Creek (impedes capacity)
- Insufficient understanding of the risk of Cache Creek flooding
- Inadequate levees to protect Madison and Esparto from Lamb Valley Slough flooding
- Inadequate flood protection at the airport.

Future land use changes in the Yolo Bypass must be closely monitored to help ensure that impediments to flow do not occur that would further minimize capacity. All current and future land uses in the Bypass must be consistent with flow capacity requirements and subject to consistent State Reclamation Board enforcement. There should be no redirected hydraulic impacts as a result of the project operations, upstream development, or in-bypass projects.

2.4.4 Climate Change

Climate change could significantly impact Yolo County, impacting the ecological, environmental, and economic conditions. The potential impact of climate change should be studied and considered in planning for resource management and economic development. The following areas of concern are particularly relevant to the region (RWMG, 2013):

- Increases in peak storm water runoff flows and flood risk
- Increased evapotranspiration
- Decreased agricultural production due to changes in temperature and carbon dioxide levels
- Reductions in the habitat of riparian and aquatic species
- Decreased availability of water supplies.

2.4.5 Water Quality

High priorities for water quality include complying with discharge requirements and Basin Plan Objectives and providing water of suitable quality for the intended beneficial use (RWMG, 2013). Water quality objectives

are prescribed by the Regional Water Quality Control Board in the *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* (Basin Plan) to protect the many beneficial uses of the region's waters, including municipal and domestic supply, agricultural supply, industrial supply, recreation, fishing, freshwater and wildlife habitat, and migration and spawning corridors. The Basin Plan includes narrative and numeric water quality objectives. Waste load allocations have been, and will continue to be, adopted as part of the development of total maximum daily loads (TMDLs) for 303(d) listed waterways within Yolo County (RWMG, 2013).

Cache Creek, Colusa Basin Drain, and the Sacramento River within Yolo County all have TMDLs, and additional TMDLs are anticipated in the future for the Colusa Basin Drain, Davis Creek and Reservoir, Putah Creek, and Sacramento River. Surface water quality constituents of primary concern in Yolo County include mercury, boron, pesticides, nutrients, and fecal coliform (RWMG, 2013).

The Upper Cache Creek carries mercury-laden flows through Cache Creek to the settling basin that drains into the Yolo Bypass, which ultimately drains into the Bay Delta. Through this conveyance pathway, Cache Creek is a major contributor of mercury to the Bay Delta. Putah Creek has also been identified as a major contributor of mercury; however, the construction of Lake Berryessa has greatly reduced this contribution (RWMG, 2013).

Boron is another common source of water quality impairment for the county. Boron, a naturally occurring element in the soils of the region, dissolves in water and is carried into surface water bodies. While necessary for plant growth at low concentrations, boron in high concentrations is toxic to plants and can stunt their growth. Portions of Cache Creek, Putah Creek, Willow Slough, Willow Slough Bypass and the Tule Canal have been 303(d) listed for elevated boron concentrations that may be impairing agricultural water quality. From an end use perspective, boron in surface water is mainly a concern for irrigators in the valley who could be affected by the negative plant growth impacts (RWMG, 2013).

Pesticides are another major concern related to water quality impairment for the Westside Region. Surface waters in the Yolo County are 303(d) listed for a host of pesticides that impair freshwater habitat and commercial and sport fishing beneficial uses. The source of

pesticides is runoff from agricultural applications (RWMG, 2013).

Compliance with state and federal water quality programs is discussed in further detail in Section 3: Water Quality Compliance.

2.4.6 Sustaining Groundwater Resources

Groundwater is a key component of the county's conjunctive water supply portfolio. Urban areas, agriculture, and the environment in Yolo County depend upon a reliable water supply, a combination of both groundwater and surface water. In a normal year, nearly all urban water users in the county, except the City of West Sacramento, rely on groundwater as their primary source of water supply. Farmers rely on groundwater for approximately 40 percent of their supply in a normal year but rely more heavily on groundwater during drought years. In the future, urban population growth will result in an increase in water supply needs and demands from cities, unincorporated communities, and UC Davis (Yolo WRA, 2007).

It is unknown if the deep aquifers in the area are able to sustain current and future demands. Although agencies have tried to improve the understanding of groundwater resources through preparation of groundwater management plans and monitoring programs, much work remains to quantify the reliable, sustainable groundwater supplies available (RWMG, 2013).

Sustaining groundwater resources is also important because heavy reliance on groundwater and groundwater pumping has resulted in subsidence (consolidation of the aquifer causing decreased ground levels). Lower land surfaces resulting from subsidence of peat soils behind levees, some of which can be attributed to groundwater pumping, also contribute to flood risk because of the reduced effectiveness of the levees. Subsidence due to groundwater pumping has been detected in the northern Yolo-Zamora area of Yolo County between Zamora and Knights Landing, where subsidence is reported to be on the order of 5 feet, and the vicinity of Davis and Woodland, where subsidence is estimated at 2 or 3 feet (RWMG, 2013).

2.4.7 Land Use

The following land uses and human activities can contribute to the degradation of soils, waterbodies, and habitat and can make watershed management more difficult. Some of the listed activities have been described under several earlier topics but are additionally emphasized here because of their importance to the stakeholders (RWMG, 2013):

- Alteration of the natural landscape for any purpose, creating disturbed soils susceptible to erosion, and requiring installation of minimum control measures prescribed for NPDES stormwater management permit compliance;
- Application or accidental release of potentially contaminating substances or prohibited waste discharges to water supplies, including wastewater system overflows, septic system failures, water treatment byproducts, pest abatement, improper disposal of litter or refuse, and lack of stormwater management

- Removal of natural vegetation and wildlife habitat, including destruction of wetlands, waterways, and shoreline ecologies
- Improper livestock husbandry and other poorly implemented agriculture, industry, and commercial BMPs
- Potential conflict between land and water use for:
 - (a) recreation and tourism, (b) agriculture, and
 - (c) opportunities to restore and preserve the environment.

In addition, urban development (parking lots, roads, and other impervious areas) contributes to increased runoff and pollution and decreased infiltration and natural creek and river flows. Methods to address these land use impacts include increasing urban greenspace, low impact development techniques such as reduced impervious area and vegetated facilities and infiltration basins for storm water runoff capture, and conversion of impervious pavement to pervious materials.

Section 3: Water Quality Compliance

The quality of surface waters in the region is greatly influenced by land use practices as well as historic sources. As discussed in Section 2.2, land use in the SWRP is approximately 44% open space, 45% agriculture, and 5% urban and community development. In Yolo County, surface waters are impacted largely by agricultural use, resource extraction (i.e., mercury mining in watersheds upstream of Yolo County), and nonpoint source pollutants from urban uses. Surface waters in the SWRP area are especially impaired by mercury, boron, pesticides, and toxicity.

3.1 Activities Associated with Pollution of Stormwater and/or Dry Weather Runoff

Yolo County is within the Sacramento River Basin. Water quality in the Sacramento and San Joaquin River Basins is collectively discussed in the Water Quality Control Plan for the California Regional Water Quality Control Board (RWQCB), Central Valley Region, Fourth Edition, The Sacramento River Basin and the San Joaquin River Basin (Basin Plan; RWQCB, 2016). Primary causes of pollutants to surface waters presented in the Basin Plan include urban runoff, industries, mines, agricultural runoff (RWQCB, 2016). Water quality in the SWRP area is summarized in Section 3.2 of the Westside Sacramento IRWMP (Kennedy/Jenks, 2013). The Central Valley Regional Water Quality Control Board (Central Valley RWQCB), as well as other state and federal regulatory and resource agencies, participated in the Westside Sacramento IRWMP planning process and will likely support the effort to obtain regulatory and environmental approval for IRWMP actions during implementation (Section 1.2.2.3, Kennedy/Jenks, 2013).

Yolo County prepared a Stormwater Management Program (SWMP) Planning Document that primarily focused on the urbanized areas of El Macero and Willowbank (Yolo County, 2003). The cities of Davis, West Sacramento, and Woodland and the University of California, Davis prepared their own Stormwater Management Plans or SWMP Planning Documents

(City of Davis, 2006; City of West Sacramento, 2003; City of Woodland, 2004; UCD, 2010).

The Basin Plan (Chapter IV, RWQCB, 2016), Westside Sacramento IRWMP (Section 3.2 and 5.10, Kennedy/Jenks, 2013), and the various Stormwater Management Plans and SWMP Planning Documents identify activities that can generate or contribute to the pollution of storm water or dry weather runoff, or impair the beneficial uses of storm water or dry weather runoff, such as:

- confined animal feeding operations
- agricultural drains
- urban drainage
- residential drainage
- industrial drainage
- agricultural runoff
- road construction activities
- mining
- agriculture irrigation
- logging and other harvest activities
- natural sources such as effects of fire, flood, and landslide
- landfill leachate collection system
- non-permitted direct connection and illicit discharges
- construction
- roads, streets, and highways operations and maintenance
- drainage system operation and maintenance
- waste handling and disposal
- water and sewer utility operation and maintenance

The magnitude of impact of these activities depends on the occurrence of activities within the drainage, which is related to land uses and percentage of lands within the SWRP Planning Area. Based on the information found in Section 2.2, urban land uses and their associated activities account for a small portion of land use, while agriculture accounts for a large portion of land use in the SWRP planning area.

Flooding and erosion are key concerns in Yolo County, as described in the Westside IRWMP, and can have a negative impact on surface water quality. The Yolo County Farm Bureau is one resource within Yolo County that provides assistance for complying with sediment and erosion requirements on irrigated lands (Yolo County Farm Bureau, 2017) and assists agricultural producers with compliance with the RWQCB Irrigated Lands Program. Mercury, in particular, is a significant source of water quality impairment and is a legacy left by the extensive mining areas upstream of Yolo County (Kennedy/Jenks, 2013).

The discussion that follows identifies specific impaired water bodies and the permits within the SWRP planning area.

3.2 NPDES and TMDL Compliance

3.2.1 TMDLs

The 1972 Clean Water Act (CWA) established strategies for managing water quality, as described in Section 3.2.1 (page 3-21 to 3-28) and Section 5.8 (pages 5-9 to 5-11) of the Westside IRWMP. To support these strategies, Section 303(d) of the CWA requires the identification of water bodies that do not meet, or are not expected to meet, water quality standards (i.e., impaired water bodies), and requires development of a total maximum daily load (TMDL) for each listing.

The Central Valley RWQCB is the state agency responsible for identifying impaired water bodies within the Central Valley region. On 4 August 2010, the SWRCB approved the 2010 Integrated Report, which is California's 2008-2010 Section 303(d) list of impaired waters requiring TMDLs and 305(b) report on the quality of the state's waters, and on 12 November 2010, the Integrated Report was approved by the USEPA. The 2012 Integrated Report was approved by the USEPA on 30 July 2015 and is the current 303(d) list; there were no updates to the 2008-2010 303(d) list for the Central Valley region.

TMDLs presented herein are for parameters that are included in a state general stormwater permit (municipal, industrial, and/or construction), indicating that stormwater has been identified as a potential source of the parameter. Mercury, for example, is

included in state general stormwater permits and is a major water quality issue in Cache Creek in Yolo County (Kennedy/Jenks, 2013). Mercury mines along the headwaters of Cache Creek, outside of the SWRP planning area, provided a significant source of mercury used in gold mining in the 19th century. SWRP stormwater and erosion control projects may assist in reaching the TMDL goals by helping to minimize the erosion of mercury-contaminated soil. Additionally, the pesticide TMDL outside of the City of West Sacramento may be partially addressed by increasing the infiltration of stormwater into soil.

Figure 3-1 shows the impaired water bodies located within the SWRP Planning Area and Table 3-1 presents a summary of 303(d) listed impaired water bodies in the SWRP Planning Area, the associated pollutant(s) of concern, the potential sources as reported by the SWRCB, and the completion date for the TMDL. A more detailed list is provided in Appendix C.

Table 3.1 Summary of 303(d) List of Impaired Water Bodies in the SWRP Area

Project Information	Pollutants												Potential Pollutant Sources (2)		
	Boron	Mercury	DDT (Dichlorodiphenyltrichloroethane)	Diazinon	Escherichia coli (E. coli)	Group A Pesticides	Chlordane	Chlorpyrifos	Invasive Species	PCBs (Polychlorinated biphenyls)	Oxygen, Dissolved	Salinity		Fecal Coliform	Unknown Toxicity
Cache Creek, Lower (Clear Lake Dam to Cache Creek Settling Basin near Yolo Bypass)	X (2021)	X (2007) ⁽¹⁾												X (2019)	The source of mercury is abandoned mines in the area. Potential sources for other pollutants are listed as unknown.
Colusa Basin Drain		X (2021)	X (2021)	X (2008)	X (2021)	X (2019)					X (2021)			X (2019)	Sources for pollutants are listed as unknown.
Davis Creek (downstream from Davis Creek Reservoir, Yolo County)		X (2017)													Sources for pollutants are listed as unknown.
Davis Creek (upstream from Davis Creek Reservoir, Yolo County)		X (2017)													Sources for pollutants are listed as unknown.
Davis Creek Reservoir		X (2017)													Sources for pollutants are listed as unknown.
Delta Waterways (northern portion)		X (2009)	X (2011)	X (2007)		X (2011)	X (2011)	X (2007) ⁽¹⁾	X (2019)	X (2019)				X (2019)	The source of mercury is abandoned mines in the area. Potential sources for other pollutants are listed as unknown.
Delta Waterways (northwestern portion)		X (2009)	X (2011)	X (2007)		X (2011)		X (2007) ⁽¹⁾	X (2019)					X (2019)	The source of mercury is abandoned mines in the area. Potential sources for other pollutants are listed as unknown.
Gordon Slough (from headwaters and Goodnow Slough to Adams Canal, Yolo County)											X (2021)				Sources for pollutants are listed as unknown.
Knights Landing Ridge Cut (Yolo County)	X (2021)										X (2021)	X (2021)			Sources for pollutants are listed as unknown.
Putah Creek (Solano Lake to Putah Creek Sinks; partly in Delta Waterways, northwestern portion)	X (2021)	X (2017)													The source of mercury is abandoned mines in the area. Potential sources for other pollutants are listed as unknown.
Sacramento River (Red Bluff to Knights Landing)		X (2021)	X (2021)							X (2021)				X (2019)	Sources for pollutants are listed as unknown.
Sacramento River (Knights Landing to the Delta)		X (2012)	X (2021)				X (2021)			X (2021)				X (2019)	The source of mercury is abandoned mines in the area. Potential sources for other pollutants are listed as unknown.
Sycamore Slough (Yolo County)											X (2021)				Sources for pollutants are listed as unknown.
Tule Canal (Yolo County)	X (2021)				X (2021)							X (2021)	X (2021)		Sources for pollutants are listed as unknown.
Willow Slough (Yolo County)	X (2021)														Sources for pollutants are listed as unknown.
Willow Slough Bypass (Yolo County)	X (2021)				X (2021)								X (2021)		Sources for pollutants are listed as unknown.
Winters Canal (Yolo County)				X (2021)											Sources for pollutants are listed as unknown.

Notes:

⁽¹⁾ This TMDL has been approved by the USEPA.

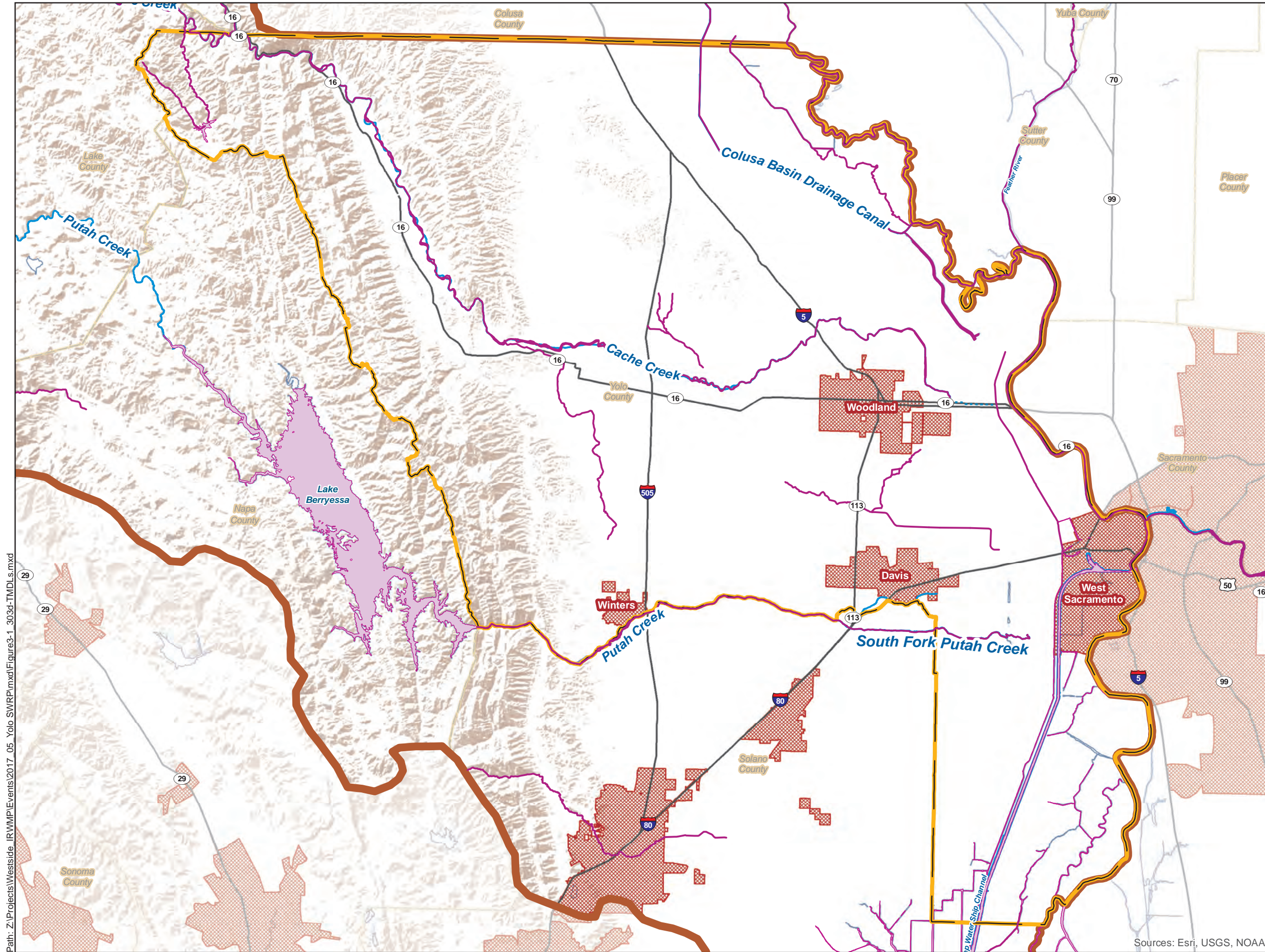
⁽²⁾ Potential sources presented are the potential sources listed on the State Water Board website, listed below.

⁽³⁾ The expected TMDL completion date is presented in parenthesis.

Sources:

(a) http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2012.shtml, accessed March 15, 2017.

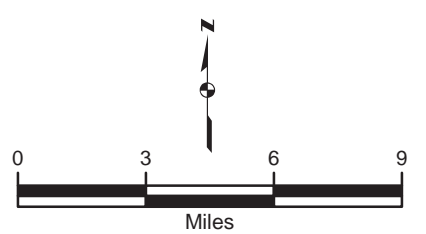
(b) Natural sources and those not included in MS4 or general statewide storm water permits are assumed not to be applicable to storm water discharges.



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- Legend**
- City Boundaries
 - County Boundaries
 - Westside Region
 - Streams
 - Projected Flow Pathway
 - Water Bodies
 - 303(d) Impaired Rivers/Streams
 - 303(d) Impaired Water Bodies

Source: 2010 303(d) Listed Waters, SWRCB, 2012.



Kennedy/Jenks Consultants

Impaired Water Bodies within Yolo County

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May 2017

Figure 3-1

Sources: Esri, USGS, NOAA

3.2.2 NPDES Permits

There are several types of National Pollutant Discharge Elimination System (NPDES) permits for discharges to surface waters within Yolo County including municipal, individual, industrial and construction permits as discussed below. Table 3-2 summarizes the applicable, active NPDES permits issued for the SWRP Area; a list of the applicable, active NPDES permits is included as Appendix D. Figure 3-2 presents the permittee locations, as published on the State Water Board website, relative to impaired water bodies.

water at the source is a more effective and sustainable alternative to augmenting water supply, preventing impacts from flooding, mitigating storm water pollution, creating green space, and enhancing fish and wildlife habitat. California encourages alternative, innovative, multi-objective solutions to help use and protect this valuable resource, while at the same time controlling pollution due to urban runoff.”

Table 3-2 NPDES Permits Issued by the Central Valley RWQCB – Yolo County

Type of Permit	Total (a)
Phase I Municipal MS4	0
Phase II Small MS4	6
Individual	2
Industrial Storm Water	102
Construction Storm Water	65

- (a) Based on the State Water Board website, accessed March 15, 2017 (<https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility>)
- (b) There also 46 Non NPDES Waste Discharge Requirements (WDRs) discussed in Section 3.3.1)

3.2.2.1 Municipal Permits

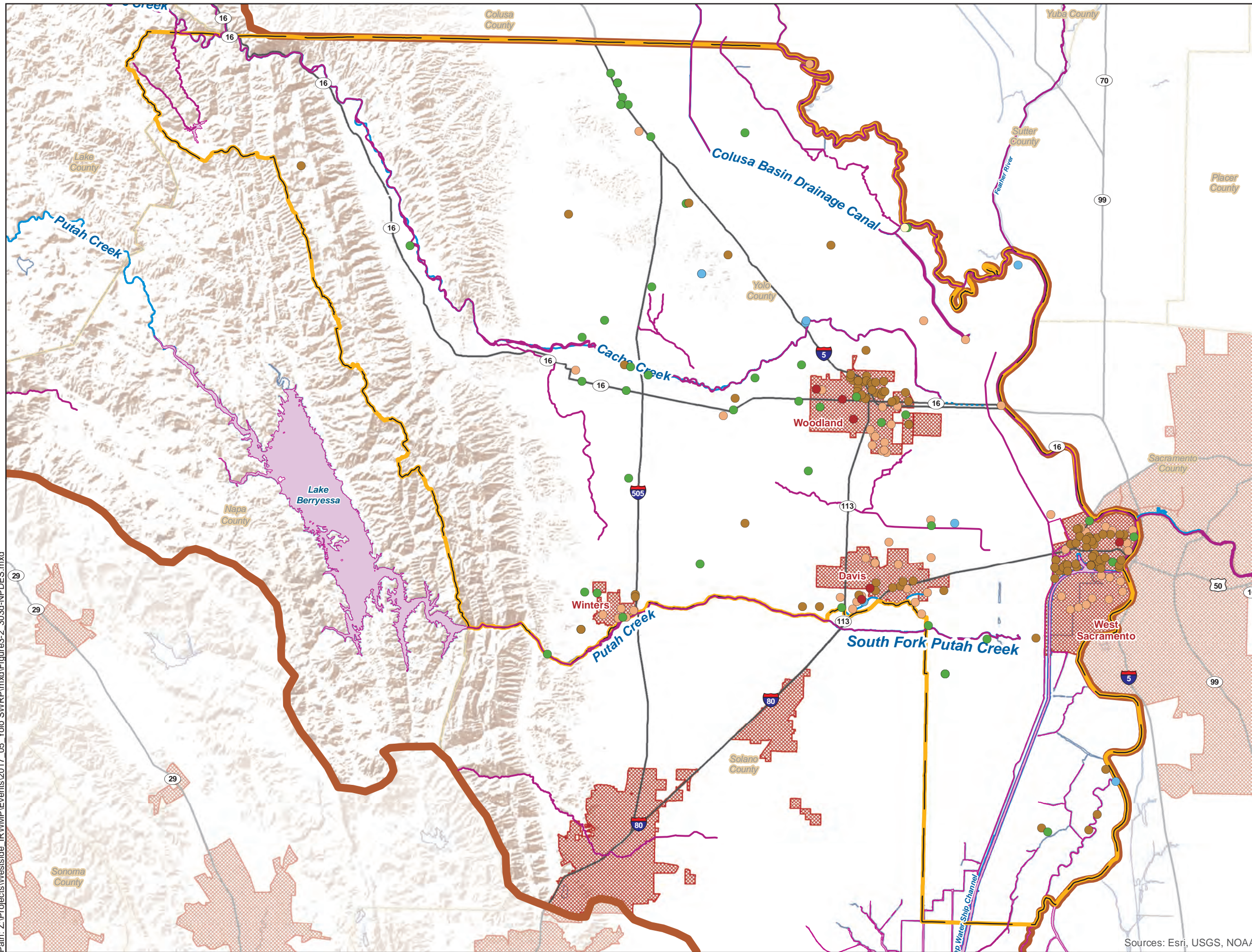
The CWA was amended in 1987 to include coverage for urban runoff discharges from Municipal Separate Storm Sewer Systems (MS4s) under NPDES, as described in Section 1.1 of the Yolo County SWMP Planning Document (page 1-1 to 1-2, Yolo County, 2004). Municipalities may require coverage by a Phase I or Phase II MS4 permit, depending on the municipality’s population or as determined by the permitting authority. The goal of MS4 permits is to improve water quality from within municipalities and the first finding of the Phase II MS4 permit states:

“The State Water Resources Control Board (State Water Board) finds that:

1. Storm water is a resource and an asset and should not be treated as a waste product. Managing rainwater and storm

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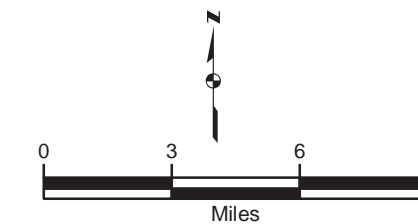
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Legend

- City Boundaries
- County Boundaries
- Westside Region
- Streams
- Projected Flow Pathway
- Water Bodies
- 303(d) Impaired Rivers/Streams
- 303(d) Impaired Water Bodies
- Regulated Facilities**
- Construction Storm Water (64)
- Industrial Storm Water (101)
- NPDES Permit (8)
- Phase II Small MS4 (6)
- Waiver (1)
- WDR (46)

Source: 2010 303(d) Listed Waters, SWRCB, 2012. Yolo County Regulated Facilities Report, CIWQS, 2017.



Kennedy/Jenks Consultants

NPDES Permits within Yolo County

K/J 1770002.00
May 2017

Figure 3-2

Sources: Esri, USGS, NOAA

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In California, Phase I municipalities now have individual NPDES permits administered by the Regional Water Quality Control Boards, and Phase II municipalities are covered by the General Permit for Discharges of Storm Water from Small Municipal Separate Storm Sewer Systems (Small MS4 General Permit) administered by the State Water Resources Control Board. There are no Phase I municipalities in the SWRP planning area, but there are six permittees that are required to comply with the Small MS4 General Permit (Order No. 2013-0001-DWQ):

- 40th District Agricultural Association
- City of Davis
- City of West Sacramento
- City of Woodland
- Yolo County
- University of California Davis (UC Davis)

Small MS4 General Permit compliance requires permittees to develop programs to address

- Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Storm Water Runoff Control
- Pollution Prevention/Good Housekeeping
- Post Construction Storm Water Management
- Water Quality Monitoring
- Program Effectiveness Assessment and Improvement
- TMDL Compliance

SWRP projects will likely aid permittees to meet some of their MS4 permit requirements in alignment with the findings of the MS4 permit. For example, UC Davis experiences major water quantity and quality issues on campus including flooding, organic loading from leaf litter in the Arboretum, and stagnant water. These issues can be resolved through potential SWRP projects such as upstream detention and a redesign of the Arboretum to increase flow rates, add flood capacity, and construct green infrastructure projects to filter storm water. The SWRP will identify these types of project implementation opportunities to address activities that contribute to the pollution of storm water and dry weather runoff.

3.2.2.2 Individual Permits

There are two facilities in the SWRP planning area that are covered by individual NPDES permits, which are issued by the Central Valley RWQCB: the City of Davis Wastewater Treatment Plant (Order No. R5-2013-0127) and the UC Davis Center for Aquatic Biology and Aquaculture (Order No. R5-2012-0053). Their Orders became effective on 23 November 2013 and 28 July 2012, respectively. The City of Davis Wastewater Treatment Plant is allowed to discharge treated municipal wastewater to Willow Slough Bypass and the Conaway Ranch Toe Drain, which are both part of the Yolo Bypass. These discharges are classified as a major discharge. The UC Davis Center for Aquatic Biology and Aquaculture is allowed to discharge treated aquaculture wastewater at two locations, both at the South Fork of Putah Creek. These discharges are classified as minor discharges. The Orders contain requirements such as effluent limitations, compliance with the Basin Plan, monitoring and reporting requirements, and implementation of best management practices (BMPs), as well as discharge prohibitions, receiving water limitations, and other provisions.

3.2.2.3 Industrial and Construction Permits

Storm water discharges associated with construction activity, industrial activity, and utilities other than water suppliers may also be covered by statewide general permits under NPDES, including the Industrial General Permit (IGP) for industrial activities and the Construction General Permit (CGP) for construction activity.

3.3 Other Permits

All projects proposed and implemented as part of the Yolo County SWRP and Westside Sacramento IRWMP will comply with applicable local storm water documents and ordinances, including the SWMP (Yolo County, 2004) and other Yolo County Public Works Division requirements. All projects will also comply with applicable state and federal regulations, including the California Environmental Quality Act (Public Resources Code § 21000 et seq.), the CWA, the Endangered Species Act (ESA), the Safe Drinking Water Act, applicable water rights permits and licenses, State Water Board plans and policies, State and Regional Water Board water quality control plans and policies (Wat. Code, § 10562, subd. (b)(5)), NPDES permits, Areas of Special Biological Significance

Compliance Plans (State Water Board Resolution 2012-0012), conditional waivers issued by State and/or Regional Water Boards (Wat. Code, § 10562, subs. (b)(5) & (6).), and the Mosquito Abatement and Vector Control District Law (Division 3, Chapter 1 of the Health and Safety Code beginning with Article 2000; State Water Board, 2015).

3.3.1 WDRs

According to the California Code of Regulations, Title 27 section 20090, there are nine categories of discharges that are regulated by the Waste Discharge Requirements (WDRs) Program: sewage, wastewater, underground injection, Regional Water Board cleanup actions, gas condensate, soil amendments, drilling waste, reuse, and waste treatment in fully enclosed units. There are a number of adopted WDR orders within Yolo County, which are listed in Appendix D and can be found on the Central Valley RWQCB website:

http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/index.shtml#yolo. However, waste discharge permits do not typically apply to storm water discharges, which are regulated under other permits, as discussed in Section 3.2.

3.3.2 California Health and Safety Code – Pest and Mosquito Abatement

As indicated in Section 2.2, all projects implemented from this SWRP and the Westside Sacramento IRWMP will comply with the Mosquito Abatement and Vector Control District Law (Division 3, Chapter 1 of the Health and Safety Code beginning with Article 2000; State Water Board, 2015). The Yolo County SWMP Planning Document includes a summary of implementation plans and schedules for complying with BMPs for illicit discharges, stormwater quality at construction sites, new and redevelopment planning, and municipal stormwater operation (Yolo County, 2004). This includes the condition that all land development applications be reviewed by the Planning and Public Works Department, which, in part, reviews proposed projects for mitigation or prevention of foreseeable health hazards or environmental degradation in the context of vector control, among other areas (Yolo County, 2004). Furthermore, the Sacramento-Yolo County Mosquito & Vector Control District has prepared a Mosquito and Mosquito-Borne Disease Management Plan, with

which all projects will be required to comply (Sacramento-Yolo Mosquito and Vector Control District, 2005).

3.3.3 Modification of a River or Stream Channel

As projects in this SWRP are implemented, some projects may result in the modification of a river or stream channel. These types of projects may require additional permitting for compliance with CWA Sections 404 and 401, as well as California Department of Fish and Wildlife regulations. CWA Section 404 permits are issued by the US Army Corps of Engineers while CWA Section 401 water quality certifications are issued by the California RWQCB.

Low impact development (LID) measures are encouraged where feasible in various stormwater guidance documents prepared in the region, such as the City of West Sacramento Post-Construction Standards Plan (City of West Sacramento, 2014). Implementing LID and hydromodification controls can also reduce the impacts to river and stream channels by reducing flow duration, volume, frequency and/or peak flow rates. The Yolo County SWRP also supports LID practices in the limited acreage of urbanized areas within the planning area.

3.4 Monitoring

The Yolo County SWRP, the Westside Sacramento IRWMP, and the implementation of projects, along with associated monitoring data, will be tracked using a Data Management System (DMS) that takes advantage of database systems developed by statewide efforts (as described in Section 11 of the Westside Sacramento IRWMP, Kennedy/Jenks, 2013). The data management approach presented in the Westside Sacramento IRWMP will be adopted, which includes collection and sharing of data through state databases such as the Water Data Library (WDL), the California Environmental Resources Evaluation System (CERES), California Environmental Data Exchange Network (CEDEN), California Statewide Groundwater Elevation Monitoring (CASGEM), and the California Environmental Information Catalog (CEIC). Additional adaptive approaches to data management will continue to be considered. The IRWMP Coordinator will work closely with the Data Management Coordinator (or in absence of a Data Management Coordinator then a subcommittee) to

track project implementation. Inclusion of SWRP projects into the Westside Sacramento IRWMP will facilitate tracking of the implemented SWRP activities via the plan-approved tracking method.

As indicated previously, the SWRP area is in the Sacramento and San Joaquin River Basins, and therefore upstream of the Sacramento-San Joaquin River Delta (Delta). The Delta is collectively monitored with the San Francisco Bay by the Bay-Delta Team, staffed by the State Water Board and the Central Valley and San Francisco Bay RWQCBs. Water quality at the Delta and upstream of the Delta is monitored as part of the Delta Regional Monitoring Program. This stakeholder-driven program is currently in progress and publishes various water quality reports in accordance with the program timeline. Additional information can be found here:

http://www.waterboards.ca.gov/centralvalley/water_issues/delta_water_quality/delta_regional_monitoring/index.shtml.

IF AVAILABLE INSERT TEXT FROM STAKEHOLDERS RE OTHER WATER QUALITY MONITORING EG IRRIGATED LANDS, MS4 COMPLIANCE ETC.