Stanislaus County

Striving to be the Best

Stanislaus Multi-Agency Regional

STORM WATER RESOURCE PLAN

PUBLIC DRAFT

April 2019

Prepared by:

STORM WATER GRANT PROGRAM

WOODARD & CURRAN

PROP 1

GOVERNOR EDMUND G. BROWN, JR.

WATER BOND 2014

RELIABILITY | RESTORATION | RESILIENCE

STANISLAUS COUNTY
DEPARTMENT OF PUBLIC WORKS

Stanislaus Multi-Agency Regional Storm Water Resource Plan

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Acknowledgements

The development of the Stanislaus Multi-Agency Regional Storm Water Resource Plan was led by Stanislaus County. The Project Partners (Stanislaus County, City of Modesto, City of Oakdale, City of Patterson, City of Waterford, and the Eastside Water District) contributed financially to the Plan.

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List of Acronyms

ACS	American Community Survey
AF	Acre-feet
AFY	Acre-feet per year
ASBS	Areas of Special Biological Significance
AWMP	Agricultural Water Management Plan
Bay-Delta Plan	Water Quality Plan for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary
BMP	Best Management Practice
CASQA	California Stormwater Quality Association
CEQA	California Environmental Quality Act
CGP	Construction General Permit
CSD	Community Services District
CVRWQCB	Central Valley Regional Water Quality Control Board
CVHS	Central Valley Hydrology Study
CWA	Clean Water Act
DAC	Disadvantaged community
Delta	Sacramento–San Joaquin Delta
DSC	Delta Stewardship Council
DWR	California Department of Water Resources
DWSC	Deep Water Shipping Channel
EDA	Economically Distressed Area
GHG	Greenhouse gas
GIS	Geographic Information System
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HEC-RAS	Hydrologic Engineering Center's River Analysis System
ID	Irrigation District
IGP	Industrial General Permit
ILRP	Irrigated Lands Regulatory Program
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
kWh	Kilowatt-hours
LID	Low-Impact Development

LSJR	Lower San Joaquin River
MAD	Mosquito Abatement District
Mgd	Million gallons per day
Mg/L	Milligrams per liter
MID	Modesto Irrigation District
MOU	Memorandum of Understanding
MPN	Most Probable Number
MS4	Municipal Separate Storm Sewer Systems
µmhos/cm	Microsiemens per centimeter
NDPES	National Pollutant Discharge Elimination System
NEPA	National Environmental Policy Act
NOA	Notice of Applicability
OID	Oakdale Irrigation District
O&M	Operation and maintenance
PID	Patterson Irrigation District
PSLR	Panoche-San Luis Reservoir
QA/QC	Quality Assurance/Quality Control
RCD	Resource Conservation Districts
RTP	Ready-To-Proceed
RWMG	Regional Water Management Group
SB	Senate Bill
SDWIS	Safe Drinking Water Information System
SED	Substitute Environmental Document
SGMA	Sustainable Groundwater Management Act
SJRECWA	San Joaquin River Exchange Contractors Water Authority
SJRNWR	San Joaquin River National Wildlife Refuge
SLDMWA	San Luis & Delta-Mendota Water Authority
STRGBA	Stanislaus and Tuolumne Rivers Groundwater Basin Association
SWAMP	Surface Water Ambient Monitoring Program
SWMP	Storm Water Management Program
SWPPP	Storm Water Pollution Prevention Plans
SWRCB	State Water Resources Control Board
SWRP	Storm Water Resource Plan

TAC	Technical Advisory Committee
TDS	Total Dissolved Solids
TGBA	Turlock Groundwater Basin Association
TID	Turlock Irrigation District
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
U.S.	United States
USACE	Unites States Army Corps of Engineers
USBR	Unites States Bureau of Reclamation
USDA	Unites States Department of Agriculture
USEPA	Unites States Environmental Protection Agency
USGS	Unites States Geological Survey
UWMP	Urban Water Management Plan
WD	Water District
WDR	Waste Discharge Requirements
WLAs	Waste Load Allocations
WSID	West Stanislaus Irrigation District
WSJ	Westside-San Joaquin

Executive Summary

The Stanislaus Multi-Agency Regional Storm Water Resource Plan (SWRP) is a regional watershed-based stormwater and dry weather runoff planning document that integrates water resource management strategies and priorities in Stanislaus County. Led by Stanislaus County, the SWRP was developed in collaboration with the Cities of Modesto, Turlock, Oakdale, Patterson, Ceres, and Waterford, Eastside Water District, as well as the nonprofit organizations River Partners and the Tuolumne River Trust. The primary purpose of the SWRP is to provide watershed-based planning throughout the Stanislaus County SWRP planning area. The SWRP aims to address challenges and opportunities for managing stormwater and dry weather runoff and to identify and assess multi-benefit stormwater projects, prioritizing those projects that can best address the identified water resource management goals.

In 2017, Stanislaus County was awarded a planning grant through the Proposition 1 Storm Water Grant Program to develop the Stanislaus Multi-Agency Regional SWRP. Matching funds and staff support to develop the plan were provided by Stanislaus County, Eastside Water District, and the Cities of Modesto, Oakdale, and Patterson. The SWRP was developed to be consistent with the Storm Water Resource Plan Guidelines (SWRCB, 2015) and the requirements of the Stormwater Resource Planning Act, Water Code Sections 10560 *et seq*. A checklist documenting compliance with the Water Code and SWRP Guidelines is provided as Appendix A.

ES-1 Planning Area Overview

The Stanislaus Multi-Agency Regional SWRP planning area (Figure ES-1) aligns with the Stanislaus County boundaries, which encompasses 1,515 square miles in California's San Joaquin Valley. The planning area is bordered in the west by the Coast Range, southwest of the San Francisco Bay, and extends east to the Sierra Nevada foothills. This planning area was chosen to facilitate regional stormwater management based on the significant overlap with the County boundaries and the East Stanislaus and Westside-San Joaquin Integrated Regional Water Management Plan (IRWMP) areas, as well as the Modesto, Turlock and Delta-Mendota groundwater subbasin management planning areas. The cities of Modesto, Turlock, Hughson, Ceres, Oakdale, Newman, Waterford, Riverbank and Patterson, 10 water and irrigation districts, and a number of Community Service Districts are contained within the planning area.

The SWRP planning area is entirely within the San Joaquin River Hydrologic Region and includes the bulk of two major watersheds, the Middle San Joaquin-Lower Merced-Lower Stanislaus and the Panoche-San Luis Reservoir watersheds, as shown in Figure ES-2. The Middle San Joaquin-Lower Merced-Lower Stanislaus Watershed covers most of the planning area. Three major rivers, the Stanislaus, Tuolumne, and San Joaquin Rivers, run through the Middle San Joaquin-Lower Merced-Lower Stanislaus Watershed. The watershed also contains several reservoirs used for water supply, flood control, and hydroelectric power production. The Panoche-San Luis Reservoir Watershed covers the westernmost portion of the County and includes the eastern portion of the Coast Range, the highest point in the County (approximately 3,800 feet above sea level). Water quality concerns in the planning area include organophosphate pesticides (diazinon and chlorpyrifos) and organic carbon (which contributes to low downstream dissolved oxygen levels), total suspended solids (TSS), pyrethroids, mercury, and bacteria which may impair water bodies and limit beneficial uses. Improving water quality and protecting and enhancing impaired water bodies is a priority for the planning area.

Stanislaus County overlies the San Joaquin Valley Groundwater Basin and four individual groundwater subbasins: the Eastern San Joaquin, Modesto, Turlock, and Delta-Mendota Subbasins. Consideration of groundwater supply and quality is crucial in the planning area due to the high reliance on groundwater for both domestic and agricultural uses.

Water quality and stormwater management priorities for the planning area were identified as part of the SWRP planning process. Nine priority pollutants were selected based on 303(d) list impairments to local waterbodies and TMDLs applicable to Stanislaus County. These water quality priorities include: TSS, mercury, diazinon, chlorpyrifos, selenium, diuron bacteria, pyrethroids, and total nitrogen. Other stormwater management priorities identified in the SWRP include identification of conjunctive use strategies to maximize the use of both surface water and groundwater. This strategy would include groundwater recharge and the protection of groundwater quality. Issues beyond groundwater contamination from within the County include salinity, land subsidence, and overdraft. Additional water quality priorities may include goals such as maintaining favorable wildlife habitat and aesthetic value to the community.

Figure ES-1. Planning Area

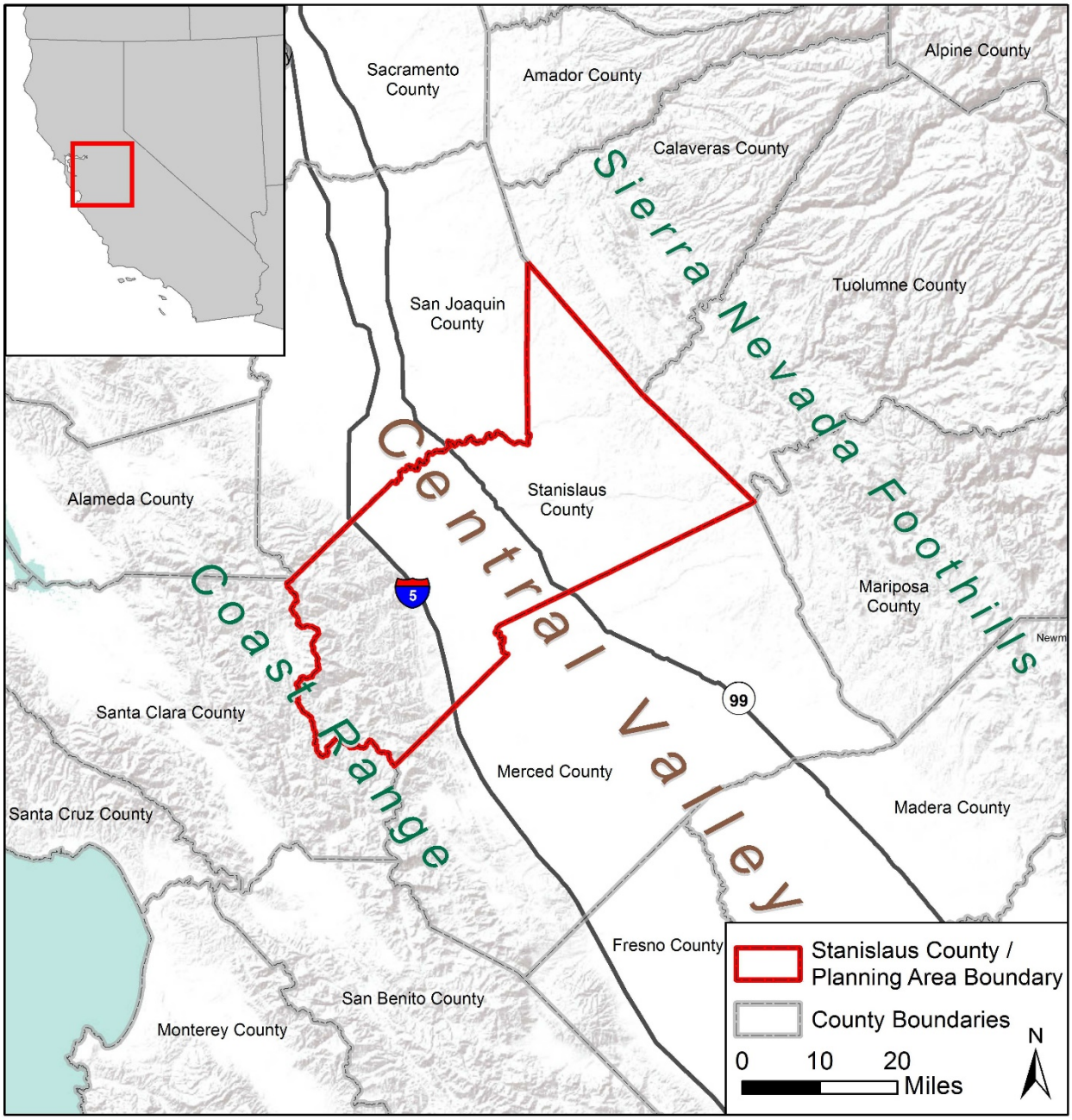
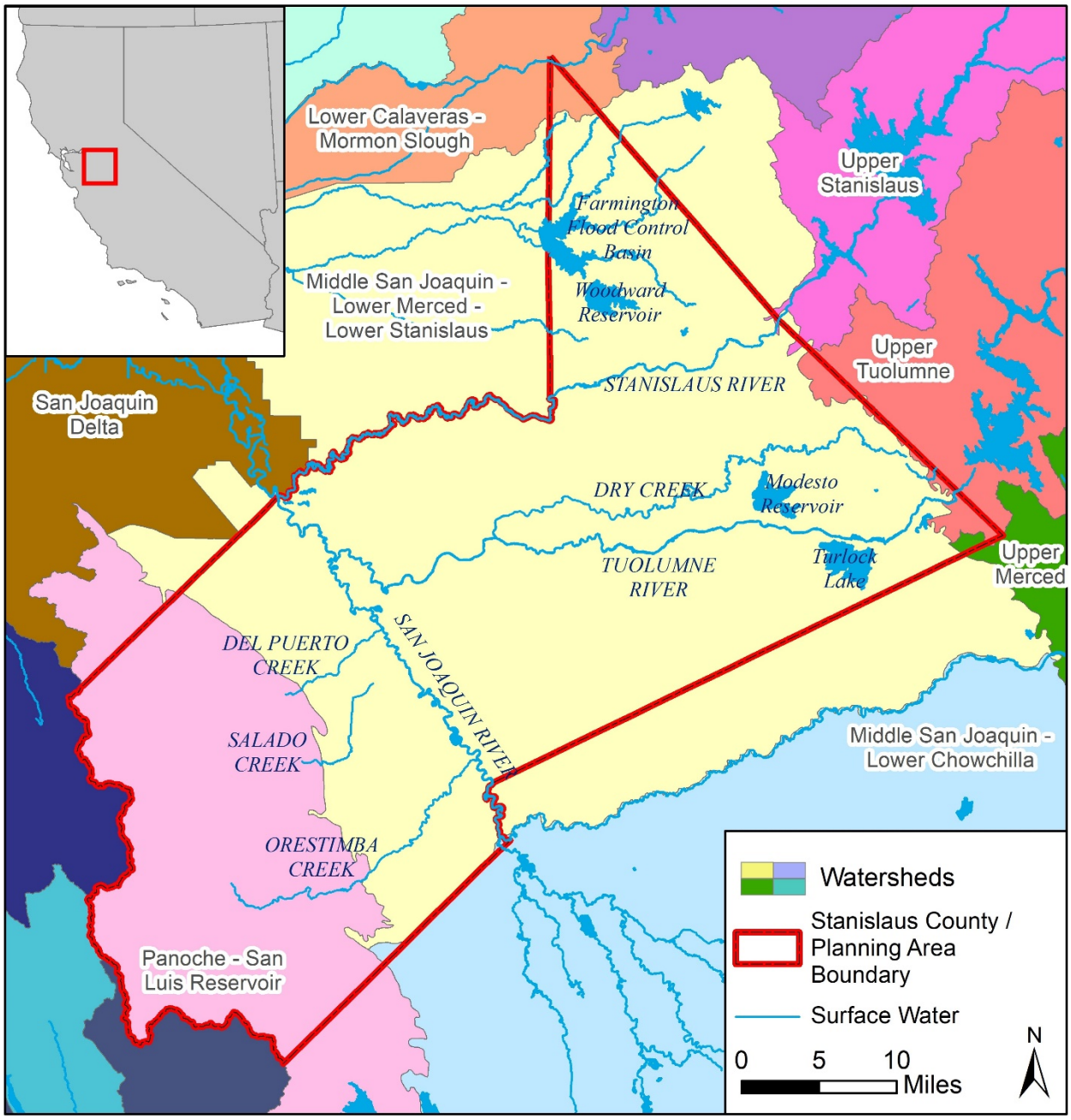


Figure ES-2. Watersheds



ES-2 Watershed Collaboration, Coordination, and Outreach

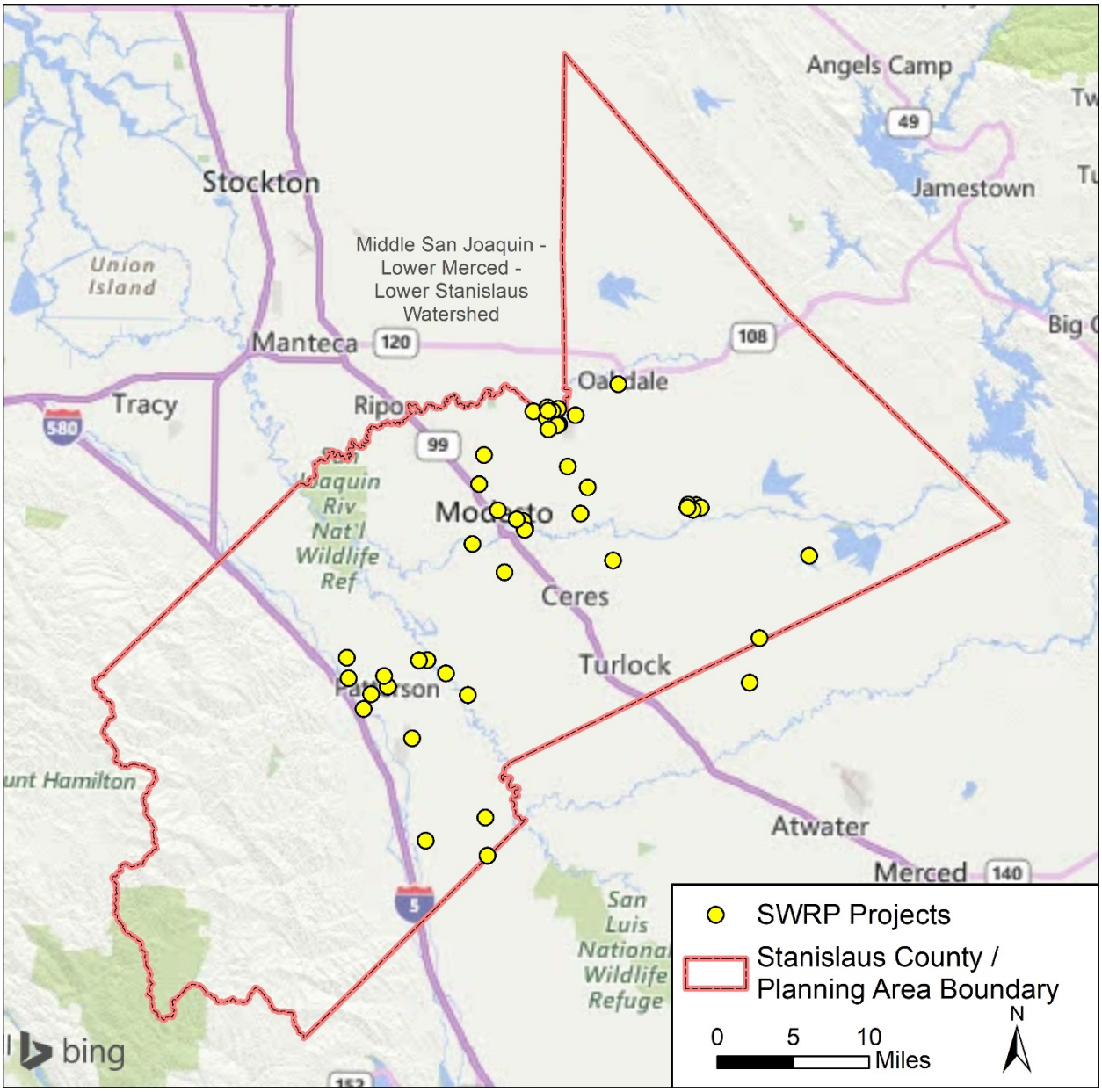
The SWRP was developed as a collaborative effort between Stanislaus County, local planning organizations that contributed both time and funds to development of the plan, and other key stakeholders identified and contacted through the SWRP planning effort. A Technical Advisory Committee (TAC), composed of agency and nonprofit representatives, was developed to provide input on planning components and support review of the plan. TAC meetings and public outreach meetings were held throughout the SWRP development to coordinate and collaborate with agencies, organizations, and nonprofit organizations. A number of disadvantaged community (DAC) representatives were identified at meetings and coordinated with directly to bolster DAC involvement in the plan development. Additional outreach occurred through development and use of the SWRP stakeholder contact list and the SWRP website.

The SWRP incorporates past management and research efforts, existing plans, as well as stormwater quality and groundwater recharge technical studies performed as part of and alongside development of this SWRP. Concurrent collaboration and planning efforts of the East Stanislaus IRWMP and Westside-San Joaquin IRWMP updates were leveraged, with the integration of stakeholders, resources and projects when applicable. Relevant information and projects resulting from the Groundwater Sustainability Plans (GSPs) to be developed for the Modesto, Turlock, Eastern San Joaquin, and Delta-Mendota groundwater subbasins will be assessed and integrated into future SWRP efforts and projects, where feasible.

ES-3 Integrated Metrics-Based Benefits Analysis

A metrics-based analysis helps illustrate how the multi-benefit projects included in the SWRP will collectively address the water resource management goals of the planning area. Projects with quantified benefits were aggregated across the planning area to estimate total SWRP benefits and assess progress toward reaching water resource management goals. The quantified benefits discussed in the SWRP are based on information provided by the project proponents to date. Quantitative information was not provided for every project, which may result in underestimation of the aggregated benefits of all SWRP projects. The locations of the projects are shown in Figure ES-3.

Figure ES-3. SWRP Projects



Stormwater benefits are evaluated within five different categories: water quality, water supply, flood management, environmental, and community benefits. Within each category, specific main and additional benefits have been identified. These categories and benefits align with those presented in the SWRP Guidelines (SWRCB, 2015) and are listed in Table ES-1.

Table ES-1. SWRP Main and Additional Benefits

Benefit Category		Benefit
Main Benefits	Water Quality Benefits	Increased filtration and/or treatment of runoff
	Water Supply Benefits	Water supply reliability
		Conjunctive use
	Flood Management Benefits	Decreased flood risk by reducing runoff rate and/or volume
	Environmental Benefits	Environmental habitat protection and improvement, including wetland enhancement/creation, riparian enhancement, and/or instream flow improvement
		Increased urban green space
	Community Benefits	Employment opportunities provided
		Public education
Additional Benefits	Water Quality Benefits	Nonpoint source pollution control
		Reestablished natural water drainage and treatment
	Water Supply Benefits	Water conservation
	Flood Management Benefits	Reduced sanitary sewer overflows
	Environmental Benefits	Reduced energy use, greenhouse gas emissions, or provides a carbon sink
		Reestablishment of natural hydrograph
		Water temperature improvements
	Community Benefits	Community involvement
		Enhance and/or create recreational and public use areas

The SWRP water quality priorities for the planning area prioritize reducing pollutant loading to 303(d)-listed water bodies and supporting existing TDMLs. Water quality benefits provided by stormwater and dry weather runoff projects in the planning area include increased filtration and/or treatment of runoff, nonpoint source pollution control, and reestablished natural water drainage and treatment. The majority of water quality projects included in the SWRP increase infiltration of stormwater to reduce specific pollutants of concern in Stanislaus County. It is estimated that by implementing all SWRP projects with water quality benefits (both conceptual and ready to proceed), there could be a reduction in TSS loading of approximately 205,000 lbs/yr and approximately 5,200 lbs/yr of trash removed from entering waterways throughout the County.

Stormwater capture for groundwater basin recharge to augment water supply was identified as a regional watershed priority during the preparation of the SWRP. SWRP projects providing supply benefits through stormwater capture and use were aggregated across the planning area to analyze how collectively the stormwater capture projects and programs could provide water supply benefits of approximately 167,000 AFY of direct recharge, direct use, and/or in-lieu recharge/conjunctive use.

Flood management projects in the planning area can also provide water augmentation benefits by diverting flood flows to increase recharge. The SWRP projects providing flood management benefits through a reduction in potential flood volume can capture almost 28,000 AFY.

Environmental and community benefits could also be quantified as part of the SWRP. Projects providing energy reduction benefits could reduce energy consumed by over 1,500,000 kWh/year when analyzed collectively. Projects may also protect or improve over 3,500 acres of habitat. Community benefits resulting from the combined project include over 30,000 estimated visits per year to parks or other recreational areas developed or improved by the projects.

ES-4 Project Identification and Prioritization Process

The primary purpose of the SWRP is to identify and assess multiple-benefit stormwater projects, prioritizing those projects that can best address the water resource management goals in the SWRP planning area of Stanislaus County. The project identification and quantitative assessment process for the plan included: project solicitation, project submission, eligibility screening, and the metrics-based project assessment and prioritization.

Project solicitation was the process by which public agencies, nonprofits, and members of the public submitted projects to the SWRP. The project submission process for the SWRP was built on the strategy developed during the East Stanislaus IRWMP using a web-based project submittal and data management system called Opti. The Opti system allows project information to be submitted, reviewed, organized, and regularly updated electronically by project proponents. Project summaries are also available for review to all interested parties at http://irwm.rmcwater.com/es.

Submitted projects were screened for four eligibility characteristics in order to qualify for inclusion in the SWRP. The eligibility requirements ensure that (1) projects would be submitted by applicants eligible to receive funding, (2) the project is of the appropriate type, and the project provides multiple benefits as required by the SWRP Guidelines, (3) providing at least two or more categories of Main Benefits and (4) providing at least one category of Additional Benefits. Main and Additional Benefit categories are listed in Table ES-1.

A project prioritization process was developed to prioritize individual projects and programs for implementation based on an integration of measurable factors to assure the greatest water quality, water supply, conservation, and community needs are addressed. The prioritization process was based on watershed and planning area-level water resource management priorities identified during SWRP development and was created to be a simple, objective, metrics-based tool for assessing projects. Projects were prioritized based on a system of points, allocated to reflect those priorities.

The SWRP scoring system follows guidance provided in the SWRP Guidelines, which encourage projects to be prioritized based on factors such as providing multiple benefits, ability to secure ongoing funding, use of a metrics-driven approach, location on public lands, augmentation of local water supplies, and habitat restoration.

During the 2017 solicitation period, 58 projects were submitted, of which 41 were Conceptual projects and 17 were Ready-to-Proceed (RTP) projects. A detailed list of the submitted project and project prioritization is provided in Appendix F including information about project sponsors, project descriptions, prioritization results, and benefits provided. Table ES-2 summarizes the prioritization scoring system based on the SWRP

main and SWRP additional benefits provided by the project. Additional points were awarded if a quantitative metric was provided for either a main or additional benefit.

Table ES-2. Project Prioritization Scoring System

Providing SWRP Main Benefits and Additional Benefits	Points
Providing SWRP Main Benefits	
Points per benefit provided	4
Additional points if a quantitative metric can be provided for that benefit	2
Providing SWRP Additional Benefits	
Points per benefit provided	2
Additional points if a quantitative metric can be provided for that benefit	1
Addressing Regional Watershed Priorities	**Points**
Implements water quality improvements to help achieve the goals of an existing TMDL?	4
Reduces pollutant discharges into a 303(d)-listed Impaired Water Body?	2
Augments water supply by capturing stormwater or dry weather runoff for recharge into a groundwater basin?	4
Does the project provide a SWRP Main or Additional Benefit to a disadvantaged community or an economically distressed area?	4
Progress Towards Project Implementation	Points
Is the project supported by entities that have created permanent, local or regional funding?	4
Is the project located on public land? If not, is there an existing easement or right of way agreement with a local land owner?	4
Readiness of project to proceed (award points for each one completed):	
Planning Study or Feasibility Study	1
Environmental Assessment/EIR	1
Preliminary Project Design	2
Acquisition of all required environmental permits	2

ES-5 Plan and Project Implementation

Implementation of the SWRP will be completed through cooperation between Stanislaus County, the TAC, the project proponents, and stakeholders. For the SWRP to be successful, projects included in the SWRP must continue to move from conceptual and planning phases toward construction and implementation. The SWRP relies on individual projects and programs to collectively achieve the water supply, water quality, flood management, environmental, and community benefits identified in the plan.

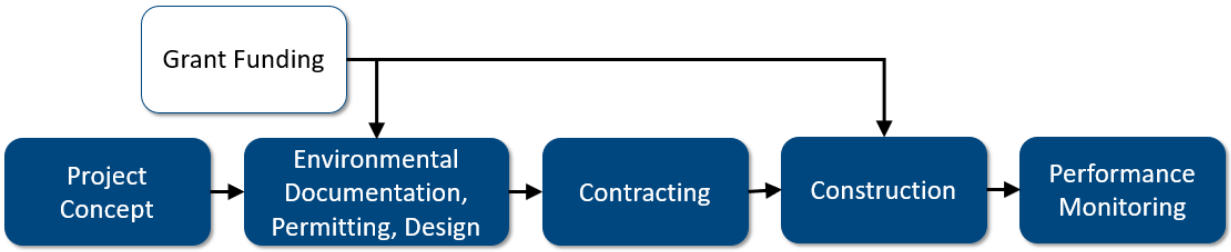
Implementing the SWRP consists of three main elements:

- Completing the design, permitting and implementation of projects included in the SWRP
- Monitoring the benefits produced by the projects included in the SWRP to ensure that project goals are being met and that SWRP objectives are being advanced
- Evaluating the SWRP at regular intervals to assess cumulative progress toward meeting the SWRP objectives and adapting the plan as necessary to ensure that objectives continue to be met

The projects included in the SWRP range from conceptual projects (which will require additional planning and design work prior to construction) to RTP projects (which may be ready for construction as soon as funding is secured). While inclusion in the SWRP does not obligate project proponents to implement projects as submitted, it is the intent of the SWRP that projects will be implemented to meet stormwater

objectives in the planning area. Project proponents are responsible for securing their own project funding and developing and implementing individual projects. A typical project lifespan is shown in Figure ES-4.

Figure ES-4. Example Project Progression



The SWRP is intended to be a living document and implemented as an ongoing, adaptive program. The plan identifies water resource management priorities and recommends projects based on current knowledge, as well as lays the framework for incorporating forthcoming information and future projects resulting from continued plan implementation.

Opti is publicly accessible and will serve as both a data repository and distribution mechanism. The use of Opti allows project proponents to update project information as details are solidified and benefits are further quantified. Eligible projects can be added at any time. Project performance data may also be uploaded to Opti where it can be viewed by stakeholders and members of the public. Project performance will be evaluated based on how well the targets established in the monitoring plan are met. This project information can be collectively managed in Opti and fed back into the plan's management structure to adapt the plan and projects to better meet overall objectives. Feedback obtained from community participation and public perception of individual project benefits is also expected to be an integral part of the adaptive management process for project proponents and plan partners.

This SWRP will be evaluated at regular intervals to assess cumulative progress toward meeting the SWRP objectives and the plan adapted, as necessary, to ensure that stormwater management objectives continue to be relevant and addressed.

Section 1. Introduction

The Stanislaus Multi-Agency Regional Storm Water Resource Plan (SWRP) is a regional watershed-based stormwater and dry weather runoff planning document that integrates water resource management strategies and priorities in Stanislaus County. Led by Stanislaus County, the SWRP was developed in collaboration with the Cities of Modesto, Turlock, Oakdale, Patterson, Ceres, and Waterford, Eastside Water District, as well as the nonprofit organizations River Partners and the Tuolumne River Trust. The primary purpose of the SWRP is to identify and assess multiple-benefit stormwater projects, prioritizing those projects that can best address the water resource management goals in the SWRP planning area of Stanislaus County. The SWRP planning area corresponds with the Stanislaus County boundary (Figure 1-1).

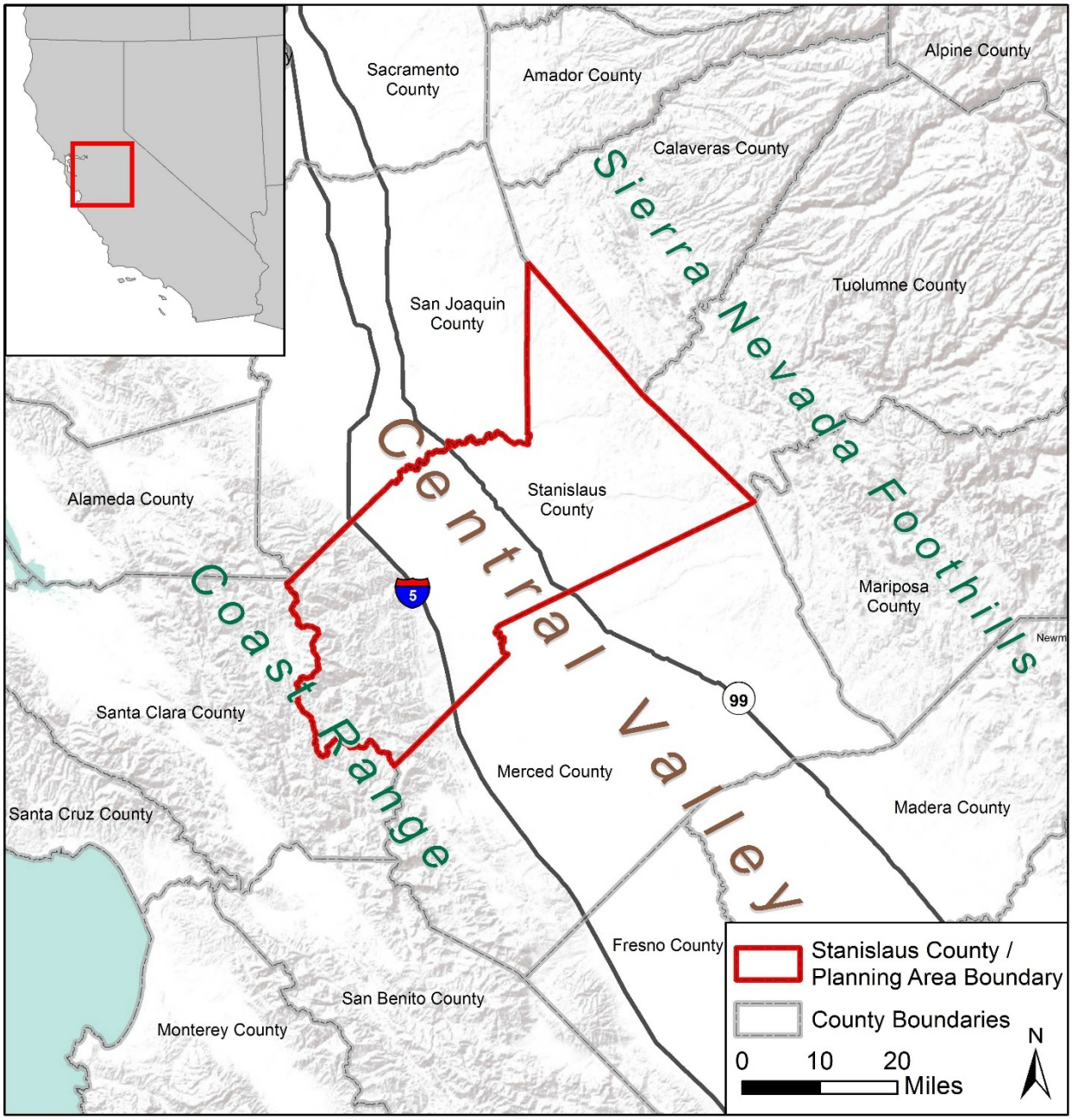
The SWRP is intended to be a living document and implemented as an ongoing, adaptive program. Therefore, this plan identifies watershed priorities and recommends projects based on current knowledge, as well as lays the framework for incorporating forthcoming information and future projects resulting from continued plan implementation.

The SWRP incorporates past management and research efforts, existing plans, as well as stormwater quality and groundwater recharge technical studies performed as part of and alongside development of this SWRP. Concurrent planning efforts of the East Stanislaus Integrated Regional Water Management Plan (IRWMP) and Westside-San Joaquin IRWMP updates were leveraged, with the integration of stakeholders, resources and projects when applicable. Relevant information and projects resulting from the Groundwater Sustainability Plans (GSPs) to be developed for the Modesto, Turlock, Eastern San Joaquin, and Delta-Mendota groundwater subbasins will be assessed and integrated into future SWRP efforts and projects, where feasible.

1.1 Background

The passage of Senate Bill 985 (SB-985), implemented as Water Code Section 10563(c)(1), requires a SWRP as a condition of receiving funds for stormwater and dry weather runoff capture projects from any bond approved by voters after January 2014. In December 2015, the State Water Resources Control Board (SWRCB) provided SWRP Guidelines to establish guidance for the development of SWRPs. These requirements and guidelines codified new approaches to managing stormwater and dry weather runoff, focusing on collaborative, watershed-based approaches to divert runoff to sites that can clean, store, infiltrate and/or use the runoff. Stormwater projects that utilize these approaches can provide multiple benefits to a watershed, such as water supply augmentation, flood control, environmental and community enhancement, as well as water quality improvements.

Figure 1-1. SWRP Planning Area Overview



1.2 SWRP Purpose and Goals

The primary purpose of this SWRP is to provide watershed-based planning throughout the Stanislaus County planning area. The SWRP aims to address challenges and opportunities for managing stormwater and dry weather runoff and to identify and assess multi-benefit stormwater projects, prioritizing those projects that can best address the identified water resource management goals.

The goals of the SWRP include:

- Define watershed and sub-watershed boundaries, surface and groundwater resources, watershed processes and native habitats within the planning area through research of existing documents and previous planning efforts (Section 2);
- Summarize water quality impacts, applicable water quality permits and regulatory activities to identify the planning area's water quality objectives (Section 3);
- Document the collaboration of and coordination with agencies and organizations responsible for water resource management, as well as nonprofit and community organizations, to address stormwater management objectives in the planning area (Section 4);
- Develop and describe an integrated metrics-based analyses to demonstrate that the proposed stormwater and dry weather runoff capture projects and programs will collectively address the SWRP's stormwater management objectives and produce the proposed multiple benefits within the planning area (Section 5);
- Identify and prioritize multi-benefit stormwater capture and use projects through a project solicitation process, project eligibility screening, and prioritization process based on a scoring (Section 6);
- Develop and provide the SWRP implementation strategies for adaptive management, including decision support tools, plan implementation, performance measures and updates, as well as the framework for project tracking and updates (Section 7);
- Engage stakeholders and public through documented education and outreach efforts to identified stakeholders, disadvantaged communities and the public (Section 8).

1.3 Development of the SWRP

Stanislaus County was awarded a planning grant through the Proposition 1 Storm Water Grant Program to develop the Stanislaus Multi-Agency Regional SWRP. Matching funds to develop the plan were provided by Stanislaus County, Eastside Water District, and the Cities of Modesto, Oakdale, and Patterson. A Technical Advisory Committee (TAC), composed of agency and nonprofit representatives, was developed to provide input on planning components and support review of the plan. Two special studies were also performed to provide technical analyses and water quality monitoring data to inform plan priorities and project opportunities. One study consists of stormwater quality monitoring at key outfalls to establish baseline water quality conditions and to generate data for future use in model calibration and project selection, and included preparation of a Monitoring Plan and Quality Assurance Project Plan. The other special study is a groundwater recharge site assessment, which will inform the planning and design of future recharge projects.

This SWRP is consistent with the Storm Water Resource Plan Guidelines (SWRCB, 2015) and the requirements of the Stormwater Resource Planning Act, Water Code Sections 10560 *et seq*. A checklist documenting compliance with the Water Code and SWRP Guidelines is provided as Appendix A.

Section 2. Planning Area Description

Stanislaus County encompasses 1,515 square miles in California's San Joaquin Valley, with its western border in the Coast Range, southwest of the San Francisco Bay. The County extends to the Sierra Nevada foothills in the east (Figure 1-1). According to 2016 census estimates, Stanislaus County has a population of 541,560 (United States [U.S.] Census Bureau, 2017). The western portion of the County, in the Coast Range, consists of undeveloped rangeland. Outside of this area, agricultural land constitutes a major fraction of the County (85% of the County area), with urban land of varying density constituting 6% of the area (ICF, 2016).

The Stanislaus Multi-Agency Regional SWRP planning area aligns with Stanislaus County boundaries and includes the bulk of two major watersheds, the Middle San Joaquin-Lower Merced-Lower Stanislaus and the Panoche-San Luis Reservoir watersheds. This planning area was chosen to facilitate regional stormwater management based on the significant overlap with the County boundaries and the East Stanislaus and Westside-San Joaquin IRWMP areas, as well as the Modesto, Turlock and Delta-Mendota Subbasin groundwater management planning areas. The SWRP planning area is entirely within the San Joaquin River Hydrologic Region. The SWRP planning area boundary conforms to the Stanislaus County boundary. This boundary allows for the SWRP to be implemented on a regional scale, while also allowing for focus on a discrete jurisdictional area. Regulatory mechanisms applicable to stormwater, such as the Stanislaus County Storm Water Management and Discharge Control Ordinance and Stanislaus County Storm Water Management Program, are enacted at the County level. County-level general planning also impacts stormwater planning. The SWRP uses the Stanislaus County boundary to define the planning area in order to streamline the SWRP and allow for adaptive management and responsiveness as local conditions change in the future. The SWRP boundary includes significant portions of two primary watersheds whose features determine the fate of stormwater within the County (described in Section 2.1).

The County includes the cities of Modesto, Turlock, Hughson, Ceres, Oakdale, Newman, Waterford, Riverbank and Patterson. The County also includes a total of 23 water districts, irrigation districts, and Community Service Districts that deliver water to their constituents. This planning area supports a multi-benefit watershed approach because the borders frame natural boundaries, responsible agencies and organizations, and communities who can collaboratively identify and support programs and projects that will collectively address water resource management goals, and provide water supply, water quality, habitat, and community benefits for the region.

A full list of data sources consulted during the development of this Section is available in Appendix B.

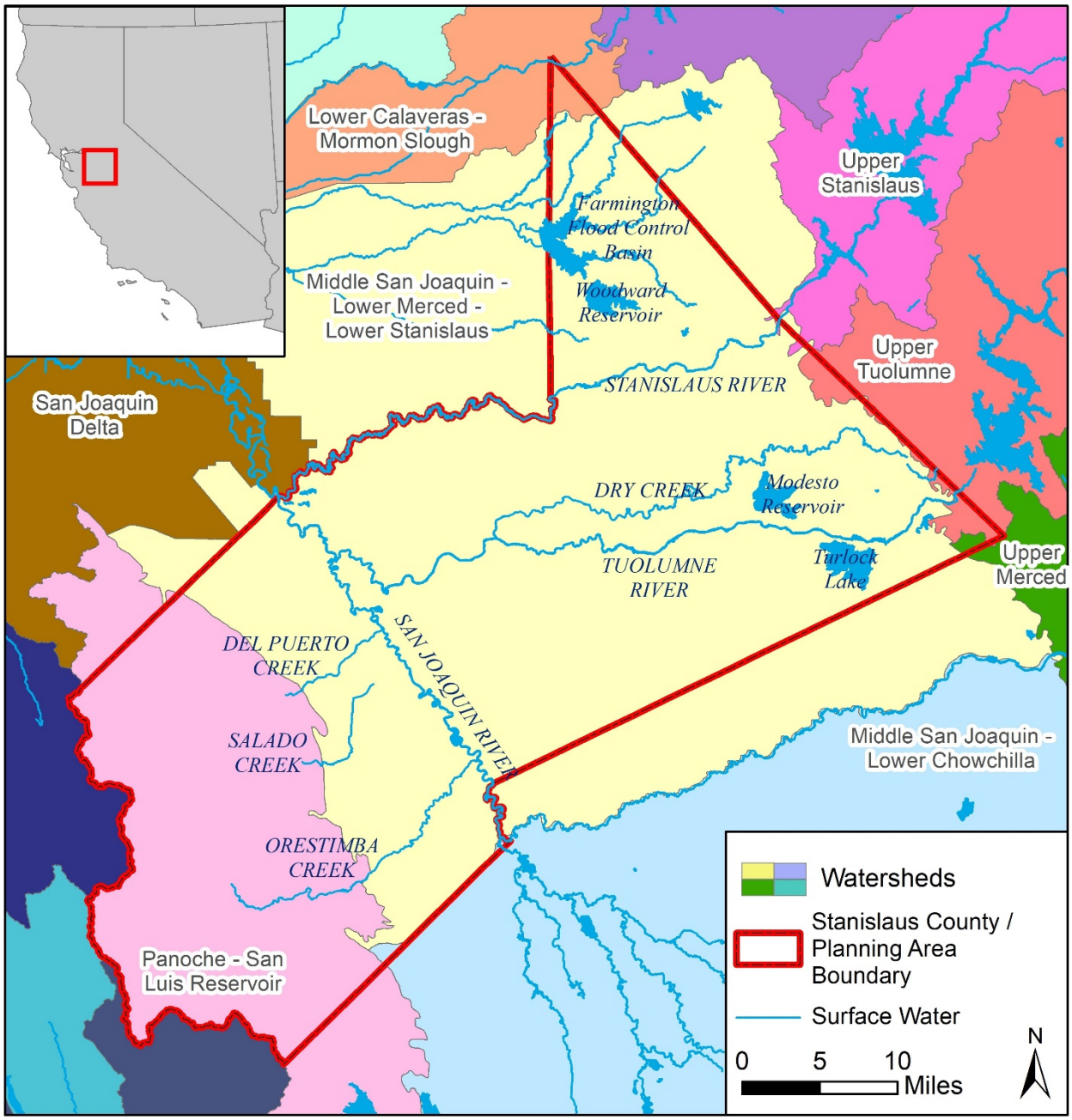
2.1 Description of Watersheds

This SWRP includes two major watersheds (defined using U.S. Geological Survey (USGS) HUC 8-digit boundaries), the Middle San Joaquin-Lower Merced-Lower Stanislaus and the Panoche-San Luis Reservoir. The SWRP planning area also includes small portions of five additional watersheds; the Upper Tuolumne, Lower Calaveras-Mormon Slough, Middle San Joaquin-Lower Chowchilla, Upper Merced, and Upper Stanislaus. Only a small portion of each watershed lies within the County boundary (Table 2-1). In total, these five additional watersheds make up less than 2% of Stanislaus County in area (covering 26 square miles out of a total 1,514 in the County overall). Therefore, these watersheds are not discussed individually in the SWRP.

Table 2-1. Watershed Areas Present in Stanislaus County

Watershed Name	Total Watershed Area (sq mi)	Watershed Area within Stanislaus County (sq mi)	% of Watershed within Stanislaus County	% of Stanislaus County Covered by Watershed
Middle San Joaquin-Lower Merced-Lower Stanislaus	1,767	1,102	62	72.7
Panoche-San Luis Reservoir	1,214	386	32	25.5
Upper Tuolumne	1,616	15	1	1.0
Lower Calaveras-Mormon Slough	199	6	3	0.4
Middle San Joaquin-Lower Chowchilla	2,494	2	0.1	0.1
Upper Merced	1,099	2	0.2	0.1
Upper Stanislaus	997	1	0.1	0.1

Figure 2-1. Watersheds in Stanislaus County



2.1.1 Middle San Joaquin-Lower Merced-Lower Stanislaus Description

The Middle San Joaquin-Lower Merced-Lower Stanislaus Watershed covers most of Stanislaus County. The watershed encompasses over 1,700 square miles and extends into five counties. The majority of the watershed, approximately 1,100 square miles or 62%, is within Stanislaus County. The watershed extends across the San Joaquin Valley from the foot of the Sierra Nevada in the east to the Coast Range and Interstate 5 (I-5) corridor in the west. The watershed is dominated by a plain composed of alluvial fan deposits and is part of the Great Valley geomorphic province. Three major rivers, the Stanislaus, Tuolumne,

and San Joaquin Rivers, run through the Middle San Joaquin-Lower Merced-Lower Stanislaus Watershed. The watershed also contains several reservoirs used for water supply, flood control, and hydroelectric power production; all located in the eastern portion of the study area. All nine incorporated cities within the planning area are in the Middle San Joaquin-Lower Merced-Lower Stanislaus Watershed (Figure 2-1).

2.1.2 Panoche-San Luis Reservoir Description

The Panoche-San Luis Reservoir Watershed covers the westernmost portion of the County (Figure 2-1). It spans approximately 100 miles from north to south, beginning in San Joaquin County in the north, and extending to Fresno and San Benito Counties at its southern end. In total, the watershed covers 1,214 square miles, with 386 square miles or 32%, inside Stanislaus County. The watershed includes the eastern portion of the Coast Range, which contains the highest point in Stanislaus County (approximately 3,800 feet above sea level). The eastern edge of the watershed, at the foot of the Coast Range, is approximately 300 feet above sea level. No major water bodies are present in the watershed, though there are several small intermittent creeks that flow from the mountains to the floor of the Central Valley within the watershed.

2.2 Jurisdictional Boundaries and Service Areas

The planning area contains nine incorporated cities whose boundaries are depicted in Figure 2-2. The largest of these cities is Modesto, with a population of 212,175 as of 2016 (U.S. Census Bureau, 2017). A total of 23 water agencies serve water within the County. Service areas for the water purveyors in the County are shown in Figure 2-3.

Wastewater service in Stanislaus County is provided by a number of entities, including the cities and sanitation districts shown in Figure 2-4. The Cities of Modesto, Ceres, Turlock, Waterford, Hughson, Riverbank, Patterson, Newman and Oakdale provide wastewater services within their jurisdictions. Empire Sanitary District, Salida Sanitary District, Western Hills Water District, and the Community Services Districts (CSD) of Denair CSD, Grayson CSD, Keyes CSD, and Westley CSD also provide wastewater and sewer services within their service areas (ICF International, 2016). Septic systems are used widely throughout the County in areas where sanitary sewers have not been installed.

Land use agencies in the area include the East Stanislaus and West Stanislaus Resource Conservation Districts (RCDs). The East Stanislaus RCD includes the eastern portion of the County, with the western boundary at the San Joaquin River. The West Stanislaus RCD includes the remainder of the County, west of the San Joaquin River.

Additional internal boundaries within the County include the IRWM (Integrated Regional Water Management) boundaries and groundwater basins. Groundwater basins are discussed in further detail in Section 2.5, *Groundwater Resources*. The IRWM Regions within the County are the East Stanislaus IRWM Region and the Westside-San Joaquin IRWM Region (Figure 2-5).

The East Stanislaus IRWM Region covers a total of 880 square miles. Most of this Region, 86%, lies within Stanislaus County, with the southern boundary extending in the Merced County. The Region covers half of Stanislaus County and includes most cities within the planning area. The Westside-San Joaquin Region lies along the western border of the East Stanislaus IRWM Region, and extends to the I-5 corridor in the east. The County's northern triangle, as well as the westernmost sections, roughly west of I-5, are not covered by IRWM regions.

Figure 2-2. Incorporated Areas in Stanislaus County

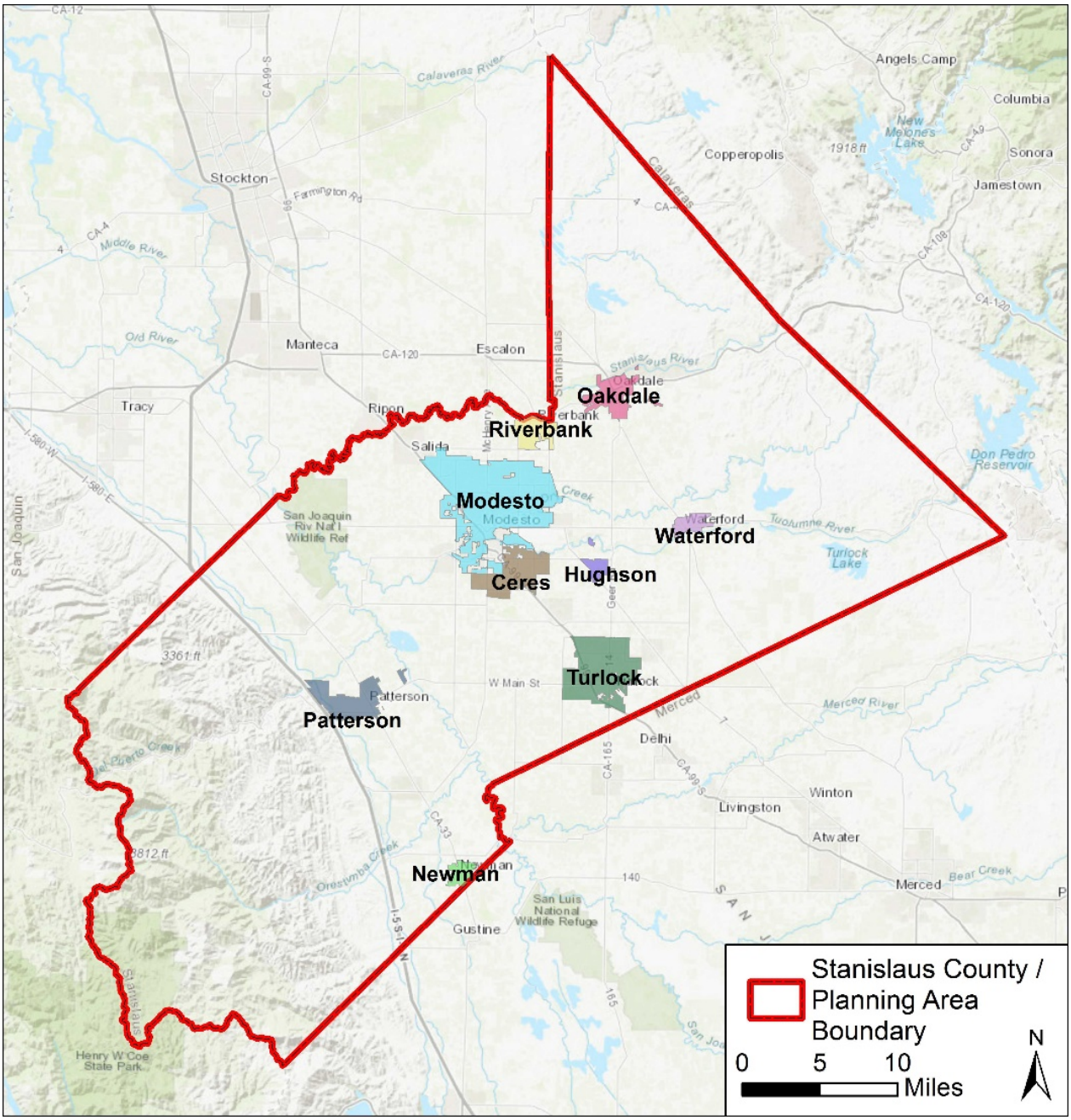
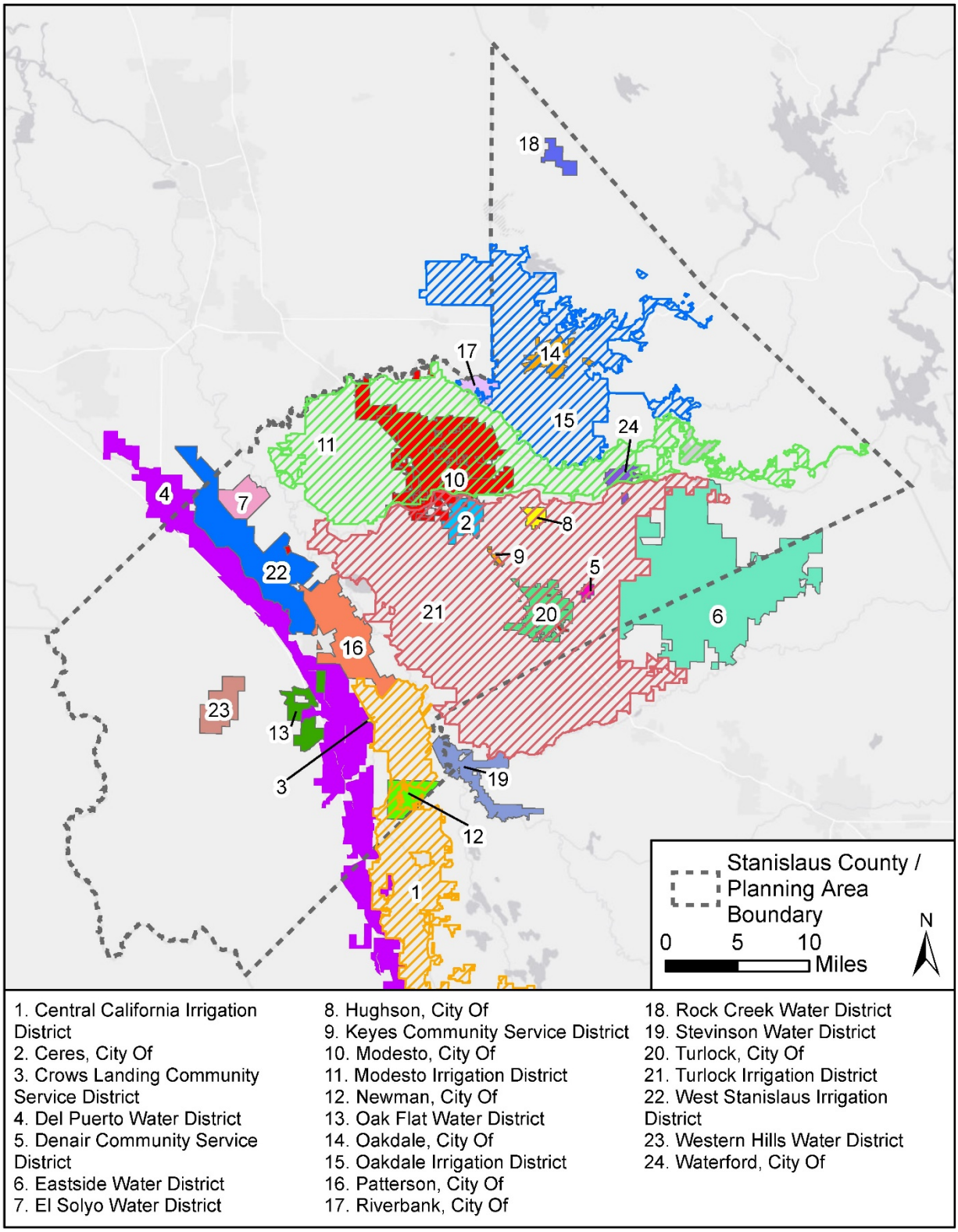
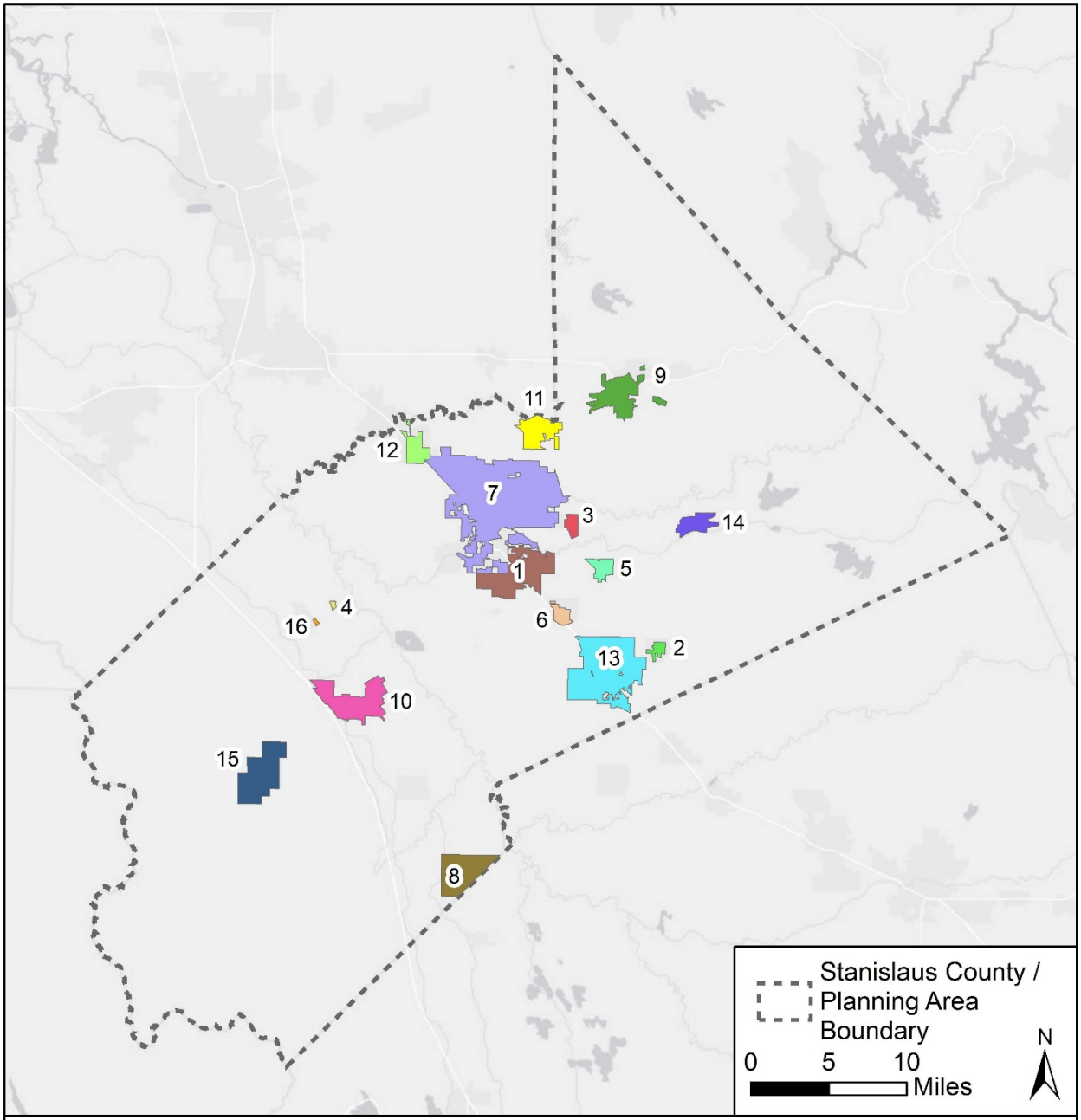


Figure 2-3. Water Purveyor Service Areas in Stanislaus County



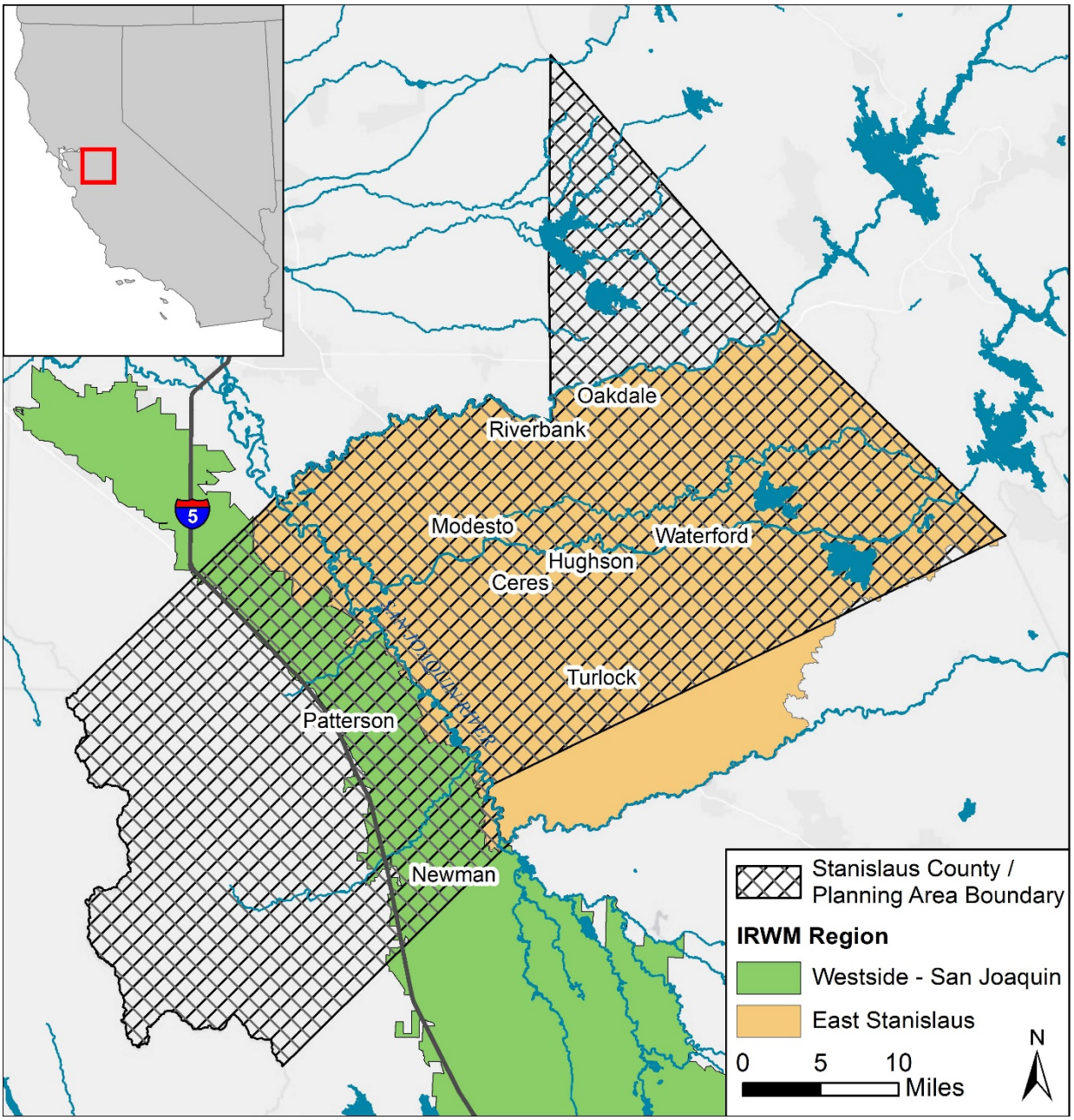
1. Central California Irrigation District
2. Ceres, City Of
3. Crows Landing Community Service District
4. Del Puerto Water District
5. Denair Community Service District
6. Eastside Water District
7. El Solyo Water District
8. Hughson, City Of
9. Keyes Community Service District
10. Modesto, City Of
11. Modesto Irrigation District
12. Newman, City Of
13. Oak Flat Water District
14. Oakdale, City Of
15. Oakdale Irrigation District
16. Patterson, City Of
17. Riverbank, City Of
18. Rock Creek Water District
19. Stevinson Water District
20. Turlock, City Of
21. Turlock Irrigation District
22. West Stanislaus Irrigation District
23. Western Hills Water District
24. Waterford, City Of

Figure 2-4. Wastewater Service Areas in Stanislaus County



1. Ceres, City of
2. Denair CSD
3. Empire Sanitary District
4. Grayson CSD
5. Hughson, City of
6. Keyes CSD
7. Modesto, City of
8. Newman, City of
9. Oakdale, City of
10. Patterson, City of
11. Riverbank, City of
12. Salida Sanitary District
13. Turlock, City of
14. Waterford, City of
15. Western Hills Water District
16. Westley CSD

Figure 2-5. IRWM Regions in Stanislaus County



2.3 Watershed Processes

The County has a Mediterranean climate, with hot dry summers and cool wet winters. On average, Stanislaus County receives 13 inches of rain annually. Major rivers in the County are the Stanislaus, Tuolumne, and San Joaquin Rivers. The San Joaquin River is the largest in the region, flowing from south to north through the San Joaquin Valley, with notable tributaries including the Cosumnes, Mokelumne, Stanislaus, Tuolumne and Merced Rivers. The Tuolumne and Stanislaus Rivers are the two tributaries of the San Joaquin River that flow through Stanislaus County, with Dry Creek being a major tributary to the Tuolumne. Both the Tuolumne and Stanislaus Rivers begin in the Sierra Nevada and flow from east to west across the San Joaquin Valley, fed by snowmelt from the Sierra Nevada. After leaving the County, the San

Joaquin River discharges to the Sacramento-San Joaquin Delta (Delta) and San Francisco Bay. Flowing from the western side of the County, Del Puerto Creek discharges into the San Joaquin River near Patterson, and Orestimba Creek discharges into the San Joaquin River north of Newman. Salado Creek drains the eastern slopes of part of the Coast Range and ends north of Patterson without meeting the San Joaquin River. Little Salado Creek also drains portions of the Coast Range, ending south of Patterson and discharging through the Marshall Road Drain into the San Joaquin River.

Land use in Stanislaus County is primarily agricultural, although localized urban areas exist and are growing in size (Figure 2-6). These urbanized pockets cause an increase in impervious surfaces which reduces the ability of stormwater to infiltrate to the subsurface. This urbanization has caused a major change to watershed processes in those areas of the County by increasing runoff and contributing to flooding and water quality issues.

The remainder of Stanislaus County has been primarily developed for agriculture. In agricultural areas, impervious surfaces are less common, but natural watershed processes may be disrupted through groundwater use or through the presence of irrigation canal levees that can redirect runoff. Groundwater pumping can impact not only the groundwater levels, but also interconnected surface water bodies. Other agricultural practices can also affect groundwater. Historically, much of the agriculture in Stanislaus County has been irrigated using unlined irrigation ditches and canals. This practice has facilitated groundwater recharge as irrigation water is transported between locations, and may encourage groundwater recharge in areas where it may not naturally occur (Department of Water Resources [DWR], 2013). As some farmers move toward more precise irrigation methods, such as micro drip irrigation, and a greater percentage of canals are lined, groundwater recharge is expected to decline (Bookman-Edmonston, 2005).

Flooding in Stanislaus County occurs naturally due to snowmelt and rainfall, and major flood events can occur regularly due to the topography and major river systems in the region (DWR, 2013). Some older areas of Stanislaus County have problems with flooding during storms that exceed ½-inch per hour due to inadequate drainage. In most rural parts of Stanislaus County, stormwater runoff is handled by field percolation or through roadside ditches which drain to Dry Creek, Tuolumne River, Stanislaus River or the San Joaquin River. There are few storm drain facilities constructed in rural areas. Cities in Stanislaus County use multiple types of infrastructure to reduce flooding, including storm drain systems, rock wells, and sanitary sewer cross-connections. Some developed areas of the County lack any stormwater management infrastructure.

Due to the agricultural nature of Stanislaus County, there is a large amount of undeveloped area in the County, including privately-owned agricultural lands, parks, and open space. An overview of non-agricultural open space and natural areas is provided in Figure 2-7. These include city parks, regional parks, wildlife refuges, and state parks. Detailed maps of parks in Modesto, Turlock, and Ceres are included in Appendix C. Regional parks are valuable in preserving natural resources, such as river and riparian areas. River corridors and floodplains are some of the most ecologically valuable areas in the landscape, especially in an arid climate like the San Joaquin Valley. The rivers and floodplains are important for fish species, including anadromous species such as salmon and steelhead, and also provide wintering areas for migratory birds on the Pacific Flyway. The San Joaquin, Merced, Tuolumne, and Stanislaus Rivers are characterized as Critical Habitat for steelhead trout, as designated by the U.S. Fish and Wildlife Service. Other Critical Habitats in the Region include those for the vernal pool tadpole shrimp and vernal pool fairy shrimp. Riparian and wetland sensitive species associated with the San Joaquin River and the lower reaches of the Merced, Tuolumne, and Stanislaus Rivers include Delta button-celery, valley elderberry longhorn beetle, riparian woodrat, riparian brush rabbit, wading bird rookeries, least Bell's vireo, tricolored blackbirds, Swainson's hawk, pallid bat, and western red bat (ICF, 2016).

Several notable natural areas exist within the County:

- **San Joaquin River National Wildlife Refuge (SJRNWR) –** The Refuge is located west of Modesto, within the historic floodplain of the confluences of the San Joaquin, Stanislaus, and Tuolumne Rivers. Refuge lands consist of oak-cottonwood-willow riparian forest, pastures, agricultural fields, and wetlands, with habitats for a diversity of wildlife including numerous special species such as Swainson's hawks, herons and cormorants, and the endangered riparian brush rabbits. The Refuge presently encompasses more than 6,500 acres. In January 2017, the U.S. Fish and Wildlife Service released a final plan authorizing the expansion of the refuge by up to 10,700 acres. This would link the refuge with the Grasslands Ecological Area, a mosaic of floodplain habitats that covers 160,000 acres. Portions of the SJRNWR consist of conservation easements, which may be shown on land use maps as agricultural areas.
- **Dos Rios Ranch –** Dos Rios Ranch is a 1,600-acre area adjacent to the SJRNWR and located at the confluence of the Tuolumne and the San Joaquin Rivers. Managed by the Tuolumne River Trust and River Partners, Dos Rios Ranch provides six miles of river frontage and is managed for habitat and attenuation of flood flows (ESA, 2014).
- **Henry W. Coe State Park –** Henry W. Coe State Park lies in the Diablo Mountains of the Coast Range and straddles Stanislaus and Santa Clara Counties. In total, it encompasses 87,000 acres of hills and mountains, offering hiking, biking, and equestrian trails. The park is home to native oaks as well as grassland and chaparral habitats (California State Parks, 2009)

Table 2-2. Land Use Area within Stanislaus County

Land Use Type	Area (sq. mi.)
Agriculture	625
Barren/Other	<1
Conifer Forest	2
Hardwood	164
Herbaceous	501
Shrub	102
Urban	105
Water	14
Wetland	4

Figure 2-6. Land Use in the Stanislaus County Area

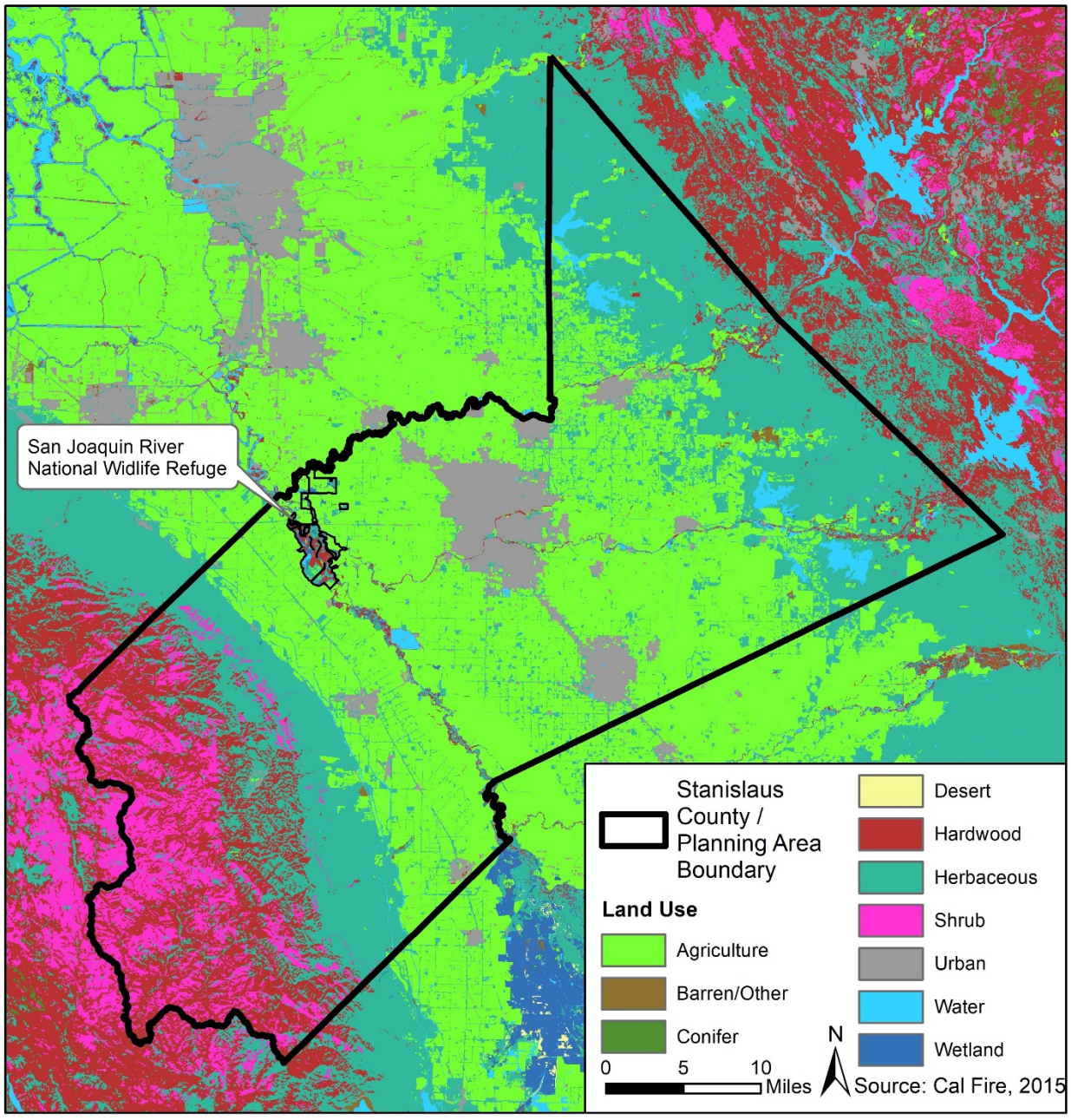
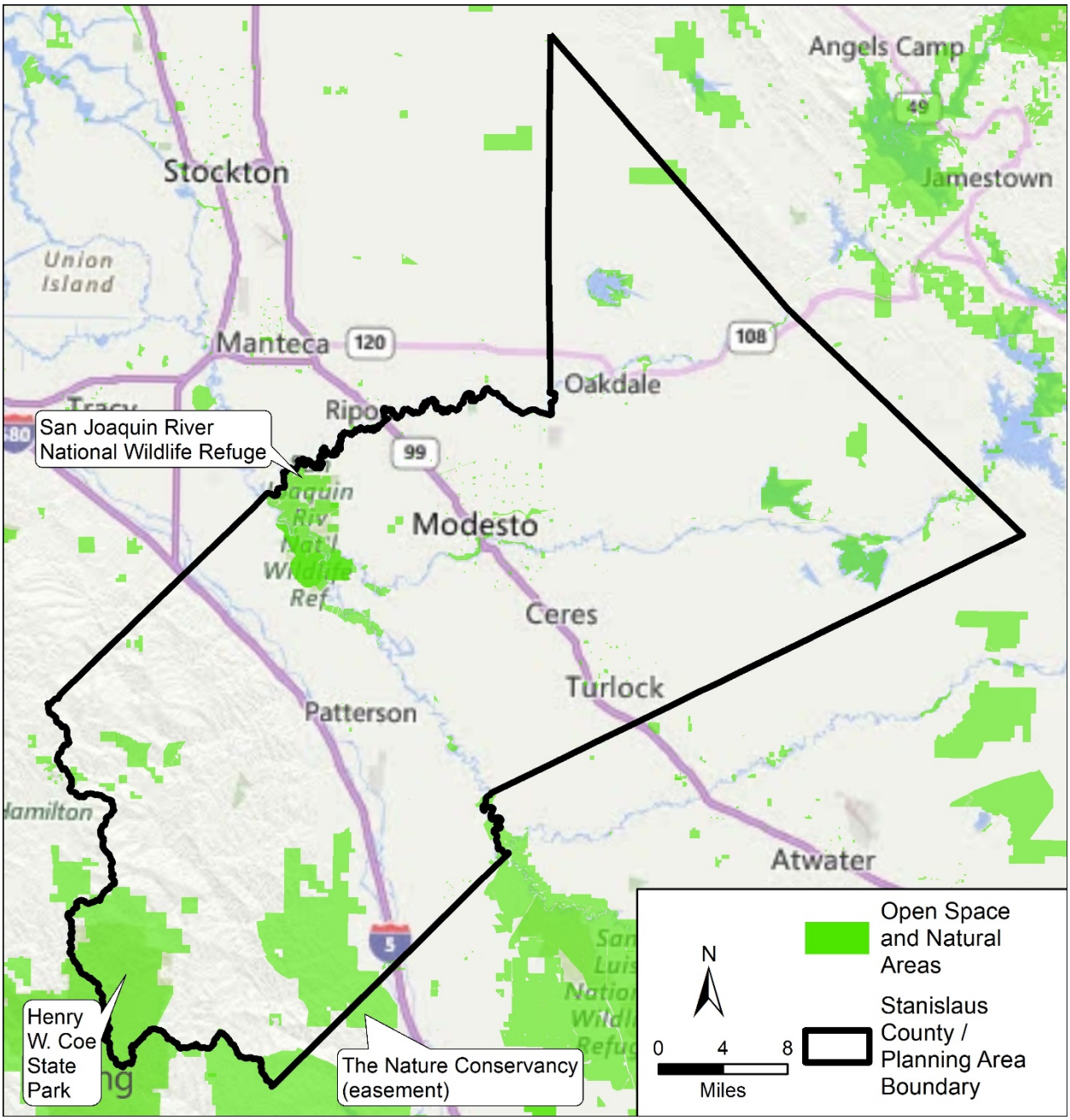


Figure 2-7. Open Space and Natural Areas within Stanislaus County



2.4 Surface Water Resources

2.4.1 Surface Water Bodies

Major surface water bodies in Stanislaus County include the San Joaquin River, Tuolumne River, and Stanislaus River. An overview of these water bodies in a regional context is provided in Figure 2-8.

San Joaquin River

The San Joaquin River Basin covers approximately 32,000 square miles in the northern part of the San Joaquin Valley, roughly from Fresno to Stockton (San Joaquin River Group Authority, 1999). The primary sources of surface water to the San Joaquin River Basin are rivers that drain the western slope of the Sierra Nevada Range. The San Joaquin River is 330 miles in length from its headwaters to its confluence with the Sacramento River. The San Joaquin River can be broken into upper and lower reaches. The Upper San Joaquin River extends from the headwaters to the Merced River; the Lower San Joaquin River runs from the river's confluence with the Merced River north to the Delta. Stanislaus County includes only the Lower San Joaquin River reach. The Lower San Joaquin River is characterized by the combination of flows from tributary streams, major rivers, groundwater accretions and agricultural drainage water (San Joaquin River Group Authority, 1999). The Lower San Joaquin River is located in the western portion of Stanislaus County and runs roughly parallel to and approximately 6 miles east of the I-5 corridor. Within the County, the San Joaquin River has a shallow gradient; its elevation falls about 1 foot/mile in the County (ESA, 2014). It meanders through oxbow lakes, old slough channels, and wetlands. The river's major tributaries from the east are the Stanislaus and Tuolumne Rivers (described in the following sections). Smaller creeks flow into the San Joaquin River from the Coast Range to the west, including Del Puerto Creek, Orestimba Creek, Salado Creek and Little Salado Creek. Del Puerto Creek flows from the Coast Range to the north of Patterson, draining into the San Joaquin River between Grayson and Patterson (Figure 2-8). Orestimba Creek drains the southwest portion of the County, flowing to the northeast, passing roughly four miles north of Newman and emptying into the San Joaquin River (Figure 2-8). Salado Creek is 20 miles long and drains 25 square miles; it terminates in Patterson prior to reaching the San Joaquin River. Little Salado Creek, just south of Salado Creek, empties into the Marshall Drain, which in turn discharges into the San Joaquin River.

Stanislaus River

The Stanislaus River Watershed is approximately 578,000 acres, located in the central Sierra Nevada, and is one of the largest tributaries to the San Joaquin River in the Central Valley. The Stanislaus River makes up a portion of the northern boundary of Stanislaus County, and meets the San Joaquin River along the County border. Snowmelt runoff contributes the largest portion of the flows in the Stanislaus River, with the highest monthly flows in May and June (San Joaquin River Group Authority, 1999). Flow control in the lower Stanislaus River is provided by the New Melones Reservoir (roughly 10 miles northeast of Stanislaus County), which has a capacity of 2.4 million acre-feet (AF) and is operated by the U.S. Bureau of Reclamation (USBR). Releases from New Melones Reservoir are re-regulated downstream at Tulloch Reservoir (approximately 5 miles northeast of the County). The main water diversion point on the Stanislaus River is Goodwin Dam, which provides deliveries to Oakdale Irrigation District (OID) as well as water purveyors in San Joaquin County (San Joaquin River Group Authority, 1999).

Tuolumne River

The headwaters of the Tuolumne River begin in Yosemite National Park in the Sierra Nevada at an elevation of about 13,000 feet above sea level. The river descends 4,000 feet to Hetch Hetchy Reservoir. At the reservoir, approximately 33% of the river's flow is diverted through Canyon Tunnel, and ultimately to the San Francisco Bay Area. The Tuolumne River and Dry Creek, a major tributary, are both within Stanislaus County. Dry Creek is an ephemeral stream that originates north of the Modesto Reservoir, passes north of

Waterford, and discharges into the Tuolumne River near downtown Modesto. Flows in the lower portion of the Tuolumne River are controlled primarily by the operation of New Don Pedro Dam, which lies just east of the County. The 2.03-million AF Don Pedro Reservoir, owned and operated by Modesto Irrigation District (MID) and Turlock Irrigation District (TID), stores water for irrigation, hydroelectric generation, fish and wildlife enhancement, and recreation purposes, and also provides flood control. MID and TID divert water to the Modesto Main Canal and the TID Main Canal a short distance downstream from New Don Pedro Dam at La Grange Dam, just west of the border of Stanislaus and Tuolumne Counties (San Joaquin River Group Authority, 1999). The water diverted by MID and TID serves agricultural demands, and drinking water demands in the case of MID (through agreements with urban water supplies such as the City of Modesto). The Tuolumne River discharges into the San Joaquin River within Stanislaus County west of Modesto, adjacent to the SJRNWR.

2.4.2 Surface Water Quality

Pesticides have been found within the San Joaquin River at concentrations that are toxic to sensitive aquatic organisms. Two multi-year studies were conducted; the first study was conducted in the early 1990's and found a 43-mile reach of the San Joaquin River, between the confluence of the Merced and Stanislaus Rivers, to be toxic about half of the time to invertebrate components of the U.S. Environmental Protection Agency (USEPA) three-species test. This portion of the San Joaquin River is the portion within the East Stanislaus IRWM Region as the Stanislaus River coincides with the northern boundary and the Merced River coincides with the southern boundary of the IRWM Region. The toxicity in the river was caused by pesticides, specifically diazinon and chlorpyrifos, in storm and irrigation runoff from crops. A year later, a follow-up study was conducted that found that water in the San Joaquin River was toxic to invertebrate species about 6% of the time. As with the first study, diazinon and chlorpyrifos in winter storm runoff from crops and summer irrigation return flows were identified as the primary sources of the toxins. Urban runoff has also been identified as a significant source of these pollutants in and around the City of Modesto (Central Valley Regional Water Quality Control Board [CVRWQCB], 2004).

The SWRCB has found elevated levels of Group A Pesticides in fish in the Tuolumne, Merced, and Stanislaus Rivers and the main stem of the San Joaquin River. Group A Pesticides include chlordane, toxaphene, endosulfan, and other pesticides, many of which are no longer used or are heavily regulated. These chemicals tend to bind to sediment and move into water systems as sediment moves offsite (CVRWQCB, 2004). The San Joaquin, Merced, Tuolumne, and Stanislaus Rivers are all listed on the Clean Water Act (CWA) 303(d) list of impaired water bodies as being impaired by Group A pesticides and various other constituents.

The *Water Quality Control Plan for the Sacramento River Basin and the San Joaquin Basin* (Basin Plan) describes the beneficial uses, water quality objectives, and actions to be taken to meet those objectives for inland surface waters and groundwater in the San Joaquin Basin. The Basin Plan, last revised in 2016, describes the following water quality objectives within the San Joaquin Basin:

- **Bacteria** – In waters designated for contact recreation, the fecal coliform concentration shall not exceed a geometric mean of 200 bacteria per 100 milliliters (200/100 mL) from five samples over a 30-day period, nor shall more than 10% of the total number of samples taken during the 30-day period exceed 400/100 mL.
- **Chemical Constituents** – Water shall not contain chemical constituents in concentrations that adversely affect beneficial uses. For domestic and municipal water supply, the concentrations of chemical constituents must not be in excess of the maximum contaminant levels (MCLs) specified in the California Code of Regulations, and state and federal drinking water regulations.
- **Color** – Water shall be free of discoloration that adversely affects beneficial uses.

- **Floating Materials, Oil and Grease** – Water shall not contain floating materials, oils, greases, waxes or other materials that cause nuisance or affect beneficial uses.

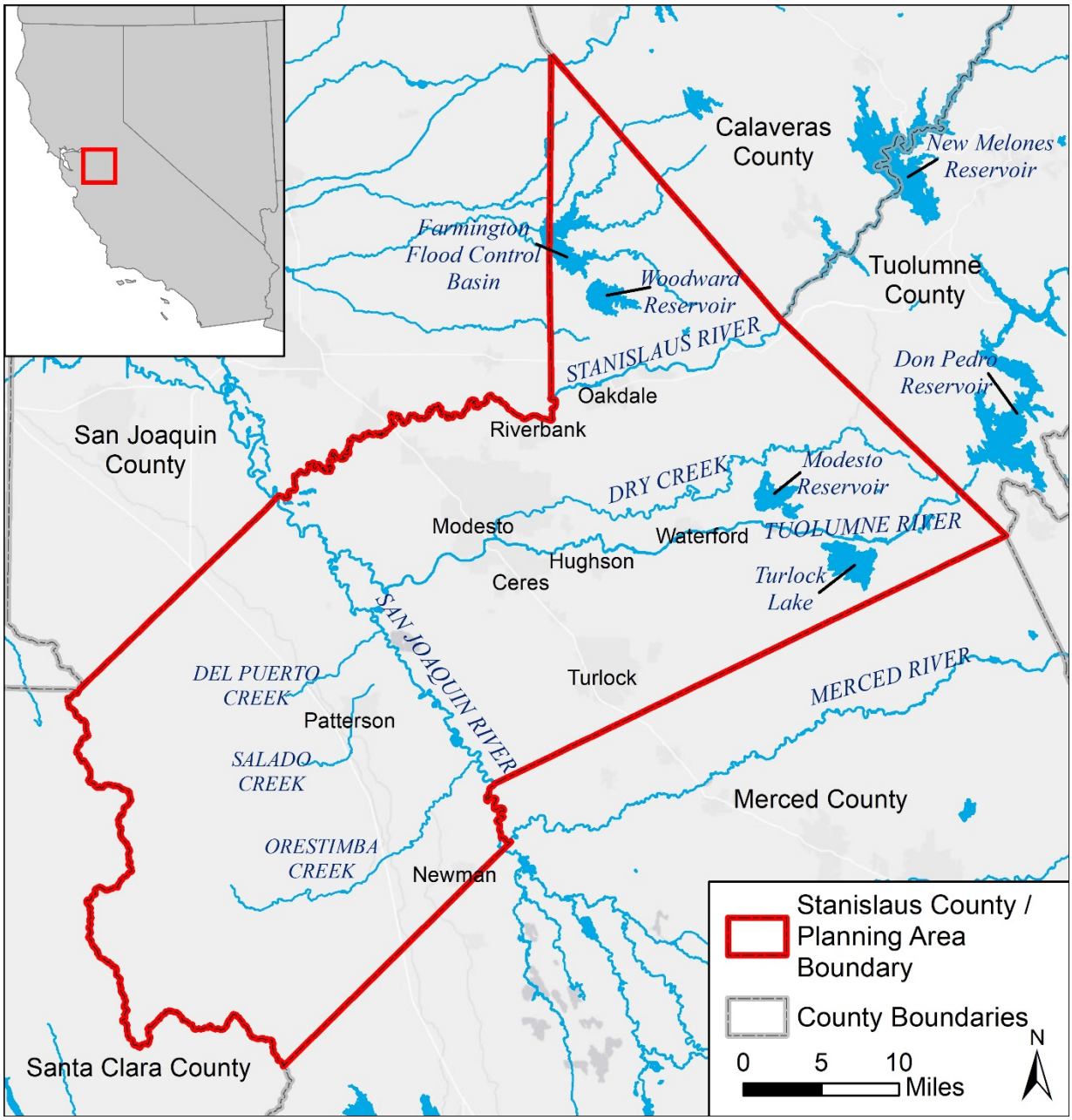
Other water quality objectives were identified in the categories of biostimulatory substances, dissolved oxygen, mercury, methylmercury, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, and turbidity. A more comprehensive description of the water quality objectives is included in the Basin Plan (CVRWQCB, 2018).

The SWRCB is also in the process of updating the *Water Quality Plan for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary* (Bay-Delta Plan). The Bay-Delta Plan was developed in 2006 to protect water quality in the region and includes water quality objectives to protect municipal and industrial, agricultural, and fish and wildlife beneficial uses. The Delta Stewardship Council (DSC), as part of the Bay-Delta Plan, directed the SWRCB to adopt and implement updated flow objectives for the Sacramento–San Joaquin Delta to achieve the coequal goals of ecosystem protection and a reliable water supply by June 2, 2014. To implement this policy, the Bay-Delta Plan is being updated by the SWRCB through a phased process. As part of Phase 1, a draft Substitute Environmental Document (SED) was prepared in December 2012. The SED included support for potential changes to San Joaquin River flow and southern Delta water quality objectives, as well as an implementation program to be included in the Bay-Delta Plan. A revised draft was issued in 2016 and will be updated to a final draft before going to the SWRCB for approval. The SED proposes to balance the use of water for fishery protection against competing uses of water such as municipal, agricultural, and hydropower. Amendments to the 2006 Bay-Delta Plan will establish the following:

- **Flow Objectives** – New flow objectives on the Lower San Joaquin River (LSJR) and its three eastside tributaries (the Stanislaus, Tuolumne and Merced Rivers) for the protection of fish and wildlife beneficial uses.
- **Water Quality Objectives –** New water quality (salinity) objectives for the protection of agricultural beneficial uses in the southern portion of the Delta.
- **Implementation Program –** An implementation program to achieve those objectives

The amendments have the potential to impact Stanislaus County, predominantly through reduced diversions from the Tuolumne and Stanislaus Rivers. As the SED and amendments progress forward, the County will track the flow objectives and water quality objectives that may be relevant to the area.

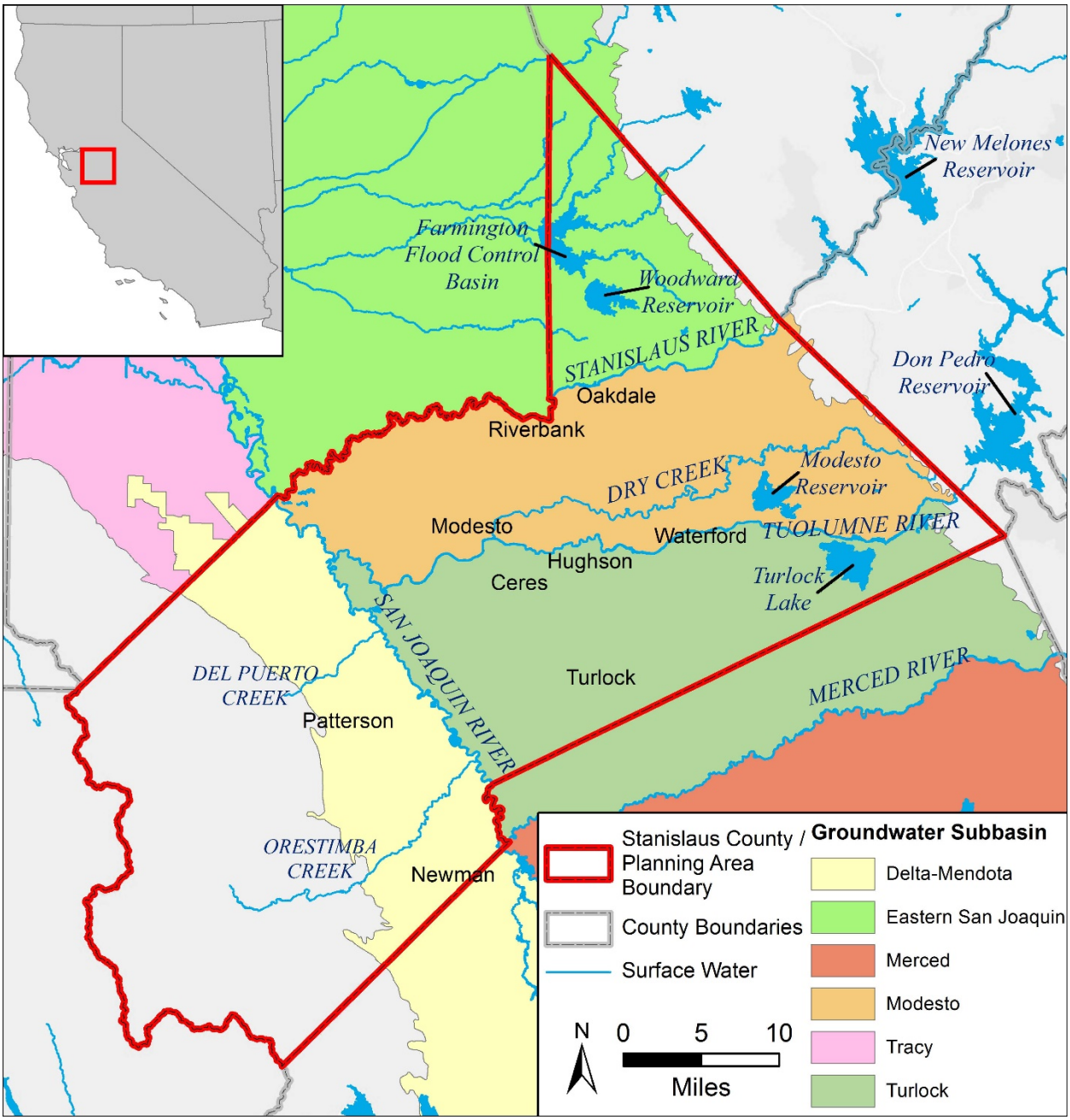
Figure 2-8. Major Surface Water Bodies in Stanislaus County



2.5 Groundwater Resources

Stanislaus County overlies the San Joaquin Valley Basin. Four individual groundwater subbasins underlie the County: the Eastern San Joaquin, Modesto, Turlock, and Delta-Mendota Subbasins (Figure 2-9). Consideration of groundwater supply and quality is crucial in Stanislaus County due to the high reliance on groundwater for both domestic and agricultural use. These subbasins are described further in the sections that follow.

Figure 2-9. Groundwater Subbasins in Stanislaus County



2.5.1 Turlock Subbasin

The Turlock Subbasin covers approximately 542 square miles. Groundwater levels in the subbasin have fluctuated over the past few decades. DWR's Bulletin 118 estimated a 160,000 AF increase of groundwater overdraft in the Turlock Subbasin from 1990 to 1995, but from 1994 to 2000, groundwater water levels rose about seven feet (DWR, 2003). The rising groundwater levels suggested that the groundwater basin had started to recover, but again, beginning in 2000, groundwater production increased, reaching its peak in 2007 when 8.359 billion gallons were pumped. Combined with below average rainfall, increased

agricultural pumping, and urbanization, groundwater pumping for urban use has adversely impacted groundwater levels. Conservation efforts and increased rainfall have helped the groundwater basin to begin to recover once again. The groundwater basin is not currently on DWR's list of critically overdrafted basins (DWR, 2016). The primary sources of groundwater recharge in the Turlock Subbasin are infiltration from the Tuolumne and Merced Rivers, leakage from Turlock Lake, and incidental recharge from applied irrigation water (TGBA, 2008).

In terms of groundwater quality, shallow groundwater in the Turlock Subbasin does not meet drinking water standards due to the presence of constituents such as nitrate and arsenic. Additional treatment, blending, and well closures have all been used as strategies for addressing poor groundwater quality. Shallow groundwater is suitable for nonpotable uses and the groundwater from deeper aquifers is generally of high quality (TGBA, 2008).

2.5.2 Modesto Subbasin

The Modesto Subbasin encompasses 385 square miles to the north of the Turlock Subbasin. The top approximately 800 feet of the subbasin bears water suitable for potable uses (Bookman-Edmonston, 2005). Groundwater recharge in the subbasin occurs mainly from seepage from irrigation canals, including MID and OID channels, with seepage from both the Stanislaus and Tuolumne Rivers. Natural recharge of the subbasin is estimated to be 33,000 acre-feet per year (AFY), while extraction is estimated to be roughly 450,000 AFY (DWR, 2004). Between 1970 and 2000, the average water level in the subbasin fell 15 feet (DWR, 2004). The subbasin has not been categorized as critically overdrafted (DWR, 2016).

Groundwater quality in the Modesto Subbasin ranges from mostly good in the unconfined aquifer to poor in some areas of the confined aquifer (MID, 2012). Total Dissolved Solids (TDS) in groundwater in the eastern two-thirds of the basin is generally less than 500 milligrams per liter (mg/L), with a range from 90 mg/L to 700 mg/L. High TDS (2,000 mg/L) groundwater is present beneath the MID service area at a depth of about 400 feet in the west to about 800 feet in the east. This degraded water originates in marine sediments underlying the San Joaquin Valley. The shallowest high TDS concentrations in groundwater (TDS greater than 1,000 mg/L) occur around 120 feet below the ground surface within a 5- to 6-mile zone parallel to the San Joaquin River (MID, 2012).

2.5.3 Eastern San Joaquin Subbasin

The Eastern San Joaquin Subbasin includes the northernmost portion of Stanislaus County. In total, the subbasin covers 1,105 square miles (only a portion of which is within the county). Groundwater levels in the subbasin have been declining continuously over the past 40 years, resulting in the subbasin being designated as a critically overdrafted groundwater basin (DWR, 2016). In some locations, groundwater levels have fallen by as much as 100 feet (DWR, 2006b). The most depressed groundwater levels occur outside the County, near Stockton and Lodi (DWR, 2006b).

Groundwater quality in the subbasin is affected by the declining water levels and proximity to the Delta. Saltwater intrusion has been occurring east of the Delta, with the saline front moving eastward. Areas of elevated nitrate level also exist in the subbasin. Average TDS was found to be 463 mg/L, and mean specific conductance was 685 microsiemens per centimeter (µmhos/cm) (DWR, 2006b).

2.5.4 Delta Mendota Subbasin

The Delta-Mendota Subbasin includes portions of San Joaquin, Stanislaus, Merced, Fresno, and Madera Counties and lies along the western side of the San Joaquin Valley. Between 1970 and 2000, the subbasin water level increased by approximately 2 feet (DWR, 2006a). Natural recharge into the subbasin is estimated at 8,000 AFY, and applied water recharge is estimated at 74,000 AFY (DWR, 2006a). Extraction is over 500,000 AFY (DWR, 2006a). Despite the gain in groundwater levels observed prior to 2000, the

subbasin has been classified as critically overdrafted, and groundwater use will be managed closely in the future.

Groundwater in the northern portion of the subbasin is characterized by mixed sulfate to bicarbonate types. TDS ranges from 400 to 1,600 mg/L in the northern portion of the subbasin (DWR, 2006a). Average TDS in public supply wells is 770 mg/L (DWR, 2006a). Across a large portion of the subbasin, saline groundwater can be found within 10 feet below the ground surface. High iron, fluoride, nitrate, and boron are also present in localized areas in the subbasin (DWR, 2006a).

2.6 Water Supply

Water suppliers in Stanislaus County are depicted in Figure 2-3. Detailed information on the water supplied by urban and agricultural water suppliers can generally be found in the Urban Water Management Plan (UWMP) or Agricultural Water Management Plan (AWMP) for the respective agencies. Overall, Stanislaus County's water use is approximately 1.6 million gallons per day (mgd) (USGS, 2017).

The primary urban water suppliers in the region are listed below along with their supply sources. All suppliers providing at least 3,000 AFY or serving at least 3,000 connections are included. The remaining water service providers serve smaller populations or volumes each year and are not required to complete UWMPs.

- **City of Modesto:** The City of Modesto serves potable water to the City and several outlying communities in Stanislaus County, with 74,898 accounts in total. The city's water sources include groundwater from the Modesto and Turlock Subbasins and surface water purchased from MID. In 2015, the City served 47,459 AF of potable water, 67% of which was groundwater (West Yost, 2016a).
- **City of Turlock:** The City of Turlock provides potable and nonpotable water through 18,686 potable connections. Turlock also serves recycled water to a power plant and recreational field irrigation. The City currently relies entirely on groundwater from the Turlock Subbasin for potable use with some recycled water use. In the future, the city expects to purchase surface water from TID. In 2015, the City of Turlock provided approximately 17,415 AF of water for municipal purposes (West Yost, 2016b).
- **City of Ceres:** The City of Ceres delivers potable water through 11,625 connections within the City of Ceres limits. Groundwater from the Turlock Subbasin is the sole supply for the city, with 6,632 AF delivered in 2015. In the future, groundwater may be supplemented with surface water purchased from TID (Ceres, 2016).
- **City of Riverbank:** The City of Riverbank relies solely on groundwater from the Modesto Subbasin. In 2015, Riverbank served 3,878 AF through 6,743 connections (Kjeldsen, Sinnock, & Neudeck, Inc., 2016).
- **City of Newman:** The City of Newman serves just over 3,000 connections and distributed approximately 1,900 AF of water in 2015. The city relies solely on groundwater from the Delta-Mendota Subbasin (Gouveia Engineering, 2016).
- **City of Patterson:** The City of Patterson serves potable water through 6,269 connections within the city. In 2015, the City delivered 3,216 AF (RMC, 2016). The city relies exclusively on groundwater from the Delta-Mendota Subbasin.

Agricultural water suppliers which have prepared AWMPs since 2012 (SBX 7-7 Plans) are listed below:

- **MID:** MID provides irrigation water to 57,000 acres and operates Don Pedro Reservoir together with TID.

- **TID:** TID serves 4,900 irrigation customers, covering a service area of 197,000 gross acres. TID operates Don Pedro Reservoir jointly with MID and delivers approximately 604,000 AFY, on average (TID, 2015).
- **OID:** OID serves 81,000 acres of cropland with surface water and groundwater in Stanislaus and San Joaquin Counties (Davids Engineering, 2016).
- **Patterson Irrigation District (PID):** PID serves approximately 13,000 acres, using both surface water and groundwater (PID, 2016).
- **West Stanislaus Irrigation District (WSID):** WSID encompasses 20,155 irrigated acres and supplies water from the San Joaquin River, Central Valley Project, and groundwater. WSID supplied roughly 68,000 AF in 2011 (WSID, 2014)
- **San Joaquin River Exchange Contractors Water Authority (SJRECWA):** The SJRECWA serves approximately 240,000 acres of agricultural land between I-5 and the San Joaquin River. Member agencies are the Central California Irrigation District, San Luis Canal Company, Firebaugh Canal Water District, and Columbia Canal Company.

Areas outside the service areas of the afore-mentioned public water agencies are primarily dependent on groundwater for their water supplies. Some small communities in the County get drinking water from small water providers, including the City of Hughson, Denair CSD, Keyes CSD, Monterey Park Tract CSD, Riverdale Park Tract CSD, and Stanislaus County Housing Authority. Outside these localized areas, privately-owned properties are managed by the individual property owner who also determines the water supply use, irrigation method, cropping patterns, and other issues related to their land. Unless a permit is acquired to install a building or well, modifications on the land are not part of a larger land use planning process. Privately-owned irrigation supply wells and domestic wells have been installed throughout the Modesto, Turlock and Delta-Mendota Groundwater Subbasins to provide water for irrigation and supplies to rural homes and businesses.

Countywide water use is shown in Table 2-3. These high-level estimates are prepared every five years by the USGS California Water Science Center. Data from 2010 was the most recent available. Withdrawal and use estimates were calculated by the California Water Science Center using data from a range of sources, including the U.S. Environmental Protection Agency (USEPA) Safe Drinking Water Information System (SDWIS); U.S. Census Bureau; and the U.S. Department of Agriculture (USDA).

Table 2-3. Water Use in Stanislaus County as of 2010[1]

Water Source	Total Withdrawal (mgd)	Total Withdrawal (Thousand AFY)
Surface Water	1,199	1,343
Groundwater	444	497
Total	*1,643*	*1,840*
Water Use	**Total Use (mgd)**	**Total Use (Thousand AFY)**
Irrigation	1,500	1,680
Public Supply	104	116
All Other Categories	39	44
Total	*1,643*	*1,840*

[1]Source: USGS California Water Science Center, 2017.

2.7 Water Quality Conditions

Water quality in Stanislaus County is regulated by the CVRWQCB. Each Regional Water Quality Control Board is required to prepare a Basin Plan to be used as a basis for regulatory actions to protect water quality.

As described in Section 2.4.2, *Surface Water Quality*, Basin Plans describe beneficial uses, identify water quality objectives, and define an implementation program consisting of actions to be taken to meet those objectives. Region 5, the Central Valley Region, has two Basin Plans, one for Tulare Lake Basin and one for the Sacramento and San Joaquin River Basins. The latter Basin Plan is pertinent to the County and was originally adopted in 1975, then updated and revised in 1984, 1989, 1994, 1998, 2011, 2015, 2016, and 2018 (CVRWQCB, 2018).

Beneficial uses of water resources as identified in the Basin Plan are critical in water quality management. The listed use of a water body helps determine what water quality conditions are acceptable or unacceptable. The existing and potential beneficial uses of the surface waters within Stanislaus County, as defined in the Basin Plan, are shown in Table 2-4.

Table 2-4. Beneficial Uses of Surface Water in Stanislaus County

Surface Water Bodies			Tuolumne River (New Don Pedro Dam to San Joaquin River)	Stanislaus River (Goodwin Dam to San Joaquin River)	San Joaquin River (Mouth of Merced River to Vernalis)	Delta-Mendota Canal
Hydrologic Unit Number			535	535	535/541	541/543
	MUN	Municipal and Domestic Supply	P	P	P	E
Agriculture	AGR	Irrigation	E	E	E	E
		Stock Watering	E	E	E	E
Industry	PROC	Process		E	E	
	IND	Service Supply		E		
	POW	Power		E		
Recreation	REC-1	Contact	E	E	E	E
		Canoeing and Rafting	E	E	E	
	REC-2	Other Noncontact	E	E	E	E
Freshwater Habitat	WARM	Warm	E	E	E	E
	COLD	Cold	E	E		
Migration	MIGR	Warm			E	
		Cold	E	E	E	
Spawning	SPWN	Warm	E	E	E	
		Cold	E	E		
	WILD	Wildlife Habitat	E	E	E	E
	NAV	Navigation				

Legend: P = Potential beneficial use; E = Existing beneficial use

The Basin Plan does not identify beneficial uses of groundwater at the subbasin level. All groundwater in the Basin is assumed to be suitable for the following beneficial uses, at a minimum:

- Municipal and Domestic Supply
- Agricultural Supply

- Industrial Service Supply (e.g. cooling water supply)
- Industrial Process Supply

The CVRWQCB may also de-designate groundwater sites for any of the applicable beneficial uses using criteria laid out in the Basin Plan.

Constituents that may impact surface water quality in Stanislaus County include dissolved salts and nutrients and residual pesticides and herbicides in agricultural return flows and seepage from percolation ponds. Additionally, in areas with agriculture and cattle grazing, water can have elevated levels of nutrients, pathogens and sediment. Urban runoff from industrial sites and roadways can carry pollutants such as petroleum hydrocarbons, metals and sediment that can also impact surface water quality.

Water quality concerns in the major rivers (Stanislaus, Tuolumne, and San Joaquin) within the County include organophosphate pesticides (diazinon and chlorpyrifos) and organic carbon, which contributes to low downstream dissolved oxygen levels. These are managed and tracked through a Central Valley-wide Total Maximum Daily Load (TMDL) for pesticides, and a TMDL for the San Joaquin River in the Stockton Deep Water Shipping Channel (DWSC) for low dissolved oxygen.

Several additional water quality impairments are identified in the CVRWQCB's 303(d) list of impaired water bodies as causing impairments of the beneficial uses of water bodies in the County. These pollutants, listed in full in Table 2-5, include pesticides, mercury, and bacteria.

2.7.1 Applicable TMDLs and 303(d)-Listed Impaired Waterbodies

Under CWA Section 303(d), States are required to develop a list of water quality-limited stream segments. These waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The CWA requires the State to develop action plans, called TMDLs, to improve water quality. The 303(d) list of impaired water bodies within the Sacramento River and San Joaquin River Basins suffer significant water quality impairments from a variety of pollutants and must be addressed through the development of TMDLs. The Lower Stanislaus River, the Lower Tuolumne River (from Don Pedro Reservoir to the San Joaquin River), and the Lower Merced River (from McSwain Reservoir to the San Joaquin River) are included on this list. Irrigated agriculture has been identified as an anthropogenic source of pesticides, nitrate and sediment loading in surface water bodies. Additional sources of sediment loading include erosion, mining, and grazing, among others.

The USEPA's 2016 303(d) list of impaired water bodies includes water body segments in Stanislaus County. Table 2-5 details the 303(d)-listed water bodies and the associated pollutants. Figure 2-10 displays the 303(d)- listed impaired water bodies in the County, as identified by the Final 2016 California Integrated Report.

Table 2-5. 303(d)-Listed Impaired Water Bodies in Stanislaus County

Water Body Name	Pollutant	Pollutant Category	TMDL Requirement Status
Del Puerto Creek	Pyrethroids	Pesticides	TMDL required
	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required
	Dieldrin	Pesticides	TMDL required
	Bifenthrin	Pesticides	TMDL required
	Toxicity	Toxicity	TMDL required
	pH (high)	Miscellaneous	TMDL required
	Salinity	Salinity	TMDL required
	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	Diazinon	Pesticides	Being addressed by action other than a TMDL
	Diuron	Pesticides	Being addressed by action other than a TMDL
	Total Dissolved Solids	Salinity	TMDL required
	Cyfluthrin	Pesticides	TMDL required
	Cyhalothrin, Lambda	Pesticides	TMDL required
	Esfenvalerate/Fenvalerate	Pesticides	TMDL required
	Nitrate/Nitrite (Nitrite + Nitrate as N)	Nutrients	TMDL required
Dry Creek (tributary to Tuolumne River at Modesto, East Stanislaus County)	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required
	Toxicity	Toxicity	TMDL required
	Oxygen, Dissolved	Nutrients	TMDL required
	Diuron	Pesticides	Being addressed by action other than a TMDL
Grayson Drain (at outfall)	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required
	Toxicity	Toxicity	TMDL required
Harding Drain	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	alpha.-BHC (Benzenehexachloride or alpha-HCH)	Other Organics	TMDL required
	DDE (Dichlorodiphenyldichloroethylene)	Pesticides	TMDL required
	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required
	Hexachlorobenzene/ HCB	Pesticides	TMDL required
	Lindane/gamma Hexachlorocyclohexane (gamma-HCH)	Pesticides	TMDL required

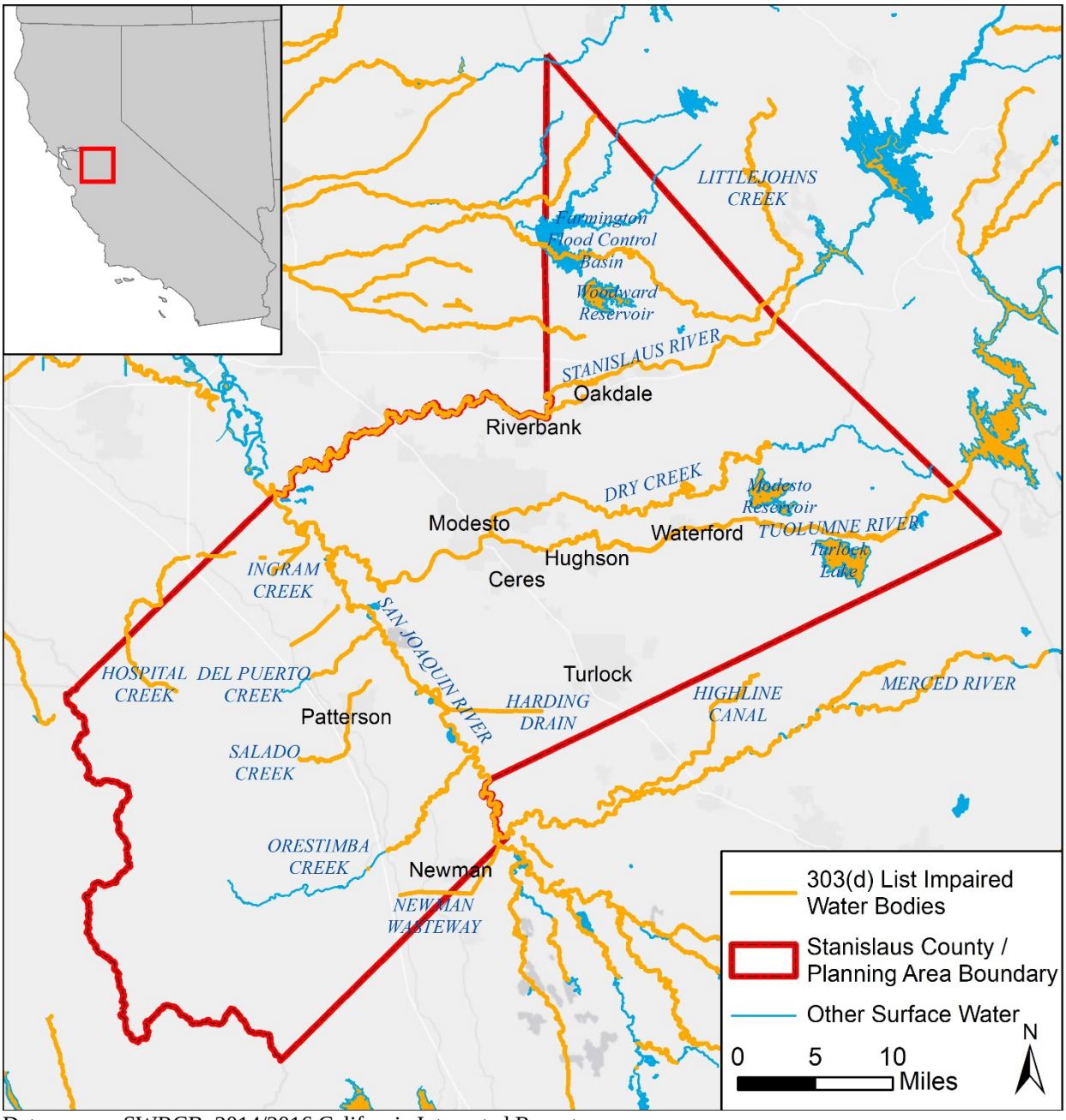
Water Body Name	Pollutant	Pollutant Category	TMDL Requirement Status
Highline Canal (from Mustang Creek to Lateral No 8, Merced and Stanislaus Counties)	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	Simazine	Pesticides	TMDL required
	Toxicity	Toxicity	TMDL required
Hospital Creek (San Joaquin and Stanislaus Counties)	Arsenic	Metals/Metalloids	TMDL required
	DDE (Dichlorodiphenyldichloroethylene)	Pesticides	TMDL required
	DDT (Dichlorodiphenyltrichloroethane)	Pesticides	TMDL required
	Dieldrin	Pesticides	TMDL required
	Pyrethroids	Pesticides	TMDL required
	Trifluralin	Pesticides	TMDL required
	Salinity	Salinity	TMDL required
	Toxicity	Toxicity	TMDL required
	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required
	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	Methyl Parathion	Pesticides	Being addressed by action other than a TMDL
	Diuron	Pesticides	Being addressed by action other than a TMDL
	Total Dissolved Solids	Salinity	TMDL required
	Specific Conductivity	Salinity	TMDL required
Ingram Creek (from confluence with Hospital Creek to Hwy 33 crossing)	Pyrethroids	Pesticides	TMDL required
	Arsenic	Metals/Metalloids	TMDL required
	Toxicity	Toxicity	TMDL required
	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	Diuron	Pesticides	Being addressed by action other than a TMDL
	Nickel	Metals/Metalloids	TMDL required
	Nitrate/Nitrite (Nitrite + Nitrate as N)	Nutrients	TMDL required
	Simazine	Pesticides	TMDL required
	DDT (Dichlorodiphenyltrichloroethane)	Pesticides	TMDL required
	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required
	Specific Conductivity	Salinity	TMDL required
	Total Dissolved Solids	Salinity	TMDL required
	Salinity	Salinity	TMDL required
	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required

Water Body Name	Pollutant	Pollutant Category	TMDL Requirement Status
Ingram Creek (from confluence with San Joaquin River to confluence with Hospital Creek)	Toxicity	Toxicity	TMDL required
	DDE (Dichlorodiphenyldichloroethylene)	Pesticides	TMDL required
	Dieldrin	Pesticides	TMDL required
	DDT (Dichlorodiphenyltrichloroethane)	Pesticides	TMDL required
	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	Pyrethroids	Pesticides	TMDL required
Newman Wasteway	Simazine	Pesticides	TMDL required
	Salinity	Salinity	TMDL required
	Oxygen, Dissolved	Nutrients	TMDL required
	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required
	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	DDE (Dichlorodiphenyldichloroethylene)	Pesticides	TMDL required
Orestimba Creek (above Kilburn Road)	Azinphos-methyl (Guthion)	Pesticides	TMDL required
	Toxicity	Toxicity	TMDL required
	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required
	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	DDE (Dichlorodiphenyldichloroethylene)	Pesticides	TMDL required
	Dieldrin	Pesticides	TMDL required
	DDT (Dichlorodiphenyltrichloroethane)	Pesticides	TMDL required
	Diuron	Pesticides	Being addressed by action other than a TMDL
	Oxygen, Dissolved	Nutrients	TMDL required
	Specific Conductivity	Salinity	TMDL required
	Total Dissolved Solids	Salinity	TMDL required
	Diuron	Pesticides	Being addressed by action other than a TMDL
	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	Azinphos-methyl (Guthion)	Pesticides	TMDL required
	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required
	Malathion	Pesticides	TMDL required
	DDD (Dichlorodiphenyldichloroethane)	Pesticides	TMDL required

Water Body Name	Pollutant	Pollutant Category	TMDL Requirement Status
	DDT (Dichlorodiphenyltrichloroethane)	Pesticides	TMDL required
	DDE (Dichlorodiphenyldichloroethylene)	Pesticides	TMDL required
	Toxicity	Toxicity	TMDL required
	Dieldrin	Pesticides	TMDL required
	Diazinon	Pesticides	Being addressed by action other than a TMDL
	Specific Conductivity	Salinity	TMDL required
	Total Dissolved Solids	Salinity	TMDL required
San Joaquin River (Merced River to Tuolumne River)	DDT (Dichlorodiphenyltrichloroethane)	Pesticides	TMDL required
	Mercury	Metals/Metalloids	TMDL required
	Group A Pesticides	Pesticides	TMDL required
	alpha.-BHC (Benzenehexachloride or alpha-HCH)	Other Organics	TMDL required
	Chlorpyrifos	Pesticides	Being addressed by USEPA-approved TMDL
	Toxicity	Toxicity	TMDL required
	DDE (Dichlorodiphenyldichloroethylene)	Pesticides	TMDL required
	Temperature, water	Miscellaneous	TMDL required
	Electrical Conductivity	Salinity	TMDL required
	Specific Conductivity	Salinity	TMDL required
	Total Dissolved Solids	Salinity	TMDL required
San Joaquin River (Tuolumne River to Stanislaus River)	Group A Pesticides	Pesticides	TMDL required
	DDT (Dichlorodiphenyltrichloroethane)	Pesticides	TMDL required
	Mercury	Metals/Metalloids	TMDL required
	Diazinon	Pesticides	Being addressed by USEPA-approved TMDL
	Chlorpyrifos	Pesticides	Being addressed by USEPA-approved TMDL
	Toxicity	Toxicity	TMDL required
	Electrical Conductivity	Salinity	TMDL required
	Temperature, water	Miscellaneous	TMDL required
Stanislaus River, Lower	Mercury	Metals/Metalloids	TMDL required
	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	Temperature, water	Miscellaneous	TMDL required

Water Body Name	Pollutant	Pollutant Category	TMDL Requirement Status
	Diazinon	Pesticides	Being addressed by action other than a TMDL
	Group A Pesticides	Pesticides	TMDL required
	Toxicity	Toxicity	TMDL required
Tuolumne River, Lower (Don Pedro Reservoir to San Joaquin River)	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	Group A Pesticides	Pesticides	TMDL required
	Mercury	Metals/Metalloids	TMDL required
	Diazinon	Pesticides	Being addressed by action other than a TMDL
	Toxicity	Toxicity	TMDL required
	Temperature, water	Miscellaneous	TMDL required
Westley Wasteway (Stanislaus County)	Chlorpyrifos	Pesticides	Being addressed by action other than a TMDL
	Indicator Bacteria	Fecal Indicator Bacteria	TMDL required
	Dimethoate	Pesticides	TMDL required

Figure 2-10. 303(d)-Listed Impaired Water Bodies in Stanislaus County



Data source: SWRCB, 2014/2016 California Integrated Report.

2.7.2 Stormwater Outfall Monitoring Results

Stormwater monitoring results are available from the City of Modesto, which conducts monitoring activities at four receiving water locations along the Tuolumne River and Dry Creek. Monitoring generally takes place three times per year: early in the rainy season (first flush), mid-to-late in the rainy season (also referred to as dormant season), and dry weather season. A range of constituents are monitored at these locations, including nitrate, Total Suspended Solids (TSS), mercury, chlorpyrifos, and diazinon. The City is required to evaluate the monitoring results to determine whether the water quality objectives are being exceeded in the receiving water. In the 2014/2015 rainy season, exceedances occurred for fecal coliform bacteria, pH,

aluminum, copper, zinc, and turbidity (Modesto, 2015). A detailed map of Modesto's storm drainage system is included in Appendix C.

Modesto also conducts monitoring at two urban discharge monitoring locations. As with the Dry Creek and Tuolumne River monitoring, monitoring generally takes place three times per year (first flush, dormant season, and dry weather season). One location is just east of downtown Modesto at Moose Park; the other is in the Sonoma residential neighborhood, approximately 2 miles east of downtown Modesto (Modesto, 2015). Exceedances in 2014/2015 included fecal coliform bacteria, various metals, turbidity, dissolved oxygen, conductivity, and TDS (Modesto, 2015).

As part of the SWRP, additional stormwater monitoring was conducted during the winter of 2018/2019. Samples were collected at key outfalls during two storm events during the rainy season. Stormwater monitoring constituents were selected based on established TMDLs, 303(d)-listed water body impairments, as well as the results of the stormwater quality monitoring sampling and analysis completed by the City of Modesto as required by their Municipal Separate Storm Sewer System (MS4) Permit R5-2015-0025 National Pollutant Discharge Elimination System (NPDES) No. CAS083526. Samples were analyzed for a range of pollutants, including bacteria, metals, organics, nutrients, pesticides and general water chemistry parameters.

Results of the stormwater monitoring during 2018/2019 found total nitrogen (nitrate + nitrite as N) concentrations ranging from 0.26 to 3.9 mg/L, below the MCL of 10 mg/L. The pesticides diazinon and chlorpyrifos were not found at detectable levels. Bacteria counts for nearly all sampling events were above a maximum threshold of 1600 Most Probable Number (MPN)/100mL. High bacteria levels are commonly found in stormwater runoff regardless of the land use type in the watershed. Sources of bacteria are primarily from animal waste (both domestic pets and wildlife), but can also include trash, leaking sewer lines, or other illicit discharges. Metal concentrations were generally higher during the first storm event than the second throughout the sites. As the first storm occurred earlier in the rainy season, higher metal concentrations would be expected as they would have accumulated on surfaces (e.g. roads) during the summer. Additionally, variations may result from samples being collected in the beginning of discharge for the first storm event, catching early flushing, in contrast with samples collected near the end of precipitation for the second storm event, due to daylight safety constraints. Additional data is provided in the monitoring report (Appendix D). Sample results are also publicly available at http://www.ceden.org/.

2.7.3 Water Quality Priorities

Stanislaus County is part of the Central Valley Pesticide TMDL, with the lower Tuolumne River and the lower Stanislaus River identified as affected water bodies. This TMDL was adopted into the Central Valley Basin Plan in March 2014. The study area and cities within it are also subject to the following TMDLs:

- Sacramento-San Joaquin Delta – mercury/methylmercury;
- San Joaquin River, Merced River to Tuolumne River – boron and chlorpyrifos;
- Lower San Joaquin River – salt and boron;
- Lower San Joaquin River (below Tuolumne River) – diazinon and chlorpyrifos (both pesticides); and

MS4 permits that apply to the plan area include the following:

- City of Modesto (WDR No. R5-2008-0092; NPDES No. CAS083526); and
- Unincorporated urban areas, towns and cities in Stanislaus County (except the above) are covered by the General Permit for the Discharge of Storm Water from Small MS4s (WQ Order No. 2013-0001-DWQ). A Region-wide MS4 general permit is under development by the CVRWQCB, which is expected to be the umbrella permit in the future for all entities in this SWRP.

As part of SWRP development, a set of priority pollutants were identified for the planning area using the 303(d) list and TMDLs applicable to Stanislaus County. The most frequently occurring pollutants were evaluated in the context of stormwater planning; those deemed most significant were designated as priority pollutants. County staff provided input throughout this process. The nine priority pollutants and their sources are listed in Table 2-6.

Table 2-6. Priority Pollutants and Source

Priority Pollutant	Pollutant Source	Data Source
Total Suspended Solids (TSS)	Agriculture	Basin Plan
Mercury	Resource extraction	303(d) list
Diazinon	Agriculture	303(d) list
Chlorpyrifos	Agriculture	303(d) list
Selenium	Agriculture	Basin Plan, San Joaquin River Selenium TMDL progress report
Diuron	Agriculture	Diuron in San Joaquin Valley Water Bodies TMDL progress report
Bacteria (Fecal coliform and E. coli)	Animal confinement operations, transient populations and domesticated pets in urban areas	Basin Plan
Pyrethroids	Agriculture	Basin Plan
Total Nitrogen	Agriculture, animal confinement operations	Basin Plan

The SWRP will assist with NPDES permits compliance by promoting reduction in these pollutant loads through the project assessment and prioritization process, and by supporting the elements of Public Education & Outreach, Public Participation, Water Quality and Habitat Enhancement in Flood Control Facilities.

2.7.4 Other Priorities

Other priorities for the region relate primarily to groundwater. Responsible groundwater management is critical to the economic and environmental health of the County. Therefore, one important priority is the identification of conjunctive use strategies to maximize the use of both surface water and groundwater. This would include groundwater recharge and the protection of groundwater quality.

Issues beyond groundwater contamination from within the County include salinity, land subsidence, and overdraft. Additional water quality priorities may include goals such as maintaining favorable wildlife habitat and aesthetic value to the community.

Section 3. Water Quality Compliance

This section addresses the water quality conditions in Stanislaus County, beginning with the sources and activities associated with pollution of stormwater and/or dry weather runoff. Following identification of these sources, this section discusses applicable regulations and consistency of the SWRP with these regulations. Finally, a detailed description of the SWRP's support of TMDLs and NPDES permits is provided. Due to the similarity of water quality issues across the planning area, water quality will be discussed at the County level rather than the watershed level.

3.1 Pollutant-Generating Activities

In Stanislaus County, pollutants are primarily generated by agriculture, resource extraction, and municipal/industrial activities. These major pollutant-generating activities are discussed in the following subsections.

3.1.1 Agriculture

Agriculture is a primary component of Stanislaus County's economy, with a value of approximate $4 billion in 2015 (Stanislaus County Agricultural Commissioner's Office, 2015). Due to the extent of agricultural lands, stormwater and dry weather runoff from these areas is a significant contributor to pollutant loading of water bodies in the County. Agricultural practices involve a high volume of water use and diffused discharges. Agricultural runoff contributes salts, nutrients, pesticides, trace elements, and sediments to the watershed (CVRWQCB, 2018). Both legacy pesticides (DDE, DDT, dieldrin) and currently-used pesticides (pyrethroids; organophosphate pesticides such as chlorpyrifos, diazinon, and dimethoate) impair water bodies in Stanislaus County. Fertilizer use can also result in high nitrate concentrations, which lead to low dissolved oxygen levels. Pesticide toxicity and low dissolved oxygen levels both contribute to fish and aquatic wildlife deaths. In addition, sediment discharge from agricultural areas can impair fisheries. Sediment also serves as a transport mechanism for compounds that are bound to soil particles, such as mercury and other heavy metals. Agricultural support activities associated with applying pesticides, disposing of pesticide rinse waters, and formulation of pesticides and fertilizers also contribute to the overall agricultural pollutant load.

Animal confinement operations (such as dairy and egg production) are another important component of Stanislaus County's agricultural economy. Confined animal facilities contribute significant nutrient and bacterial loads to the surrounding water bodies due to animal waste. Ammonia, nitrate, TDS, and coliform bacteria can all be attributed to animal confinement operations.

3.1.2 Municipalities and Industries

Municipal and industrial activities introduce a variety of pollutants into stormwater. Urban stormwater runoff picks up a variety of pollutants from impermeable surfaces, including petroleum products from cars and roads, bacteria from pet waste, solvents and wood preservatives, heavy metals, and sewage from areas that experience sewer backups during storms (CVRWQCB, 2018). The 2015 *Modesto Stormwater Program Annual Report* also notes that a large transient population on the Tuolumne River and Dry Creek may be contributing to fecal coliform and E. coli loading in those locations. Due to the climate in Stanislaus County, such contaminants tend to accumulate for months at a time during the dry summers; this results in a high pollutant load during the first storm. Trash is also a common impairment in urban areas.

3.1.3 Mineral Extraction

Mineral extraction in the Central Valley has increased in recent years, particularly in the Sierra foothills (to the east of Stanislaus County) and the Coast Range. This increase is due to technological advances which use cyanide and other reagents to cost-effectively extract gold from large volumes of ore. When improperly

managed, mining materials such as ore, reagents, and tailings have the potential to leach toxic materials, such as mercury and arsenic, into surface water bodies and groundwater (CVRWQCB, 2018). Contaminated runoff also occurs at old mining sites, which are present in the County, particularly in the northeastern portion of the County and north of the Stanislaus River. Historic and current mining sites also exist in the far west of Stanislaus county, in the Coast Range (USGS, 2011).

3.2 Applicable Permits and Regulations

3.2.1 Discharge Permits

The NPDES permit program regulates point source pollutant discharges to waters of the U.S. The program includes several types of permits that regulate stormwater, including permits for MS4, construction activities, and industrial activities. MS4 permitting includes two types of MS4s: Phase I and Phase II. Phase I MS4s cover medium and large cities, or certain counties with populations exceeding 100,000 persons. Phase II MS4s, or small MS4s, apply to municipalities that serve populations of fewer than 100,000 persons.

In Stanislaus County, unincorporated urban areas, towns and cities (except Modesto) are regulated under the statewide general Phase II MS4 Permit (SWRCB Water Quality Order No. 2013-0001-DWQ NPDES General Permit No. CAS000004), issued in 2013. Stanislaus County developed a Storm Water Management Program (SWMP) to meet the terms of the MS4 General Permit. The SWMP was first developed in 2004 and was updated in February 2015 to meet the conditions of the 2013 Phase II MS4 Permit. The SWMP is intended to be a living document that evolves based on new management practices and knowledge.

The Stanislaus County SWMP contains six specific control measures which were established by the SWRCB for Phase II stormwater discharges. Each control measure contains best management practices (BMPs) for stormwater management. An overview of each control measure is provided below.

- **Public Education and Outreach:** This measure is intended to raise public awareness of the impact that citizens' actions have on stormwater quality in the County. This measure primarily aims to educate citizens on stormwater issues and pollution prevention strategies. Another purpose of this measure is to develop public support for the funding necessary to implement stormwater management projects. This measure includes general public outreach and focused outreach to specific community groups, such as light industrial businesses.
- **Public Participation and Involvement:** The goal of this measure is to educate the public about sources of runoff pollution and to encourage participation in community projects to prevent pollution (for example, storm drain marking and community cleanups). The Stanislaus County Storm Water Management and Discharge Control Ordinance was also developed in accordance with this measure.
- **Illicit Discharge Detection and Elimination:** This measure aims to control illicit discharges, such as the dumping of pollutants on rural roadsides and streambanks. The measure addresses the lack of BMPs in industrial, commercial, and residential areas that lead to illicit discharges. Control methods include conducting pilot surveillance, coordinating with landowners to achieve voluntary compliance, and progressive enforcement if necessary. Minimizing these discharges helps prevent large inputs of pollutants into County waterways.
- **Construction Site Stormwater Runoff Control:** The purpose of this measure is to minimize polluted runoff from construction activities, including sediment. This measure is achieved through the use of construction Storm Water Pollution Prevention Plans (SWPPPs). In addition, this measure includes plans for educating developers, construction inspections, and enforcement for required controls.

- **Post-Construction Stormwater Management in New Development and Redevelopment:** This measure is intended to reduce pollutant discharge from newly developed areas and implements low impact development and hydromodification measures. As with the previous measure, education and outreach to developers and building staff is a component of this measure. Enforcement at problem sites occurs under the Stanislaus County Storm Water Management and Discharge Control Ordinance.
- **Pollution Prevention/Good Housekeeping for Municipal Operations Program:** Finally, the SWMP contains provisions for reducing the level of stormwater pollutants generated by operation and maintenance of municipal facilities. Implementation practices for this measure include inspection of municipal activities, development of training programs, and updates to standard operating procedures as necessary.

Stormwater discharges in the City of Modesto are currently regulated under a Phase I MS4 Permit (Order No. R5-2015-0025). The CVRWQCB adopted a Region-wide MS4 Permit in June 2016. Phase I MS4 Permittees must enroll in the Region-wide permit as their current individual permits expire. In October 2016, the CVRWQCB issued a Notice of Applicability (NOA) for Modesto to obtain coverage under the Region-wide Permit; this action also rescinded Modesto's previous Waste Discharge Requirement (Order No. R5-2015-0025). Phase II MS4 Permittees may also choose to enroll in the Region-wide Permit. As an example of the programs being implemented under these permits, the City of Modesto's stormwater BMP program includes a major program to remove sediments from detention basins; outreach to minimize waste disposal into storm drains from a variety of sources; and a prevention program to minimize the use and disposal of pesticides that appear in runoff (diazinon and chlorpyrifos). In addition, Modesto developed a *Stormwater Management Plan*, last updated in 2009, with the goal of identifying and controlling pollutants in urban runoff, protecting groundwater and surface water resources. This plan also includes a Monitoring Program Element, which includes monitoring for a range of constituents, including nitrogen, TDS, lead, mercury, and pesticides.

For construction activities within the County that disturb one or more acres of soil, stormwater regulation occurs under a Construction General Permit (CGP) administered by the SWRCB (Order No. 2009-0009-DWQ). Dischargers whose projects disturb greater than one acre are required to obtain coverage under the CGP. Compliance with the CGP requires the development of a SWPPP which includes BMPs for reducing pollution risk during construction. Construction projects less than one acre in size are regulated under the County's Stormwater Management and Discharge Control Ordinance.

The NPDES program regulates industrial stormwater discharges through the Industrial General Permit (IGP) administered by the SWRCB (Order 2014-0057-DWQ). The IGP covers industrial stormwater discharges and authorized non-stormwater discharges by industrial facilities throughout the state; permittees then comply with the IGP at their individual facilities. Facilities covered by this permit include manufacturing facilities, mining facilities, feedlots, and wastewater treatment facilities.

3.2.2 Total Maximum Daily Loads

TMDLs are established to control pollutant loading in water bodies where point source controls have not been sufficient to bring the water body into compliance with water quality standards. A TMDL determines the pollutant load that a water body can accept while still meeting water quality standards, and TMDLs must account for all sources of the pollutants that caused the water body to be listed. TMDLs serve as a guide for implementing water quality control measures; in Stanislaus County, TMDLs are established by the CVRWQCB. TMDLs relevant to Stanislaus County are listed in Table 3-1 and discussed in the following sections.

Table 3-1. TMDLs Relevant to Stanislaus County

TMDL Short Name	Resolution Number	Effective Date	Pollutants	Water Bodies
Sacramento-San Joaquin Delta Mercury TMDL	R5-2010-0043	2011	Mercury, methylmercury	Sacramento-San Joaquin Delta
San Joaquin River Dissolved Oxygen TMDL	R5-2005-0005	2006	Oxygen demanding substances	San Joaquin River Watershed downstream of Friant Dam, downstream of major Eastside reservoirs
Lower San Joaquin River Salt and Boron	R5-2004-0108	2006	Salt, boron	Lower San Joaquin River at Vernalis
Lower San Joaquin River Diazinon and Chlorpyrifos TMDL	R5-2005-0138	2006	Diazinon, chlorpyrifos	San Joaquin River from Mendota Dam to Vernalis
Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL	R5-2006-0061	2007	Diazinon, chlorpyrifos	Sacramento-San Joaquin Delta
Central Valley Pesticide TMDL	R5-2014-0041	2017	Diazinon, chlorpyrifos	San Joaquin River Watershed between Mendota Dam and Vernalis, downstream of major Eastside reservoirs

Sacramento-San Joaquin Delta Mercury TMDL

Resolution No. R5-2010-0043, *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin Delta Estuary* (Sacramento-San Joaquin Delta Mercury TMDL), became effective in 2011. This TMDL addresses the elevated levels of mercury in fish in the Sacramento-San Joaquin Delta Estuary. The purpose of this TMDL is to lower fish mercury levels in the Delta so that beneficial uses of fishing and wildlife habitat are attained.

This TMDL applies to all water bodies within the legal boundaries of the Delta, which abuts the border of Stanislaus County but does not extend into the county. Therefore, Stanislaus County is not directly subject to the Sacramento-San Joaquin Delta Methylmercury TMDL. However, due to the presence of mercury pollutants in Stanislaus County and the county's location immediately upstream of the Delta, this TMDL is relevant to stormwater planning in the County.

The Sacramento-San Joaquin Delta Methylmercury TMDL is proceeding in two phases. In Phase 1 (2011-2020), activities include studies to develop and evaluate methylmercury control measures as well as mercury pollution prevention by municipal wastewater and stormwater permittees. Following Phase 1, the SWRCB will review the TMDL and adjust based on methylmercury control studies. During Phase 2 (2020-2030), dischargers must meet waste load allocations (WLAs) and load allocations.

Lower San Joaquin River Salt and Boron

Resolution No. R5-2004-0108, *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges into the Lower San Joaquin River* (LSJR Salt and Boron), was approved by the USEPA in 2006 to address salt and boron in the LSJR. This TMDL focuses on achieving existing salinity and boron water quality objectives for the San Joaquin River at Vernalis.

The WLAs established by the LSJR Salt and Boron TMDL are concentration-based, and set equal to existing salinity water quality objectives for the LSJR near Vernalis. Nonpoint source dischargers may comply by ceasing discharge to surface waters, meeting a conductivity threshold, operating under WDRs that include effluent limits for salt, or operating under a waiver for salt and boron discharges to the LSJR. The CVRWQCB, USBR, and local water districts are responsible for implementing salinity controls.

Lower San Joaquin River Diazinon and Chlorpyrifos TMDL

Pesticide runoff into the LSJR was first addressed through Resolution No. R5-2005-0138, *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Lower San Joaquin River* (LSJR Diazinon and Chlorpyrifos TMDL), effective 2006. This TMDL established new numeric water quality objectives and TMDLs for diazinon and chlorpyrifos.

Maximum concentrations for both pesticides were applied to the San Joaquin River from Mendota Dam to Vernalis, which includes the portion of the river within Stanislaus County. The CVRWQCB is responsible for developing management practices to reduce pesticide runoff under this TMDL. The load allocations for this TMDL are apportioned between five subareas along the LSJR. The discharge from each of these subareas must be below the concentration-based load allocation, which is equal to the loading capacity of the SJR. The Irrigated Lands Regulatory Program (ILRP) regulates WDRs for discharges from irrigated lands throughout the Central Valley. The ILRP is working with dischargers to address these exceedances.

Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL

Building on the Lower San Joaquin River Diazinon and Chlorpyrifos TMDL, the CVRWQCB implemented Resolution No. R5-2006-0061, *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Sacramento-San Joaquin Delta* (Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL), which took effect in 2007.

This TMDL extended the water quality objectives set by the LSJR Diazinon and Chlorpyrifos TMDL to the Delta Waterways. The CVRWQCB is responsible for developing and implementing management practices to reduce diazinon and chlorpyrifos runoff. The ILRP is working with dischargers to address these exceedances, as well as potential impacts of replacement products.

Central Valley Pesticide TMDL

Effective August 2017, the CVRWQCB and USEPA approved Resolution No. R5-2014-0041, *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Discharges* (Central Valley Pesticide TMDL). The Central Valley Pesticide TMDL applies the same maximum chlorpyrifos and diazinon concentrations established by the LSJR Diazinon and Chlorpyrifos TMDL to additional water bodies in the Central Valley.

Many water bodies in Stanislaus County are identified in the TMDL, including Del Puerto Creek, Dry Creek, Orestimba Creek, Stanislaus River, Tuolumne River, and Westley Wasteway. The TMDL specifies that the diazinon and chlorpyrifos discharge program shall ensure compliance with water quality standards

through management practices, and that measures should be implemented to ensure that reductions in discharges of diazinon and chlorpyrifos do not result in increased discharges of other pesticides.

3.2.3 Local Regulations

Prior to the preparation of the SWRP, Stanislaus County and the other entities collaborating on the SWRP reviewed their local codes and ordinances related to stormwater management to determine if there are any potential conflicts between existing laws, ordinances, regulations and standards and the types of projects proposed to be implemented. At this time, no conflicts with existing laws, ordinances or regulations have been identified. Project definition and preparation of the SWRP will be coordinated in consultation with local public work departments and the Mosquito Abatement Districts to assure that required and recommended design standards are identified and addressed.

In addition, projects included in the SWRP that undergo implementation will comply with the Stanislaus County Storm Water Management and Discharge Control Ordinance (Stanislaus County Code, Chapter 14.14). This Ordinance, adopted in 2008 and updated in 2015, governs discharges in Stanislaus County that are not regulated under a NPDES permit. The Ordinance allows for certain types of discharges provided that they do not violate any NPDES permit, including potable water line flushing, incidental runoff from landscaping, flows from fire suppression, and diverted streamflows. The Ordinance also determines inspection frequency at construction sites and determines procedures that must be followed in the event of pollution or non-stormwater releases.

3.2.4 Other Regulations

The SWRP will be implemented in accordance with the additional regulations listed below.

- California Environmental Quality Act (CEQA) (Public Resources Code Section 2100 *et seq*.).
- Clean Water Act and Safe Drinking Water Act
- Water rights permits and licenses
- State Water Board plans and policies
- State and Regional Water Board water quality control plans and policies, including TMDLs adopted by the CVRWQCB (Water Code Section 10562(b)(5))
- Any other federal and /or state laws, regulations, and permits.

The SWRP was written in accordance with existing permits and supports these regulations by providing a process through which beneficial projects may be funded and implemented. The SWRP project review process reflects the value of multiple benefits, including water quality, water supply, flood management, environmental benefits, and community benefits. Any SWRP project implemented will provide at least one of these benefits, thus furthering the goals of the listed regulations.

Programs and projects implemented as part of this SWRP will comply with all applicable regulations, waste discharge permit requirements, water rights determinations, and required environmental documentation under CEQA, as ensured by the individual program or project's proponent. No Areas of Special Biological Significance (ASBS) are present in Stanislaus County, and therefore ASBS compliance is not required.

3.3 NPDES and TMDL Compliance and Support

The SWRP assists in compliance with the NPDES permits described in Section 3.2.1, *Discharge Permits*, by supporting the elements of Public Education & Outreach, Public Participation, Water Quality and Habitat Enhancement in Flood Control Facilities, Post-Construction Low-Impact Development (LID) Stormwater Management, Water Quality Monitoring and TMDL Compliance.

The SWRP provides watershed-based planning to address challenges and opportunities for managing stormwater and dry weather runoff. During the creation of the SWRP, region-specific issues were identified via examination of existing data, planning documents, TMDLs, and NPDES permits. Based on this research, pollutants of concern were identified; the SWRP also includes discussion of methods that are currently being used to reduce pollutant loading and additional strategies that may be implemented in the future. Because the SWRP is based on documents specific to the Stanislaus County area, the SWRP's approach to pollution reduction is tailored to the watersheds within the County. The SWRP supports TMDL and NPDES compliance by drawing on these documents as a key source of data, and by ensuring that the plan contains policies and procedures that promote compliance, including the project review process.

As part of SWRP preparation, criteria were developed for assessing the benefits of each project submitted for inclusion in the SWRP. Stormwater and dry weather runoff projects submitted to the SWRP were evaluated based on their benefits during the project review process. Benefit criteria and benefit metrics were developed based on an initial characterization of the planning area; criteria then were further refined using region-specific studies and other documents, including TMDLs and NPDES permits. The SWRP TAC provided input during development of the benefit criteria and metrics, and the TAC approved the final benefit criteria and quantitative metrics. This approach resulted in a prioritization methodology whose benefits and metrics are targeted to the watersheds in the SWRP planning area. Thus, the prioritization of projects reflects the regional priorities established in the SWRP, and the projects implemented will provide multiple benefits to help achieve watershed and regional planning goals in support of NPDES and TMDL compliance.

The SWRP further supports TMDL implementation and NPDES compliance through the project review process. The project review process was structured so that project proponents would have the opportunity to earn higher scores for reducing pollutant discharge and supporting TMDLs. Project proponents were given the option to state whether their project supports one or more of the following TMDLs, and were awarded points for support of a TMDL:

- Sacramento-San Joaquin Delta Methylmercury TMDL
- Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL
- Central Valley Pesticide TMDL

Through this mechanism, the SWRP identifies and prioritizes projects that support TMDL implementation. Additionally, project proponents were given the opportunity to state whether their project reduces discharges into a 303(d)-listed impaired water body, thereby prioritizing projects that support water quality improvements in these water bodies.

Finally, project proponents were able to submit water quality benefit information with their project information. Proponents could state that the project would increase filtration and/or treatment of runoff and note the specific pollutant(s) addressed. Proponents could also provide quantitative metrics for the reduction in pollutant loading that would result from the project. Pollutants considered include the following, which were identified as priorities for the planning area (as discussed in Section 2.7.3, *Water Quality Priorities*):

- Total suspended solids (TSS)
- Mercury
- Diazinon
- Chlorpyrifos
- Selenium
- Diuron

- Bacteria (fecal coliform/E. coli)
- Pyrethroids
- Total Nitrogen

The established project review and prioritization processes allowed projects that provided water quality benefits (i.e., supportive of NPDES permits and/or TMDLs) the opportunity to earn points based on these benefits. Thus, projects that improve water quality are more likely to be ranked highly and be implemented in the future. Although project ranking does not directly determine projects that are included in a future funding application, it nonetheless helps applicants identify projects that stand out and provide the most benefit in terms of water quality.

Section 4. Organization, Coordination, and Collaboration

A broad range of agencies and individuals may coordinate in order to maximize the benefits of stormwater projects. These entities may include municipalities, water suppliers, school districts, agencies with public lands, and individuals or agencies with open space. Collaboration and coordination increase the ability of the County and others to implement stormwater projects with wide range of benefits to multiple organizations. This section discusses the coordination that occurred during preparation of the SWRP.

4.1 Coordination with Local Planning Organizations

4.1.1 Memorandum of Understanding

Local planning organizations within the planning area were consulted at several stages in the SWRP development through multiple methods. A formal structure for coordination among local government agencies was established via a Memorandum of Understanding (MOU) between Stanislaus County, Eastside Water District, and the Cities of Modesto, Oakdale, and Patterson. Through this MOU, the five agencies agreed to work together to provide the local matching funds requirement for the Prop 1 Planning Grant awarded to the lead agency, Stanislaus County, for preparation of the SWRP. Additional coordination occurred as representatives from Stanislaus County, Modesto, and Patterson worked together to select a consultant to prepare the SWRP.

4.1.2 Technical Advisory Committee (TAC)

During preparation of the SWRP, the SWRP TAC was convened to provide an opportunity for a variety of agencies, nonprofits, utilities, etc. to participate in the preparation and implementation of the SWRP. In August 2017, Stanislaus County and its consultant performed outreach to key stakeholders to request TAC member participation in plan development via email and during an East Stanislaus IRWMP Update Steering Committee meeting. Representatives of the lead agency, Stanislaus County, as well as other MS4 permittees, including a disadvantaged community (DAC), and two nonprofit organizations agreed to serve on the TAC. The TAC members and their affiliations are listed in Table 4-1.

The TAC assisted the County in developing the project analysis and prioritization process for stormwater and dry weather projects included in the SWRP, facilitated stakeholder outreach, provided available reports and data to support watershed characterization and benefit prioritization, solicited multiple-benefit stormwater projects, and provided comments on SWRP elements during development and the Administrative, Public, and Final Draft SWRP documents. TAC members also participated in several TAC meetings over the course of SWRP preparation (Table 4-2).

Table 4-1. TAC Members and Affiliations

Category	TAC Contact	Title
Stanislaus County (representative)	Dhyan Gilton	Stormwater Program Manager
Stanislaus County (alternate)	Frederic Clark	Deputy Director, Department of Public Works
City of Modesto (representative)	Miguel Alvarez	Associate Engineer
City of Waterford (representative) (DAC)	Karen Morgan	Water and Wastewater Supervisor
City of Patterson (representative)	Maria Encinas	Water Resources Manager
City of Turlock (representative)	Fallon Martin	Analyst
Eastside Water District	Kevin Kauffman	Consultant for Eastside Water District
Tuolumne River Trust	Edgar Garibay	Riverside Community Organizer (Central Valley Office)
River Partners	Maggie Boberg	Central Valley Regional Director
SWRCB (Grant Manager)	Spencer Joplin	Water Resource Control Engineer

Table 4-2. TAC and Outreach Meetings

Meeting	Date	Location	Topics Covered
TAC Kickoff Meeting	October 5, 2017	Modesto, CA	SWRP approach and schedule, TAC roles and responsibilities, SWRP goals and priorities, project prioritization process
TAC Meeting #2	December 20, 2017	Conference call	Updates on project solicitation, benefits quantification, and outreach
TAC Meeting #3	January 31, 2018	Conference call	Project solicitation and prioritization results
TAC Meeting #4	August 7, 2018	Modesto, CA	Plan status and schedule, grant opportunities and strategies for pursing grant funding
TAC Meeting #5	September 20, 2018	Modesto, CA	SWRP Administrative Draft presentation and discussion
Stakeholder Meeting #1	October 23, 2017	Ceres, CA	SWRP purpose and process, how to submit projects
Stakeholder Meeting #2	December 6, 2018	Conference call	Opti project submittal walk-through
Stakeholder Meeting #3	May 30, 2018	Modesto, CA	SWRP overview, goals and objectives, prioritization and solicitation of projects, implementation funding timeline

4.1.3 Other Coordination

In addition to the TAC, a stakeholder contact list was prepared to notify other stakeholders of SWRP preparation and provide ongoing information about the SWRP. Stakeholders also received email announcements regarding public meetings, the Call for Projects, and the Public Draft of the SWRP. The stakeholder contact list drew on contact lists from past regional planning efforts and coordinated with ongoing planning efforts in the area, such as the East Stanislaus and Westside-San Joaquin IRWMPs. TAC members also provided input on the stakeholder contact list. The stakeholder contact list was used to distribute announcements to a broad group of interested parties, including:

- Cities
- Nonprofits
- Water Districts
- Irrigation Districts
- Community Services Districts
- Disadvantaged Communities
- Surrounding IRWM Regions
- Stanislaus County Farm Bureau
- Agricultural and Ranchland Owners

Additional agency involvement occurred during the Project Solicitation Period when agencies within the planning area were encouraged to submit projects via Opti, the planning area's online project database. During the Project Solicitation Period from October 23, 2017 through December 8, 2017, projects were submitted by a total of 15 entities, including cities, water districts, irrigation districts, and nonprofits. The Opti system allows project information to be viewed by anyone, including the public. Opti also supports coordination in the future as agencies are able to stay informed regarding projects throughout the planning area.

Both organizations and members of the public participated in SWRP development through public meetings. During the course of SWRP preparation, three stakeholder and public outreach meetings were held. Coordination via public outreach is discussed further in Section 8, *Education, Outreach, and Public Participation*. The public was also invited to participate in SWRP preparation by providing comments on the Public Draft SWRP.

IRWM Regions

The East Stanislaus and Westside-San Joaquin IRWM Regions overlap the planning area (Figure 2-5). The East Stanislaus IRWM Region is overseen by the East Stanislaus Regional Water Management Partnership, which is comprised of the Cities of Modesto, Turlock, Ceres, Hughson, Waterford, and Stanislaus County. Due to the significant overlap between the East Stanislaus Region and the SWRP planning area, the two plans share the same Opti database system, which promotes increased coordination between these two efforts. The western portion of Stanislaus County overlaps the Westside-San Joaquin IRWM Region; SLDMWA functions as the governing body for the Region. The SWRP will be incorporated into both these IRWMPs by reference once it is complete and the SWRP Executive Summary will be included as an appendix. Additional detail on the IRWM Regions is included in Section 2.2, *Jurisdictional Boundaries and Service Areas*, and Section 7.3, *IRWMP Submittal*.

4.1.4 Implementation Authority

In order to execute stormwater projects and achieve benefits, a variety of agencies may need to implement their own authorities. Depending on the project location, type, and lead agency, the agencies or

organizations involved would differ. The primary entities with authority over stormwater management are the local jurisdictions: Stanislaus County, the Cities of Ceres, Hughson, Modesto, Newman, Oakdale, Patterson, Riverbank, Turlock, and Waterford. Specifically, Stanislaus County adopted a Storm Water Management and Discharge Control Ordinance in 2008, which governs discharges in Stanislaus County that are not regulated under a NPDES permit; the ordinance was subsequently updated in July 2015 to implement 2013 Phase II MS4 Permit. Projects implemented via the SWRP may need to comply with this ordinance. This Ordinance provides a basis for enforcing stormwater regulations and may be able to serve as the driver for future projects.

Empire Sanitary District, Salida Sanitary District, Western Hills Water District, Denair CSD, Grayson CSD, Keyes CSD, and Westley CSD provide wastewater and sewer services within the planning area; these districts could potentially be involved in project development and implementation as appropriate, as could SLDMWA and the San Joaquin River Exchange Contractors Authority as primary suppliers of regional agricultural water supplies. Individual landowners may oversee stormwater management on their property, whether in urban or rural settings. Urban and agricultural water suppliers may also be involved in project implementation.

With the passage of the Sustainable Groundwater Management Act (SGMA), GSAs have formed throughout the planning area that will be managing groundwater basins within their boundaries. These GSAs must prepare GSPs which establish acceptable conditions for the groundwater basin. Where appropriate, the GSAs would exercise their authority to implement stormwater projects that also provide groundwater benefits. According to DWR's SGMA portal, four GSPs will overlap Stanislaus County. The GSPs and their participating GSAs are listed below:[1]

- Eastern San Joaquin Subbasin GSP: Eastside San Joaquin GSA, Oakdale Irrigation District Eastern San Joaquin Sub-basin GSA
- Modesto Subbasin GSP: Stanislaus and Tuolumne Rivers Groundwater Basin Association GSA, Tuolumne Groundwater Sustainability Agency
- Northern & Central Delta-Mendota Region Subbasin GSP: Central Delta-Mendota Multi-Agency GSA, City of Patterson GSA, DM-II GSA, Northwestern Delta-Mendota GSA, Ora Loma Water District GSA, Patterson Irrigation District GSA, West Stanislaus Irrigation District GSA, Widren Water District GSA
- SJRECWA GSP: SJRECWA; City of Dos Palos GSA, Cities of Firebaugh, Gustine, Los Banos, Mendota, Newman, County of Madera – 3, Merced County – Delta-Mendota, Turner Island Water District – 2.
- Turlock Subbasin GSP: East Turlock Subbasin GSA, West Turlock Subbasin GSA

Multiple agencies will need to implement identified stormwater programs and projects in order to achieve the collective SWRP benefits. The objectives of the SWRP cannot be achieved with a single project; rather, the SWRP contains a variety of projects that each contribute toward achieving a certain subset of benefits. Not every agency in the planning area with relevant statutory authority over a resource would need to implement projects, but greater participation from and coordination among these agencies would allow the County to achieve more goals.

[1] Information compiled from DWR's SGMA portal as of May 8, 2018 and the Delta-Mendota SGMA website. GSP names may still be under development and subject to change.

4.1.5 Nonprofits

Nonprofits in the County that work on stormwater and dry weather runoff planning or management, or would be interested in these efforts include:

- The Nature Conservancy
- Tuolumne River Trust
- Community Water Center
- Environmental Defense Fund
- Self-Help Enterprises

All these organizations are included on the SWRP stakeholder contact list and received information related to project submittal, SWRP public workshops, and the public draft of the SWRP.

4.2 Public Engagement and Community Participation

Public education and community participation were provided for throughout the SWRP preparation process; opportunities for public education and participation included public workshops (summarized in Table 4-2 and Table 8-2), project submittal, and comment on the Public Draft SWRP. Communication and education also occurred via email announcements and the SWRP website. Community involvement in the SWRP is discussed further in Section 8, *Education, Outreach, and Public Participation*.

4.3 Relation to Other Planning Documents

The SWRP does not replace other local planning documents; the SWRP builds on existing plans to develop a regional framework for understanding stormwater management. The following list describes the relationships of key local planning documents and ordinances to the SWRP.

- **Stanislaus County General Plan:** The General Plan contains policies on land use, agriculture, and other subjects relevant to stormwater planning. Stormwater projects would need to be consistent with the General Plan. The SWRP and stormwater projects contribute to the goals of the General Plan, such as Goal Four of the Land Use Element ("Ensure that an effective level of public service is provided in unincorporated areas") and Goal Two of the Conservation and Open Space Element ("Conserve water resources and protect water quality in the County"). The General Plan also contains community plans for unincorporated areas in the County, specifically Crows Landing, Del Rio, Denair, Hickman, Keyes, Knights Ferry, La Grange, Salida, and Westley.
- **City General Plans:** Similar to the Stanislaus County General Plan, stormwater projects would need to be consistent with any applicable General Plan. The Cities of Turlock, Hughson, Patterson, and Modesto have their own General Plans.
- **UWMPs:** UWMPs provide details on urban water suppliers, such as water system descriptions, water supplies and demands, and water supply reliability. UWMPs can inform how stormwater projects fit into the overall urban supply in the planning area (e.g., groundwater replenishment projects could both capture stormwater and augment water supply). The Cities of Modesto, Turlock, Ceres, Riverbank, Newman, and Patterson have all prepared 2015 UWMPs. Additional details from these UWMPs are provided in Section 2.6, *Water Supply*.
- **AWMPs:** Like UWMPs, AWMPs are useful in providing a complete picture of the planning area. As Stanislaus County is a heavily agricultural area, AWMPs can provide information on water use and quality across a large portion of the SWRP planning area. Modesto Irrigation District (ID), Turlock ID, Oakdale ID, West Stanislaus ID, and Patterson ID have all prepared AWMPs

since 2012 (SBx7-7 Plans). Information from these AWMPs is included in Section 2.6, *Water Supply.*

- **Groundwater Management and GSPs:** Existing documents such as Groundwater Management Plans provide key information on groundwater quality as it pertains to stormwater. Groundwater Management Plans have been developed for the Delta-Mendota, Turlock, and Modesto Subbasin; the existing Groundwater Management Plan for the Eastern San Joaquin Subbasin excludes the portion of the Subbasin within Stanislaus County. As implementation of the SGMA progresses, GSPs will be prepared which will cover all of Stanislaus County. These GSPs will likely contain stormwater-related projects, since groundwater quality (and thus supply) are linked to stormwater. Moreover, the GSPs will provide guidance on groundwater management, and stormwater projects would need to be consistent with the goals for groundwater basin management laid out in the applicable GSP.
- **Water, Sewer, and Stormwater Master Plans:** Master planning documents lay out long-term plans for various types of systems and identify necessary improvements. Stormwater management could be integrated into projects identified in master planning documents in order to broaden project benefits. Documents by agencies within the planning area include: Water Master Plans for Modesto, Ceres, Oakdale, and Waterford; Wastewater/Sewer Master Plans for Modesto and Ceres; and Storm Drainage Master Plan for Modesto.
- **IRWMPs:** IRWMPs are conceptually similar to SWRPs in that they integrate information on a regional scale and include projects that would achieve regional water management goals. Projects identified through the SWRP may also be included in the appropriate IRWMP. The two planning processes can build on one another's education and outreach efforts, as done for the Stanislaus County Multi-Agency SWRP, and facilitate integration of stormwater management techniques into a variety of projects, as discussed in Section 6, *Identification and Prioritization of Projects.*
- **Mid-San Joaquin Regional Flood Management Program (RFMP):** Like an IRWMP, the RFMP is a compilation of regional information (in this case, specific to flooding) which also contains projects that could be implemented to improve flood management. Flood and stormwater management are closely tied, and some projects contained in the RFMP have been included in the SWRP.
- **Climate Action Plans:** Climate action plans outline strategies for communities to reduce their greenhouse gas (GHG) emissions. Currently, the City of Hughson is the only agency in the County with a Climate Action Plan. When implementing stormwater projects, project proponents should consider project consistency with any applicable Climate Action Plans. Climate Action Plans may also address the expected local impacts of climate change and address possible adaptation measures. Stormwater projects have the potential to contribute to climate change impact adaptation through benefits such as water supply augmentation and flood mitigation.
- **Stanislaus County Storm Water Management and Discharge Control Ordinance:** This Ordinance (Stanislaus County Code, Chapter 14.14), adopted in 2008 and updated in July 2015, governs discharges in unincorporated Stanislaus County that are not regulated under a NPDES permit. This Ordinance supports the goals of the SWRP by providing a regulatory mechanism for local stormwater management. Additionally, the Ordinance may precipitate stormwater projects as agencies work to achieve or maintain compliance.

4.4 Collaboration

A new structure was created to support coordination between agencies in order to prepare the SWRP. Stanislaus County, Eastside Water District, and the Cities of Modesto, Oakdale, and Patterson coordinated via a MOU to secure grant funding to prepare the SWRP. Additionally, the TAC was created to support

coordination between agencies and incorporate feedback from multiple organizations. Although Stanislaus County is the lead agency responsible for preparation of the SWRP, the SWRP will be implemented via multiple projects that may be conducted by various agencies throughout the County. The roles of the TAC, Stanislaus County, and other coordinating agencies are described further in Section 7, *Implementation Strategy and Schedule*.

In order to implement the SWRP, various agencies must support the SWRP and work toward implementing the projects that it contains. The agencies that signed the MOU to prepare the SWRP (Stanislaus County, Modesto, Oakdale, Patterson, and Eastside Water District) intend to support and/or adopt the final SWRP. Additionally, both the East Stanislaus and Westside-San Joaquin IRWM Regions have incorporated information about the SWRP into their respective IRWMPs (to the extent possible based on the timing of IRWMP preparation). Following completion of the SWRP, the East Stanislaus RWMG (comprised of Stanislaus County and the Cities of Modesto, Ceres, Turlock, Hughson, and Waterford) and the Westside-San Joaquin RWMG (comprised of the SLDMWA Board of Directors) will append the SWRP Executive Summary to their respective IRWMPs.

Given project feasibility, funding, and political will, SWRP projects will be implemented over time. To complete the projects contained in the SWRP, agencies such as water suppliers, cities, and the County need to exercise their authority to secure funding for projects either through grants, general funds, levying taxes, or other means. Depending on the agency, project approval would occur via a City Council, Board of Supervisors, Board of Directors, or other governing body. Lead agencies would also need to coordinate to secure applicable permits and conduct environmental review (CEQA), if required. This work would occur on a project-by-project basis. To attain permits, coordination and approvals may be required with such federal and state agencies such as those listed below:

- US Army Corps of Engineers
- US EPA
- US Department of Fish and Wildlife
- SWRCB
- CVRWQCB
- California Department of Fish and Wildlife
- California EPA
- Central Valley Flood Protection Board
- FEMA – No Rise Certificate – Work within the Floodway

Following project completion, project-specific monitoring may be required (such as for projects funded through the Prop 1 Storm Water Grant Program or IRWM grants). The type of monitoring would vary depending on the project. The implementing agency would be responsible for uploading monitoring information to the designated state database as required. Ongoing stormwater monitoring by the City of Modesto (as discussed in Section 2.7.2, *Stormwater Outfall Monitoring Results*) also supports implementation of the SWRP by supplying data that can be used to help select projects for implementation or determine the success of projects.

The SWRP was developed through the collaborative participation of multiple agencies in the planning area. Individual agencies within the County are not preparing separate SWRP documents, although some municipalities have their own preexisting stormwater management documents (the SWRP is consistent with these documents as discussed in Section 4.3, *Relation to Other Planning Documents*). However, it is possible that stormwater projects may be implemented individually by agencies across the County. This could be necessary due to the location of the project relative to local jurisdictions, the source of funding

(e.g., an individual city), or other considerations. Even if stormwater projects were implemented by a single agency, other agencies or organizations would have an opportunity to provide input via any public outreach mechanism, including those provided during the CEQA process. Therefore, project implementation would not occur in isolation. Further, the use of the interactive online project database (Opti) to house project information improves transparency and allows agencies to find opportunities to collaborate during project development.

Section 5. Quantitative Methods

As part of the SWRP development process, plan proponents must develop quantitative methodologies for identifying and prioritizing stormwater and dry weather runoff capture projects. SWRPs are required to include "a metrics-based and integrated evaluation and analysis of multiple benefits to maximize water supply, water quality, flood management, environmental, and other community benefits within the watershed" (California Water Code, § 10562 (b)(2)).

This section describes the quantitative methodologies used for the integrated identification, prioritization, and analysis of multiple-benefit projects and programs for the Stanislaus Multi-Agency Regional SWRP. The following sections summarize the benefit metrics used, tools available for quantifying project benefits, and the method used for determining collective benefits of SWRP projects, which ensures that the SWRP will satisfy the identified water management objectives of the planning area.

5.1 Benefit Metrics

Stormwater benefits are evaluated within five different categories: water quality, water supply, flood management, environmental, and community benefits. Within each category, specific main and additional benefits have been identified. These categories and benefits align with those presented in the SWRP Guidelines (SWRCB, 2015). In addition, the SWRP identified quantitative metrics for each main and additional benefit. For example, one benefit in the community benefit category is "community involvement." The metric for quantifying this benefit is "participants per year." Table 5-1 and Table 5-2 list each of the main and additional benefits in each benefit category as well as the metric used for quantification of each benefit. Table 5-3 shows the relationship between each benefit metric and the SWRP priorities.

User-defined metrics were provided, recognizing that for certain categories of benefit, there could be a wide array of ways to measure that benefit that would still support SWRP priorities. For example, project proponents could provide a quantitative estimate of their project's contributions to reducing nonpoint source loading of any of the priority pollutants listed in Table 2-6. Examples of user-defined benefit metrics that were provided by project proponents include number of inlets protected (for the "Nonpoint source pollution control" Additional Benefit) and number of cross-connections removed (for the "Reduced Sanitary Sewer Overflows" Additional Benefit). Project proponents are given the option to provide their own benefit metric in recognition that the project information form in Opti cannot encompass every possible benefit that might be provided by a project; therefore it is useful to build flexibility into the form.

Table 5-1. SWRP Main Benefits and Quantitative Metrics

Benefit Category	Benefit	Quantitative Metrics
Water Quality Benefits	Increased filtration and/or treatment of runoff	• Average annual pollutant load reduction (unit varies by pollutant) • Volume of water treated (mgd) • Volume of runoff infiltrated (AFY)
Water Supply Benefits	Water supply reliability	• Increase in water supply through direct groundwater recharge (AFY) • Increase in water supply through direct use (AFY)
	Conjunctive use	• Increase in water supply through in lieu recharge/conjunctive use (AFY)
Flood Management Benefits	Decreased flood risk by reducing runoff rate and/or volume	• Reduction in peak flow discharge (cfs) • Reduction in volume of potential flood water (AFY)
Environmental Benefits	Environmental habitat protection and improvement, including wetland enhancement/creation, riparian enhancement, and/or instream flow improvement	• Size of habitat protected or improved (acres) • Amount of instream flow rate improvement (cfs)
	Increased urban green space	• Size of increase in urban green space (acres)
Community Benefits	Employment opportunities provided	• Number of employment opportunities provided
	Public education	• Number of outreach materials provided, or events conducted

Table 5-2. SWRP Additional Benefits and Quantitative Metrics

Benefit Category	Benefit	Quantitative Metrics
Water Quality Benefits	Nonpoint source pollution control	• User-defined
	Reestablished natural water drainage and treatment	• User-defined
Water Supply Benefits	Water conservation	• Reduction in water use (AFY)
Flood Management Benefits	Reduced sanitary sewer overflows	• Reduction in sewer overflow volumes (AFY)
Environmental Benefits	Reduced energy use, greenhouse gas emissions, or provides a carbon sink	• Amount of energy consumption reduced (kilowatt-hours (kWh)/year) • Amount of GHG emissions reduced (tons/year)
	Reestablishment of natural hydrograph	• User-defined
	Water temperature improvements	• Amount of temperature improvement
Community Benefits	Community involvement	• Number of participants per year
	Enhance and/or create recreational and public use areas	• Estimated visits per year

Table 5-3. Relationship Between Quantitative Metrics and SWRP Priorities

Benefit Category	Benefit	Quantitative Metric	Implement water quality improvements to help achieve the goals of an existing TMDL	Reduce pollutant discharges into a 303(d)-listed Impaired Water Body	Augment water supply by capturing stormwater or dry weather runoff for recharge into a groundwater basin	Provide a SWRP Main or Additional Benefit to a disadvantaged community or an economically distressed area
Water Quality Benefits	Increased filtration and/or treatment of runoff	Average annual pollutant load reduction (unit varies by pollutant)	✓	✓		✓
		Volume of water treated (mgd)	✓	✓		✓
		Volume of runoff infiltrated (AFY)		✓	✓	✓
	Nonpoint source pollution control	User-defined (e.g., number of inlets protected)	✓	✓		✓
	Reestablished natural water drainage and treatment	User-defined (e.g., volume infiltrated)	✓	✓		✓
Water Supply Benefits	Water supply reliability	Increase in water supply through direct groundwater recharge (AFY)			✓	✓
		Increase in water supply through direct use (AFY)				✓
	Water conservation	Reduction in water use (AFY)				✓
	Conjunctive use	Increase in water supply through in lieu recharge/conjunctive use (AFY)			✓	✓
Flood Management Benefits	Decreased flood risk by reducing runoff rate and/or volume	Reduction in peak flow discharge (cfs)			✓	✓
		Reduction in volume of potential flood water (AFY)	✓	✓	✓	✓
	Reduced sanitary sewer overflows	Reduction in sewer overflow volumes (AFY)	✓	✓		✓
Environmental Benefits	Environmental habitat protection and improvement, including wetland enhancement/creation, riparian enhancement, and/or instream flow improvement	Size of habitat protected or improved (acres)	✓	✓	✓	✓
		Amount of instream flow rate improvement (cfs)				✓
	Reduced energy use, greenhouse gas emissions, or provides a carbon sink	Amount of energy consumption reduced (kilowatt-hours (kWh)/year)			✓	✓
		Amount of GHG emissions reduced (tons/year)		✓	✓	✓
	Reestablishment of natural hydrograph	User-defined (e.g., volume infiltrated)	✓	✓	✓	✓
	Water temperature improvements	Amount of temperature improvement		✓		✓
	Increased urban green space	Size of increase in urban green space (acres)		✓		✓
Community Benefits	Employment opportunities provided	Number of employment opportunities provided				✓
	Public education	Number of outreach materials provided, or events conducted				✓
	Community involvement	Number of participants per year				✓
	Enhance and/or create recreational and public use areas	Estimated visits per year	✓	✓	✓	✓

Benefit criteria and metrics were established through a series of steps. First, benefit criteria were developed based on an initial characterization of the planning area; criteria then were further refined using region-specific studies and input from the SWRP TAC (as discussed in Section 2.7.3, *Water Quality Priorities*). The TAC approved the final benefit criteria. This approach resulted in a prioritization methodology containing benefits and metrics targeted to the watersheds in the SWRP planning area. Thus, the prioritization of projects reflected the regional priorities established in the SWRP. Additionally, projects located outside the SWRP boundary may still contribute to meeting regional priorities and providing multiple benefits at a watershed scale. Therefore, such projects may still be included in the SWRP if they meet the eligibility requirements listed in Section 6.2, *Project Eligibility*. For example, the Middle San Joaquin-Lower Merced-Lower Stanislaus Watershed extends beyond the boundary of the SWRP planning area, and projects in this watershed may provide benefits within the planning area.

5.2 Technical Studies Supporting Quantitative Benefits Assessments

Technical studies were conducted by agencies within Stanislaus County in conjunction with the SWRP development. These studies provide quantitative assessments of stormwater pollutant loading to receiving waters to help estimate potential water quality benefits and the potential for groundwater recharge using stormwater to provide water supply benefits.

5.2.1 Stormwater Outfall Monitoring

During the development of the SWRP, stormwater quality data were collected at key outfalls during the 2018/2019 rainy season to assess potential contaminant loading from stormwater to the County's surface receiving waters and groundwater basins. The results, in combination with existing water quality data from regional, County, and municipal monitoring programs, help establish baseline water quality conditions to support watershed characterization, as well as project assessments and prioritization in the SWRP. The results are summarized in Section 2.7.2, *Stormwater Outfall Monitoring Results.* The full monitoring report is included as Appendix D. Further sampling across multiple years at a greater number of monitoring sites will be needed in order to robustly study trends and characterize water quality.

5.2.2 Groundwater Recharge Study

Additionally, a preliminary groundwater recharge evaluation was performed to characterize local near-surface hydrogeologic conditions and identify favorable areas for groundwater recharge in Stanislaus County. Potential stormwater capture/groundwater recharge sites were assessed through field work and laboratory testing. Two project locations were selected for potential stormwater capture/groundwater recharge on three land parcels, one land parcel near Crows Landing and two land parcels along the Tuolumne River. Targeted field investigations were conducted at the two project locations to confirm suitability for groundwater recharge. Field investigations included advancing and logging hand-driven boreholes at each site and falling-head infiltration testing. Silty sands were found at both the Crows Landing and Tuolumne River locations. Both locations show potential for recharge projects. Because site-specific conditions will determine the feasibility of a recharge project, more testing would likely be needed to determine the best specific recharge site at each parcel. Further testing can help determine the acreage that would be needed to percolate estimated stormwater flow volumes which will then support identification of specific sites and design of field-testing programs at those locations. Therefore, additional work is recommended to determine necessary project size and potential siting. These study results will inform site selection and appropriate modeling activity for future projects. Appendix E includes the complete Stormwater Capture/Groundwater Recharge Site Assessment Technical Memorandum.

5.2.3 Other Studies

Other studies have been conducted to examine hydrologic conditions and pollutant loading within the planning area to inform the SWRP benefits assessment and project prioritization methodology. The City of

Oakdale completed its *Storm Drain Master Plan* in 2015, which included an evaluation of the existing storm drain system in the City of Oakdale (MCR Engineering, 2015). Hydrologic and water quality analyses contained in the master plan informed the SWRP project prioritization methodology. Another useful document, the *Empire Community Storm Drainage Report Low Impact Development & Greening Study*, examined urban greening and LID approaches in the Empire community (Stanislaus County, 2014). The study modeled stormwater runoff and evaluated a range of LID options for Empire's storm drainage system and discussed target pollutants, pollutant sources, and the efficacy of selected LID strategies for pollutant removal. This information guided the project prioritization methodology; for example, the prioritization process awards points to projects that reduce loading of certain pollutants that are known to be problematic in the area. The study contributed to the overall understanding of regional pollutants and the LID options available to address them. Eastside Water District performed a managed aquifer recharge study from 2014 to 2016, titled *Geologic, Hydrologic, and Hydrogeologic Characterizations for Potential Managed Aquifer Recharge (MAR) of Diffused Stormwater.* The objective of this study was to identify suitable locations for intercepting diffused stormwater and directing it to potential managed aquifer recharge facilities. The soils and hydrogeologic evaluations conducted in this study provide proof of concept and performance evaluation data for a key stormwater project type.

5.3 Available Tools for Quantitative Assessment of Benefits

The SWRP project solicitation process allows project applicants to submit quantitative metrics for each benefit. The quantitative information provided was used by the SWRP to report total benefits for each SWRP main and additional benefit, which are quantified by aggregating the benefits associated with each project submitted to the SWRP.

Project proponents determined the quantitative methods appropriate for their proposed stormwater and dry weather runoff projects and were responsible for calculating the metrics for their project, shown in Table 5-1 and Table 5-2 above. In most cases, these quantitative assessments have been performed as part of a planning or feasibility study in support of the project. This section briefly discusses some quantitative assessment tools that are available to project proponents to develop metrics for SWRP main and additional benefits or could be used to further evaluate their proposed projects in the future.

5.3.1 EPA System for Urban Stormwater Treatment and Analysis Integration Model

The USEPA System for Urban Stormwater Treatment and Analysis Integration (SUSTAIN) is a decision support system capable of analyzing multiple projects. SUSTAIN assists with developing and implementing plans for flow and pollution control measures to protect source waters and meet water quality goals (USEPA, 2014). SUSTAIN allows watershed and stormwater practitioners to develop, evaluate, and select optimal BMP combinations at various watershed scales based on cost and effectiveness. SUSTAIN runs on an ArcGIS platform and has seven modules. The tool supports users with selecting suitable locations for common structural BMPs that meet user-defined site suitability criteria, such as soil type and drainage area. SUSTAIN performs hydrologic and water quality modeling and can be used to determine optimal management practices to achieve water quality objectives based on cost-effectiveness. The tool provides simulation outputs detailing treatment containment volume, attenuation, and pollutant removal effectiveness.

5.3.2 EPA Storm Water Management Model

The USEPA's Storm Water Management Model (SWMM) is used for stormwater planning, analysis, and design (USEPA, 2017). SWMM is a dynamic hydrology-hydraulic water quality simulation model used primarily for urban areas. SWMM accounts for various hydrologic processes that produce runoff from urban areas and includes a flexible set of hydraulic modeling capabilities used to route runoff and external inflows through the drainage system network of pipes, channels, storage/treatment units and diversion

structures. SWMM can also estimate the production of pollutant loads associated with stormwater runoff and the reduction in pollutant loading attributable to a project. Newer versions of SWMM have been expanded to include support for modeling the performance (including infiltration, percolation, and runoff reduction) of LID stormwater controls, including rain gardens, vegetative swales, and permeable pavement.

5.3.3 Central Valley Hydrologic Study

The Central Valley Hydrology Study (CVHS) was developed by DWR and the U.S. Army Corps of Engineers (USACE) to provide a basis for defining existing hydrologic conditions at locations throughout the Central Valley to support flood management analyses (DWR and USACE, 2015). The CHVS includes the following study products:

- Unregulated flow-frequency curves at key locations (201 analysis points) in the Central Valley. 138 of these locations are based on flow-frequency analysis, and 63 locations are based on rainfall-runoff modeling.
- Unregulated flow-time series (which serve as the basis of the frequency analysis and transform development).
- Reservoir operations models of Central Valley reservoirs developed in the Reservoir System Simulation (HEC-ResSim) software by the USACE Hydrologic Engineering Center.
- Regulated flow-times series (unregulated flows routed through the reservoir simulation model).

The unregulated and regulated flow-time series were developed using the USACE Hydrologic Engineering Center's River Analysis System (HEC-RAS) model, which contains analysis components for (1) steady flow water surface profile computations, (2) one- and two-dimensional unsteady flow simulation, (3) movable boundary sediment transport computations, and (4) water quality analysis. In addition to flow simulations and water quality analyses, HEC-RAS can also be used to map datasets such as floodplain boundaries. SWRP applicants can use the CVHS models to evaluate flood management benefits related to peak flow discharges and changes in the volume of potential flood water.

5.4 Integrated Metrics-Based Analysis

An integrated metrics-based analysis of project benefits was conducted following the close of the project submission period. The purpose of this analysis was to quantify the benefits provided by the SWRP as a whole (assuming all projects submitted are implemented) to demonstrate how the projects collectively address the plan’s stormwater management objectives.

The integrated analysis was achieved through use of Opti, an online data management system. Opti was developed for use during the East Stanislaus IRWMP development and has been adapted to facilitate project solicitation for the SWRP. Opti was made available through the East Stanislaus IRWMP website (http://irwm.rmcwater.com/es). The Opti system allows project information to be submitted, reviewed, organized, and regularly updated electronically by project proponents. As part of submitting projects to Opti, project proponents provide information on the quantitative benefits of the project, as shown in Table 5-1 and Table 5-2. In addition to the benefit metrics listed in Table 5-1 and Table 5-2, users may define their own benefit metric for any main or additional SWRP benefit.

The quantitative benefit information provided by project proponents was used as the basis for the integrated analysis. The Opti system was used to automate aggregation of benefits and produce reports on the total benefits for the SWRP planning area. SWRP benefits were quantified in each of the five SWRP benefit categories: water quality, water supply, flood management, environmental, and community. The use of Opti allows for a streamlined assessment of the SWRP benefits across varied geographic scales. In addition, each project’s relative contribution to the SWRP objectives can be quantified through the Opti system.

Through these analyses, SWRP benefits were thoroughly characterized and summarized as most relevant to Stanislaus County.

The SWRP is intended to be a living document. In practice, this means that projects will be updated and added beyond the initial development of the SWRP. Project solicitation periods would likely occur prior to funding solicitation periods or as needed. The use of Opti allows Stanislaus County to maintain a dynamic project list that is conducive to continued project solicitation. Opti makes it easy for project proponents to add new information as their project progresses, including additional quantitative information regarding project benefits.

Opti is used to facilitate an aggregated analysis of projects. As more projects are added to the SWRP and as existing projects develop, more quantitative information will be submitted to Opti, allowing for an increasingly robust analysis of benefits. Subsequent project prioritizations and prioritized project lists will be incorporated into the SWRP as appendices.

The following sections describe the evaluation methods and analysis results for each of the benefit categories aggregated and assessed in Opti for the SWRP, based on the projects that were submitted in response to the 2017 solicitation period conducted during plan development. The quantified benefits discussed in the subsequent sections are based on information provided by the project proponents. Quantitative information was not provided for every project, which may result in underestimation of the aggregated benefits of all SWRP projects.

5.4.1 Water Quality Projects Analysis

SWRP projects that provide water quality benefits were assessed individually and collectively at the planning area-level based on their ability to address the SWRP's water quality objectives; to reduce pollutant loading, support existing TMDLs or provide benefits to a 303(d)-listed water body. As discussed in Section 2.7.3, *Water Quality Priorities*, nine priority pollutants were identified for the planning area based on 303(d)-listed constituents and the TMDLs applicable to the County. Estimated pollutant load reductions for priority pollutants were used as metrics to assess aggregated SWRP water quality benefits. Water quality benefits provided by stormwater and dry weather runoff projects in the planning area include increased filtration and/or treatment of runoff, nonpoint source pollution control, and reestablished natural water drainage and treatment. These processes result in the reduction of specific pollutants of concern in Stanislaus County, such as nitrates and pesticides, and support the implementation of TMDLs in the County.

A number of water quality projects will contribute to the management objective of restoration and enhancement of key watershed processes, particularly related to groundwater recharge and infiltration. The majority of water quality projects increase infiltration of stormwater to reduce pollutant loading. Urbanization has reduced the permeability of land surfaces, resulting in increased runoff and decreased infiltration. Several projects in the SWRP increase infiltration to provide both water quality and groundwater recharge benefits.

Project proponents were asked to quantify water quality benefits using one of the available tools, or another standardized method. While project proponents may calculate benefits using different tools or methodologies, the same types of information would be needed such as stormwater quality, precipitation quantity, the volume of stormwater intercepted or treated by the project, or the amount of pollutant removal provided by the project. Once benefits were quantified using the metrics shown in Table 5-1 and Table 5-2, the project proponents input the quantified benefits into Opti.

The Opti system was used to calculate the projected benefits of SWRP implementation across the planning area for each metric. Water quality projects were analyzed to estimate planning area-based outcomes through pollutant mass and water volume balances calculations. Project specific metrics were aggregated to provide estimates of expected planning-area wide pollutant load reductions.

Specific metrics used to assess water quality benefits included:

- Pollutant load reduced, typically in lbs/yr, for any of the following constituents: total suspended solids (TSS), mercury, diazinon, chlorpyrifos, selenium, diuron, bacteria, pyrethroids, trash, or total nitrogen
- Volume of water treated, in units of mgd
- Volume of water infiltrated rather than discharging to surface water, in units of AFY

Additionally, project proponents were able to note whether the project reduces pollutant loading to a 303(d)-listed water body or will help achieve the goals of an existing TMDL. Project proponents are responsible for ensuring that their project meets all applicable NPDES requirements (e.g., Construction General Permit, Industrial General Permit, Phase I MS4 Permit and/or general Phase II MS4 Permit) which are discussed in Section 3.2.1. Project proponents must comply with discharge requirements both during and after construction, including preparing and abiding by SWPPPs as applicable.

Projects were identified as either ready to proceed or conceptual. All listed projects are assumed to be implemented over time as part of the SWRP and to ultimately help meet the stormwater management objectives of the SWRP. At the time of the SWRP development, a total of 46 projects had noted main and/or additional benefits related to water quality improvement, either through increased filtration and/or treatment of runoff, nonpoint source pollution control, or by reestablished natural drainage and treatment, as shown in Table 5-4 and Figure 5-2. Of the 46 projects, 27 reduce pollutant loading to a 303(d)-listed water body, eight support the goals of the Central Valley Pesticides TMDL and seven support the goals of the Delta diazinon and chlorpyrifos TMDL. The locations of these projects are shown in Figure 5-1.

Table 5-4. Number of Projects Providing SWRP Water Quality Benefits

SWRP Benefit	Benefit Type	Conceptual	Ready to Proceed	Total
Increased filtration and/or treatment of runoff	Main	29	13	42
Nonpoint source pollution control	Additional	13	5	18
Reestablished natural water drainage and treatment	Additional	9	3	12

Figure 5-1. Projects with Water Quality Benefits to Support TMDLs and 303(d)-Listed Water Bodies

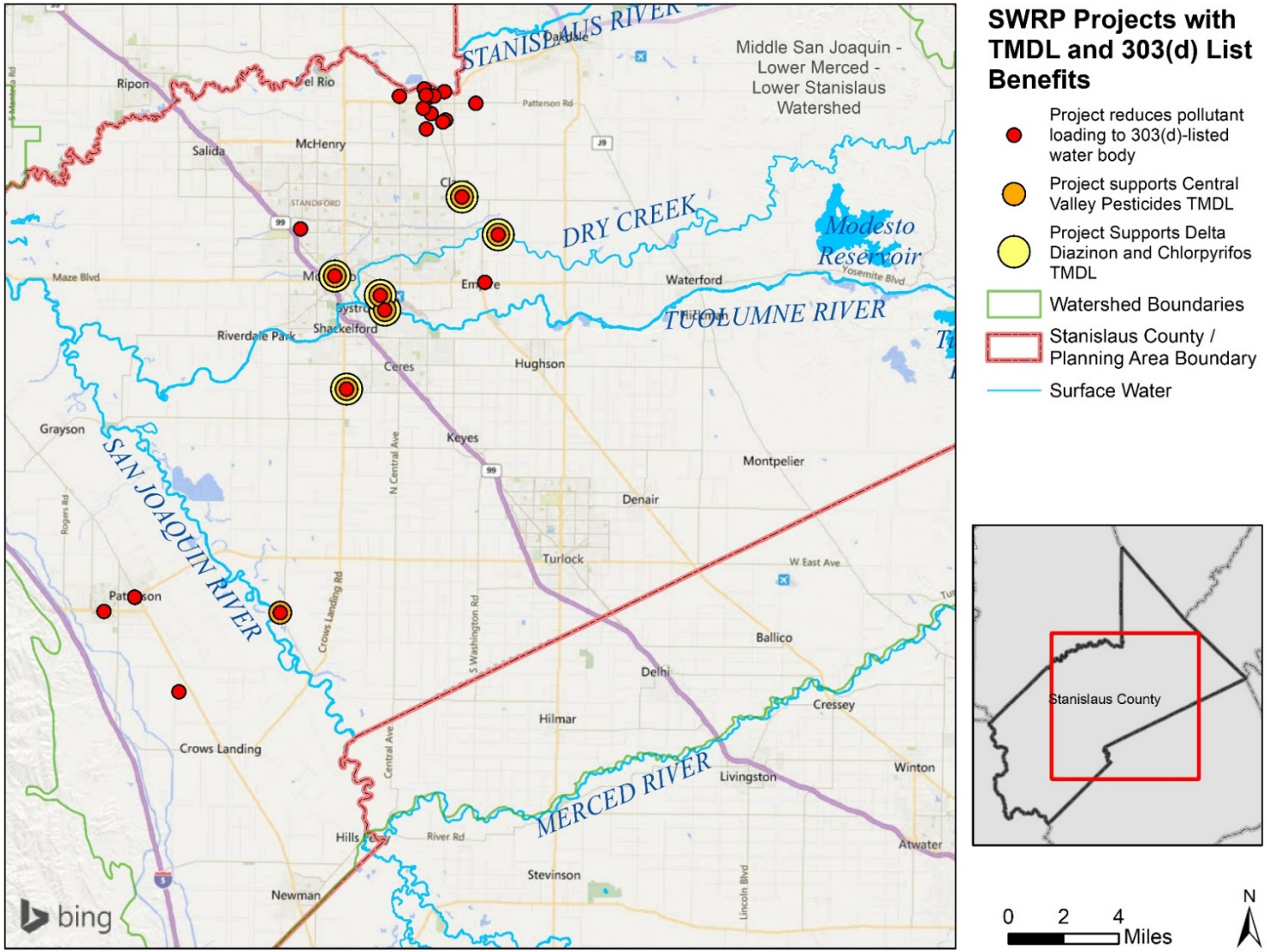
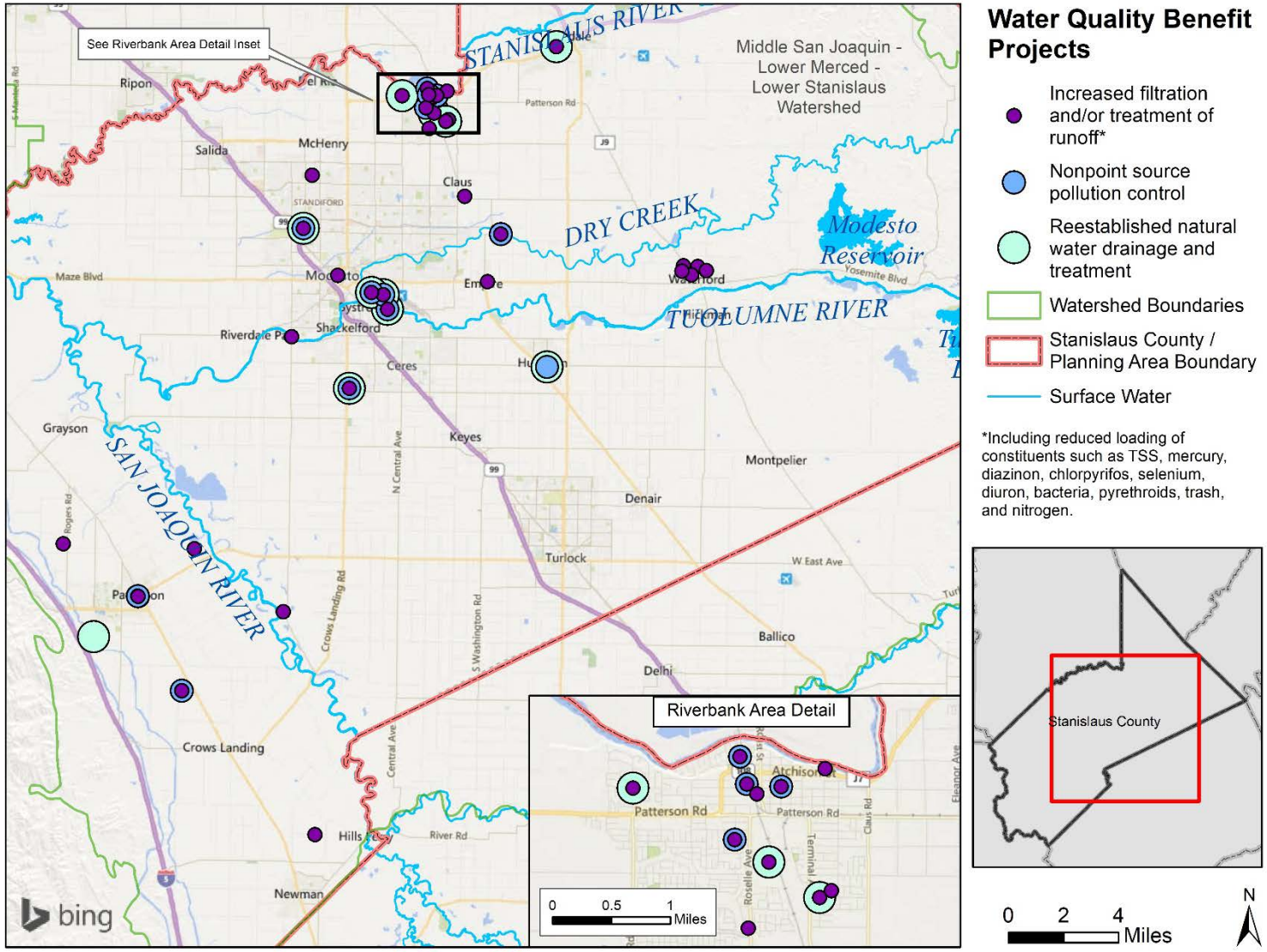


Figure 5-2. Projects Providing SWRP Water Quality Benefits



Quantified water quality benefits were viewed collectively over the planning area to estimate regional pollutant load reductions. All projects with quantified water quality benefits were located in the Middle San Joaquin-Lower Merced-Lower Stanislaus watershed. It is estimated that by implementing all SWRP projects with water quality benefits (both conceptual and ready to proceed), there could be a reduction in TSS loading of approximately 205,000 lbs/yr and approximately 5,200 lbs/yr of trash removed from entering waterways throughout the County. Additional pollutant load reductions would result from infiltration of over 5,600 AFY of runoff and treatment of 520 mgd of stormwater. A number of other stormwater pollutants can also be impacted by reducing TSS and trash loading to the water bodies since many contaminants travel via sediment and other particles. See Table 5-5 for a summary of the quantified water quality benefits provided by project implementation. Individual project benefits are detailed in Appendix F.

Table 5-5. Total Quantitative Water Quality Benefits

SWRP Benefit	Conceptual	Ready to Proceed	Total
Reduction in TSS loading (lbs/yr)	204,100	750	204,850
Trash removed (lbs/yr)	5,100	100	5,200
Volume of water treated (mgd)	510	10	520
Volume of runoff infiltrated (AFY)	2,582	3,042	5,624

In addition to the specific water quality benefits detailed in Table 5-5, projects with water quality benefits are anticipated to contribute to preservation, restoration or enhancement of watershed processes.

The retention or detention of stormwater will reduce the velocity and volume of overland flow, particularly in developed areas that currently face flooding concerns. These projects are discussed further in Section 5.4.2, *Stormwater Capture and Use/Water Supply Projects Analysis* and Section 5.4.3, *Flood Control Projects Analysis*. Proposed water quality improvement projects included in the SWRP will provide an additional 5,600 AFY of groundwater recharge, thereby improving recharge and infiltration processes. These projects are discussed in Section 5.4.2, *Stormwater Capture and Use/Water Supply Projects Analysis*. Water quality projects with restoration and "green" elements will increase the soil and vegetation surfaces, as well as restore native plants to increase evapotranspiration rates in the planning area and are discussed in Section 5.4.4, *Environmental and Community Benefits Analysis*. Delivery of sediment and organic matter is expected to be mitigated in the implementation of the proposed projects, as these are priority water quality issues in this planning area. Reduced TSS loading can improve downstream habitats, which may help restore ecosystem services (such as water filtration) or provide greater community benefits (via cleaner recreational areas). Chemical and biological transformation in the soil column will be supported due to the greater stormwater infiltration and reduction of overland flow.

Further quantification of collective water quality benefits within the planning area is anticipated as more project information is developed during future solicitations and project updates. In addition, as more stormwater quality monitoring data become available through regional monitoring efforts and project-level pre- and post-construction monitoring, the impact of the plan's implementation on water quality will be more robustly estimated.

5.4.2 Stormwater Capture and Use/Water Supply Projects Analysis

Stormwater capture for groundwater basin recharge to augment water supply was identified as a regional watershed priority during the preparation of the SWRP. SWRP projects providing supply benefits through stormwater capture and use were aggregated across the planning area to analyze how collectively the

stormwater capture projects and programs could provide water supply benefits of approximately 167,000 AFY of direct recharge, direct use, and/or in-lieu recharge/conjunctive use (Table 5-7). The locations of these projects are displayed in Figure 5-4.

SWRP stormwater capture and use project supply benefits included water supply reliability, conjunctive use, or water conservation. Project proponents were responsible for quantifying supply benefits using available tools or other methods. Typical information needed to quantify supply benefits could vary between benefits but would generally be similar for each supply benefit. For example, quantifying supply benefits from conjunctive use would require information about soil type and permeability, precipitation volume, aquifer characteristics, and groundwater pumping.

All projects submitted to the SWRP with quantified supply benefits were located in the Middle San Joaquin-Lower Merced-Lower Stanislaus watershed. Table 5-6 summarizes the number of conceptual and ready to proceed projects that provide a supply benefit in the SWRP.

Table 5-6. Number of Projects Providing SWRP Water Supply Benefits

SWRP Benefit	Benefit Type	Conceptual	Ready to Proceed	Total
Water supply reliability	Main	28	14	42
Conjunctive use	Main	8	5	13
Water conservation	Additional	9	4	13

Project proponents quantified stormwater capture and use benefits using the metrics shown in Table 5-1 and Table 5-2, which included:

- Increase in supply through direct groundwater recharge (AFY)
- Increase in supply through direct use (AFY)
- Increase in supply through in lieu recharge/conjunctive use (AFY)
- Reduction in water use (AFY)

Supply benefits were viewed collectively across the planning area, and more specifically within the Middle San Joaquin-Lower Merced-Lower Stanislaus watershed where all projects were located. Figure 5-4 shows the locations of stormwater capture and use projects that provide supply benefits and the type of benefit they provide. Water supply reliability benefits include increase in water supply through direct groundwater recharge, direct use or in-lieu recharge/conjunctive use or a reduction in water demand through water conservation. Table 5-7 aggregates the detailed quantified benefit information for each project submitted by project proponents, summarizing the total quantified supply benefits across the watershed.

Figure 5-3. Projects Supporting Stormwater Capture and Recharge Regional Watershed Priority

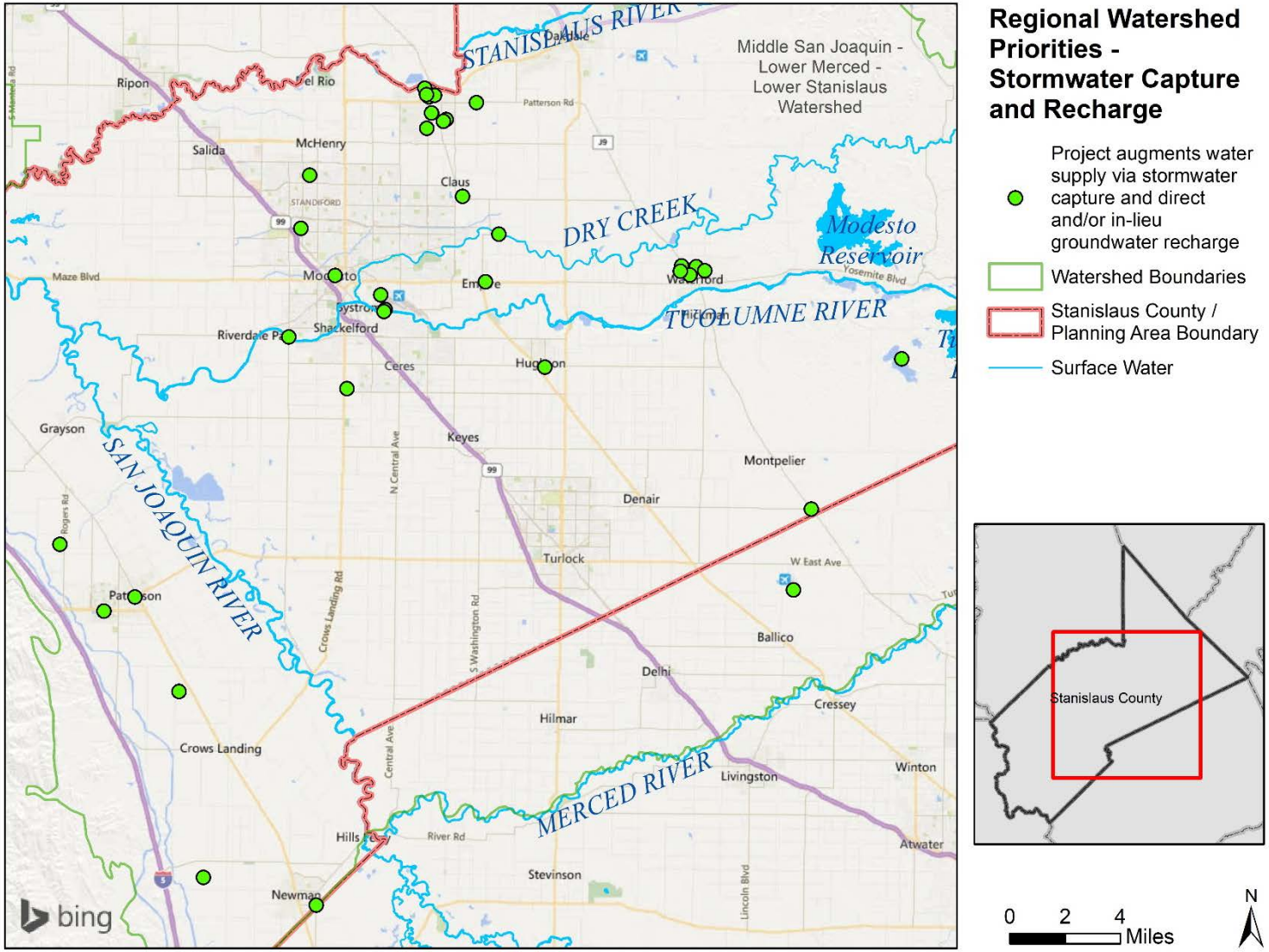


Figure 5-4. Projects with Water Supply Benefits

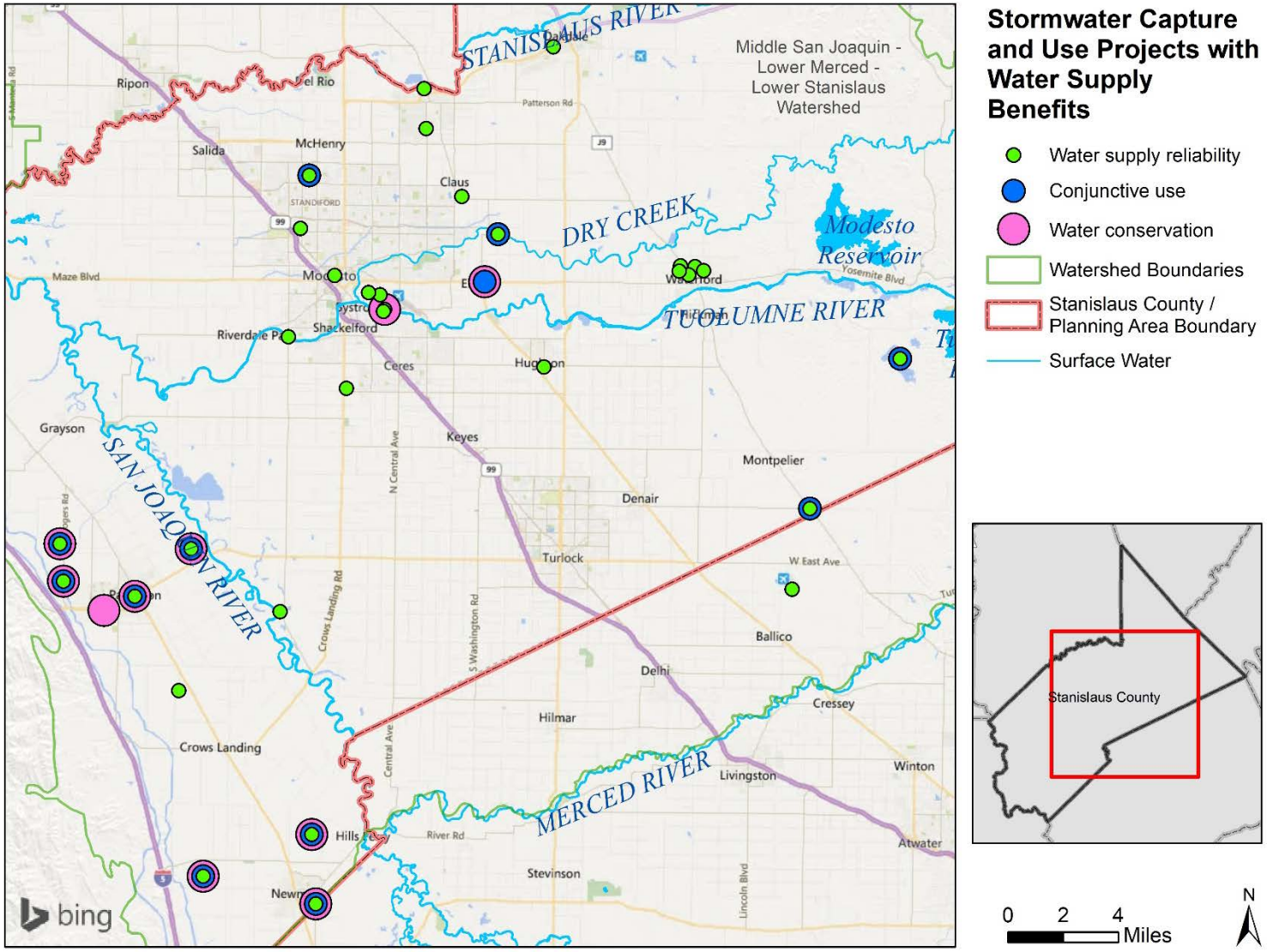


Table 5-7. Total Quantitative Water Supply Benefits

SWRP Benefit	Conceptual	Ready to Proceed	Total
Increase in water supply through direct groundwater recharge (AFY)	19,332	19,542	38,874
Increase in water supply through direct use (AFY)	2,572	101,000	103,572
Increase in water supply through in lieu recharge/conjunctive use (AFY)	15,000	10,000	25,000
Reduction in water use (AFY)[1]	-	240	240

[1]Reduction in water use would be achieved through conversion of land from farmland to recharge area, thereby reducing water use on those parcels.

5.4.3 Flood Control Projects Analysis

A flood management projects analysis was conducted based on the projects that provide flood management benefits. Flood management benefits include decreased flood risk through a reduction of runoff rate or volume and reduced sanitary sewer overflows. These benefits may be quantified through metrics such as peak flow reduction, flood volume reduction, or reduced sanitary sewer overflows. Project proponents are responsible for quantifying benefits using available tools or other methods and inputting quantified benefits into Opti. To accurately quantify flood management benefits, analyses such as hydraulic modeling are often needed to determine the project's impact on the overall storm drainage and/or sanitary sewer system. Detailed information on the relevant infrastructure or watershed features, such as location and capacity, would likely also be needed to quantify benefits.

Opti was used to assess how projects and programs in the SWRP would collectively support the SWRP flood management objectives. The number of SWRP projects that provided flood management benefits is summarized in Table 5-8. The locations of projects that decrease flood risk by reducing runoff rate or volume are shown in Figure 5-5. The total quantified flood management benefits across the planning area are summarized in Table 5-9. Water supply augmentation benefits in the SWRP from stormwater capture projects are quantified and described in Section 5.4.2, *Stormwater Capture and Use/Water Supply Projects Analysis*. Flood control projects that also augment water supplies will create up to a 137,446 AFY increase in water supply (as a subset of the total water supply benefits listed in Section 5.4.2).

Table 5-8. Number of Projects Providing SWRP Flood Management Benefits

SWRP Benefit	Benefit Type	Conceptual	Ready to Proceed	Total
Decreased flood risk by reducing runoff rate and/or volume	Main	27	11	38
Reduced sanitary sewer overflows	Additional	15	7	22

Figure 5-5. Projects with Flood Management Benefits

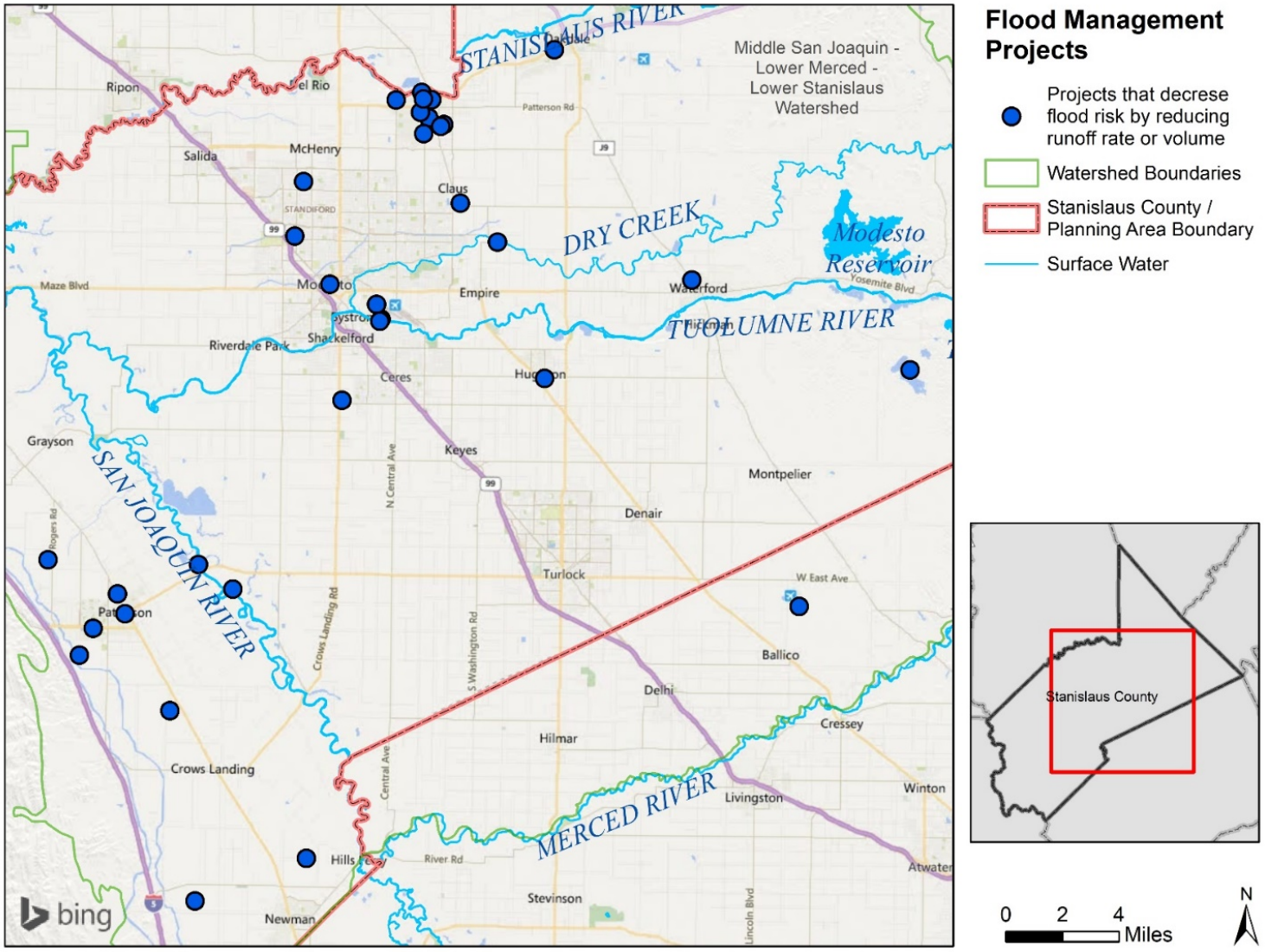


Table 5-9. Total Quantitative Flood Management Benefits

SWRP Benefit	Conceptual	Ready to Proceed	Total
Reduction in peak flow discharge (cfs)	145	2,685	2,830
Reduction in volume of potential flood water (AFY)	2,662	25,052	27,714
Reduction in sewer overflow volumes (AFY)	7	-	7

5.4.4 Environmental and Community Benefits Analysis

Environmental benefits include improvements such as habitat restoration, increased urban green space, reduced greenhouse gas emissions, reestablishment of the natural hydrograph and water temperature improvements. Due to the broad range in potential environmental benefits, project proponents used a variety of quantification methods. Some benefits, such as increasing urban green space, can be calculated based on project design information. Other environmental benefits, such as greenhouse gas emission reduction, require more in-depth calculations with inputs such as the energy usage of the project compared to the existing conditions, the emissions factor for any energy sources, and estimates for carbon sequestration potential. Several stormwater and dry weather runoff projects include environmental benefits as main or additional benefits as summarized in Table 5-10. The location of these projects and their associated environmental benefits are shown in Figure 5-6. Quantified environmental benefits were aggregated across the planning area to assess cumulative SWRP environmental benefits. These quantified benefits are summarized in Table 5-11.

Table 5-10. Number of Projects Providing SWRP Environmental Benefits

SWRP Benefit	Benefit Type	Conceptual	Ready to Proceed	Total
Environmental habitat protection and improvement, including wetland enhancement/creation, riparian enhancement, and/or instream flow improvement	Main	14	9	23
Increased urban green space	Main	20	3	23
Reduced energy use, greenhouse gas emissions, or provides a carbon sink	Additional	7	6	13
Reestablishment of natural hydrograph	Additional	3	3	6
Water temperature improvements	Additional	1	1	2

Figure 5-6. Projects with Environmental Benefits

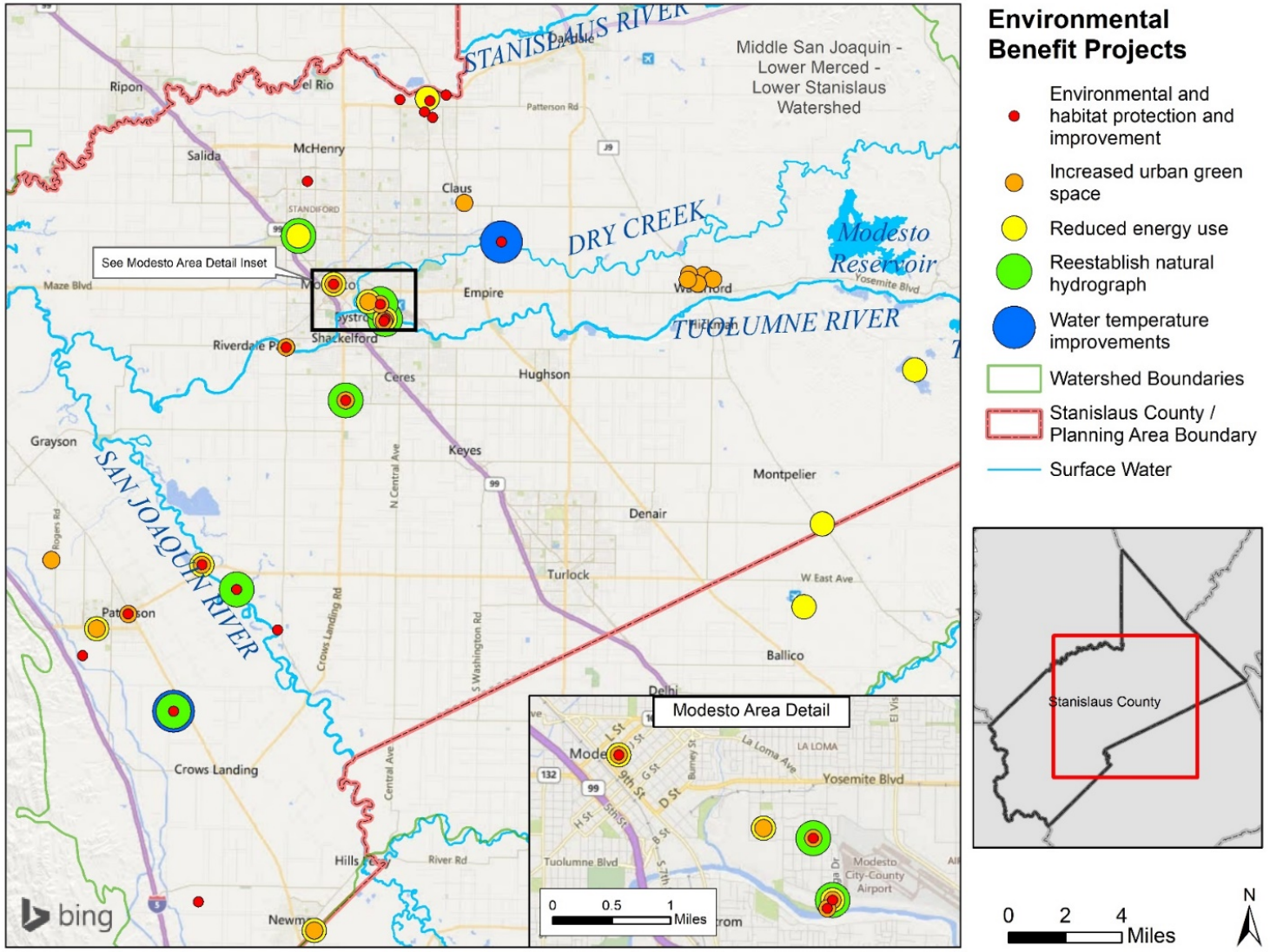


Table 5-11. Total Quantitative Environmental Benefits

SWRP Benefit	Conceptual	Ready to Proceed	Total
Habitat protected or improved (acres)	50	3,513	3,563
Instream flow rate improvement (cfs)	65	15	80
Energy consumption reduced (kWh/year)	525,000	997,500	1,522,500
GHG emissions reduced (tons/year)	391	743	1,134

Community benefits can be quantified using metrics such as number of jobs created, number of community participants, or number of outreach materials distributed. These types of benefits are typically determined during the planning phases of projects. For example, project proponents would estimate the number of temporary and permanent jobs needed to implement a project. Outreach projects (or project components) would include quantitative targets in their planning process and the outreach program would be structured to meet those targets. Quantification of community benefits relies on organizer experience, rather than the types of modeling approaches typical for other benefit types. The number of conceptual and ready to proceed projects with community benefits is summarized in Table 5-12 and the locations of these projects and their benefits are shown in Figure 5-7. Several of the community benefits were quantified in Opti using metrics provided in Table 5-1 and Table 5-2, or otherwise defined by the project proponents. These benefits were aggregated across the watershed and are summarized in Table 5-13.

Table 5-12. Number of Projects Providing SWRP Community Benefits

SWRP Benefit	Benefit Type	Conceptual	Ready to Proceed	Total
Employment opportunities provided	Main	13	6	19
Public education	Main	22	10	32
Community involvement	Additional	16	8	24
Enhance and/or create recreational and public use areas	Additional	22	10	32

Figure 5-7. Projects with Community Benefits

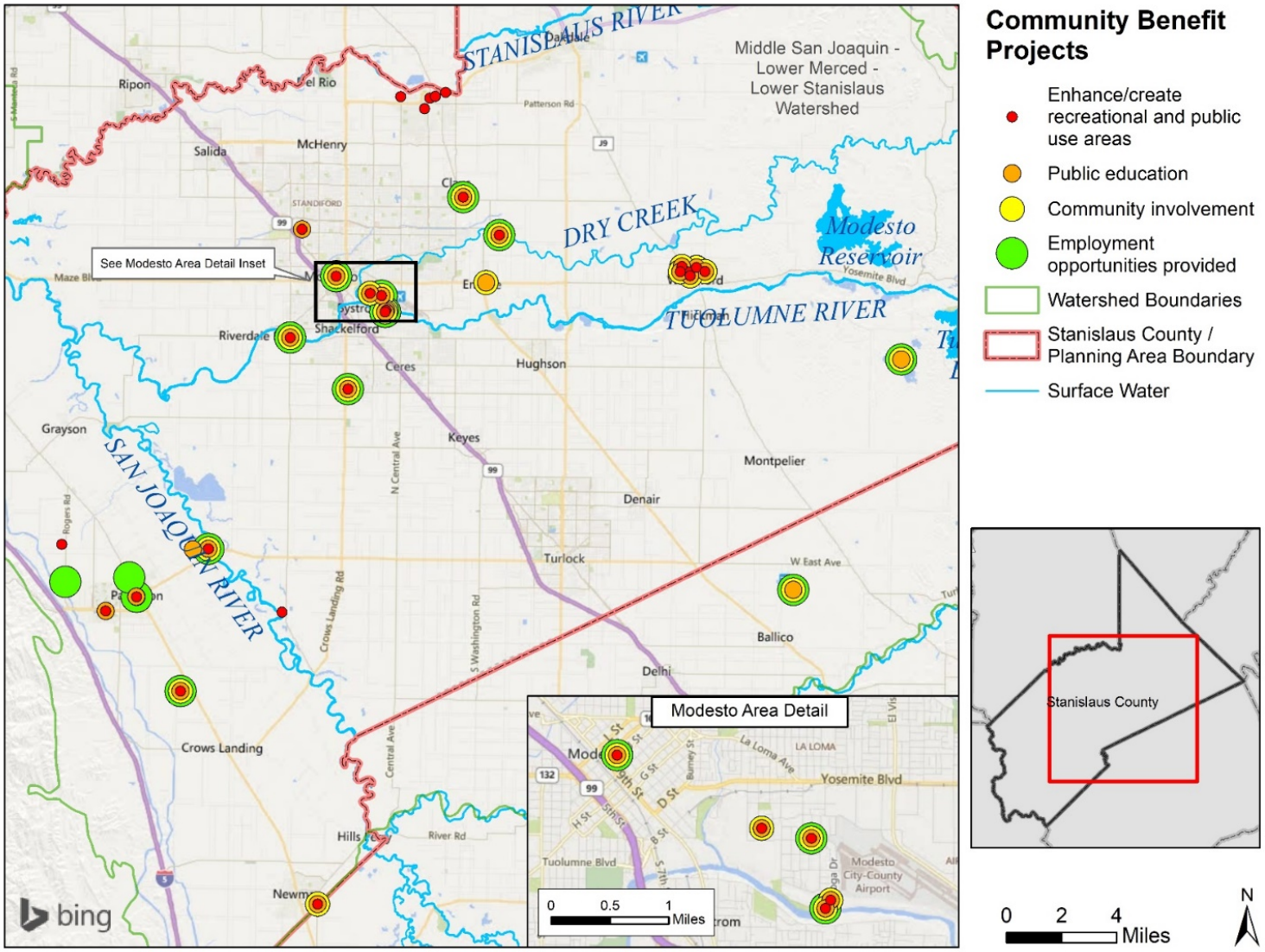


Table 5-13. Total Quantitative Community Benefits

SWRP Benefit	Conceptual	Ready to Proceed	Total
Number of employment opportunities provided	-	4	4
Participants per year[1]	62	200	262
Number of outreach materials provided or events conducted	-	27	27
Estimated visits per year[2]	20,250	10,200	30,450

[1]This metric includes participants at public outreach information meetings and/or participants at project-related public meetings to date.
[2]This metric includes estimated visits per year to parks or other recreational areas developed or improved by the project.

5.4.5 Disadvantaged Community (DAC) Benefits Analysis

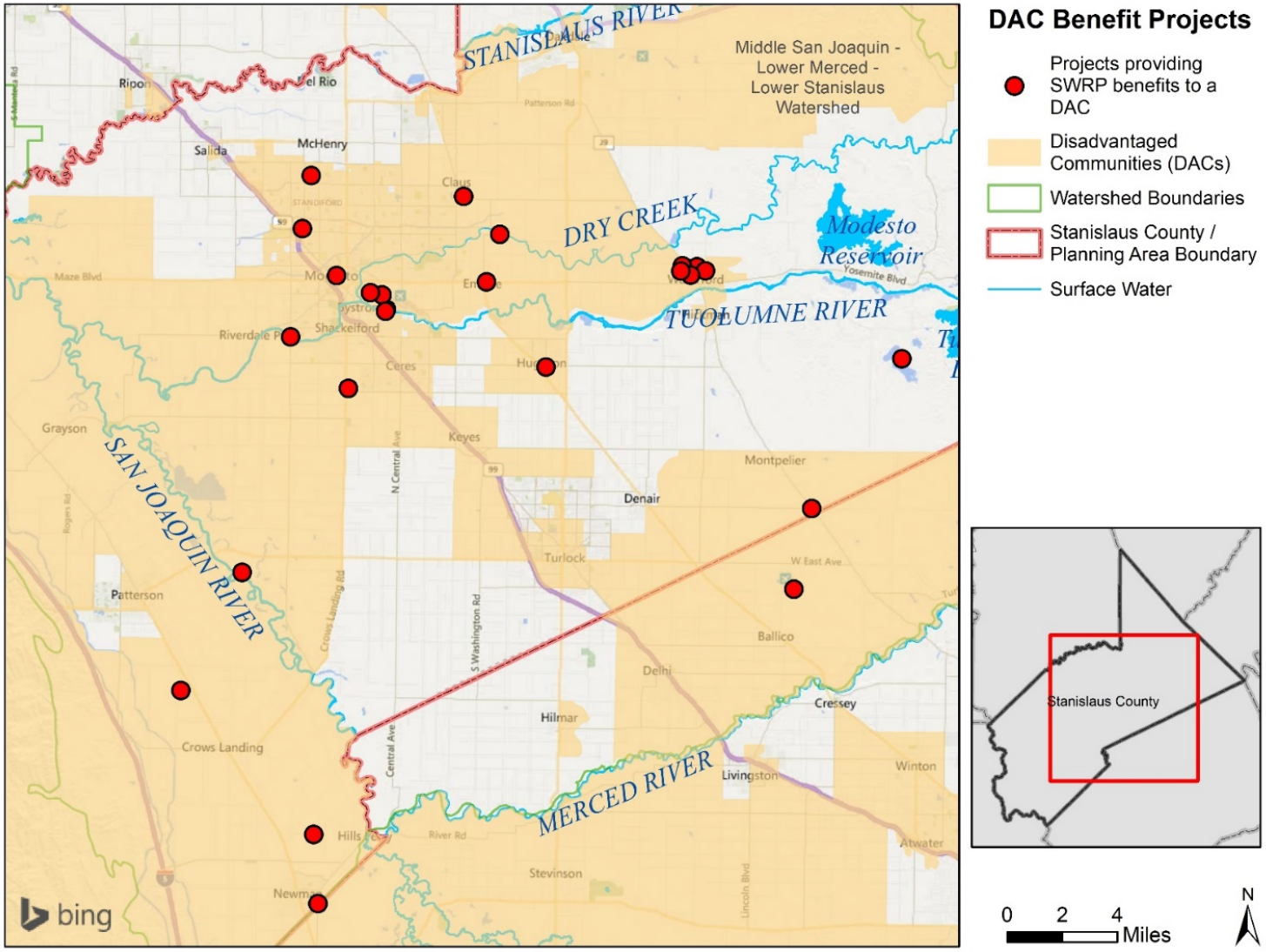
As discussed further in Section 6.3, *Project Prioritization*, and Section 8.3, *Disadvantaged Community Outreach and Environmental Justice*, a significant portion of Stanislaus County is categorized as a DAC. A portion of this area is identified in Figure 5-8. The SWRP established that projects benefiting these communities are a priority for the planning area. Projects that provide benefits to DACs are shown in Figure 5-8. The *Stormwater Infrastructure and Dual Use Basins for County Islands (DUCs)* project included a detailed map of DACs and unincorporated areas that currently lack storm drainage infrastructure, this is included as Appendix C.

Projects can provide a range of benefits to DACs, such as improved water supply reliability, increased recreational area, improved sewer infrastructure, and reduced flooding. The number of projects providing SWRP benefits to DACs are shown in Table 5-14.

Table 5-14. Number of Projects Providing SWRP Benefits to DACs

SWRP Benefit Category	Conceptual	Ready to Proceed	Total
Water Quality	13	11	24
Water Supply	16	13	29
Flood Management	9	12	21
Environment	16	5	21
Community	15	10	25

Figure 5-8. Projects with Benefits to DACs



5.5 Information and Data Management

Data management is an important component of the SWRP planning process because the SWRP encompasses many agencies, watersheds, jurisdictions, groundwater basins, and other types of areas throughout the County. The SWRP relies on a range of data sources, including data produced prior to or during SWRP projects. Therefore, a comprehensive database is ideal to promote the efficient and effective use of data. The Opti system is the Region's existing database; Opti is used to manage project information and also allows project proponents to upload data and documents.

Data related to the SWRP includes project- and program-specific technical information (e.g., feasibility studies, design documents) and any data collected during project or program development, implementation or operation or as a result of required monitoring efforts. Project proponents typically collect and maintain project-specific data according to their own protocols, but project data may also be uploaded to Opti. Each project proponent is responsible for collecting, maintaining, performing quality assurance/quality control (QA/QC) on project-specific data collected, and uploading its data to relevant statewide databases, which may include:

- California Surface Water Ambient Monitoring Program (SWAMP) - https://www.waterboards.ca.gov/water_issues/programs/swamp/
- California Environmental Data Exchange Network - http://www.ceden.org/
- Water Data Library - http://www.water.ca.gov/waterdatalibrary/
- California Statewide Groundwater Elevation Monitoring - https://www.water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM

Project proponents may update their project information in Opti at any time as projects are developed and implemented. Therefore, data are updated on an ongoing basis. New project solicitation periods may also occur as needed (e.g., to prepare for new funding opportunities) to encourage all project proponents to update their information in Opti.

Opti is publicly accessible to anyone who creates an account. This allows stakeholders and members of the public to view complete project information for every project in the SWRP. Additionally, as projects are implemented, project-specific data are shared by and between participating agencies during project development, and the project proponents may make data available to the public at various milestones. Environmental documentation completed under CEQA and NEPA (National Environmental Policy Act) also provide for dissemination of data for review by interested stakeholders and the public. These data dissemination methods will continue to be used moving forward.

Additional ongoing regional monitoring can supplement data collection efforts that occur as part of stormwater project implementation. For example, the City of Modesto conducts monitoring activities at four receiving water locations along the Tuolumne River and Dry Creek and at two urban discharge locations. Monitoring occurs three times per year at all sites (during first flush, dormant season, and dry weather season). The City of Modesto is responsible for evaluating those monitoring results for a range of constituents, including nitrate, TSS, mercury, chlorpyrifos, and diazinon. Updated stormwater monitoring information from the City of Modesto and Stanislaus County will be incorporated into the SWRP every five years at a minimum (during regular updates to the SWRP).

As part of SWRP development, stormwater outfall monitoring at key outfalls in the county occurred during the 2018/2019 rainy season. The SWAMP compliant database of monitoring results was submitted to the SWRCB and made available to the public at the SWAMP website listed above. The complete stormwater monitoring report is included as Appendix D.

While water resources in Stanislaus County are generally well-characterized, data gaps do exist, particularly in unincorporated areas of the County. A full list of data sources consulted during the development of this Section is available in Appendix B. Additional data needs include information regarding groundwater banking opportunities, localized flooding and stormwater management, and Countywide information to promote the reuse of stormwater. Several projects in the SWRP would help fill data gaps, including the following:

- **Hydraulic and Channel Migration Studies:** This project includes two regional studies to advance flood management planning within the Mid San Joaquin River (SJR) area. First, updated baseline hydraulic analyses of flood conditions on the mainstem of the San Joaquin River in the Mid SJR Region's planning area are needed to inform site-specific studies of flood hazards and better identify flood hazard mitigation opportunities. The analyses will include a range of flood events, such as the 2-, 10-, 25-, 100-, and 200-year events, and will largely or entirely rely on available models and hydrology as developed for the Central Valley Flood Protection Plan. A report on this study will provide a regional evaluation of the level of performance of the flood management facilities and produce a set of recommendations for improvements and a strategy for pursuing them. Second, as a counterpart to the hydraulic analyses, a channel migration study within the same area will also be conducted to identify under current (baseline) conditions approximately where, and by what degree, channel movement is anticipated to occur, creating challenges and opportunities for flood management. The results of the channel migration study will be used to inform the recommendations in the hydraulic study.
- **Evaluation of Stormwater Management and Groundwater Recharge Projects in the Dry Creek Watershed of Stanislaus County:** This project is currently underway, funded by a Proposition 1 Disadvantaged Communities Involvement Program grant. The project will include a reconnaissance study of potential options for reducing flood risks by detaining flood flows in the Dry Creek watershed, upstream of the City of Modesto. It will evaluate opportunities for groundwater recharge in the detention areas. In addition, a Flood Hazard Assessment will be conducted in an Integrated Development Planning Study. Available topographic, hydrologic and vegetation mapping data, as well as aerial and satellite imagery, will be reviewed in order to determine the need for a flood hazard assessment.
- **Tuolumne River Flood Management Feasibility Study:** This project would consist of a USACE Feasibility Study (or study similar in scope) that evaluates how the management of the Tuolumne River could be revised to improve flood control, enhance aquatic habitat, and improve water quality. A hydraulic analysis of current conditions is needed to identify any existing constrictions or structures at risk of flood damage along the Tuolumne River. With this information in hand, agencies responsible for flood management would be better able to develop focused flood damage reduction projects while also improving flood operations of Don Pedro Dam. Other necessary analyses may be identified in the reevaluation of the scope of the feasibility study.

Section 6. Identification and Prioritization of Projects

The project list is the central component of the SWRP. This section provides a detailed summary of the process which was used to identify and prioritize multiple-benefit stormwater and dry weather runoff projects for inclusion in the SWRP based on the projects' ability to collectively address the SWRP's water resource management priorities. The project review process included the following components:

- Project solicitation
- Project submission
- Eligibility screening
- Prioritization

This section describes each of these steps in detail. The results of the project review process are fully detailed in Appendix F.

6.1 Project Solicitation

Project solicitation is the process by which public agencies, nonprofits, and members of the public submitted projects to the SWRP. Anyone may submit a project to the SWRP provided that they have coordinated with a nonprofit or other eligible agency that would act as the project lead. Submitting a project to the SWRP can provide several benefits, including improved project visibility and community support, identification of opportunities for improvement, and positioning the project for potential State funding.

The project submission process for the SWRP was built on the strategy used during the East Stanislaus IRWMP. The East Stanislaus IRWMP used a web-based project submittal and management system called Opti. Opti was made available through the East Stanislaus IRWMP website (http://irwm.rmcwater.com/es). The Opti system allows project information to be submitted, reviewed, organized, and regularly updated electronically by project proponents. Project proponents were also given the opportunity to submit project information in a hard copy format to Stanislaus County staff. Opti was updated in August 2017 for the East Stanislaus IRWMP Update, and was then further updated in October 2017 to allow for submission of SWRP projects. New fields were added to Opti so that SWRP project proponents could enter their project for inclusion in the IRWMP and/or SWRP through the same process, thereby maximizing efficiency between the IRWMP and SWRP and reducing complexity for project proponents. See Appendix F for the project information form that shows the information project proponents were able to submit in Opti. Access to project summaries is available to all interested parties with the intention of improving IRWMP and SWRP transparency.

The project solicitation period occurred from October 23, 2017 to December 8, 2017. This period was kicked off with a stakeholder meeting held on October 23, 2017 in Ceres. This meeting provided an opportunity for all stakeholders, including members of the public, to learn about the SWRP and its role in facilitating project implementation. At this meeting, stakeholders were informed about project eligibility requirements, how to use Opti and the process for scoring submitted projects. Further notification regarding the project solicitation period occurred via email to the stakeholder contact list (creation of the stakeholder contact list is discussed further in Section 8.1, *Outreach and Participation Methods*).

During the project solicitation period, an Opti demonstration workshop was held via Skype on December 6, 2017. This workshop provided a step-by-step review of the submission process in Opti. The goal of this meeting was to help project proponents identify the most important information to gather for their projects, as well as to answer specific questions.

Information submitted by project proponents includes basic information such as a project description, cost information, and eligibility information. To be considered for inclusion in the SWRP, projects must be described in sufficient detail to identify the needs being met, infrastructure to be constructed and operated, and the impacts and benefits of the project. However, projects can be submitted to the SWRP at any stage of development, from conceptual to final design. Projects are designated as either conceptual or ready-to-proceed.

Following the close of the project solicitation period, follow-up with project proponents was conducted on an individual basis, as needed to provide clarifications. For example, project proponents who did not correctly fill out the eligibility information were given an opportunity to correct this information prior to project evaluation and scoring.

Opti remains open at all times for submission of new projects or revision of currently submitted projects. Projects added after the end of the project submission period were not prioritized at this time, but will be in the future (e.g., during the next call for projects or SWRP update). Future project solicitation periods will occur as needed prior to new funding opportunities.

6.2 Project Eligibility

To be considered for inclusion in the SWRP, a project is required to fulfill the following conditions:

- Project must be sponsored by an eligible applicant. Proposition 1 (Water Code section 79712(a)) states that eligible applicants consist of:
    - Public agencies;
    - 501(c)(3) Nonprofit organizations;
    - Public utilities;
    - Federally recognized Indian tribes;
    - State Indian tribes listed on the Native American Heritage Commission's Tribal Consultation List; and
    - Mutual water companies.
- Project must be a stormwater or dry weather runoff project.
    - A stormwater project is defined as a project affecting temporary surface water runoff and drainage generated by immediately preceding storms.
    - A dry weather runoff project is defined as a project affecting surface water runoff and flow in storm drains, flood control channels, or other means of runoff conveyance produced by non-stormwater resulting from irrigation, residential, commercial and industrial activities.
- Project must contribute to two or more SWRP main benefits.
    - SWRP main benefits are shown in Table 5-1.
- Project must contribute to at least one SWRP additional benefits.
    - SWRP additional benefits are shown in Table 5-2.

These four requirements ensure that (1) projects would be submitted by applicants eligible to receive funding, (2) the project is of the appropriate type, and (3) the project provides multiple benefits as required by the SWRP Guidelines. Projects are screened for these four characteristics in order to qualify for inclusion in the SWRP. Projects that did not meet these requirements were not included in the SWRP.

As multi-benefit stormwater and dry weather projects may provide watershed-wide benefits, projects located outside the SWRP boundary may still be eligible for inclusion in the SWRP, provided that they

meet the requirements listed above. For example, Eastside Water District and Turlock Irrigation District, located within the Middle San Joaquin-Lower Merced-Lower Stanislaus Watershed, participated in development of the SWRP. Though projects in their districts might extend beyond the southern SWRP boundaries, they can provide benefits to the watershed and the planning area and therefore may be included in the SWRP.

6.3 Project Prioritization

During the 2017 solicitation period, 70 projects were submitted to the SWRP, of which 58 were eligible for inclusion in the SWRP. Of these, 41 were Conceptual projects and 17 were Ready-to-Proceed (RTP) projects. Appendix F contains the full details of the project list and project prioritization, including project sponsors, descriptions, prioritization, and benefits provided.

A project prioritization process was developed to prioritize individual projects and programs for implementation based on an integration of measurable factors to assure the greatest water quality, water supply, conservation, and community needs are addressed. The prioritization process, which was approved by the TAC, was based on watershed and planning area-level water resource management priorities identified during SWRP development (e.g., the water quality priorities discussed in Section 2.7.3, *Water Quality Priorities*) and was created to be a simple, quantitative and objective tool for assessing projects.

Projects were prioritized based on a system of points, allocated to reflect priorities of the stormwater management planning area. The SWRP scoring system follows guidance provided in the SWRP Guidelines which encourage projects to be prioritized based on factors such as providing multiple benefits, ability to secure ongoing funding, use of a metrics-driven approach, location on public lands, augmentation of local water supplies, and habitat restoration. The quantitative scoring methodology is discussed further below.

Projects may be submitted to the SWRP at various stages of completeness. Some projects were submitted to the SWRP while still at a conceptual stage, with little or no preliminary planning completed. These projects are included in the SWRP provided that they met the eligibility requirements; however, the scores for the "conceptual" projects were not compared directly to other projects due to lack of available information.

Table 6-1 lists the points awarded to a project for each SWRP main and SWRP additional benefit that will be provided by the project. Additional points were awarded if a quantitative metric was provided for that benefit (either main or additional). This supports the SWRP's emphasis on quantification of benefits and encourages project proponents to include these metrics. These metrics support the integrated analysis in Section 5.4, *Integrated Metrics-Based Analysis.*

Table 6-1. Points Awarded Per SWRP Main Benefit and Additional Benefit

Providing SWRP Main Benefits and Additional Benefits	Points
Providing SWRP Main Benefits	
Points per benefit provided	4
Additional points if a quantitative metric can be provided for that benefit	2
Providing SWRP Additional Benefits	
Points per benefit provided	2
Additional points if a quantitative metric can be provided for that benefit	1

Points were also awarded according to the project's ability to address planning area and watershed priorities, as shown in Table 6-2. Regional watershed priorities were identified based on local knowledge provided by the TAC, region-wide information gathered during the preparation of the SWRP, and were also informed by the SWRP Guidelines. Specific project questions were dedicated to each of the regional watershed priorities. Questions in this category awarded points to projects that help achieve the goals of an existing TMDL or reduce pollutant discharges into a 303(d)-listed water body, thus supporting water quality regulations. Credit was also given if a project supports water supply augmentation, as water supply is an ongoing issue in the area which has been exacerbated by recent droughts. Additionally, the region depends heavily on groundwater supplies, so priority was given to projects that augment water supply via groundwater recharge. Points were also awarded based on whether a project benefits DACs or economically distressed areas (EDAs). A significant portion of Stanislaus County is categorized as a DAC (Figure 8-1); therefore, the SWRP seeks to implement projects that benefit these communities. Questions on each of these regional priorities were included in the Opti form following the project eligibility information. Project proponents were asked to select yes or no in response to each question (Table 6-2). These questions were included in Opti so that projects within the planning area that meet these regional priorities can be identified at a glance, and so that the project scores would accurately reflect the regional priorities.

Table 6-2. Points Awarded for Addressing Regional Watershed Priorities

Addressing Regional Watershed Priorities	Points
Implements water quality improvements to help achieve the goals of an existing TMDL?	4
Reduces pollutant discharges into a 303(d)-listed Impaired Water Body?	2
Augments water supply by capturing stormwater or dry weather runoff for recharge into a groundwater basin?	4
Does the project provide a SWRP Main or Additional Benefit to a disadvantaged community or an economically distressed area?	4

Finally, project prioritization took into account the project status in terms of funding, siting, and readiness to proceed (Table 6-3). Projects with secure sources of funding received points, as did projects that are either located on public lands or have existing easements or right-of-way agreements. Projects also earned points based on the amount of documentation completed as an indicator of readiness to proceed.

Table 6-3. Points Awarded Based on Status of Project Implementation

Progress Towards Project Implementation	Points
Is the project supported by entities that have created permanent, local or regional funding?	4
Is the project located on public land? If not, is there an existing easement or right of way agreement with a local land owner?	4
Readiness of project to proceed (award points for each one completed):	
Planning Study or Feasibility Study	1
Environmental Assessment/EIR	1
Preliminary Project Design	2
Acquisition of all required environmental permits	2

The quantified collective project benefits in various SWRP benefit categories (water quality, water supply, flood, environment, and community) are summarized in Section 5, *Quantitative Methods*.

6.4 SWRP Priority Project Opportunities

In accordance with Water Code Section 10562(d), SWRPs must identify opportunities to implement a variety of water resource management strategies. Specifically, the SWRP must note the following:

- **Opportunities to augment local water supply through groundwater recharge or storage for beneficial use of storm water and dry weather runoff**

  These would include projects such as infiltration basins, which capture stormwater and allow it to percolate through the soil to an aquifer below thus increasing aquifer levels and water supply. Because water suppliers in Stanislaus County rely heavily on groundwater, augmentation of groundwater supply is an important strategy. The SWRP project list includes multiple recharge projects, such as the *Mustang Creek Managed Aquifer Recharge Project* and the *Rouse Lake Management Aquifer Recharge Project*. On-site rainwater capture (e.g., rain gardens, permeable surfaces, bioswales, etc.) can also augment water supply by reducing the amount of potable water needed for irrigation and limiting offsite runoff. Benefits of rainwater capture include improved soil moisture levels and a shorter irrigation season.

  Project proponents were able to indicate that their project met this goal by selecting a specific checkbox in Opti. In addition to the recharge opportunities identified by project proponents, additional groundwater recharge opportunities were evaluated via a groundwater recharge site assessment (Appendix E). Potential stormwater capture/groundwater recharge sites were assessed by conducting surface reconnaissance, mapping of the area, surveying, soil profile assessment through the logging of test pits or hand auger borings, field permeameter or percolation testing, and laboratory testing of soil samples to assess grain size distribution, bulk density, porosity and permeability. As discussed in Section 5.2, both the Crows Landing and Tuolumne River project sites had silty sand soils in some locations and showed potential for groundwater recharge projects. Due to the alluvial nature of the soils underlying the sites, there can be significant lateral and vertical variation in soil type and infiltration rates within relatively short distances, therefore, additional testing will likely be needed to support project design at these locations. The complete study is included as Appendix E to the SWRP.

- **Opportunities for source control of pollutants due to storm water and dry weather runoff, onsite and local infiltration, and use of storm water and dry weather runoff**

  Source control of pollutants can be achieved onsite and at a local level through use of LID techniques, such as permeable paving, bioretention planters, and biological treatment options (e.g., bioswales). Wetlands and riparian habitats can be used to reduce pollutant input and enhance water quality by filtering out common stormwater contaminants, such as fine sediment, nutrients, and some metals (DWR, 2013). Stormwater and dry weather runoff can be used to reduce the need for landscape irrigation, and stormwater flows can also be used to replenish groundwater supplies as noted previously. Examples of projects in the SWRP that provide source control of pollutants include the *Modesto Area 2 Stormwater to Sanitary Sewer Cross-Connection Removal Project*, which would include use of bio-retention planters and other LID techniques to improve water quality in Dry Creek and the Tuolumne River.

- **Projects to reestablish natural water drainage treatment and infiltration systems, or mimic natural system functions to the maximum extent feasible**

  Reestablishing natural water drainage and treatment occurs through actions such as reducing the rate and volume of runoff, reducing pollutant input to receiving waters, and allowing the natural

supply of sediment to reach receiving waters. Strategies to achieve this goal include physical and biological structures to reduce runoff rate, reduction of impervious surfaces to improve infiltration, and establishment of buffer areas around receiving waters to reduce pollution. The SWRP contains multiple projects that would help restore natural drainage and treatment, such as green street projects in the City of Patterson which would improve groundwater infiltration and reduce stormwater pollution in the City's downtown.

- **Opportunities to develop, restore, or enhance habitat and open space through storm water and dry weather runoff management, including wetlands, streams, riverside habitats, parkways, and parks**

  Habitat and wetland restoration projects can provide many stormwater-related benefits, such as pollution control, flood protection, sediment management, recreational opportunities, and promotion of biodiversity. Such projects also often incorporate educational components, such as interpretive signage. Specific strategies used to achieve these benefits can include planting native vegetation and restoring natural streambeds (reducing channelization). Projects in the SWRP, such as the *Newman LID Water Quality and Conservation Project* which would develop 78 acres for water treatment using LID strategies and include a trail system, would restore and enhance open space and also provide stormwater management benefits.

- **Opportunities to use existing publicly owned lands and easements, including, but not limited to, parks, public open space, community gardens, farm and agricultural preserves, school sites, and government office buildings and complexes, to capture, clean, store, and use storm water and dry weather runoff either onsite or offsite**

  Use of publicly owned lands and easements for stormwater projects improves the cost effectiveness of many projects by reducing land purchase costs and improving regional management once the project is built. Many stormwater projects are compatible with existing land uses; for example, permeable paving, rain gardens, or rainwater capture systems can be added to existing buildings. Parklands can provide space to implement infiltration and wetland restoration. Many projects in the SWRP would occur on existing publicly-owned land and easements. For example, the *Stormwater Infrastructure and Dual Use Basins for County Islands* project would utilize existing parks and public right of ways as groundwater recharge locations; in tandem, the project would enhance pedestrian safety in DACs by adding curbs, gutters, and sidewalks.

These five opportunity categories were incorporated into the Opti system. Project proponents had the opportunity to indicate whether their project would meet any of these needs, either as part of the benefits information or supplementary information (see the project form in Appendix F for detail). Table 6-4 lists all SWRP projects and indicates which of the opportunities are provided by each project.

Table 6-4. SWRP Priority Project Opportunities

Project Name	Project Status	Augments local water supply through groundwater recharge or storage[1]	Provides source control of pollutants[2]	Reestablishes natural water drainage treatment and infiltration systems[3]	Develops, restores, or enhances habitat and open space[4]	Uses existing publicly owned lands and easements[5]
7th Street Low Impact Development (LID) Storm Drainage Improvements	Ready to Proceed	✓		✓		✓
7th Street Outfall Rehabilitation	Ready to Proceed		✓		✓	✓
Catherine Everett Park Cross Connection Elimination	Ready to Proceed	✓	✓			✓
Empire Community Storm Drainage Plan	Ready to Proceed	✓	✓			✓
F St Storm Pond	Ready to Proceed	✓	✓			
First Street Basin Rehabilitation	Ready to Proceed	✓	✓		✓	✓
JM Pike Park Cross Connection Elimination	Ready to Proceed	✓	✓			✓
Little Salado Creek Groundwater Recharge and Flood Control Basin	Ready to Proceed	✓	✓		✓	✓
Modesto Area 2 Stormwater to Sanitary Sewer Cross-Connection Removal Project	Ready to Proceed	✓	✓	✓		✓
Mustang Creek MAR Project	Ready to Proceed	✓				✓
North Valley Regional Recycled Water Project	Ready to Proceed		✓		✓	✓
Orestimba Creek Flood Management Project	Ready to Proceed		✓			✓
Orestimba Creek Recharge and Recovery Project (OCRRP)	Ready to Proceed	✓			✓	
Rouse Lake Managed Aquifer Recharge (MAR) Project	Ready to Proceed	✓				
TRRP - Carpenter Road/West Modesto Flood Management and Park Development	Ready to Proceed	✓	✓		✓	✓
Tuolumne River Regional Park	Ready to Proceed	✓	✓	✓	✓	✓
West Stanislaus Irrigation District Fish Screen Project	Ready to Proceed	✓	✓		✓	✓
Airport Neighborhood Stormwater Retention System and Dual Basin/Low Impact Strategies Stormwater Runoff	Concept	✓	✓	✓	✓	✓
Airport Neighborhood Urban Greening Project	Concept		✓	✓		✓
Borax Ct Storm Basin	Concept	✓	✓			✓
Candlewood Storm Drainage System Upgrade	Concept		✓	✓	✓	✓
Castleberg Storm Drainage System Upgrades	Concept	✓	✓			✓
City of Patterson Storm Treatment Compliance Program	Concept		✓		✓	✓
City of Patterson Zone 3 Storage Tank	Concept					✓

Project Name	Project Status	Augments local water supply through groundwater recharge or storage[1]	Provides source control of pollutants[2]	Reestablishes natural water drainage treatment and infiltration systems[3]	Develops, restores, or enhances habitat and open space[4]	Uses existing publicly owned lands and easements[5]
City of Riverbank/OID Roselle Avenue Basin Improvements	Concept	✓	✓			
Dry Well Rehabilitation, Rejuvenation, Reconstruction	Concept	✓	✓			✓
Eastside Regional Storm Recharge Basin	Concept	✓	✓	✓	✓	✓
Evaluation of Stormwater Management and Groundwater Recharge Projects in the Dry Creek Watershed of Stanislaus County	Concept	✓	✓		✓	✓
EWD Diffused Surface Water Project Merced County Dry Creek Project	Concept	✓				
F Street / Bryan Groundwater Recharge	Concept		✓	✓		
Forrestal Storm Basin	Concept	✓	✓			✓
Gangi Cannery Site MS4 Compliance	Concept	✓	✓			✓
G St and Church Storm Basin	Concept	✓	✓			✓
Hydraulic and Channel Migration Studies	Concept				✓	✓
Install Storm Drainage Capture and Recharge Systems in Flood-prone Areas	Concept	✓	✓			✓
Modesto Urban Stormwater Basin Recharge Enhancement Program	Concept	✓	✓		✓	✓
New Tertiary Filtration System at WQCF	Concept		✓			✓
Newman LID Water Quality and Conservation Project	Concept	✓				✓
Non-Potable Pipeline Connection to WQCF	Concept					✓
Northeast Storm Drainage Interceptor Project	Concept	✓	✓			
Old Downtown Green Street Improvements	Concept	✓	✓			✓
Patterson Green Alley Retrofit Project	Concept	✓				✓
Patterson Green Street Improvement Project	Concept	✓				✓
Patterson Wellhead Treatment	Concept		✓			✓
Percolation Ponds for Stormwater Capture and Recharge	Concept	✓	✓			
Safreno Park Storm Drainage System Upgrades	Concept	✓	✓			✓
Salado Creek Flood Management and Repair Project	Concept			✓	✓	
Salado Creek Landscape and Pedestrian Path Project	Concept	✓				✓
San Joaquin Riverfront Park Project	Concept				✓	✓
Stein Basin	Concept	✓	✓			✓

Project Name	Project Status	Augments local water supply through groundwater recharge or storage[1]	Provides source control of pollutants[2]	Reestablishes natural water drainage treatment and infiltration systems[3]	Develops, restores, or enhances habitat and open space[4]	Uses existing publicly owned lands and easements[5]
Storm Drainage Enhancements along Salado Creek	Concept					
Storm Filter Installation Projects	Concept		✓		✓	✓
Stormwater Infrastructure and Dual Use Basins for County Islands (DUCs)	Concept	✓	✓	✓	✓	✓
Stormwater Outfall Capture and Storage Project	Concept	✓	✓		✓	✓
Townsend Avenue storm drainage improvements to reduce repeated flood events.	Concept	✓	✓	✓		✓
Tuolumne River Flood Management Feasibility Study	Concept	✓			✓	
Various Storm Water Basin and Outfall Projects	Concept	✓	✓			✓
Various Storm Water Pipeline Rehabilitation projects	Concept	✓	✓	✓	✓	✓

Notes:
1. Box is checked if the project proponent answered yes to the following question in Opti: Does the project augment water supply by capturing storm water for recharging into a groundwater basin?
2. Box is checked if the project proponent selected the checkbox in Opti indicating that the project provides increased filtration and/or treatment of runoff.
3. Box is checked if the project proponent selected the checkbox in Opti indicating that the project would reestablish natural water drainage and treatment.
4. Box is checked if the project proponent selected the checkbox in Opti indicating that the project provides environmental habitat protection and improvement, including wetland enhancement/creation, riparian enhancement, and/or instream flow improvement.
5. Box is checked if the project proponent responded yes to one of the following questions in Opti: Is the project located on public land? If not, does the project have an easement or right of way agreement with a local land owner?

6.5 Design Criteria and BMPs for New Development and Redevelopment

The SWRP does not establish new design criteria or BMPs; however, this section summarizes BMPs relevant to SWRP projects. Stanislaus County's *2015 Post-Construction Standards Plan* discusses design measures and BMPs in detail (Stanislaus County, 2015). This plan was prepared to provide developers with the information needed to mitigate negative impacts of stormwater runoff that may be caused by new development or redevelopment.

County design criteria that must be implemented include site design measures and source control measures. Small projects (which create and/or replace between 2,500 to 5,000 square feet of impervious surface) are required to implement one or multiple site design measures. These include:

- Stream setbacks and buffers
- Soil quality improvement and maintenance
- Tree planting and preservation
- Rooftop and impervious area disconnection
- Porous pavement
- Green roofs
- Vegetated swales
- Rain barrels and cisterns

These design measures provide benefits such as reduced pollutant input to water bodies, increased infiltration of stormwater, and slowing peak rates of stormwater runoff.

Larger projects that will create and/or replace over 5,000 square feet of impervious service must implement source control measures through a multistep process. Developers must map discrete drainage management areas, identify applicable source controls (e.g., proper storage and tracking of hazardous materials at a waste disposal site), and incorporation of LID design standards. Site design measures must also be included.

Runoff from construction sites is regulated under the Construction General Permit administered by the SWRCB (Order No. 2009-0009-DWQ). Any project that disturbs one or more acre of soil must obtain coverage under the Permit. Compliance includes development of a construction SWPPP, which would include BMPs for reducing pollution during construction. Detailed discussion of BMPs can be found in the California Stormwater Quality Association (CASQA) Stormwater Best Management Practice Handbook (CASQA, 2003). Examples of BMPs include:

- Capture sediment via silt fences
- Reduce flow velocity with fiber rolls, check dams, or gravel bag berms
- Reduce wind erosion by applying water to sites
- Protect stockpiles of material from stormwater using coverings or barriers
- Prevent spills of hazardous materials and be prepared to respond to spills immediately

Project proponents are responsible for including the appropriate design measures and BMPs during project development and construction in order to comply with applicable regulations. Project proponents are also responsible for ensuring that project designs are vetted through the appropriate vector control districts (the Eastside Mosquito Abatement District (MAD) or Turlock MAD).

Section 7. Implementation Strategy and Schedule

For the SWRP to be successful, projects included in the SWRP must continue to move from conceptual and planning phases toward construction and implementation. The SWRP relies on individual projects and programs to achieve the water supply, water quality, flood management, environmental, and community benefits identified in the plan. This section describes plan implementation, including financing options, scheduling, and ongoing SWRP management.

7.1 Implementation Strategy

7.1.1 SWRP Implementation Method

Implementing the SWRP consists of three main elements:

- Completing the design, permitting and implementation of projects included in the SWRP
- Monitoring the benefits produced by the projects included in the SWRP to ensure that project goals are being met and that SWRP objectives are being advanced
- Evaluating the SWRP at regular intervals to assess cumulative progress toward meeting the SWRP objectives and adapting the plan as necessary to ensure that objectives continue to be met

Implementation of the SWRP will be completed through cooperation between Stanislaus County, the TAC, the project proponents, and stakeholders. The primary method of implementing the SWRP will be via the projects. The projects included in the SWRP all provide multiple benefits (discussed in Section 5, *Quantitative Methods*, and Section 6, *Identification and Prioritization of Projects*). Therefore, as projects are implemented, SWRP benefits will be realized. The projects included in the SWRP range from conceptual projects (which will require additional planning and design work prior to construction) to RTP projects (which may be ready for construction as soon as funding is secured). The status and schedule of each project was submitted to the Opti data management system by the project proponent as part of project submittal and is summarized in Section 7.1.7, *Schedule*. Individual projects will move forward as funding and other resources become available; funding is discussed in greater detail in Section 7.2, *Financing*.

Regulatory mechanisms also help ensure that the SWRP is implemented. For example, the Stanislaus County SWMP, which was developed to meet the terms of the County's 2013 NPDES Phase II MS4 permit, contains specific control measures for stormwater discharges. One of these measures requires that new development and significant redevelopment integrate LID strategies and other stormwater control measures. The County requires land developers to enter into an agreement to maintain the LID/stormwater control measures in perpetuity to ensure the long-term protection of water quality. These standards are enforced under the Stanislaus County Storm Water Management and Discharge Control Ordinance. The required stormwater control measures ensure that development within the County will also serve to improve stormwater management, thereby ensuring progress toward meeting the SWRP objectives.

SWRP updates will occur every five years, or as needed, due to changes in regional priorities, NPDES permits, SWRP guidelines or watershed conditions. The project list will be updated annually or as needed in preparation for funding opportunities; updates to the project list will be made using Opti, an online database which streamlines the project solicitation process and enables continuous updates to project information. Updated project lists will be appended to the SWRP. Additional detail related to SWRP updates can be found in the following sections.

Implementation Work to Date

Prior to development of the SWRP, several studies were undertaken in the County that provided a basis for stormwater planning and project implementation. These studies support future project implementation by gathering data and presenting project alternatives that can be further developed.

- *City of Oakdale Storm Water Master Plan:* This plan, developed in 2015, contains a detailed evaluation of the existing storm drain system, identifies deficiencies in the existing system, and proposes improvements to enhance the overall performance of the system and accommodate future growth. Hydrologic and water quality analysis contained in the plan will be useful in future project development efforts.
- *Empire LID Study*: Stanislaus County conducted this study to assess stormwater design options for the community of Empire. This report provides general information and documentation necessary for the County to assess the suitability of assumptions, design criteria, and design methodology used in developing the proposed LID system to accommodate stormwater runoff in the Empire community. This study provides a knowledge base that can be used during development and implementation of future projects.
- *Eastside Water District Managed Aquifer Recharge Study*: This study identified suitable locations for intercepting diffused stormwater and directing it to potential managed aquifer recharge sites. Thirteen sites were identified as being suitable for future managed aquifer recharge projects. The site identification and hydrogeologic evaluations in this study will provide valuable direction to SWRP projects as they move toward implementation.

7.1.2 Governance Structure

The SWRP creation effort was led by Stanislaus County with other agencies providing financial and technical advisory assistance in developing the SWRP. In 2018, a MOU was developed between Stanislaus County and several other agencies which are coordinating under the grant agreement that provided funding for creation of the SWRP. The MOU signatories are Stanislaus County, City of Modesto, City of Oakdale, City of Patterson, City of Waterford, and the Eastside Water District. Collectively, these agencies are referred to as the plan partners.

Decision-making authority related to the SWRP rests with Stanislaus County with significant input from the other plan partners. During development of the SWRP, the County also solicited input from other stakeholders via the TAC and at stakeholder meetings. Stanislaus County intends to continue seeking feedback from stakeholders such as the plan partners, TAC, IRWM Region governing groups, NPDES co-permittees, residents of DACs, city representatives, water supplier representatives, nonprofits, and the public during future updates of the SWRP. Public participation in the SWRP will be discussed in more detail in Section 8, *Education, Outreach, and Public Participation.*

7.1.3 Responsible Entities

As the lead agency preparing the SWRP, Stanislaus County will be responsible for key elements of SWRP implementation together with its plan partners. In addition to managing the development of the original SWRP for the planning area, Stanislaus County and plan partners will be responsible for future updates of the plan that may be required, either due to regulatory changes or to keep information up-to-date. Projects may be submitted to the project list via Opti on an ongoing basis; the plan partners will also be responsible for coordinating periodic updates to the list or new Calls for Projects as needed (e.g., in preparation for new funding opportunities). The plan partners will revise the SWRP as needed based on adaptive management procedures, as discussed further in Section 7.4.3, *Adaptive Management*. For example, the plan partners will approve any changes to water quality priorities or benefit metrics found appropriate following regulatory changes or project performance monitoring.

Project proponents are responsible for most elements not directly related to the SWRP document itself, including securing their own project funding and developing and implementing individual projects. Project proponents are also responsible for keeping project information up-to-date in Opti as project details are solidified and benefits become better quantified. As projects are implemented, project proponents are responsible for the following:

- Complying with all federal, State, and local rules and regulations, including CEQA
- Obtaining all necessary permits for their project(s)
- Conducting pre- and post-construction monitoring, as required by applicable regulations and/or funding agreements
- Meeting the terms of any applicable funding agreements (e.g. managing schedule and budget during project implementation)
- Submitting data obtained during project implementation to the applicable agencies or databases, including to the SWRP, as applicable

The projects in the SWRP are in various stages of planning or implementation. While inclusion in the SWRP does not obligate project proponents to implement projects as submitted, it is the intent of the SWRP that projects will be implemented to meet stormwater objectives in the planning area. None of projects currently on the list contain linkages with or dependencies upon other projects in the SWRP.

7.1.4 Decision Support Tools

The primary decision support tool used in the SWRP is the Opti data management system and the associated project prioritization scheme (described in detail in Section 5, *Quantitative Methods*). Project data is gathered using Opti, which ensures that information is standardized across projects, and that all projects contribute to at least two main SWRP benefits and one additional SWRP benefit. Other information necessary to prioritize projects is also collected through the Opti system, such as whether the project supports TMDLs or augments water supply. The project scores are not intended to exclude any projects from implementation or from funding applications; the scores serve as a guideline to help weigh the projects against one another in general, leaving room to take into account individual requirements or needs of an agency or funding source.

Project proponents are asked to provide a range of information when entering a project into Opti. This includes project description, location, feasibility information, cost information, planning or implementation status, schedule, and benefits (both qualitative and quantitative). Data gaps may exist, as projects in Opti may be at any stage of the planning or implementation process. For example, projects may be entered in Opti without full cost information or quantified benefits, since these are often unknown until a project is well-developed. The project prioritization method described in Section 5, *Quantitative Methods*, awards greater points to projects with more complete information, thereby giving project proponents an incentive to fill data gaps in Opti. Section 5 provides additional detail on the data needs and gaps in Opti.

7.1.5 Community Participation Strategy in Plan Implementation

Because the primary method of SWRP implementation is via individual project implementation, community participation, with an emphasis on outreach to disadvantaged communities, will also occur as part of project implementation. Community participation in the SWRP planning process itself, in addition to project planning and design, is discussed in Section 8, *Education, Outreach, and Public Participation*. Depending on the project and applicable regulations, project proponents may conduct public forums, meetings and/or comment periods, and may notify members of the public via newspaper announcements, website postings, mail, email, and/or signage at the project site. While the plan partners do not have the authority to require that all SWRP projects provide for community participation, most projects will be

subject to CEQA, which contains procedures for community outreach and participation. SWRP encourages all project proponents, and especially disadvantaged communities, to engage in a robust community involvement program prior to and during project implementation.

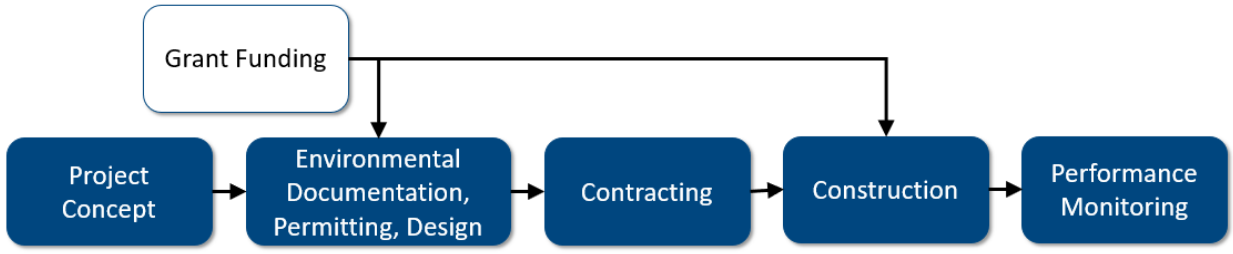
7.1.6 Permitting Strategy

Permitting will occur at the individual project level, and project proponents will be responsible for securing their own permits at the federal, state, and local level. Permitting status (relative to environmental permitting, not necessarily building or other permits) is fully detailed in Appendix F.

7.1.7 Schedule

Project implementation schedules are determined by project proponents. A typical project timeline is illustrated in Figure 7-1. Specific stages and the length of time required for each stage vary from project to project. Project proponents can apply for grant funding to help support both the planning and construction phases of their projects. Project proponents provide schedule information when entering their projects into Opti and can update Opti on an ongoing basis as the project progresses. The use of Opti enables the plan partners to maintain an updated list of the status of each project element. Information can be submitted on overall project completeness, as well as the status of individual project components such as planning, design, and construction. The schedule information that has been submitted for SWRP projects is summarized in Appendix F. Project schedules have not been vetted, but represent the information gathered during the 2017 Call for Projects. Opti serves as a living repository of the most up-to-date project schedule information.

Figure 7-1. Example Project Progression



TMDL Schedules

An overview of the schedules for the three TMDLs relevant to stormwater management in the planning area is provided in Figure 7-2.

The Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL was amended to the Basin Plan in October 2007. Compliance with load allocations and waste load allocations in the Delta Waterways was required by December 2011. Table 7-1 lists SWRP projects that, if implemented, would contribute to the goals of this TMDL.

The Sacramento-San Joaquin Delta Methylmercury TMDL came into effect in 2011. Currently, a Phase 1 Delta Mercury Control Program Review is being prepared. Phase 2 will begin upon completion of Phase 1 or in October 2022, whichever occurs first. During Phase 2, dischargers shall implement methylmercury control programs and continue inorganic mercury reduction programs. Compliance monitoring and implementation of upstream control programs will also occur in Phase 2. Although no projects included in the SWRP explicitly stated that they would contribute to the goals of this TMDL, various projects would likely contribute to the TMDL in multiple ways. Sediment is a transport mechanism for mercury, therefore projects that treat runoff via bioretention or other means, will both filter runoff through biofiltration and reduce runoff velocities, thereby trapping or allowing sediment to settle, potentially reduce mercury loading to rivers and assist in meeting TMDL goals. Additionally, by reducing runoff that discharges into receive water, any mercury concentrations in those flows would be mitigated.

The Central Valley Pesticide TMDL was effective in 2017. The associated Basin Plan Amendment indicates that compliance shall be achieved not later than 10 years from the effective date of the Amendment, in 2027. Table 7-1 lists SWRP projects that would contribute to meeting the TMDL schedule, provided that they are implemented prior to the compliance deadline.

Figure 7-2. TMDL Schedules

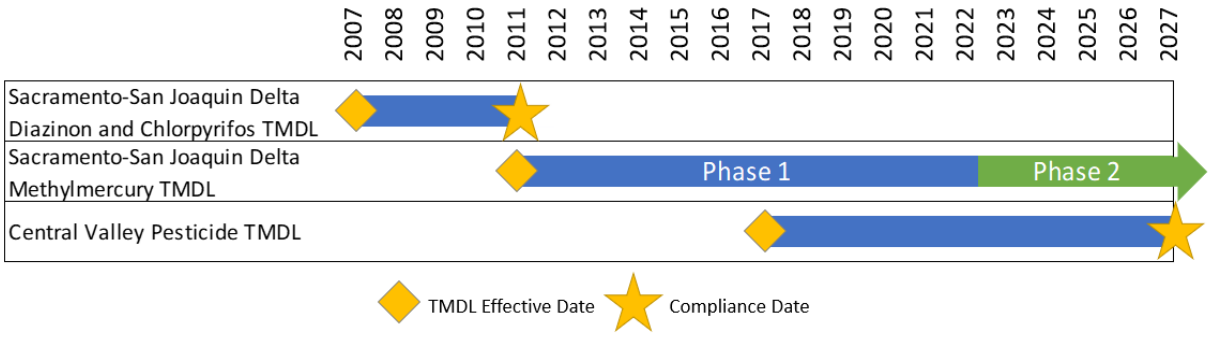


Table 7-1. SWRP Projects Contributing to TMDL Goals

Project Name	Project Proponent	Project Category	Delta Diazinon and Chlorpyrifos TMDL	Central Valley Pesticide TMDL
North Valley Regional Recycled Water Project (NVRRWP)	City of Turlock on behalf of NVRRWP Partners	RTP		✓
Tuolumne River Regional Park	Tuolumne River Regional Park JPA	RTP	✓	✓
Stormwater Outfall Capture and Storage Project	City of Modesto	Concept	✓	✓
Modesto Urban Stormwater Basin Recharge Enhancement Program	City of Modesto	Concept	✓	✓
Northeast Storm Drainage Interceptor Project	City of Modesto	Concept	✓	✓
Stormwater Infrastructure and Dual Use Basins for County Islands (DUCs)	Stanislaus County	Concept	✓	✓
Evaluation of Stormwater Management and Groundwater Recharge Projects in the Dry Creek Watershed of Stanislaus County	Stanislaus County	Concept	✓	✓
Airport Neighborhood Stormwater Retention System and Dual Basin/Low Impact Strategies Stormwater Runoff	Tuolumne River Trust	Concept	✓	✓

7.2 Financing

Table 7-2 shows project costs that were submitted by project proponents for RTP projects (not all RTP projects submitted their cost information). As projects move toward implementation, costs will become more defined. Through the use of Opti, project proponents will be able to update costs on an ongoing basis as more information becomes available, as additional work is completed (e.g., feasibility studies, design), or as funding is secured. The project costs in Table 7-2 are estimates provided by the project proponents during the 2017 Call for Projects; costs have not been independently verified. At the time of SWRP development, estimated SWRP project capital costs totaled over $292 million with only approximately $39 million in funding identified and an additional $253 million still needed to implement the projects.

Stormwater projects have unique funding needs and issues in California. The majority of cities and counties do not have allocated fees or taxes devoted to stormwater, making finding ongoing capital and operation and maintenance (O&M) funding sources difficult. While grant programs can provide capital funds, agencies typically still need to provide a local cost share as well as cover the O&M costs to maintain the project so that the project can continue to provide benefits over project lifespan.

A handful of projects have secured local funds and/or grant funding, as indicated in Table 7-2. Project proponents will be responsible for securing funding for their projects; this process will be ongoing as different projects progress on different schedules. Potential sources of funding are shown in Table 7-3, along with the approximate schedules for applicable funding programs. As project proponents secure funding, they may update Opti to reflect the sources of funding identified.

Project funding will be secured on a project-by-project basis by the project proponents. Implementation of the SWRP itself does not require funding separate from project funding. Costs related to updates of the SWRP, adaptive management of the plan, and other administration related to the SWRP will be covered by Stanislaus County, although other plan partners may be identified to share in these costs in the future. The use of Opti as a living project list will help minimize these costs as project proponents can submit new projects, as well as keep their information up-to-date independently of formal SWRP updates.

Table 7-2. SWRP Project Costs for Ready-to-Proceed Projects

Project Name	Project Proponent	Total Estimated Capital Cost (2017 dollars)[1]	Estimated Annual O&M Cost	Existing Funding	Source of Existing Funding
7th Street Low Impact Development (LID) Storm Drainage Improvements	City of Hughson	$380,000	*not provided*	-	
Modesto Area 2 Stormwater to Sanitary Sewer Cross-Connection Removal Project	City of Modesto	$4,100,272	*not provided*	-	
Catherine Everett Park Cross Connection Elimination	City of Modesto	$4,465,068	*not provided*	-	
JM Pike Park Cross Connection Elimination	City of Modesto	$15,874,672	*not provided*	-	
Orestimba Creek Flood Management Project	City of Newman	$47,690,629	*not provided*	$22,000,000	Federal grant
7th Street Outfall Rehabilitation	City of Riverbank	$265,000	$5,000	$15,000	City General Fund
First Street Basin Rehabilitation	City of Riverbank	$844,352	$15,000	-	
North Valley Regional Recycled Water Project	City of Turlock on behalf of NVRRWP Partners	$102,577,000	*not provided*	-	
F St Storm Pond	City of Waterford	$185,300	*not provided*	-	
Orestimba Creek Recharge and Recovery Project (OCRRP)	Del Puerto Water District	$1,208,500	*not provided*	$1,198,500	Del Puerto Water District; San Joaquin River Exchange Contractors Water Authority; USBR grant
Rouse Lake Managed Aquifer Recharge (MAR) Project	Eastside Water District	$9,800,000	$980,000	$4,900,000	Approved per-acre Charges
Mustang Creek MAR Project	Eastside Water District	$450,000	$30,000	$450,000	Eastside Water District Diffused Surface Water Project Fund
Empire Community Storm Drainage Plan	Stanislaus County	$3,000,000	$90,000	-	
Carpenter Road/West Modesto Flood Management and Park Development	Tuolumne River Regional Park JPA	$793,734	*not provided*	-	
Tuolumne River Regional Park	Tuolumne River Regional Park JPA	$60,000,000	*not provided*	-	
West Stanislaus Irrigation District Fish Screen Project	West Stanislaus Irrigation District	$40,722,988	$46,000	$4,313,725	Rate payers, USBR grant
Total Plan Implementation Cost	-	*$292,357,516*	-	*$38,877,225*	-

[1]Costs that were not originally provided in 2017 dollars were converted to 2017 dollars using the ENR CCI for San Francisco (annual averages used).

Table 7-3. Schedule Overview for Potential Funding Sources

Funding Source	Estimated Timing
Local	
Ratepayer charges (per volume of water, per irrigated acreage, etc.)	Ongoing
Stormwater Parcel Tax	Annual, if implemented
City and County general funds	Ongoing
Other local agency funds (water district, irrigation district)	Ongoing
State	
Proposition (Prop) 1 IRWM Implementation Grants	Early 2019
SWRCB Stormwater Prop 1 Implementation Grants	Summer 2019
Clean Water State Revolving Fund low-interest loans	Ongoing
California Department of Fish and Wildlife Prop 1 and Fisheries Restoration Grants	Typically annual
California Department of Fish and Wildlife Wetlands Restoration for Greenhouse Gas Reduction Program	Historically every 3 years
California Wildlife Conservation Board Habitat Enhancement and Restoration Program Grants	Ongoing
SWRCB Clean Water Act Section 319(h) Non-Point Source Grant Program	Annually (Winter/Spring)
Federal	
US Bureau of Reclamation WaterSMART grant Programs	Ongoing
USDA Rural Development Water and Waste Revolving Fund Grants	Ongoing
USDA Water and Environmental Programs	Program-dependent timing, many are ongoing

7.3 IRWMP Submittal

The geographic area covered by the Stanislaus County SWRP overlies two IRWM Regions – East Stanislaus and Westside-San Joaquin (Figure 2-5).

The East Stanislaus IRWMP was updated in 2018 and adopted by its Regional Water Management Group (RWMG) member agencies in September and October of 2018. The East Stanislaus IRMWP incorporates the Stanislaus SWRP by reference and will include the SWRP Executive Summary as an appendix. The SWRP is expected to be completed in June 2019. Once the SWRP is final, Stanislaus County staff will submit the SWRP to the East Stanislaus Steering Committee (which oversees the day-to-day maintenance of the IRWMP) for inclusion in the IRWMP. Stanislaus County is a member of the RWMG, and certain county staff members have been involved in both efforts, so coordination between the SWRP and IRWMP will be streamlined. Additionally, projects from the Stanislaus County SWRP are tracked in the same online data management system, Opti, as the projects in the East Stanislaus IRWMP. Opti provides public access to project information, which will enable the SWRP and IRWMP efforts to continue coordinating.

The Westside-San Joaquin (WSJ) IRWMP was updated in January 2019. Similar to the East Stanislaus IRWMP, the WSJ IRWMP will incorporate the SWRP by reference. Specifically, the SWRP Executive Summary will be included in an appendix and referenced throughout the WSJ IRWMP as applicable. The SWRP will be submitted to the WSJ Region's governing body, SLDMWA, upon completion for inclusion in the WSJ IRWMP.

During any future updates to the SWRP, Stanislaus County will be responsible for notifying the East Stanislaus and WSJ Regions, which will allow the IRWM Regions to determine how best to incorporate SWRP updates into the IRWMPs. As of 2019, City of Modesto should be contacted regarding the East Stanislaus IRWMP, and SLDMWA should be contacted regarding the WSJ IRWMP. The East Stanislaus Region website (www.eaststanirwm.org/) and WSJ Region website (www.sldmwa.org/integrated-regional-water-management-plan/) will also be useful resources as these two planning efforts continue in parallel.

7.4 Implementation Performance Measures and Tracking

Implementation performance measures serve as a way to determine whether the SWRP is providing the multiple benefits it set out to achieve. Monitoring for the SWRP will be based on project-specific monitoring, and will help ensure the following:

- Projects included in the SWRP are being implemented
- Progress is being made to achieve the SWRP benefits
- Adaptive management is being applied during project implementation

7.4.1 Project Performance

Project-specific monitoring plans may be required for programs that receive funding from certain sources. While the SWRP does not require monitoring plans for projects, project proponents are strongly encouraged to prepare and implement performance monitoring plans to be carried out as part of project implementation. Performance data will be collected by the plan partners as it is made available by project proponents. These data will allow the plan partners to assess the success of individual projects as well as the SWRP as a whole.

In general, project monitoring plans should contain the project goals and objectives, quantitative metrics to measure progress toward the project's objectives, and procedures to address any problems encountered during monitoring. Each monitoring plan should include specific methodologies to ensure consistent data throughout all monitoring, and project proponents will provide the results to the plan partners. Quantitative metrics, such as those discussed in Section 5, *Quantitative Methods*, are necessary in order to evaluate the impact of the project. Examples of metrics include:

- Pollutant load reduction (lbs/year or most probable number (MPN)/year)
- Increase in water supply (AFY)
- Reduction in peak flow discharge (cfs)
- Reduction in sewer overflow volume (AFY)
- Instream flow improvement (cfs)
- Energy consumption reduced (kWh/year)
- Community involvement (participants/year)

Project performance data may be uploaded to Opti where it can be viewed by stakeholders and members of the public. Opti will serve as both a data repository and distribution mechanism. Project proponents will be responsible for quality control of the data they provide and for uploading data to Opti as it becomes available.

Project performance will be evaluated based on how well the targets established in the monitoring plan are met. Provided that monitoring data are available, the plan partners will review project performance following project implementation/construction and at intervals of no less than five years; this review may be conducted as part of updates to the SWRP.

7.4.2 SWRP Performance

The plan partners will evaluate SWRP performance as needed, but no less than every five years. The project list will be updated annually, or as needed, and updated project lists will be appended to the SWRP as they are available. The plan partners will assess the progress toward SWRP implementation using metrics such as the following:

- Number of projects completed
- Progress toward achieving SWRP objectives, as measured using the quantitative metrics listed in Section 5, *Quantitative Methods*
- Watershed priorities supported (e.g. reduced discharges into 303(d)-listed impaired water body, support for disadvantaged communities, etc.)
- Project funding secured by project proponents

The plan partners will also assess data gaps during its reviews of SWRP performance. This information will be used during future updates of the SWRP to improve the document and processes, as discussed in Section 7.4.3, *Adaptive Management*. The plan partners may choose to convene the TAC to provide feedback and assistance on changes to the SWRP.

SWRP performance information will be shared with stakeholders via announcements on the Opti platform, posting on the SWRP website, and by direct outreach to project proponents who provided monitoring information.

7.4.3 Adaptive Management

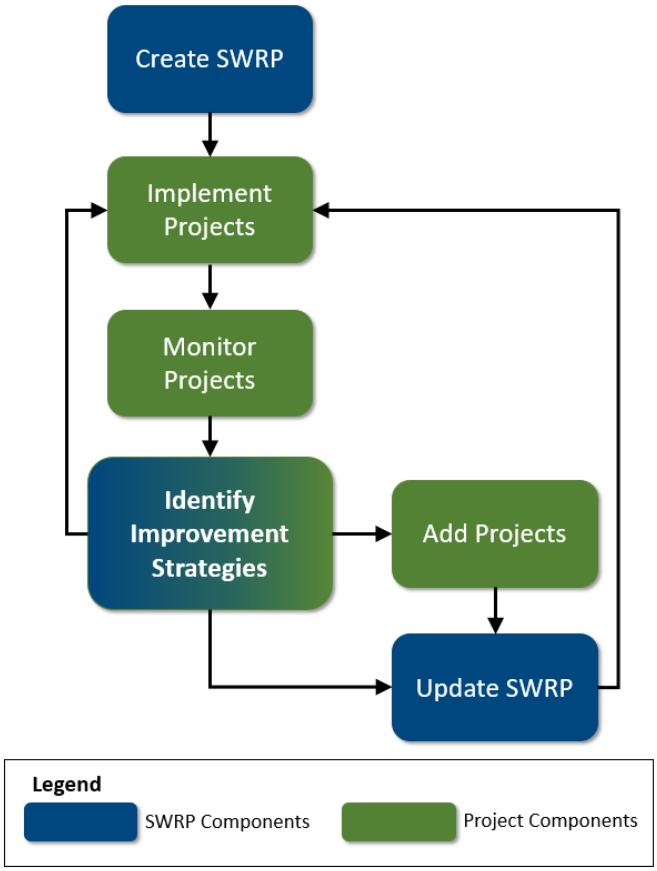
Adaptive management is the method by which a process or project is evaluated, and the information obtained is then used to improve the process or project. For example, as a project is implemented, useful information can be gathered and fed back into the project's management structure to adapt the project to better meet its overall objectives. The SWRP contains policies for adaptive management of the SWRP itself, and project proponents are also encouraged to engage in adaptive management of individual projects, where feasible. Feedback obtained from community participation and public perception of individual project benefits is expected to be an integral part of the adaptive management process for project proponents.

The SWRP will be assessed at regular intervals to determine whether updates are necessary to keep the SWRP current and thorough. The plan partners will conduct this assessment as needed, but no less than once every five years. Updates to the SWRP may be necessary due to changes in NPDES MS4 permits, regional priorities, SWRP Guidelines, or other factors. As watershed conditions change, the plan partners may need to alter elements of the SWRP, including water quality priorities, pollutant source assessments, project effectiveness, and quantitative analysis methods. The plan partners will maintain responsibility for completing any SWRP updates or changes that it deems necessary. The plan partners will evaluate the performance of the SWRP in terms of benefits achieved (as identified in Section 5, *Quantitative Methods*). The adaptive management process for the SWRP is illustrated in Figure 7-3. Actions related to the SWRP (shown in blue) would be the responsibility of the plan partners. Actions related to individual projects (shown in green) would be the responsibility of individual project proponents. At the project level, adaptive management could be used to improve management of the same project, or feedback could be applied to future projects undertaken by the same project proponent or shared with other project proponents.

Through the use of Opti, project proponents have the ability to modify project information and add new projects at any time. Opti is publicly accessible, therefore the plan partners can monitor project changes on an ongoing basis. The plan partners will continue to rely on project proponents to update project information as it becomes available.

The SWRP also may need to change as new stakeholders are identified or as new permittees emerge. During the periodic assessments of the SWRP, the plan partners will determine whether changes to the SWRP are needed, either in terms of governance structure or SWRP content.

Figure 7-3. Adaptive Management of the SWRP and SWRP Projects



Section 8. Education, Outreach, and Public Participation

Outreach and public participation are key components to developing and implementing an effective SWRP. As part of the SWRP development, stakeholders and the public were asked to participate at various stages of plan development. Additional outreach and involvement mechanisms were put in place to promote ongoing participation during plan implementation. This section discusses the outreach methods and opportunities presented to engage stakeholders and communities in the SWRP planning process.

8.1 Outreach and Participation Methods

During development of the Stanislaus SWRP, several mechanisms were used to facilitate public participation. These included a stakeholder contact list, stakeholder meetings, web resources, and opportunities for public comment. Together, these efforts provided opportunities for public participation and education about the SWRP.

A stakeholder contact list was created early in the development of the SWRP in order to distribute information to a wide variety of interested parties. The stakeholder contact list was based on contact lists prepared for previous planning efforts in the County, including the East Stanislaus and Westside-San Joaquin IRWMPs. TAC members also provided input on the stakeholder contact list. Once revised for the SWRP, the stakeholder contact list was used to disseminate information regarding the preparation of the SWRP, the Call for Projects, stakeholder meetings, and the Public Draft of the SWRP. Agencies and organizations represented on the stakeholder contact list are shown in Table 8-1. The stakeholder contact list will be updated on an ongoing basis as new contacts are identified.

Table 8-1. Agencies/Organizations Represented on Stakeholder Contact List

Category	Agency/Organization
Cities	Ceres, Firebaugh, Huron, Hughson, Los Banos, Modesto, Oakdale, Patterson, Riverbank, Tracy, Turlock, Waterford
Unincorporated Communities	Grayson, Keyes, Riverdale, Westley, Airport, Monterey Park Tract, Empire, Denair, South Modesto (Bret Harte, Bystrom, Olivero, Park Lawn), West Modesto (Rouse, Robertson Road)
Water Suppliers	Ballico Community Water Service District, Byron Bethany Irrigation District (ID), Central California ID, Del Puerto Water District (WD), Eastside WD, Grassland WD, Merced ID, Modesto ID, Oakdale ID, Panoche WD, San Luis & Delta-Mendota Water Authority, San Luis WD, Santa Nella Community WD, Tranquility ID, Turlock ID, West Stanislaus ID, Westlands WD
Non-profits	Tuolumne River Trust, River Partners, Self-Help Enterprises, The Nature Conservancy, Friends of the Tuolumne, Community Water Center
IRWM Regions	Mokelumne-Amador-Calaveras Region, Eastern San Joaquin Region, Merced Region, Tuolumne-Stanislaus Region, Westside-San Joaquin Region, Yosemite-Mariposa Region
GSAs	West Turlock Subbasin GSA, Merced Subbasin GSA, Eastside San Joaquin GSA,
Universities	University of California Davis, California State University Fresno
State	CV-Salts Coalition, Department of Water Resources, State Water Resources Control Board

Category	Agency/Organization
Other	Stanislaus County Water Advisory Committee, East Stanislaus Resources Conservation District, Salida Sanitary District, California Water Law, Linneman Law, Storm Water Consulting, Inc., Summers Engineering, Inc., Adams Ashby Group, Stanislaus County Farm Bureau, Ceres and Modesto area citizens

In developing the SWRP, Stanislaus County used two main online resources. First, the County prepared a website for the SWRP (http://www.stancounty.com/publicworks/swrp/), which includes general information about the SWRP, as well as work products, data sets, meeting documentation and links to additional resources. The website was used to post announcements about upcoming meetings and will continue to be used to post relevant announcements related to plan implementation. The Public Draft of the SWRP was also posted on the website for public comment. The website also enables users to sign up to receive announcements via the stakeholder contact list.

The second web resource used during development of the SWRP is Opti (http://irwm.rmcwater.com/es/). Opti is an online data management system used to facilitate project solicitation and information sharing. The Opti system allows project information to be submitted, reviewed, organized and regularly updated electronically by project proponents. Further, Opti plays an important role in disseminating information and increasing transparency. Anyone who wishes can create an Opti login and view submitted project information. The Stanislaus County SWRP Opti site was created as a subcomponent of the East Stanislaus IRWMP Opti site. The East Stanislaus Opti site was updated to allow for submission of SWRP projects. This allows project proponents to enter their projects into both documents via a single platform, which streamlines the submission process and reduces complexity for those entering projects. Projects may be entered for any portion of the County, not just the portion that overlaps with the East Stanislaus IRWMP. Project proponents input information that is specific to SWRP projects, including information on SWRP benefits. Opti's role in project solicitation is discussed further in Section 6.1, *Project Solicitation*, and its role in data management is discussed in Section 7, *Implementation Strategy*.

Finally, the County provided opportunities for public review and comment on the SWRP. The Public Draft of the SWRP was posted on the SWRP website for a 30-day review period during April and May 2019. The availability of the Public Draft was announced via email to the stakeholder contact list. A public meeting was also held during the public comment period, on April 23, 2019 in Ceres.

8.1.1 Initial Public Engagement and Education Schedule

Initial public engagement and education for the SWRP occurred with the first stakeholder meeting in October 2017. Subsequent stakeholder meetings were held between December 2017 and April 2019. Table 8-2 provides a summary of these meetings, including date, location, and topics covered. These meetings were announced via emails to the stakeholder contact list. The primary purpose of these meetings was to provide a platform for community members to learn about what an SWRP is and how they can participate in the development of the document, including how to submit projects to the plan, and comment on the draft SWRP. In addition to meeting announcements, emails regarding the project solicitation were sent to the stakeholder contact list.

Table 8-2. Summary of Stakeholder and Public Meetings

Meeting	Date	Location	Description
Stakeholder Meeting #1	October 23, 2017	Ceres, CA	This meeting provided an overview of the SWRP purpose and process and how to submit projects. This meeting also kicked off the Call for Projects.

Meeting	Date	Location	Description
Stakeholder Meeting #2	December 6, 2018	Conference call	This conference call provided detailed instructions on how to use the Opti system to submit projects online.
Stakeholder Meeting #3	May 30, 2018	Modesto, CA	This meeting provided additional details about the SWRP, including discussion of the SWRP goals and objectives, prioritization and solicitation of projects, and the implementation funding timeline.
Stakeholder Meeting #4	April 23, 2019	Ceres, CA	This meeting consisted of an overview of the Public Draft SWRP and covered how public comments can be provided.

Following completion of the SWRP, public outreach work will likely occur as part of the preparations for grant applications and as part of individual project implementation. For example, any public meetings related to the Storm Water Grant Program would be scheduled to occur in early 2019, in advance of the application due date. In the future, public outreach and engagement work will occur as part of individual project implementation, or in parallel with new Calls for Projects or SWRP Updates.

8.2 Outreach Efforts

8.2.1 SWRP Audience

The outreach process during SWRP development was designed to include a range of groups that would be interested in stormwater management as well as water management planning more broadly. The following list summarizes outreach to specific groups identified in the SWRP Guidelines; other stakeholder groups are identified in Table 8-1.

- **Developers:** Developers in the County generally become involved in stormwater management as they work to comply with applicable regulations, including stormwater pollution prevention measures that may be required as part of the CEQA process.
- **Commercial/industrial:** Commercial and industrial stakeholders will likely become engaged in stormwater planning during local permitting processes and project implementation.
- **Local ratepayers:** Water purveyors have been engaged with the SWRP since its initiation. As the SWRP is implemented, water purveyors can assist with outreach to their ratepayers through website announcements or bill inserts, as appropriate.
- **Nonprofit organizations:** Outreach occurred to nonprofit organizations via the stakeholder contact list (detailed in Table 8-1)
- **General public:** The general public has the opportunity to engage with the SWRP through the SWRP website, Opti website, and through their local governments (including Stanislaus County). The public also had the opportunity to comment on the plan during the public comment period.

8.2.2 Public Outreach During SWRP Development

During development of the SWRP, the outreach and participation methods discussed in Section 8.1, *Outreach and Participation Methods*, were used. Outreach occurred via email notifications to the stakeholder contact list, stakeholder meetings (Table 8-2), postings to the SWRP website and Opti, and the Public Draft comment period. Interested parties were notified of the following SWRP milestones: the initial of SWRP development, Call for Projects opening and closing, stakeholder meetings, and the publishing of

the SWRP Public Draft. Three stakeholder meetings were held during SWRP development; these were announced via the stakeholder contact list and SWRP website. Comments on the public draft SWRP were received from <insert number> community members.

8.2.3 Public Outreach During SWRP Implementation

As implementation of the SWRP occurs through implementation of individual projects, public outreach and participation opportunities may vary by project. Overall, project proponents are responsible for conducting public outreach as the project develops.

Often, project proponents are public agencies. Public projects would need approval from the governing agency for funding. This approval would take place at a public meeting such as a board meeting or City Council meeting, which are subject to public noticing requirements and are open to the public. The results of governing bodies' decisions are also part of the public record. Through this mechanism, communication with the public remains transparent.

Opti will also allow for continued public outreach during SWRP implementation. Anyone can view the project list in Opti at any time; this allows the public to stay engaged with the process. Opti can also be used to announce funding opportunities. Other outreach during plan implementation may occur via the SWRP website (e.g., posting announcements, project updates, or new Calls for Projects).

Any projects subject to CEQA and/or NEPA would also be required to comply with public noticing and comment requirements. Additionally, projects funded through grants may be required to comply with requirements related to information-sharing (such as uploading data to publicly-accessible databases). Project proponents are responsible for complying with all applicable public outreach, noticing, and data-sharing requirements.

8.2.4 Additional Outreach Considerations

Beyond general education and outreach, public participation and engagement was facilitated when considering technical and policy issues related to the development and implementation of the SWRP. One technical consideration in the SWRP is the establishment of quantitative benefits against which projects are evaluated. The quantitative benefits were established based on the expertise and local knowledge of County staff, and were reviewed by the TAC. These benefits were also reviewed at the October 23, 2017 stakeholder meeting, where the public had the opportunity to comment on the benefits. The public was also invited to submit comments on the Public Draft SWRP, including associated technical information, during the public review period. Any technical issues that arise are anticipated to be associated with implementation of projects. Project proponents are responsible for conducting outreach and soliciting public feedback on technical components of their projects, as needed.

Policy changes related to stormwater would not occur through the SWRP process or implementation of the SWRP. Local jurisdictions, including Stanislaus County and the incorporated areas within it, are the ones to make large policy decisions in the planning area. Policy decisions, such as new ordinances governing stormwater, would need to be approved at a public hearing of the relevant governing body. As policy changes occur in the planning area, they will be incorporated into future SWRP updates. Additionally, the SWRP will be evaluated during plan updates to ensure it is consistent with any new or modified policies within the planning area.

During SWRP development, local communities were encouraged to engage with project design and implementation. For example, at the first stakeholder meeting, members of several unincorporated communities (such as the community of Airport) voiced concerns about the lack of stormwater infrastructure in their communities and improvements that would benefit the community (e.g., construction of storm drainage infrastructure which could be combined with sidewalks). As a result, the *Airport Neighborhood Stormwater Retention System and Dual Basin/Low Impact Strategies Stormwater Runoff*

project was submitted to the SWRP. As such projects move toward implementation, agency representatives, such as Stanislaus County staff, will conduct public outreach as necessary. This could include public meetings, individual discussions with community leaders, or surveys.

Communities can also engage with project design and implementation through Opti. Since anyone can view projects in Opti, including projects at the pre-design phase, the public has the opportunity to provide input. The public could provide feedback via email to the County (using contact information listed on the SWRP website), or by reaching out to the point of contact associated with the project in Opti (since all information in Opti is publicly viewable). The public can also provide comments to their elected officials on projects that they would like to see completed. Prior to implementation, projects will likely be required to complete an environmental review process, including soliciting public input; this provides another opportunity for public involvement in project implementation.

8.3 Disadvantaged Community Outreach and Environmental Justice

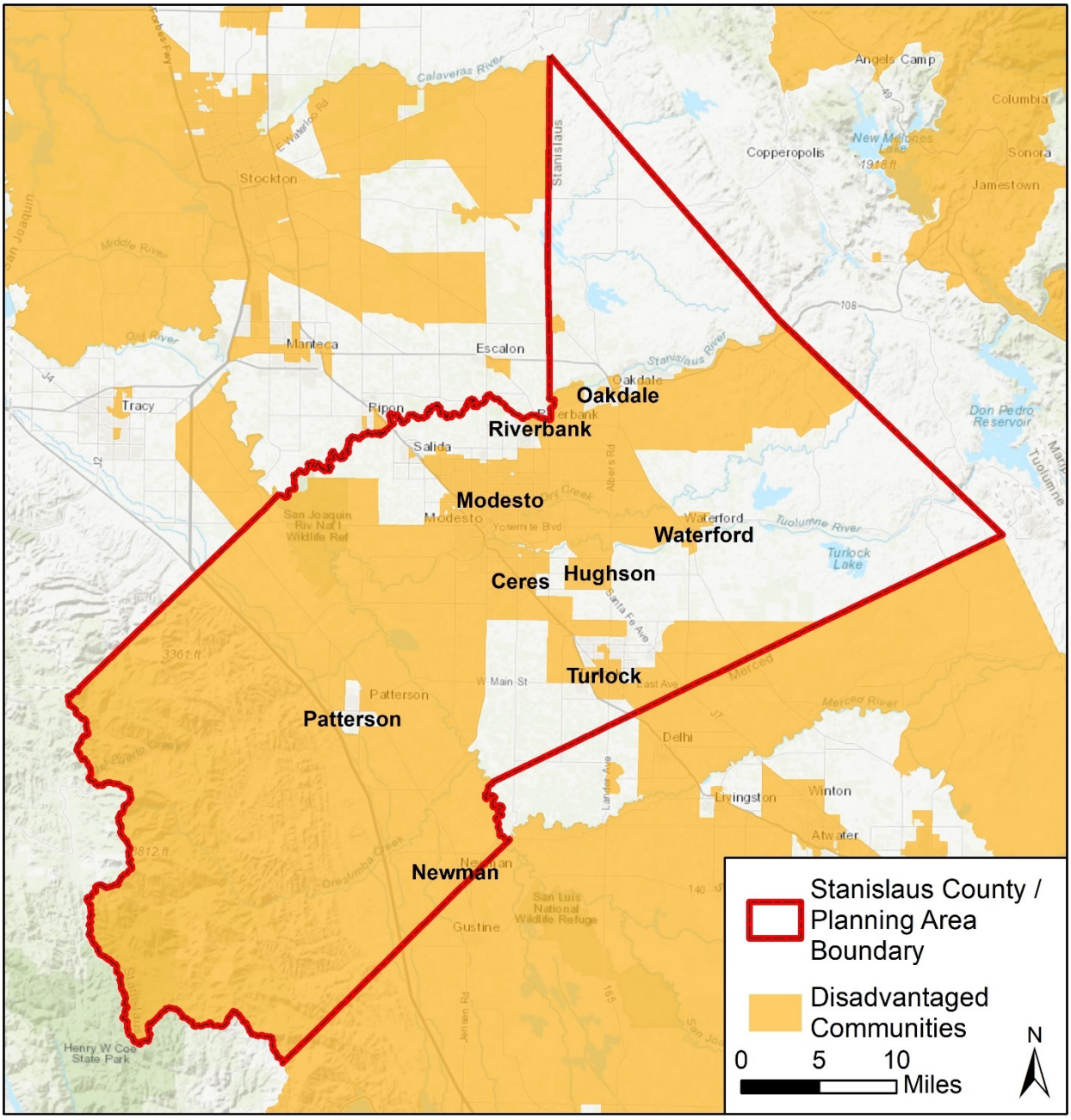
During preparation of the SWRP, specific outreach was conducted to disadvantaged communities. A DAC, according to the State of California (Water Code Section 79505.5(a)), is a community with a Median Household Income (MHI) less than 80 percent of the California statewide MHI. DWR compiled DAC information based on the U.S. Census Bureau's American Community Survey (ACS) data for the period of 2010 to 2014. According to this database, a community with an MHI of $49,191 or less is considered a DAC. DWR makes DAC data available at three different geography levels: census designated places, census block groups, and census tracts. DAC areas from each of the three geography types were combined to determine all the DAC area in Stanislaus County (Figure 8-1).

DACs were engaged in the planning process by the methods discussed in Section 8.1, *Outreach and Participation Methods,* during the overall public outreach process. Additional DAC involvement occurred through agency and community representatives who participated on the TAC. These TAC members represented the interests of DACs and encouraged other DAC representatives to attend stakeholder meetings. During stakeholder meetings, several of these DAC representatives shared their perspectives on critical issues in their communities that could be mitigated through stormwater projects. Ongoing DAC involvement in the planning process was tracked via meeting sign-in sheets and meeting notes that include reference to DAC comments or concerns. Future updates to the SWRP will continue to provide avenues for DAC engagement through similar outreach mechanisms.

Climate vulnerable communities are those that are at risk of experiencing particularly damaging impacts from climate change. In Stanislaus County, climate impacts may include reduced water supply, reduced water quality, and increased flooding. These impacts will likely be felt throughout Stanislaus County, but would affect disadvantaged communities in particular as they have fewer resources available to adapt to changing conditions. In this respect, climate vulnerability issues and environmental justice issues have significant overlap and may be addressed in similar ways.

Environmental justice can be defined as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice seeks to redress inequitable distribution of environmental burdens (e.g. pollution, industrial facilities) and access to environmental goods (e.g. clean water and air, parks, recreation, nutritious foods, etc.).

Figure 8-1. Disadvantaged Communities



Environmental justice has a broad scope and could include actions like ensuring access to safe drinking water, reducing exposure to toxins, and repairing aging infrastructure in minority communities. Stormwater projects can provide multiple benefits to address a range of community issues, ultimately supporting greater environmental justice in the planning area. For example, stormwater projects could provide opportunities to increase green space in urban areas, which would mitigate the effects of urban heat islands, and potentially improve air quality through increasing vegetation. Stormwater projects may also be used to expand recreational opportunities; for example, projects could provide benefits via creating parks or improving access to recreational areas such as the Stanislaus river. Street improvements can also be

achieved in conjunction with utilizing stormwater BMPs, and could include improvement of sidewalks, bicycle lanes, and roadways; these types of projects would improve transportation and community safety, while also providing potential flood, water supply, and water quality benefits. There are a range of benefits beyond water quality and supply that can be achieved through the implementation of stormwater projects.

The SWRP submittal form in Opti specifically asks project proponents to indicate whether their project will provide benefits in terms of public education or community involvement. Project proponents can also indicate whether their project will enhance and/or create recreational and public use areas; access to such areas is an environmental justice issue, and projects may be implemented that address this issue by improving access to such amenities.

Opti also directs project proponents to include information about flooding, water supply, and water quality, which are all key environmental justice issues. For example, low-income communities may be particularly vulnerable to flooding, such as mobile home parks located along waterways. Water supply is another environmental justice issue in the planning area; low-income communities that rely on groundwater may experience decreasing groundwater levels or groundwater contamination and have few resources to deal with these issues. Stormwater projects can aid in flood management, water supply, and water quality, all of which would have beneficial impacts to environmental justice within the planning area. Further, environmental justice aspects of a project would be considered as part of the CEQA process prior to project implementation (if applicable).

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Prepared by:

WOODARD &CURRAN

1545 River Park Drive
Suite 425
Sacramento, CA 95815
916.999.8700