CENTRAL VALLEY FLOOD PROTECTION PLAN

State Plan of Flood Control Descriptive Document

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CVFPP

2022 UPDATE TECHNICAL SERIES

Draft Memorandum

2022 State Plan of Flood Control Descriptive Document

February 2022

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Acronyms and Abbreviations

Acronym	Definition
1986 Butte Basin Plan	Plan of Flood Control for the Butte Basin Overflow Area
AB	Assembly Bill
CCR	California Code of Regulations
CDEC	California Data Exchange Center
CFR	Code of Federal Regulations
cfs	cubic feet per second
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CWC	California Water Code
D.C.	District of Columbia
Delta	Sacramento-San Joaquin Delta
DVD	digital versatile disk
DWR	California Department of Water Resources
EIP	Early Implementation Program
EP	engineering pamphlet
FCA	Flood Control Act
FCCD	Flood Control Committee Document
FOC	Flood Operations Center
FRS	flood relief structure

Acronym	Definition
FSSR	Flood System Status Report
GIS	geographic information system
H:V	horizontal to vertical
HD	house document
LAP	Levee Accreditation Project
LD	Levee District
LMA	local maintaining agency
LSJLD	Lower San Joaquin Levee District
M	minimally acceptable
MOU	Memorandum of Understanding
NGVD	National Geodetic Vertical Datum
No.	number
NSA	Non-Structural Alternative
O&M	operations and maintenance
OMRR&R	operation, maintenance, repair, replacement, and rehabilitation
PCA	project cooperation agreement
RD	Reclamation District
Revised O&M Manual	revised Supplement to Standard Operations and Maintenance Manual, Sacramento River Flood Control Project, Unit No. 125, Back Levee of Reclamation District No. 100
SAFCA	Sacramento Area Flood Control Agency
SD	Senate Document
SPFC	State Plan of Flood Control

Acronym	Definition
SRBPP	Sacramento River Bank Protection Project
SRFCP	Sacramento River Flood Control Project
SSJDD	Sacramento-San Joaquin Drainage District
State	State of California
U	unacceptable
U.S.C.	United States Code
UD	U.S. Senate document
UFFR	Urban Flood Risk Reduction
Update	2022 State Plan of Flood Control Update
USACE	U.S. Army Corps of Engineers
WPRR	Western Pacific Railroad
WRDA	Water Resources Development Act

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CHAPTER 1

Introduction

The 2022 State Plan of Flood Control (SPFC) Descriptive Document is organized according to the components of the SPFC, including project facilities, lands, operations and maintenance (O&M), conditions, and programs and plans. This document also addresses several ongoing projects that could become part of the SPFC after a process has been completed for their addition. When the 2017 SPFC Descriptive Document Update (California Department of Water Resources 2017) was prepared, it was organized to present and address changes to the SPFC's components in a condensed format. The level of detail in this 2022 State Plan of Flood Control Update (Update) is consistent with the 2010 SPFC Descriptive Document (California Department of Water Resources 2010), which focused on the SPFC's major changes and activities. Figure 1-1 shows the planning areas of the Sacramento River and San Joaquin River watersheds that contain the SPFC.

1.1 Organization of Update

This document is organized into the following chapters:

- Chapter 1 – Introduction provides overview information about updates to the SPFC since the 2017 Descriptive Document, provided in this document.
- Chapter 2 – Existing Projects Update presents updates to the ongoing State of California (State)-federal projects mentioned in the 2017 Descriptive Document.
- Chapter 3 – State Plan of Flood Control Facilities Update describes changes to SPFC project works or facilities located along the various reaches of the Sacramento and San Joaquin rivers and their tributaries and distributaries.
- Chapter 4 – State Plan of Flood Control Lands Update describes changes to Sacramento – San Joaquin Drainage District land holdings, types of property rights, agreements for use of easements and properties, lands of designated floodways, and ongoing evaluations. This section also includes a discussion of fee title lands, encroachment permits, and easements in greater detail.
- Chapter 5 – State Plan of Flood Control Operations and Maintenance Update presents updated information about repair projects, O&M manuals, maintenance, and operations for the SPFC.

- Chapter 6 – State Plan of Flood Control Conditions Update presents changes to the conditions, or terms, of the SPFC set forth by the federal government and the State.
- Chapter 7 – Program and Plans Related to the State Plan of Flood Control Update describes updated information on existing programs and plans that support the SPFC, and ongoing evaluations and processes that could affect the SPFC.
- Chapter 8 – State Plan of Flood Control Future Updates describes updated information on activities contributing to the SPFC update and ongoing projects.
- Chapter 9 – Observations Updates presents observations made during the preparation of this Update that could facilitate its presentation for the reader.
- Chapter 10 – References presents the references used to prepare this Update.

1.2 Summary of State Plan of Flood Control Updates Since the 2017 Descriptive Document

Table 1-1 summarizes SPFC updates since the 2017 Descriptive Document, organized by document chapter.

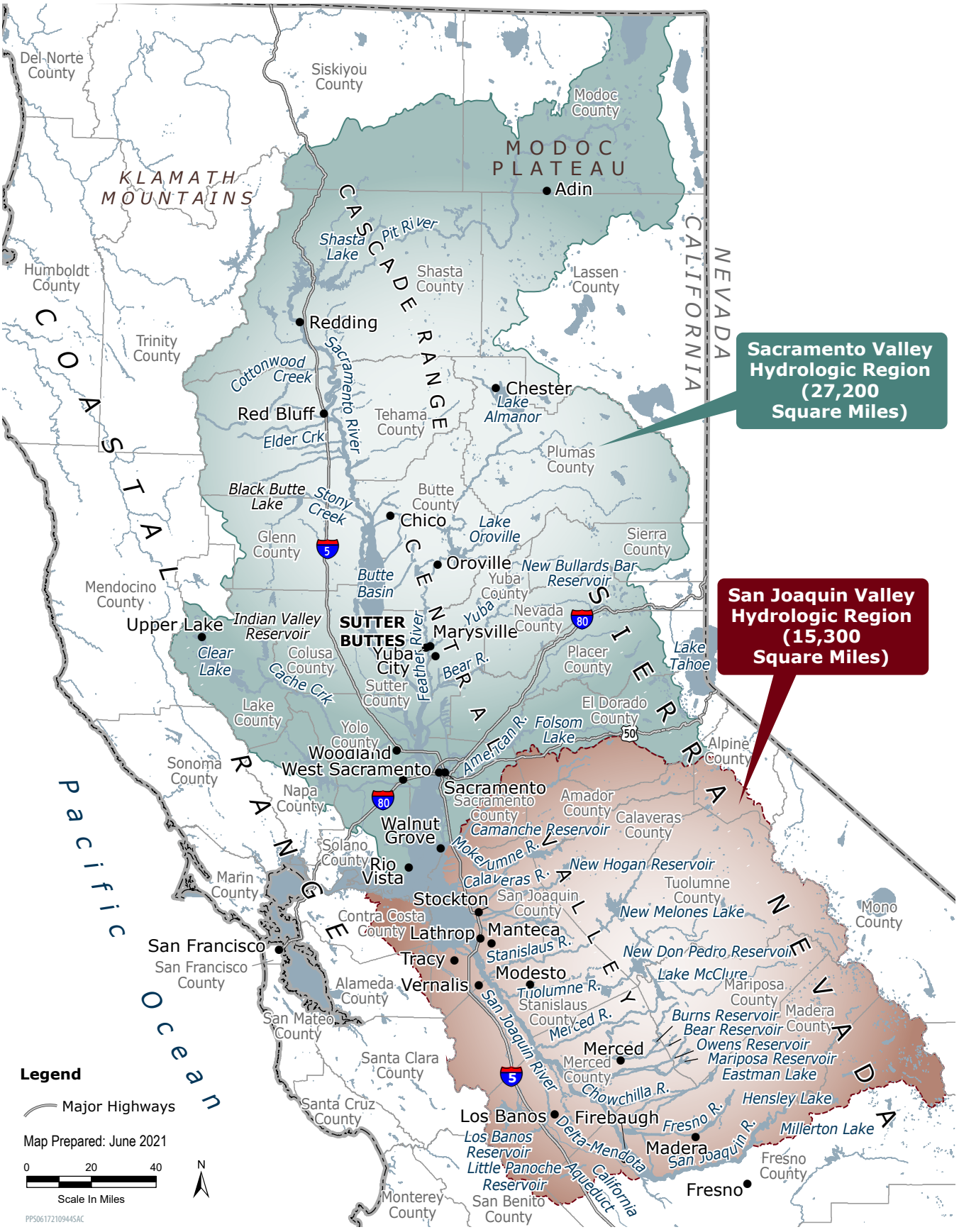
Table 1-1. Chapter Updates Since the 2017 Descriptive Document

Chapter Number and Name	Updated Items	Reason for Update
2, Existing and ongoing Projects Update	American River Watershed, Joint Federal Project at Folsom Dam	This State-federal project was completed in 2016 and approved in 2019. There are some remaining works associated with closeout.
	American River Watershed, Common Features, WRDA 2016 Project	This ongoing project was not listed in the 2017 Descriptive Document.
	Sutter Watershed, San Joaquin River Watershed Project	This ongoing project was not listed in the 2017 Descriptive Document.
3, Facilities Update	South Sacramento County Streams Group Project	This project was completed after the 2017 Descriptive Document.
4, Lands Update	Fee Title Lands	Additional details were added about these subjects.
	Encroachment Permits	Additional details were added about these subjects.
	Easements	Additional details were added about these subjects.

Chapter Number and Name	Updated Items	Reason for Update
5, Operations and Maintenance Update	Updated O&M Manuals	Relevant O&M manuals were updated or revised since the 2017 Descriptive Document. A table listing the manuals is provided.
	O&M Manual Database	The database of O&M manuals can be found on the SPFC O&M Manuals webpage of the DWR CDEC website (California Department of Water Resources 2022).
	Inspections	The discussion on vegetation criteria required updating.
6, Conditions Update	No Updates Required	The SPFC conditions description provided in the 2017 Descriptive Document remain unchanged.
7, Programs and Plans Update	Ongoing State-federal Projects Update	Information in these subsections has changed since the 2017 Descriptive Document.
	Early Implementation Program Update	Information in these subsections has changed since the 2017 Descriptive Document.
	ULE and NULE	Information in these subsections has changed since the 2017 Descriptive Document.
8, State Plan of Flood Control Future Updates	DWR Implementation of CVFPP and Financial Assistance Programs	Information on programs and plans related to the SPFC required updating.
	Flood System Status Report	Report text was updated since the 2017 Descriptive Document.
	2022 CVFPP Update	The CVFPP is updated every 5 years. The 2017 Descriptive Document discussed the 2017 CVFPP, and this Update discusses the 2022 CVFPP Update.
	Ongoing Evaluations, Projects, and Repairs	An updated description of the Sacramento River Bank Protection Program, Flood System Repair Program, Levee Rehabilitation Program, and Urban Flood Risk Reduction Program has been added.
9, Observations	No Updates Required	SPFC observations description provided in the 2017 Descriptive Document remain unchanged.
10, References	List of References	References that are used in this Update, but were not used in the 2017 Descriptive Document, have been included in this list.

Notes:
CDEC = California Data Exchange Center
CVFPP = Central Valley Flood Protection Plan
DWR = California Department of Water Resources
NULE = Non-Urban Levee Evaluation Program
ULE = Urban Levee Evaluation Program
SPFC = State Plan for Flood Control
WRDA = Water Resources Development Act

Figure 1-1. Sacramento River and San Joaquin River Watersheds Planning Area for the State Plan of Flood Control



CHAPTER 2

Existing Projects

Within the Central Valley watershed, numerous reservoirs, channels, levees, bypasses, and related facilities reduce the threat of major flooding along the Sacramento and San Joaquin rivers and tributaries and distributaries. As early as the 1850s, the first levees were constructed by local landowners in the Central Valley. Some of these early levees eventually became part of a State of California (State)-federal flood protection system that began when Congress authorized the Sacramento River Flood Control Project (SRFCP) in the Flood Control Act of 1917.

This section presents the State and federal authorizations for the State-federal flood protection projects included in the SPFC. It also mentions ongoing State-federal projects that are likely to become part of the SPFC upon their completion, and other portions of the flood management system (Chapters 2.3, 2.4, and 2.5) that are important for overall flood management, but not part of the SPFC. In general, the successful operation of these non-SPFC facilities is essential for the successful operation of the SPFC.

This section provides updates to the ongoing State-federal projects described in the 2017 Descriptive Document. These changes resulted from additional documentation related to various facilities discovered since 2017 and completed improvements to SPFC facilities as of June 30, 2021.

2.1 Summary

The SPFC includes many different projects authorized by federal and State legislation. Table 2-1 summarizes these projects, organized under the Sacramento River and San Joaquin River watersheds. The table includes the federal acts, public law numbers, and Chief of Engineers Reports (generally printed as U.S. House documents [HDs] or U.S. Senate documents [SDs]) and California Water Code (CWC) sections pertaining to each SPFC project. Figure 2-1 shows general project locations. The projects listed in Table 2-1 are completed projects that include SPFC facilities (Chapters 2.2 and 3). Since the 2017 Descriptive Document was prepared, the status of multiple existing flood control projects has changed, and those projects have been added to Table 2-1.

At the conception of this document, the 2010 Descriptive Document incorporated information in reports that originated from two standard and 118 individual project (unit-specific) operations and maintenance (O&M) manuals, their associated project turnover letters from the

U.S. Army Corps of Engineers (USACE) to the Central Valley Flood Protection Board (CVFPB)[1], and acceptance letters from CVFPB to USACE indicating project completion. Often, O&M manuals provide key information about each project element, including project authorizations, maintaining agencies, project ownerships, and O&M requirements. Many individual projects included in the SPFC were implemented almost a century ago; as a result, some project information may have been lost or never obtained.

Correspondence between USACE and CVFPB noted the federal authorization status of some existing SPFC facilities may have denoted a difference of opinion between the State and USACE. This difference of opinion in federal authorization status could affect multiple aspects of associated SPFC facilities in terms of emergency assistance, maintenance, and potential flood control system improvements.

The California State Legislature authorized funding for numerous flood control projects throughout the Sacramento River and San Joaquin River watersheds. These statutory authorizations included varying provisions regarding responsibility for O&M of the flood control facilities.

Table 2-1. Summary of Existing State Plan of Flood Control Projects: Sacramento River Watershed

Project	Federal Act	Public Law	Chief of Engineers Report	State Authorization
Sacramento River Flood Control Project	FCA 1917	64-367	HD 62-81 RHCD 63-5	CWC Section 8350 and CWC Section 12648
	FCA 1928	70-391	SD 69-23	
	FCA 1937	75-392	SCCD 75th Congress	
	FCA 1941	77-205	HD 77-205	
Sacramento River and Major and Minor Tributaries Project	FCA 1944	78-534	HD 78-649	CWC Section 12648
	FCA 1950	81-516		
American River Flood Control Project	FCA 1954	83-780	HD 81-367	CWC Section 12648.1

[1] The Central Valley Flood Protection Board was formerly the State Reclamation Board until 2008.

Project	Federal Act	Public Law	Chief of Engineers Report	State Authorization
Sacramento River – Chico Landing to Red Bluff	FCA 1950	81-516	HD 84-272	CWC Section 12648.2
	FCA 1958	85-500		
Adin Project	FCA 1937	75-352	CAP	CWC Section 12656.7 (channel clearing)
	FCA 1954	83-780		
Middle Creek Project	FCA 1954	83-780	HD 81-367	CWC Section 12656.5
McClure Creek Project	FCA 1937	75-352	CAP	CWC Section 12656.7 (channel clearing)
	FCA 1954	83-780		
Salt Creek Project	FCA 1937	75-352	CAP	CWC Section 12656.7 (channel clearing)
	FCA 1954	83-780		
Lake Oroville Project	FCA 1958	85-500	Not applicable	CWC Section 12648 and CWC Section 12649 (not specific to Lake Oroville)
Sacramento River Bank Protection Project	FCA 1960	86-645	SD 86-103	CWC Section 12649.1
North Fork Feather River Project	FCA 1968	90-483	HD 90-314	CWC Section 12648.7
South Sacramento County Streams Group Project	WRDA 1999	106-53	South Sacramento County Streams, California, October 6, 1998	CWC Section 12670.14

Notes:
Other federal authorizations for flood management projects may be included in future updates to this SPFC Descriptive Document if the projects are added to the SPFC. Similarly, some of these projects may be removed from the SPFC if they are deauthorized.

CAP = Continuing Authorities Project
CWC = California Water Code
FCA = Flood Control Act
WRDA = Water Resources Development Act

Table 2-2. Summary of Existing State Plan of Flood Control Projects: San Joaquin River Watershed

Project	Federal Act	Public Law	Chief of Engineers Report	State Authorization
Lower San Joaquin River and Tributaries Project	FCA 1944	78-534	FCCD 78-2	CWC Section 12651
	FCA 1950	84-327		
Buchanan Reservoir and Channel Improvement on Chowchilla River	FCA 1962	87-874	SD 87-98	CWC Section 12648.4
Hidden Dam and Hensley Lake Project	FCA 1962	87-874	SD 87-37	CWC Section 12648.3
Merced County Streams Project	FCA 1944	78-534	HD 78-473	CWC Section 12650
	FCA 1970	91-611		
Bear Creek Project	FCA 1944	78-534	HD 78-545	CWC Section 12652
Littlejohns Creek and Calaveras River Stream Group Project	FCA 1944	78-534	HD 78-545	CWC Sections 12652 and 12653
Farmington Reservoir Project	FCA 1944	78-534	HD 78-545	CWC Section 12653 (channel work only)
Mormon Slough Project	FCA 1962	87-874	HD 87-576	CWC Section 12648.6

Notes:
Other federal authorizations for flood management projects may be included in future updates to this SPFC Descriptive Document if the projects are added to the SPFC. Similarly, some of these projects may be removed from the SPFC if they are deauthorized.

CWC = California Water Code
FCA = Flood Control Act
FCCD = Flood Control Committee Document
HD = House Document
SD = Senate Document
WRDA = Water Resources Development Act

Figure 2-1. Approximate locations of Federal/State Flood Damage Reduction Projects within the Sacramento River and San Joaquin River Watersheds that are included in the State Plan of Flood Control

2.2 Federal and State Authorizations for Completed State-Federal Flood Protection Projects

This section shows the federal and State authorizations for each completed State-federal flood protection project currently included in the SPFC. The projects are organized as Sacramento River Watershed projects and San Joaquin River Watershed projects. While each authorization covers one major project, such as the Sacramento River Flood Control Project (SRFCP), projects were generally implemented over time through the construction of their various segments. Some levees are physically disconnected from the larger system and were constructed to provide local benefits while others were con structed to provide system benefits.

While the purpose of this section is to show the federal and State authorizations, statements on each project's features are included. The statements were extracted from the Congressional authorizations and their supporting USACE Chief of Engineers reports (these documents are available upon request).

Chapter 3 provides details about major SPFC project works (facilities) associated with the following State-federal authorized projects.

2.2.1 Sacramento River Watershed Projects

Most of the State-federal flood protection projects included in the SPFC are located in the Sacramento River Watershed. Federal authorizations for the projects described here began in 1917, while State authorization began in 1953.

2.2.1.1 Sacramento River Flood Control Project

The SRFCP is the core of the flood protection system along the Sacramento River and its tributaries. The SRFCP includes most of the levees, weirs, control structures, bypass channels, and river channels that make up the SPFC. About 980 miles of levees were involved in the project. Portions of these levees were originally constructed by local interests and were either included directly in the project without modification or were modified to meet USACE project standards. The project was originally authorized by the Flood Control Act of 1917 and subsequently modified and extended by the FCAs of 1928, 1937, and 1941. The State adopted and authorized the SRFCP in 1953 by adding Section 12648 to the CWC. Assurances of cooperation were provided in the 1953 Memorandum of Understanding (MOU) (U.S. Army Corps of Engineers and Central Valley Flood Protection Board 1953).

- **Flood Control Act of 1917** – Public Law 64-367 (64th Congress) is the FCA of 1917. The authorized project was in accordance with plans contained in the California Debris Commission (predecessor of the State Reclamation Board) report submitted on August 10, 1910, and printed as HD 81 (62nd Congress), as modified by the California Debris Commission report submitted on February 8, 1913, and printed in Rivers and Harbors Committee Document No. 5 (63rd Congress). The 1913 document provides for the rectification and enlargement of river channels and the construction of weirs.

- **Flood Control Act of 1928** – Public Law 70-391 (70th Congress) is the FCA of 1928. The 1928 act modified the FCA of 1917 in accordance with the California Debris Commission report submitted on May 1, 1924, and printed in SD 23 (69th Congress). Significant changes made by the act include the following:
  - Elimination of reclamation works in the Butte Basin.
  - Construction of a weir above Colusa.
  - Elimination of two of the four proposed cutoffs in the stretch of river between Colusa and the mouth of the Feather River.
  - Use of the existing Tisdale Weir instead of construction of a new weir.
  - Relocation of certain levee lines on the Feather River and Yolo Bypass.
  - Settling basin at the mouth of Cache Creek.
  - Three sloughs in the Sacramento-San Joaquin Delta (Delta) to be left open instead of closed.
  - Increase in levee cross-section dimensions.
  - Conclusion that San Joaquin Valley flood problems are different from those of the Sacramento Valley, and that flood control in the San Joaquin Valley should be considered in a separate report, if deemed advisable.
  - Identification of federal government to carry some maintenance responsibility (enlarged channels, of weirs, and of certain gauges).
  - Increase in the project cost.
  - Change of the cost-share between the federal government and nonfederal interests.
  - Set design capacities.
- **Rivers and Harbors Act of 1937** – Public Law 75-392 (75th Congress) is the Rivers and Harbors Act of 1937. The prior 1917 and 1928 FCAs were modified in accordance with a Senate Commerce Committee Document (75th Congress). The document concluded that maintenance by the federal government was not consistent with policies of the FCA of 1936 (Public Law 74-738, 74th Congress). Additional work was required on revetment for eroding levees, and the project cost was adjusted. Requirements were added for local interests to provide rights-of-way and hold the federal government harmless from damage claims.

- **Flood Control Act of 1941** – Public Law 77-228 (77th Congress) is the FCA of 1941. The 1941 act modified previous acts in accordance with HD 205 (77th Congress). The act authorized federal expenditures for completion of the project, and required the following local cooperation:
  - Furnish all rights-of-way, including railway, highway, and all other utility modifications.
  - Hold and save the United States free from damage claims.
  - Maintain and operate all works after their completion in accordance with regulations prescribed by the Secretary of the Army.
- **Flood Control Act of 1944** – Public Law 78-534 (78th Congress) is the FCA of 1944. The act modified previous acts and authorized federal expenditure for various other flood control projects in the Central Valley. It also, among other provisions, gave USACE authority to regulate reservoirs constructed completely or partially with Federal funds to allocate and manage storage for flood control and navigation purposes.

The construction of the SRFCP began in 1918 and continued for decades. By 1944, the project was regarded as being about 90-percent complete. The plan for completing the project was presented in the November 30, 1953, *MOU Respecting the Sacramento River Flood Control Project* between USACE and the CVFPB (U.S. Army Corps of Engineers and Central Valley Flood Protection Board 1953). This MOU included levee construction standards for river project levees and bypass levees and outlined maintenance responsibilities. The plan specified no difference in levee standards for urban versus agricultural levees. By 1961, the project was essentially completed (Kelley 1989).

Some documents refer to the project from these authorizations as the "Old" SRFCP.

2.2.1.2 Sacramento River and Major and Minor Tributaries Project

The Sacramento River and Major and Minor Tributaries Project was initially authorized by the federal government in the FCA of 1944, and was further amended by the FCA of 1950 (Public Law 81-516, 81st Congress). The project was a modification and extension of the SRFCP and was to supplement reservoir storage by reducing flooding potential to certain areas along the Sacramento River. Section 12648 of the CWC includes authorizing legislation by the State. Assurances of cooperation were provided in the 1953 MOU.

The project provided for levee construction and/or channel enlargement of the following minor tributaries of the Sacramento River: Chico, Mud, and Sandy Gulch; Butte and Little Chico creeks; Cherokee Canal; and Elder and Deer creeks (Tehama County). In addition, the project included the revetment of levees for the Sutter, Tisdale, Sacramento, and Yolo bypasses. Minor tributary improvements were to reduce flood risk to about 80,000 acres of agricultural land that was important to the economy of the region and to the City of Chico and other smaller communities. Bypass levee revetment features of the project were to reduce flood risk to

floodplain lands adjacent to the bypasses, and ideally would decrease requirements for levee repairs under emergency conditions (U.S. Army Corps of Engineers 1999).

2.2.1.3 American River Flood Control Project

The American River Flood Control Project was authorized by the federal government in the FCA of 1954 to reduce flood risk along the lower American River. Section 12648.1 of the CWC includes authorizing legislation by the State. In 1958, USACE constructed the project, which includes approximately 8 miles of levee along the northern bank of the American River between Carmichael Bluffs and the terminus of the SRFCP levee near the State Fairgrounds. It also includes about 10 miles of levee along the south bank of the American River from the confluence with the Sacramento River to Mayhew drain.

2.2.1.4 Sacramento River – Chico Landing to Red Bluff

The Sacramento River project for bank protection and channel improvements from Chico Landing to Red Bluff was authorized by the FCA of 1958 (Public Law 85-500, 85th Congress). Section 12648.2 of the CWC includes authorizing legislation by the State. The project was authorized in accordance with recommendations by the USACE Chief of Engineers in HD 272 (84th Congress). The project was a modification and extension of the SRFCP and was to increase bank protection along the Sacramento River from Chico Landing to Red Bluff and lower portions of its principal tributaries to reduce flood risk with discharges modified by Shasta Dam and Black Butte Dam. Black Butte Dam was planned to be constructed soon after this project was completed. The area encompassed by this project included the Sacramento River from Chico Landing to Red Bluff, and lower portions of Antelope, Mill, Deer, Pine, Elder, Thomes, and Stony creeks (U.S. Army Corps of Engineers 1999).

2.2.1.5 Lake Oroville Project

Federal participation in the construction of Oroville Dam was authorized by the FCA of 1958 (Section 204 of Public Law 85-500, 85th Congress). The federal interest was flood control provided by the flood control storage reservation of 750,000 acre-feet. This authorization also included the non-SPFC New Bullards Bar and the Marysville Dam (not constructed at the time of this report). Sections 12648 and 12649 of the CWC include authorizing legislation by the State, though these sections refer only to a project that would accomplish the same flood control purposes as proposed by the Table Mountain Dam.

2.2.1.6 Sacramento River Bank Protection Project

Erosion presents a serious ongoing threat to the SRFCP levee system. The Sacramento River Bank Protection Project was authorized by Section 203 of the FCA of 1960 (Public Law 86-645, 74 Statute 498), supplemented by Section 202 of the River Basin Monetary Authorization Act of 1974 (Public Law 93-252, 88 Statute 49), as amended by Section 3031 of the WRDA of 2007, and further supplemented by Section 140 of Public Law 97-377 (96 Statute 1916), to preserve the integrity of the SRFCP levee system. Section 12649.1 of the CWC provides the State authorization for the project.

The First and Second Phases authorized the construction of 915,000 linear feet of bank protection work. Construction of the First Phase began in June 1965. The Second Phase of construction was authorized in 1974, and USACE began investigation of the Third Phase in the mid-1990s.

2.2.1.7 Sacramento River Bank Protection Project, First Phase Mitigation

Environmental mitigation for the impacts of the First Phase of the Sacramento River Bank Protection Project was authorized by Congress in 1986 and approved a post-project mitigation program involving the purchase, protection, and revegetation of 260 acres.

2.2.1.8 North Fork Feather River Project

The North Fork Feather River Project at Chester was authorized by Section 203 of the FCA of 1968 (Public Law 90-483, 90th Congress). Section 12648.7 of the CWC provides the State authorization for the project. The authorized local project was in accordance with recommendations by the USACE Chief of Engineers in HD 314 (90th Congress). This project, consisting of a diversion dam, channel, and levees, was intended to reduce local flood risk.

2.2.1.9 Middle Creek Project

The Middle Creek Project, upstream from Clear Lake, was authorized by the FCA of 1954, Section 203. The authorized project was in accordance with recommendations by the USACE Chief of Engineers in HD 367 (81st Congress). Section 12656.5 of the CWC provides authorizing legislation by the State; this was enacted under the California Statutes of 1955.

2.2.1.10 Snagging and Clearing Projects

The Continuing Authorities Program allows USACE to respond to a variety of flood problems without obtaining specific Congressional authorization for each project. Section 208 of the 1954 FCA, as amended, allows work to remove accumulated snags and other debris, and to clear and straighten stream channels. Section 12656.7 of the CWC provides the State authorization for these types of projects. Three snag removal and stream clearing projects in the Sacramento River Watershed include the following:

- **Adin Project** – A flood control project was authorized by the federal government for Ash and Dry creeks at Adin in Modoc County in the FCA of 1937 and modified by the FCA of 1954. Ash and Dry creeks are tributary streams to the Pit River above Shasta Dam. This project was intended to reduce local flood risk.

- **Salt Creek Project** – The Salt Creek Project was authorized by Section 2 of the FCA of 1937, as amended by Section 208 of the FCA of 1954. This project was intended to reduce local flood risk.

- **McClure Creek Project** – The McClure Creek Project was authorized by Section 2 of the FCA of 1937, as amended by Section 208 of the FCA of 1954. This project was intended to reduce local flood risk.

2.2.1.11 South Sacramento County Streams Group Project

The South Sacramento County Streams Group Project includes levee and channel improvements on Morrison Creek and its major tributaries and, in the lower watershed, the Beach Stone Lakes levees to provide a 200-year level of flood protection to the area, and enhance recreation and restore wildlife habitat. Construction was completed in 2016.

2.2.1.12 Sacramento River Flood Control Project Unit 106 Mellin Levee

The Mellin Levee is located in Solano County near the City of Rio Vista and is a feature of SRFCP Unit 106. According to the SAC106 O&M Manual, dated May 1953, Unit 106 of SRFCP originally consisted of the South Levee of Lindsey Slough and the West Levee of Yolo Bypass from Lindsey Slough to Watson Hollow Drain and the North Levee of Watson Hollow Drain. The purpose of the Unit 106 levees was to protect adjacent agricultural lands against flooding from Lindsey Slough and the Yolo Bypass and also against tidal action during various high-flood stages.

The CVFPB formally provided the assurance of cooperation to USACE for the Unit 106 levees by letters dated April 2, 1952 (Central Valley Flood Protection Board 1952), and March 9, 1953 (Central Valley Flood Protection Board 1953).

The Mellin Levee was subsequently constructed in 1971 by USACE, at CVFPB's request, and was incorporated into the Unit 106 features of the SRFCP as an extension of the West Levee Yolo Bypass of the SRFCP Unit 106 (refer to the CDEC O&M manual database for the supplement to the *SAC106 O&M Manual*, dated December 1971 [U.S. Army Corps of Engineers 1971]). CVFPB acquired ownership of the Mellin Levee in 1971.

2.2.1.13 Natomas Cross Canal South Levee Improvements Project

The Natomas Cross Canal South Levee is located in Reclamation District (RD) 1000, within Sutter County, and is a feature of SRFCP Unit 125. This was an Early Implementation Program (EIP) project and included improving the level of flood protection to the Natomas Basin perimeter levee system located north of Sacramento through construction of cutoff walls and levee strengthening and reshaping features. The project was approved under Title 33 of the United States Code (U.S.C.) Section 408 by USACE, at the request of CVFPB. The project was constructed by the Sacramento Area Flood Control Agency (SAFCA).

The turnover letter from USACE to CVFPB for transfer of O&M responsibilities is dated April 18, 2014. The CVFPB adopted the project by Resolution No. 2014-22 on June 27, 2014, which does the following (Central Valley Flood Protection Board 2014):

- Acknowledges acceptance, from USACE, responsibilities to operate and maintain the Natomas Cross Canal South Levee via USACE Sacramento District letter to the CVFPB dated April 18, 2014.

- Acknowledges receipt, from USACE, the revised *Supplement to Standard Operations and Maintenance Manual, Sacramento River Flood Control Project, Unit No. 125, Back Levee of Reclamation District No. 1000,* U.S. Army Corps of Engineers, Sacramento, California, April 2014 (Revised O&M Manual) (U.S. Army Corps of Engineers 2014).

- Acknowledges receipt, from USACE, final project as-built drawings, originally prepared by SAFCA.

- Transfers responsibilities to operate and maintain the Natomas Cross Canal South Levee to RD 1000, along with the Revised O&M Manual and as-built drawings via June 27, 2014, letter.

2.2.1.14 Lower Feather River Setback Levee at Star Bend Project

The Lower Feather River Setback Levee at Star Bend is located in Levee District (LD) 1, within Sutter County, and is a feature of the SRFCP, Unit 144. This EIP project included the construction of a 3,400-foot-long setback levee to provide 200-year flood protection to the surrounding urban areas and the conversion of 45 acres of land on the river side of the setback levee to riparian habitat. The project was approved under Title 33 of the U.S.C. Section 408 by USACE, at the request of CVFPB. The project was constructed by LD 1.

USACE transferred O&M responsibilities to CVFPB through a turnover letter dated July 18, 2013. CVFPB formally adopted this project by Resolution No. 2013-21 on December 20, 2013 (Central Valley Flood Protection Board 2013). The resolution does the following:

- Accepts, from USACE, responsibilities to operate and maintain the Feather River Setback Levee at Star Bend.

- Receives, from USACE, the revised Supplement to Standard Operations and Maintenance Manual, Sacramento River Flood Control Project, Unit No. 144, West Levee of Feather River from North Boundary of Levee District 1 to North Boundary of Maintenance Area 3 (previously Reclamation District No. 823), USACE, Sacramento District, June 2013.

- Receives, from USACE, final project as-built drawings, originally prepared by LD 1.

- Transfers responsibilities to operate and maintain the Star Bend Setback Levee to LD 1, Sutter, along with the listed documentation.

2.2.2 San Joaquin River Watershed Projects

Components of the SPFC located in the San Joaquin River Watershed are the Lower San Joaquin River and Tributaries Project, Littlejohns Creek and Calaveras River Stream Group Project, including the New Hogan and Farmington projects, and the Merced County Streams Project. Federal authorizations began in 1944 while State authorization began in 1955.

2.2.2.1 Lower San Joaquin River and Tributaries Project

The federal government authorized the improvement of lower reaches of the San Joaquin River and its tributaries in the FCA of 1944 (Public Law 78-534). Section 12651 of the CWC provides the State authorization for the project. The project provided for improvement by the federal government of the existing channel and levee system on the San Joaquin River from the Delta upstream to the mouth of the Merced River, and on the lower reaches of the Stanislaus and Tuolumne rivers, by raising and strengthening existing levees, constructing new levees, constructing revetments on riverbanks where required, and removing accumulated snags in the main river channel. The project was also intended to reduce flood risk for areas above the mouth of the Merced River through the State construction of levee and channel improvements, authorized by the federal government in the Emergency Flood Control Funds Act of 1955. The project includes a State-designed and constructed bypass system in the upper reaches of the project area. Project construction was completed by November 1968, except the left-bank San Joaquin River levee between the confluence with the Merced River and the confluence with the Tuolumne River (completed in 1972).

2.2.2.2 Buchanan Dam and Eastman Lake Project

The Buchanan Dam and Eastman Lake Project was authorized by the FCA of 1962 (Public Law 87-874, 87th Congress) in accordance with recommendations by the USACE Chief of Engineers in SD 98. Section 12648.4 of the CWC provides the State authorization for the project. The dam and reservoir are not part of the SPFC, but the channel improvements downstream from Buchanan Dam on the Chowchilla River and tributaries are included in the SPFC.

2.2.2.3 Hidden Dam and Hensley Lake Project

The Hidden Dam and Hensley Lake Project was authorized by the FCA of 1962 (Public Law 87-874, 87th Congress), substantially in accordance with recommendations by the USACE Chief of Engineers in SD 37 (87th Congress). Section 12648.3 of the CWC provides the State authorization for the project. The dam and reservoir are not part of the SPFC, but the channel improvements downstream from Hidden Dam on the Fresno River are included in the SPFC.

2.2.2.4 Merced County Streams Project

The improvement of the Merced County Streams was authorized by the FCA of 1944 (Public Law 78-534, 78th Congress). The authorization was based on HD 473 (78th Congress). Section 12650 of the CWC provides the State authorization for the project. The project includes a diversion from Black Rascal Creek to Bear Creek, a diversion between Owens Creek and Mariposa Creek, channel improvements and levees, and one retarding-type reservoir east of the City of Merced. The project reduces flood risk to agricultural areas, the City of Merced, and the towns of Planada and Le Grand and other smaller communities. Of the five authorized and constructed reservoirs, the State provided assurances to the federal government for only one reservoir, Castle Dam, authorized by the FCA of 1970 (Public Law 91-611, Section 201, Statute 1824).

2.2.2.5 Bear Creek Project

The Bear Creek Project was authorized by the FCA of 1944 (Public Law 78-534, 78th Congress). Section 12652 of the CWC provides the State authorization for the project. Bear Creek is a tributary to the San Joaquin River in the Delta near Stockton. The Bear Creek channel and levee improvements are included in USACE Chief of Engineers recommendations to the Secretary of the Army in HD 545 (78th Congress).

2.2.2.6 Littlejohns Creek and Calaveras River Stream Group Project

The Littlejohns Creek and Calaveras River Stream Group Project was authorized by the FCA of 1944 (Public Law 78-534, 78th Congress). Sections 12652 and 12653 of the CWC provide the State authorization for the project. This act authorized the improvement of Littlejohns Creek and Calaveras River, as well as its tributaries, in accordance with recommendations by the USACE Chief of Engineers in HD 545 (78th Congress). The project included a diversion from Duck Creek to Littlejohns Creek and other channel improvements and levees.

2.2.2.7 Farmington Dam Project

The Farmington Dam Project was authorized by the FCA of 1944 (Public Law 78534, 78th Congress). Section 12653 of the CWC provides the State authorization for the project. This act authorized the improvement of Littlejohns Creek and tributaries in accordance with recommendations by the USACE Chief of Engineers in HD 545 (78th Congress). Farmington Dam is not part of the SPFC, but channel improvements along South Littlejohns Creek and its north and south branches are included in the SPFC.

2.2.2.8 Mormon Slough Project

The Mormon Slough Project was authorized by the FCA of 1962 (Public Law 87-874, 87th Congress). Section 12648.6 of the CWC provides the State authorization for the project. The authorization was in accordance with recommendations in HD 576 (87th Congress). The USACE Chief of Engineers concurred with these recommendations in his 1962 report. The project includes channel improvements, levees, and pumping plants.

2.3 Ongoing State-federal Flood Management Projects

Work continues on multiple State-federal flood protection projects in the Sacramento River Watershed. When they are completed, these projects are likely to become facilities (or modifications to facilities) of the SPFC (refer to Chapter 7.6). Table 2-2 includes the federal acts, public law numbers, and Chief of Engineers Reports and CWC sections pertaining to each ongoing project. This section briefly describes each project, with the status of each project as of the time of this report. Some elements of these projects are expected to become part of the SPFC upon completion, while other elements are not (such as the bridge raise for Folsom Dam Modifications).

2.3.1 Ongoing Sacramento River Watershed Projects

Ongoing State-federal flood protection projects in the Sacramento River Watershed at the time of this report include the following:

- Modifications to the Sacramento River Flood Control Project.
- American River Watershed, Common Features Project.
- American River Watershed, Folsom Dam Raise Project.
- American River Watershed, Common Features Project, Natomas Basin.
- American River Watershed, Joint Federal Project at Folsom Dam.
- Yuba River Watershed, Marysville Ring Levee Project.
- Middle Creek Flood Damage Reduction and Ecosystem Restoration Project.
- West Sacramento Project.
- Cache Creek Settling Basin Enlargement.
- Murphy Slough Habitat Restoration Project.
- Sutter Watershed, California Project.

2.3.1.1 Modifications to the Sacramento River Flood Control Project

Ongoing modifications to the SRFCP include the Upper Sacramento Area Levee Reconstruction, Mid-Valley Area Levee Reconstruction, and Lower Sacramento Area Levee Reconstruction projects to restore sections of levee to design standards. Construction of these modifications is partially complete as of the time of this report, and some elements are being re-evaluated.

2.3.1.2 American River Watershed, Common Features Project

The American River Watershed, Common Features Project includes multiple proposed improvements along the lower American River downstream from Folsom Dam, Sacramento River downstream from the Natomas Cross Canal, and the Natomas Cross Canal to provide a minimum 200-year level of flood protection in combination with the Folsom Dam Raise Project. The construction of these improvements is partially complete as of the time of this report, and some elements are being re-evaluated.

2.3.1.3 American River Watershed, Common Features Project, Natomas Basin

The project improvements encompass 41.7 miles of levee repair including 34.0 miles of cutoff wall and 9.1 miles of seepage berm. Improvements will also include relocation of drainage facilities, reconstruction of pumping plants, real estate acquisition and creation of new habitat. The project was authorized in 1996.

2.3.1.4 American River Watershed, Folsom Dam Raise Project

The American River Watershed, Folsom Dam Raise Project includes raising Folsom Dam, other modifications to the dam facilities, environmental restoration, and a new bridge downstream from the dam to provide a minimum 200-year level of flood protection in combination with the Common Features Project. A large majority of the remaining project components are in the design phase. Construction is estimated to be complete in 2025. The American River

Watershed, Folsom Dam Raise Project, Bridge Element listed in the 2010 and 2017 Descriptive Document was removed from this list because construction is complete. This project is not part of the SPFC.

2.3.1.5 Yuba River Watershed, Marysville Ring Levee Project

The Yuba River Watershed, Marysville Ring Levee Project includes improvements to the ring levee that surrounds Marysville. The project is being constructed at the time of this report.

2.3.1.6 Middle Creek Flood Damage Reduction and Ecosystem Restoration Project

The Middle Creek Flood Damage Reduction and Ecosystem Restoration Project includes the removal of levees to restore vegetation and wetlands on approximately 1,650 acres in the Robinson Lakebed area. The project is about to begin the design phase at the time of this report.

2.3.1.7 West Sacramento Project (Slip Repair)

The West Sacramento Project includes raising and strengthening about 5 miles of existing levees on the east side of the Yolo Bypass and south side of the Sacramento Bypass to provide a 200-year level of flood protection to West Sacramento. Construction was completed in 2005, but slips developed during high water in 2006. Construction was completed in 2011.

2.3.1.8 Cache Creek Settling Basin Enlargement

The Cache Creek Settling Basin Enlargement includes enlargement of the settling basin facilities. Construction is mostly complete at the time of this report.

2.3.1.9 Murphy Slough Habitat Restoration Project

The Murphy Slough Habitat Restoration Project includes the restoration of riparian vegetation on approximately 300 acres of fallow land and 2,000 linear feet of riverbank and to protect the area from head cuts. Construction is complete at the time of this report.

2.3.1.10 American River, Common Features 2016 Project, ARCF-16

This project will provide flood damage reduction improvements to address seepage, stability, erosion and overtopping concerns identified for the east levee of the Sacramento River downstream of the American River to Freeport, east levee of the Natomas East Main Drainage Canal, Arcade Creek, and Magpie Creek, as well as erosion control measures for specific locations along the American River, and the widening of the Sacramento Weir and Bypass to deliver more flood flows into the Yolo Bypass. A majority of the project is in the design phase, and construction is estimated to be complete in 2025.

2.3.1.11 Sutter Watershed, California Project

This project is implementing flood risk reduction measures along the Feather River's right (west) bank levee (36.5 miles). The project consists of in-place strengthening of the existing levee along the west bank of the Feather River from Thermalito Afterbay south to Laurel

Avenue. Improvements include soil bentonite levee cutoff walls, seepage berms, and levee erosion protection. The project was authorized in 2014. Construction was completed in 2020.

Table 2-3. Summary of Ongoing State-federal Flood Protection Projects

Project	Federal Act	Public Law	Chief of Engineers Report	State Authorization
Common Features Project	WRDA 1986	99-662	American River Watershed Project, California	CWC Section 12670.10, 12670.11, 12670.12, 12670.14, 12670.16
	WRDA 1996	104-303		
	WRDA 1999	106-53		
	WRDA 2016	114-322		
Folsom Dam Raise Project	DAA 1993	102-396	American River Watershed Project, California	CWC Section 12670.11, 12670.14
	WRDA 1999	106-53		
	EWDAA 2004	108-137		
	EWDAA 2006	109-103		
	BBA 2018	115-123		
Joint Federal Project at Folsom Dam	WRDA 1996	110-114	American River Watershed Project, California	CWC Section 12670.14
	WRDA 1999	106-53		
Common Features Project Natomas Watershed	WRDA 1996	110-114	American River Watershed Project, California	CWC Section 12670.14
	WRDA 2014	113-121		
Yuba River Watershed, Marysville Ring Levee Project	WRDA 1999	106-53	Yuba River Watershed Investigation, California Feasibility Report	CWC Sections 8615, 12616, and 12670.7
	WRDA 2007	110-114		

Project	Federal Act	Public Law	Chief of Engineers Report	State Authorization
Middle Creek Flood Damage Reduction and Ecosystem Restoration Project	FCA 1962	87-874	HD 104-149	CWC Sections 12585.12 and 12656.5
	WRDA 2007	110-114		
West Sacramento Project	WRDA 1992	102-580	Sacramento Metro Area, California, June 29, 1992	CWC Sections 12670.2 and 12670.3
Cache Creek Settling Basin Enlargement	WRDA 1986	99/662	Report dated April 27, 1981	CWC Section 12670
Murphy Slough Habitat Restoration Project	WRDA 1986	99-662	CAP	CWC Sections 8590, 8590.2, 8615, 8623, and 12841
Sutter Watershed, California Project	WRDA 2014	113-121	Sutter Watershed, California General Investigation Feasibility Study Report Dated March 12, 2014	CWC Code Sections 8615 and 12657
San Joaquin River Watershed, Lower San Joaquin River, California Project	WRDA 2018	115-270	Lower San Joaquin River Feasibility Study Dated July 31, 2018	CWD Sections 8617.1, 12645, 12657, and 12651

Notes:
CAP = Continuing Authorities Project
CWC = California Water Code
FCA = Flood Control Act
HD = house document
WRDA = Water Resources Development Act

2.3.2 Ongoing San Joaquin River Watershed Projects

Ongoing State-federal flood protection projects in the San Joaquin River Watershed at the time of this report include the following:

- San Joaquin River Watershed, Lower San Joaquin River, California Project.
- RD 17 Phase 1-3 100-year Seepage Project.
- Smith Canal Gate Project.

2.3.2.1 San Joaquin River Watershed, Lower San Joaquin River, California Project

This project is to provide 200-year protection for the north and central Stockton area. The Design Agreement and Local Design Agreement have been approved by the CVFPB. USACE has initiated the project and has determined the first reach to begin the preconstruction engineering and design. Construction is anticipated to begin in fall 2021.

2.3.2.2 RD17 Phase 1-3 100-year Seepage Project

Phases 1 and 2 of the RD17 have been constructed. The final Phase 3 of the RD17 project has the 100 percent designs has been approved, and its construction began in October 2019. The work provides seepage repairs along the RD17 existing levee system.

2.3.2.3 Smith Canal Gate Project

The purpose of this project is to provide 200-year protection for areas located in the central Stockton area. It will provide a gates structure and levee improvements. The 100-percent final designs have been submitted and nearly approved. The construction for this project began in the spring of 2020.

2.4 Ongoing State-sponsored Flood Protection Projects and Feasibility Studies

Since the adoption of the Central Valley Flood Protection Plan in 2012, DWR has undertaken multiple specialty projects that aim to meet flood-risk-management objectives, improve O&M, promote multi-benefit projects and ecosystem functions, and address key stressors, such as fish passage barriers. These projects are listed here.

2.4.1 Lower Elkhorn Basin Levee Setback Project

This 7-mile-long multi-benefit flood risk reduction and ecosystem enhancement project widens Yolo Bypass and Sacramento Bypass floodplain between I-5 and I-80 in Yolo County by about 1,500 feet and makes corresponding interior drainage improvements. The project was initiated by the 2012 CVFPP, and construction began in August 2020. The project will reduce flood risk to the Sacramento region and establish wildlife-friendly agriculture and ecological improvements for native salmon, steelhead, and avian species. As of August 2021, grading of the proposed 5 million cubic yard levee was roughly 20-percent complete, with final completion expected in 2023.

2.4.2 Tisdale Weir Rehabilitations and Fish Passage Project

Built in 1932 by the U.S. Army Corps of Engineers atop an early structure built around 1911, the Tisdale Weir is a 1,150 foot-long concrete structure located on the east side of the Sacramento River, south of the town of Meridian in Sutter County, and four miles west of the Sutter Bypass. The overall goals of the proposed Project are to rehabilitate the Tisdale Weir to correct structural deficiencies and to address the known fish passage and stranding issues at the weir.

The final environmental impact report for the project pursuant to the California Environmental Quality Act was certified in fall 2021, and the project is expected to start construction in Spring 2023.

2.4.3 Lookout Slough Tidal Habitat Restoration and Flood Improvement Project

The Lookout Slough Tidal Habitat Restoration and Flood Improvement Project is located in the Cache Slough region, of the Sacramento-San Joaquin Delta with elevations favorable for establishing tidal habitat for the endangered Delta smelt. The project would restore approximately 3,000 acres of tidal wetland, creating habitat that is beneficial to native fish and wildlife and provides systemwide flood risk reduction benefits. The project has been designed and is obtaining final permits and is expected to start construction in 2022.

2.4.4 Little Egbert Tract Feasibility Study

The Little Egbert Tract Project sits at the southern end of the Yolo Bypass, just northeast of the City of Rio Vista, along Cache Slough. This project is expected to create about 3,400 acres of habitat of varying types, from green sturgeon, delta smelt, giant garter snake, tidal wetlands, riparian habitat and more. A multi-benefit feasibility study was completed in 2019, and a Little Egbert Tract Joint Powers Agency was established in 2020 to advance implementation. The feasibility level cost estimate places this project around $200 million and will improve the overall flood conveyance of the Yolo Bypass, reduce flood risk, improve and create habitat for listed species, create recreational opportunities for people in the area, and improve performance of the SPFC levees that surround the Little Egbert Tract.

2.5 Existing Federal Participation in Other Non-SPFC Flood Protection Projects

In addition to SPFC facilities, USACE has an interest and role in other flood management projects in the Central Valley. While these are not part of the SPFC, their operation may influence operation of the SPFC, especially in reducing peak flood flows through the SPFC levee system. This section briefly describes other projects that function with the SPFC as a flood protection system.

2.5.1 Multipurpose Reservoir Projects

Many of the storage facilities that contribute to flood management in the Sacramento River and San Joaquin River watersheds are also operated for other purposes, such as water supply and power generation, but are not part of the SPFC because they include no State assurances to the federal government. Debris dams in the upper Yuba River Watershed contribute in a minor way to flood management in the Sacramento River Watershed, and hydroelectric reservoirs in the upper American River Watershed sometimes provide flood storage space that can be credited to Folsom Lake. Figure 2-2 shows major multipurpose storage projects that contribute significantly to flood management, which are listed in Table 2-4 and 2-5 in chronological order of construction for the Sacramento River Watershed and San Joaquin River watershed,

respectively. Under Section 7 of the 1944 Flood Control Act, USACE was authorized to establish rules for operation for storage allocated to flood control at reservoirs constructed wholly or in part with federal funds. Note, Oroville Dam is the only major multipurpose project listed that is part of the SPFC, and it is also operated for Flood Control in accordance with USACE rules under Section 7. During high-water periods, reservoir operators coordinate with DWR and USACE during operations conferences at the State-federal Flood Operations Center in Sacramento. These conferences sometimes lead to voluntary modifications of individual reservoir operations to improve overall system operation. In total, these reservoir operations significantly reduce peak flood flows to the downstream levee system.

Table 2-4. Major Multipurpose Reservoir Project Summary: Sacramento River Watershed

Reservoir	Dam	Date Completed	Total Reservoir Capacity (acre-feet)	Flood Storage Capacity (acre-feet)	Owner and Operator
Shasta Lake	Shasta Dam	1949	4,550,000	1,300,000	Reclamation
Black Butte Lake	Black Butte Dam	1963	160,000	137,000	USACE
Folsom Lake	Folsom Dam	1956	973,000	400,000[a]	Reclamation
Lake Oroville	Oroville Dam[b]	1967	3,540,000	750,000	DWR
New Bullards Bar Reservoir	New Bullards Bar Dam	1967	960,000	170,000	Yuba County Water Agency
Indian Valley Reservoir	Indian Valley Dam	1976	301,000	40,000	Yolo County Flood Control and Water Conservation District

Source: U.S. Army Corps of Engineers (1997)

[a] Folsom Dam is operated with variable flood storage between 400,000 acre-feet and 670,000 acre-feet to account for available storage in upstream reservoirs.

[b] Oroville Dam is part of the SPFC as is the smaller single-purpose Castle Dam in the San Joaquin River Watershed. All other dams in this table are non-SPFC.

Notes:
DWR = California Department of Water Resources
Reclamation = Bureau of Reclamation
USACE = U.S. Army Corps of Engineers

Table 2-5. Major Multipurpose Reservoir Project Summary: San Joaquin River Watershed

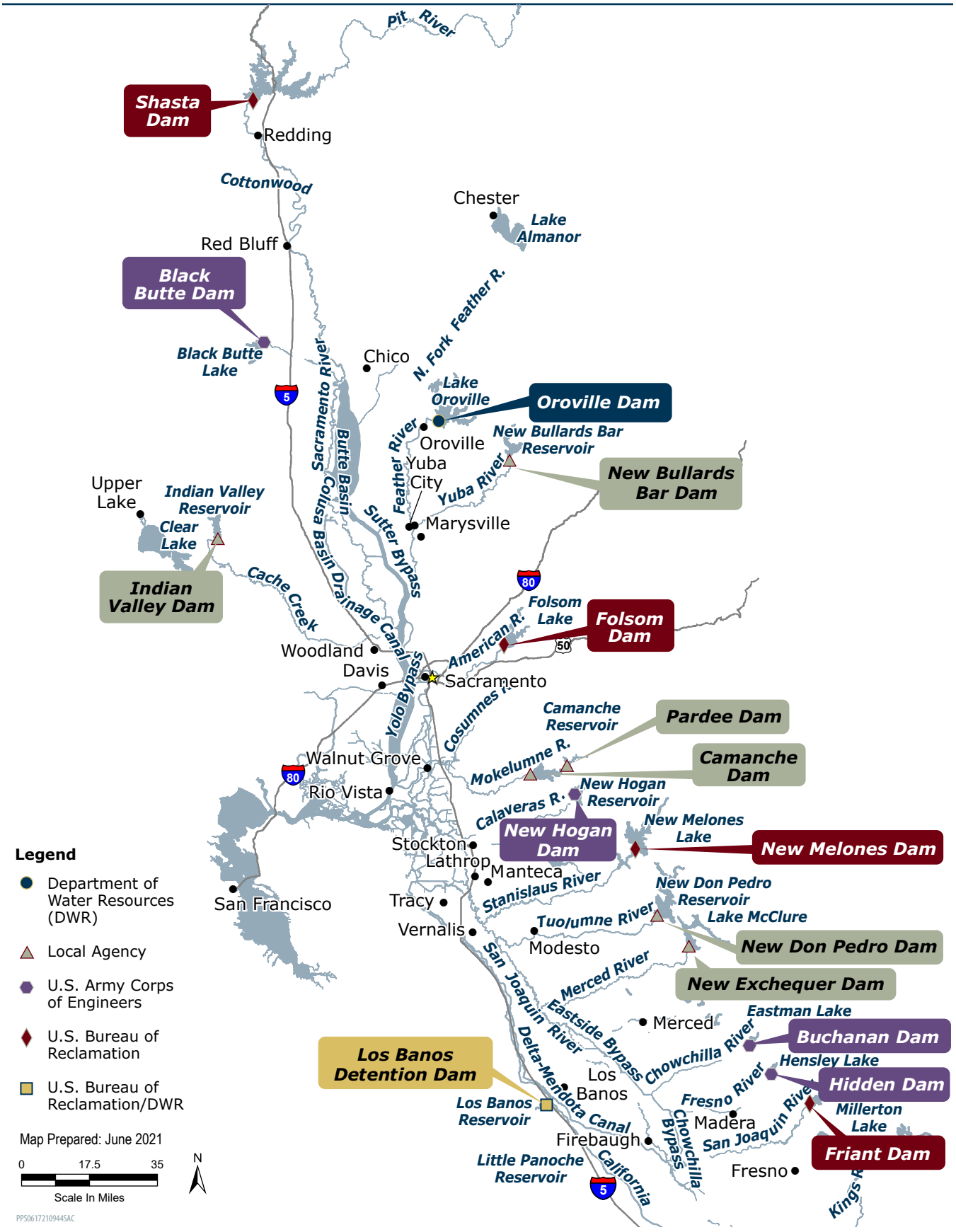
Reservoir	Dam	Date Completed	Total Reservoir Capacity (acre-feet)	Flood Storage Capacity (acre-feet)	Owner and Operator
Millerton Lake	Friant Dam	1949	521,000	390,000[a]	Reclamation
Lake McClure	New Exchequer Dam	1967	1,025,000	400,000	Merced Irrigation District
New Don Pedro Reservoir	New Don Pedro Dam	1970	2,030,000	340,000	Turlock and Modesto Irrigation Districts
Hensley Lake	Hidden Dam	1975	90,000	65,000	USACE
Eastman Lake	Buchanan Dam	1975	150,000	45,000	USACE
New Melones Lake	New Melones Dam	1978	2,420,000	450,000	Reclamation
Los Banos Reservoir	Los Banos Detention Dam	1965	34,600	14,000	Reclamation and DWR
Pardee Reservoir	Pardee Dam	1963	198,000	200,000[b]	East Bay Municipal Utilities District
Camanche Reservoir	Camanche Dam	1963	431,000		
New Hogan Reservoir	New Hogan Dam	1964	325,000	165,000	USACE

Source: U.S. Army Corps of Engineers (1997)

[a] Friant Dam operated in conjunction with upstream reservoirs.
[b] Camanche Dam operated in conjunction with Pardee Dam and upstream reservoirs.

Notes:
DWR = Department of Water Resources
Reclamation = Bureau of Reclamation
USACE = U.S. Army Corps of Engineers

Figure 2-2. Locations of Multipurpose (including Flood Control) Dams and Reservoirs in the Sacramento River and San Joaquin River Watersheds



2.5.2 Local and Regional Projects

The federal government has interest in local projects for which local or regional entities, rather than the State, provided assurances. These projects include, but are not limited to the following:

- Folsom Lake Crossing.
- Yuba River Goldfields.
- Chico Landing to Keswick Dam.
- Big Dry Creek Dam and Diversion Project.
- Duck Creek Project.
- Stanislaus River Local Interest Project Levees.
- Mariposa Dam.
- Owens Dam.
- Burns Dam.
- Bear Dam.
- North Area Local Project (Sacramento Area Flood Control Agency).

2.6 Other Non-SPFC Flood Protection Facilities

In addition to the projects described in Chapter 2.4, the flood protection system in the Central Valley includes other facilities that are not part of the SPFC. They are briefly discussed here.

2.6.1 Non-project Levees

Non-project levees and related facilities have been constructed by USACE and local agencies along many of the rivers, creeks, and streams in the Central Valley. Many of these facilities are operated and maintained similar to project facilities and connect to project facilities for flood management purposes. By definition, they are not part of the SPFC, and are not addressed in this report. However, it is important to recognize that these non-project levees may affect the SPFC's performance as part of the flood management system.

Non-project levees include the levee systems in the Delta downstream from Collinsville on the Sacramento River and downstream from the Stockton area on the San Joaquin River that consist entirely of non-project levees maintained by USACE (e.g., levees of the Sacramento and Stockton ship channels) or local interests. These levees were not constructed for flood management purposes.

2.6.2 Other Non-project Facilities

Numerous other flood protection facilities are owned and operated by local entities but are not part of the SPFC, including the following:

- Local levees and floodwalls within SPFC-levee-protected areas.

- Local pumping plants that discharge drainage water into SPFC-leveed channels. Examples include a number of pumping plants owned and operated by local RDs, LDs, and communities to pump interior storm runoff into the larger waterways.

2.6.3 Designated Floodways

Designated floodways are not part of the SPFC facilities, as defined in CWC Section 9110 (f), because they are State-designated without assurances to, or participation of, the federal government. However, these floodways provide an important management tool to help the State meet its requirement for passing project design flows (refer to Chapter 6.8 for designated floodways as a condition of project operation).

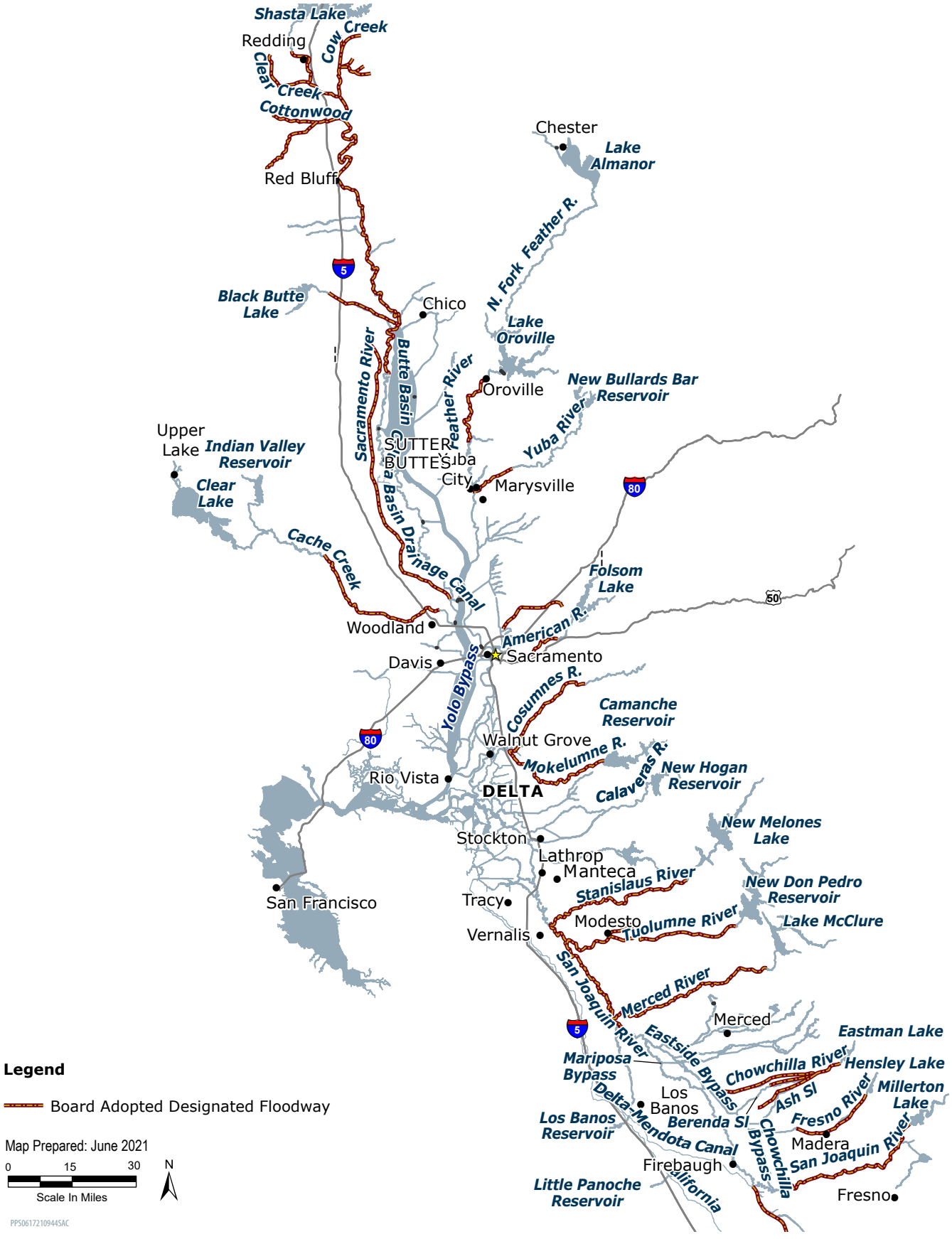
Designated floodways are the primary nonstructural flood management program employed by the State. The program was started in 1968 to control encroachments and preserve the flow regimes of floodways to protect public improvements, lives, and land-use values (CWC Section 8609). Designated floodways are defined as follows: (1) the channel of the stream and that portion of the adjoining floodplain reasonably required to provide for the passage of a design flood, as indicated by floodway encroachment lines on an adopted map, or (2) the floodway between existing levees, as adopted by the Board or the California State Legislature.

Designated floodways serve a critical function in protecting life and property from flood risks. The designated floodway system includes more than 60 designated floodways covering more than 1,300 miles of stream length. Figure 2-3 shows designated floodways along the Sacramento River and San Joaquin River, as well as major tributaries. There are additional designated floodways in the Tulare Lake Watershed.

To designate a floodway, the CVFPB usually completes a detailed hydraulic study to determine the design discharge associated with the design flood (usually 100-year recurrence interval) and the area needed to convey the design flood. The findings of the study are then used to delineate floodway maps, and in some cases, determine areas of shallow flooding. In other cases, floodway boundaries have been developed using analytical methods based on engineering judgment and review of historical floods. In proposing or revising designated floodways, the CVFPB must also consider: (1) flood control improvements and regulations affecting the floodplain; (2) the degree of danger from flooding to life, property, and public health and welfare; and (3) the rate and type of development taking place on the floodplain (23 California Code of Regulations [CCR] Section 102).

Land uses within an adopted designated floodway are restricted to not impede the free flow of water in the floodway or jeopardize public safety (23 CCR Section 107). In general, activities such as agriculture, grazing, and recreation are allowed, as are structures and activities that can be quickly and easily removed or pose little impedance to river flow. The CVFPB has the authority to determine additional permitted uses within the floodway on a case-by-case basis.

Figure 2-3. Location of Designated Floodways within the Sacramento River and San Joaquin River Watersheds



CHAPTER 3

State Plan of Flood Control Facilities Update

This chapter describes State Plan of Flood Control (SPFC) facilities according to the function they perform, which is to manage flood flows. Therefore, the facility descriptions are presented geographically by river reach, generally bounded by points where significant inflows or outflows occur.

The facility descriptions are scaled to the major facilities: levees, drainage pumping plants, weirs or other water control structures, drop structures, dams and reservoirs, other major channel improvements, and mitigation areas. This chapter does not include smaller components of these facilities and associated features, such as transportation relocations, stream gauges, pipes passing through levees, or bridges, but those can be found in unit-specific operations and maintenance (O&M) manuals or the O&M summary data table included on the reference digital versatile disk (DVD) that accompanies this report.

The facilities are generally described in an upstream-to-downstream direction. However, the flood management system is not linear; rather it is a network of tributary and distributary channels. As such, some deviation from the upstream-to-downstream convention is necessary. Levees referred to as being on the left bank or right bank of a river reach are based on their position when looking downstream.

Levee data for the SPFC are mostly consistent with the California Levee Database. Because California Levee Database information is continually being revised to reflect the best available information, future updates to this SPFC Descriptive Document will reflect changes since the prior draft or update.

3.1 Summary

This section presents a general summary of the SPFC facilities that are described in more detail in Chapters 3.2 and 3.3. Apart from the backwater effect of flows mingling in the Delta, SPFC facilities on the Sacramento River and tributaries operate independently from SPFC facilities on the San Joaquin River and tributaries. The Sacramento River system carries flood flows that are about 10 times greater in volume than those in the San Joaquin River system.

Both the Sacramento River and San Joaquin River use bypass systems to carry a large portion of floodwater. Together, the rivers and their tributaries have approximately 1,600 miles of SPFC

levees. Most non-SPFC reservoirs in each system have flood reservation storage that significantly helps attenuate flows and aids in the operation of downstream SPFC facilities.

3.1.1 Sacramento River Watershed

The flood management system along the Sacramento River and tributaries manages flood flows originating from an area of approximately 27,000 square miles. Major tributaries to the Sacramento River include the Feather, Yuba, Bear, and American rivers, which discharge to the Sacramento River from the east. The design flood flow capacities of the various stream reaches are also shown on Figures 3-1A to 3-1B and listed in Table 3-1.

The design flood flow capacities shown in Table 3-1 are from unit-specific O&M manuals and from Sacramento River Flood Control Project (SRFCP) levee and channel profiles dated March 1957, revised August 1969 (1957 Revised Profile Drawings) (U.S. Army Corps of Engineers 1957) (refer to Chapter 6.6.1); in some cases, these capacities are inconsistent within a given river reach. Where design flood flow capacities are inconsistent between the O&M manuals and 1957 Revised Profile Drawings, the California Department of Water Resources (DWR) operates SPFC facilities in the Sacramento River Watershed based on the 1957 Revised Profile Drawings rather than on design flood flows from the O&M manuals. These design flood flow capacities are based on hydraulic analyses conducted before 1960, generally to establish the minimum standard for top-of-levee elevations during the design phase. These capacities do not account for geotechnical or geomorphic conditions that may result in current flood flow capacities being less than design flood flow capacities. In some cases, State of California (State), federal, or local agencies may have conducted more recent hydraulic studies that estimate higher or lower flow capacities than those shown in the table – refer to the 2022 Flood System Status Report Update (FSSR) (California Department of Water Resources 2022) for updated estimates of current actual flood flow capacities and the Central Valley Flood Protection Plan (CVFPP) for resolution of these inconsistencies.

Where the 1957 Revised Profile Drawings did not include design flood flow capacities and the capacities from O&M manuals are different for the left-bank levee and right-bank levee along a particular reach, the lowest capacity is shown on Figures 3-1A and 3-1B. Appendix A provides detailed maps of the areas shown on Figures 3-1A and 3-1B.

Along tributary streams to the Sacramento River upstream from Ord Ferry, most SPFC facilities were constructed primarily to help reduce local flooding and have no association with the continuous flood management system that stretches from Ord Ferry to Collinsville in the Delta.

Flow in the Sacramento River is reduced by spilling floodwater into bypass areas through historical overflow areas and SPFC weirs. The first spill from the Sacramento River occurs just upstream from the start of the levee system at Ord Ferry. Floodwater leaves the river through three designated overflow areas and flows into the Butte Basin, which drains into the Sutter Bypass. Floodwater also spills into bypasses over five SPFC weirs. Because of these spills to the bypass areas, the design flow capacity of the Sacramento River generally decreases in a downstream direction except where tributary inflow increases river flow. For example, the

design capacity of the Sacramento River upstream from the leveed system is about 260,000 cubic feet per second (cfs). Downstream from the Tisdale Weir, the river's design capacity is only 30,000 cfs.

The comprehensive system of SPFC levees, river channels, overflow weirs, drainage pumping plants, and flood bypass channels is the largest flood management system in California. This system includes the following major SPFC facilities:

- About 440 miles of river, canal, and stream channels (including an enlarged channel of the Sacramento River from Cache Slough to Collinsville).
- About 1,000 miles of levees (along the Sacramento River channel, Sutter and Yolo watersheds, and Feather, Yuba, Bear, and American rivers).
- Four relief bypasses (Sutter, Tisdale, Sacramento, and Yolo bypasses).
- Knights Landing Ridge Cut, connecting the Colusa Basin to the Yolo Bypass.
- Five major weirs (Sacramento Weir, built in 1916; Fremont Weir, built in 1924; Moulton and Tisdale Weir, both built in 1932; and Colusa Weir, built in 1933).
- Two flood relief structures and one natural overflow area (M&T Flood Relief Structure, Three B's Natural Overflow Area, and Goose Lake Flood Relief Structure).
- Two sets of outfall gates.
- Five major drainage pumping plants.
- Cache Creek Settling Basin, maintaining the flood conveyance integrity of the Yolo Bypass.
- Numerous appurtenant structures such as minor weirs and control structures, bridges, and gauging stations.

Figure 3-1A. Design Flood Flow Capacities within the Sacramento River, Bypasses, and Major Tributaries and Distributaries in the Sacramento River Watershed

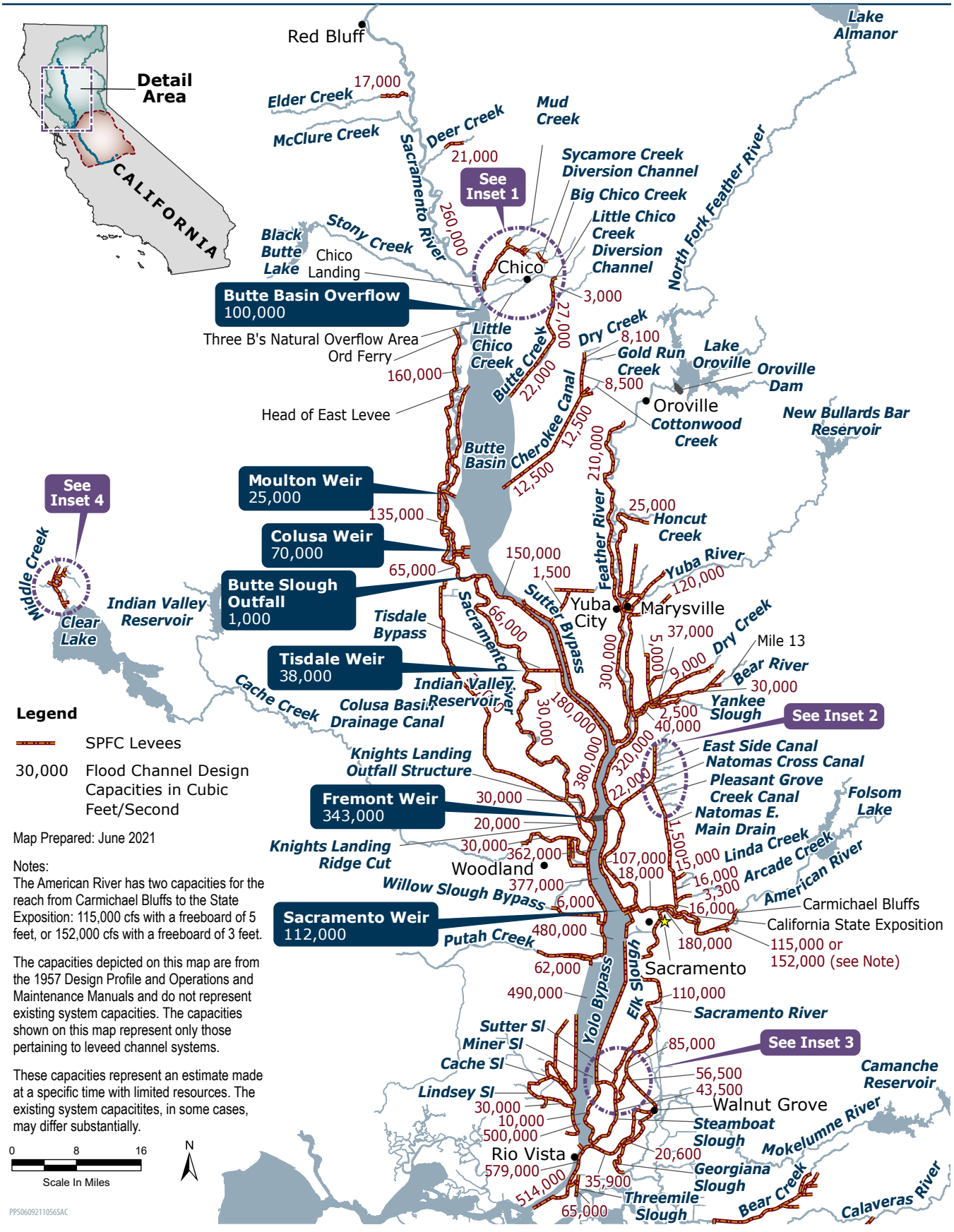


Figure 3-1B. Inset of Design Flood Flow Capacities for Mud Creek, Natomas East Main Drain Canal streams, Clear Lake streams, and Steamboat Slough

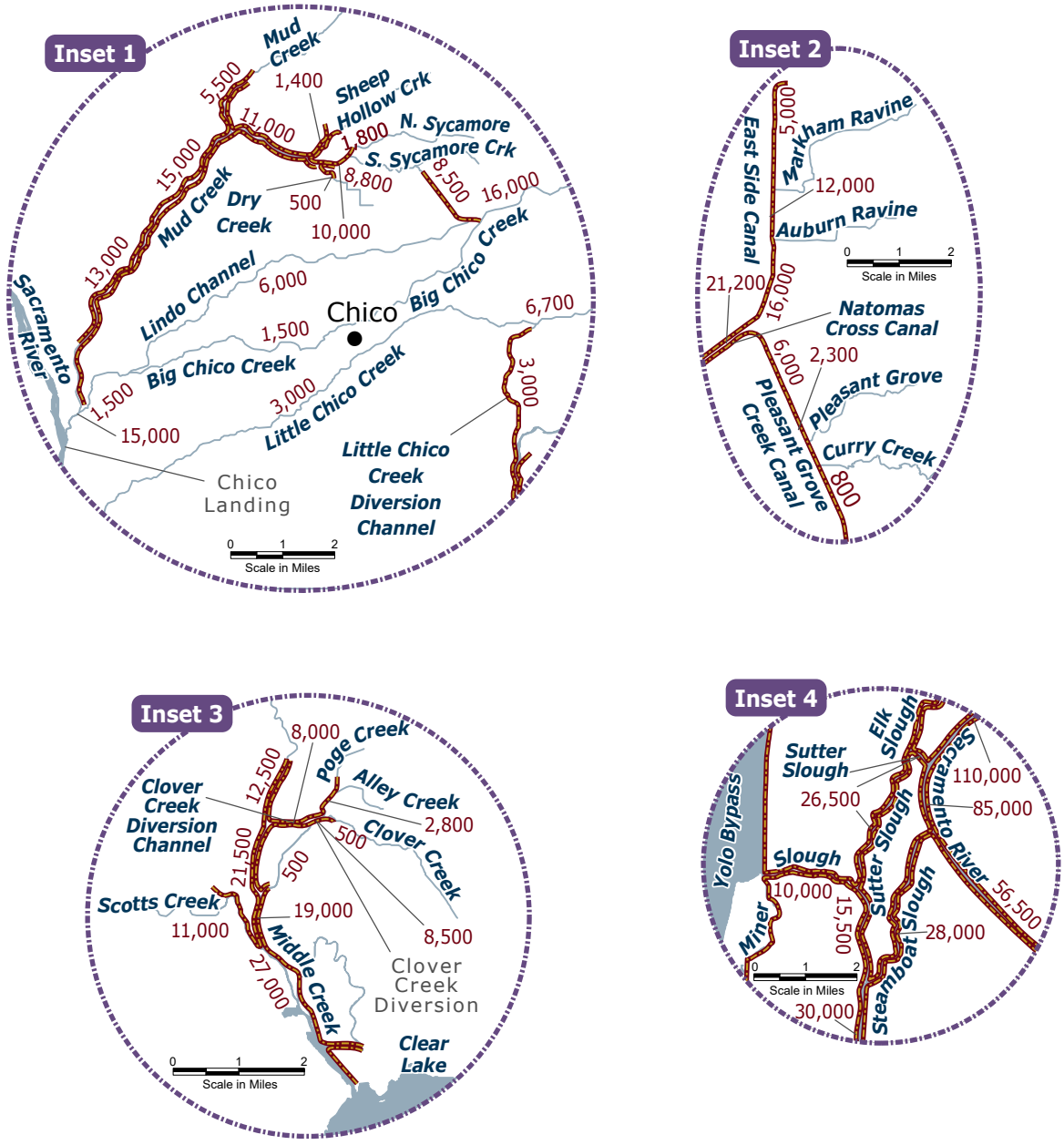


Table 3-1. Design Capacities by Reach in Sacramento River Watershed

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual Left Bank (cfs)	Design Capacity from O&M Manual Right Bank (cfs)	Design Capacity from 1957 Revised Profile Drawings (Basis of State Operations) (cfs)
Sacramento River	Deer Creek to Chico Landing	197.30	175.00	260,000	260,000	260,000
Elder Creek	Upstream End of Project Levees to Sacramento River	6.00	0.00	17,000	17,000	17,000
Deer Creek	Upstream End of Project Levees to Sacramento River	7.40	0.00	21,000	21,000	21,000
Sacramento River	Chico Landing to Head of East Levee	175.00	166.00	160,000	160,000	160,000
Sacramento River	East Levee Head to Moulton Weir	166.00	148.25	160,000	160,000	160,000
Sacramento River	Moulton Weir to Colusa Weir	148.25	138.00	110,000	135,000	135,000
Mud Creek	Upstream End of Project Levees to Sycamore Creek	8.20[b]	6.80[b]	5,500	5,500	No Data
Mud Creek	Sycamore Creek to SPRR	6.80[b]	4.30[b]	15,000	15,000	15,000
Mud Creek	SPRR to Big Chico Creek	4.30[b]	0.00	13,000	13,000	13,000 to 15,000
Big Chico Creek	Mud Creek to Sacramento River	0.20[b]	0.00	15,000	15,000	15,000

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual Left Bank (cfs)	Design Capacity from O&M Manual Right Bank (cfs)	Design Capacity from 1957 Revised Profile Drawings (Basis of State Operations) (cfs)
Overflow to Butte Basin	Sacramento River to Butte Basin	191.00	175.00	100,000	100,000	100,000
Moulton Weir	Sacramento River to Butte Basin	158.50	158.50	25,000	25,000	25,000
Colusa Weir	Sacramento River to Butte Basin	146.00[b]	146.00[b]	70,000	70,000	70,000
Sacramento River	Colusa Weir to Butte Slough	138.00	130.00	48,000	48,000	65,000
Sacramento River	Butte Slough to Tisdale Weir	130.00	119.50	66,000	48,000	66,000
Sacramento River	Tisdale Weir to Knights Landing	119.50	90.00	30,000	30,000	30,000
Sacramento River	Knights Landing to Fremont Weir	90.00	85.00	30,000	30,000	30,000
Butte Slough Outfall	Upstream End of Project Levees to Sacramento River	138.00[b]	138.00[b]	3,500	3,500	1,000
Knights Landing Outfall	Upstream End of Project Levees to Sacramento River	90.00[b]	90.00[b]	No Data	No Data	No Data
Tisdale Weir and Bypass	Sacramento River to Sutter Bypass	119.00[b]	119.00[b]	38,000	38,000	38,000
Fremont Weir	Sacramento River to Yolo Bypass	85.00[b]	82.00[b]	343,000	343,000	343,000

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual Left Bank (cfs)	Design Capacity from O&M Manual Right Bank (cfs)	Design Capacity from 1957 Revised Profile Drawings (Basis of State Operations) (cfs)
Sutter Bypass	Butte Slough to Wadsworth Canal	93.00[b]	83.00	178,000	178,000	150,000
Sutter Bypass	Wadsworth Canal to Tisdale Bypass	83.00	77.80	178,000	178,000	155,000
Sutter Bypass	Tisdale Bypass to Feather River	77.80	67.00	216,500	216,500	180,000
Sutter Bypass	Feather River to Verona	67.00	59.00	416,500	416,500	380,000
Butte Creek	Little Chico Creek Diversion Channel to Midway	15.30[b]	8.00[b]	27,000	27,000	27,000
Butte Creek	Midway to 1.6 Miles Downstream from Aguas Frias Road	8.00[b]	0.00	22,000	22,000	22,000
Cherokee Canal	Dry Creek to Gold Run Creek at Nelson Road	21.70[b]	20.20[b]	N/A	8,100	No Data
Cherokee Canal	Gold Run Creek at Nelson Road to Cottonwood Creek at Western Canal	20.20[b]	15.80[b]	8,500	8,500	No Data
Cherokee Canal	Cottonwood Creek at Western Canal to RD 833 Canal Entrance at Afton Road	15.80[b]	7.90[b]	11,500	11,500	12,500

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual Left Bank (cfs)	Design Capacity from O&M Manual Right Bank (cfs)	Design Capacity from 1957 Revised Profile Drawings (Basis of State Operations) (cfs)
Cherokee Canal	RD 833 Canal Entrance at Afton Road to Lower Butte Watershed About 1 Mile Downstream from Colusa-Gridley Road	7.90[b]	0.00	12,500	12,500	12,500
Wadsworth Canal	East-West Interceptor Canal to Sutter Bypass	5.00	0.50	1,500	1,500	1,500
Feather River	Oroville to Mouth of Yuba River	50.85	27.40	210,000	210,000	210,000
Feather River	Mouth of Yuba River to Bear River	27.40	12.00	300,000	300,000	300,000
Feather River	Bear River To Yolo Bypass	12.00	7.60	320,000	320,000	320,000
Honcut Creek	Upstream End of Project Levees to Feather River	4.50[b]	0.00[b]	5,000	5,000	25,000
Yuba River	Upstream End of Project Levees to Feather River	5.00	0.50	120,000	120,000	120,000
Bear River	River Mile 13 to Dry Creek	13.00[b]	6.00[b]	30,000	30,000	30,000
Bear River	Dry Creek to WPRR	6.00[b]	4.70[b]	37,000	37,000	37,000
Bear River	WPRR to Feather River	4.70[b]	0.00[b]	40,000	40,000	40,000

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual Left Bank (cfs)	Design Capacity from O&M Manual Right Bank (cfs)	Design Capacity from 1957 Revised Profile Drawings (Basis of State Operations) (cfs)
WPRR Interceptor Channel	Upstream End of Project Levees to Bear River	6.30[b]	0.00[b]	10,000	10,000	10,000
South Dry Creek	Upstream End of Project Levees to Bear River	1.50[b]	0.00[b]	7,000	7,000	9,000
Yankee Slough	Upstream End of Project Levees to Bear River	4.00[b]	0.00[b]	2,500	2,500	2,500
Sacramento River	Fremont Weir to Sacramento Weir	85.00	63.90	107,000	107,000	107,000
Sacramento River	Sacramento Weir to American River	63.40	51.70	110,000	110,000	18,000
Natomas Cross Canal	Eastside Canal to Sacramento River	4.70	0.10	22,000	22,000	22,000
East Side Canal	WPRR to Markham Ravine	No Data	No Data	N/A	5,000	5,000
East Side Canal	Markham Ravine to Auburn Ravine	No Data	No Data	N/A	12,000	12,000
East Side Canal	Auburn Ravine to Natomas Cross Canal	No Data	No Data	N/A	16,000	16,000
Pleasant Grove Creek Canal	Sankey Road to Keys Road	No Data	No Data	900	900	800

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual Left Bank (cfs)	Design Capacity from O&M Manual Right Bank (cfs)	Design Capacity from 1957 Revised Profile Drawings (Basis of State Operations) (cfs)
Pleasant Grove Creek Canal	Keys Road to Pleasant Grove Creek	No Data	No Data	2,700	2,700	2,300
Pleasant Grove Creek Canal	Pleasant Grove Creek to Natomas Cross Canal	No Data	No Data	7,000	7,000	6,000
American River	Carmichael to State Fairgrounds (left bank)	10.00[b]	3.00[b]	115,000 to 152,0003[c]	N/A	115,000 to 152,0003[c]
American River	Mayhew to State Fairgrounds (right bank)	13.00[b]	3.00[b]	N/A	115,000 to 152,0003[c]	115,000 to 152,0003[c]
American River	State Fairgrounds to Sacramento River	3.00[b]	0.00	180,000	180,000	180,000
Natomas East Main Drainage Canal	Sankey Road to Dry (Linda) Creek	13.00[b]	4.00[b]	N/A	1,100	1,500
Natomas East Main Drainage Canal	Dry (Linda) Creek to Arcade Creek	4.00[b]	2.00[b]	12,600 to 12,900	12,600 to 12,900	16,300
Natomas East Main Drainage Canal	Arcade Creek to American River	2.00[b]	0.00	16,000 to 16,300	16,000 to 16,300	16,000 to 16,300
Dry Creek (previously, Linda Creek)	Upstream End of Project Levees to Natomas East Main Drainage Canal	1.30[b]	0.00	15,000	N/A	15,000

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual Left Bank (cfs)	Design Capacity from O&M Manual Right Bank (cfs)	Design Capacity from 1957 Revised Profile Drawings (Basis of State Operations) (cfs)
Arcade Creek	Upstream End of Project Levees to Natomas East Main Drainage Canal	2.00[b]	0.00	3,300	3,300	3,300
Sacramento Weir and Bypass	Sacramento River to Yolo Bypass	45.30	45.30	112,000	112,000	112,000
Yolo Bypass	Fremont Weir to Knight's Landing Ridge Cut	57.00[b]	54.00[b]	343,000	343,000	343,000
Yolo Bypass	Knight's Landing Ridge Cut to Cache Creek	54.00[b]	51.80	362,000	362,000	362,000
Yolo Bypass	Cache Creek to Sacramento Weir	51.80	45.30	377,000	377,000	377,000
Yolo Bypass	Sacramento Weir to Putah Creek	45.30	39.50	480,000	480,000	480,000
Yolo Bypass	Putah Creek to Miner Slough	39.50	19.00[b]	490,000	490,000	490,000
Yolo Bypass	Miner Slough to Cache Slough	No Data	No Data	490,000	490,000	500,000
Yolo Bypass	Cache Slough to Sacramento River	No Data	0.00	490,000	490,000	500,000
Knight's Landing Ridge Cut	Colusa Drain to Yolo Bypass	2.6	0.00	20,000	20,000	20,000

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual Left Bank (cfs)	Design Capacity from O&M Manual Right Bank (cfs)	Design Capacity from 1957 Revised Profile Drawings (Basis of State Operations) (cfs)
Cache Creek	Upstream End of Project Levees to Yolo Bypass	12.7	0.00	30,000	30,000	30,000
Willow Slough Bypass	Upstream End of Project Levees to Yolo Bypass	No Data	0.00	6,000	6,000	6,000
Putah Creek	Upstream End of Project Levees to Yolo Bypass	9.7	0.00	40,000	40,000	62,000
Miner Slough	Sutter Slough to Yolo Bypass	1.68	0.00	10,000	10,000	10,000
Cache Slough and Lindsey Slough	Upstream End of Project Levees to Yolo Bypass	No Data	0.00	43,500	43,500	30,000
Sacramento River	American River to Elk Slough	51.60	42.30	110,000	110,000	110,000
Sacramento River	Elk Slough to Sutter Slough	42.10	34.30	110,000	110,000	110,000
Sacramento River	Sutter Slough to Steamboat Slough	34.10	32.70	84,500	84,500	85,000
Sacramento River	Steamboat Slough to Head of Georgiana Slough	32.50	26.75	56,500	56,500	56,500
Sacramento River	Georgiana Slough to Yolo Bypass Junction	26.50	14.75	35,900	35,900	35,900
Sacramento River	Yolo Bypass to 3-Mile Slough	14.62	9.75	579,000	579,000	579,000

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual Left Bank (cfs)	Design Capacity from O&M Manual Right Bank (cfs)	Design Capacity from 1957 Revised Profile Drawings (Basis of State Operations) (cfs)
Sacramento River	3-Mile Slough to Collinsville	9.50	0.00	514,000	514,000	514,000
Sutter Slough	Sacramento River to Miner Slough	No Data	0.00	25,500	25,500	26,500
Sutter Slough	Miner Slough to Steamboat Slough	6.55[b]	No Data	15,500	15,500	15,500
Steamboat Slough	Sacramento River to Sutter Slough	10.00	7.00	28,000	28,000	28,000
Steamboat Slough	Sutter Slough to Sacramento River	7.00	0.00	43,500	43,500	43,500
Georgiana Slough	Sacramento River to Mokelumne River	10.00	0.00	20,600	20,600	20,600
3-Mile Slough	San Joaquin River to Sacramento River	No Data	0.00	65,000	65,000	65,000

Source: 1957 Revised Profile Drawings (U.S. Army Corps of Engineers 1957)

[a] Sequential river reaches were not necessarily designed as a system. Therefore, the capacities in the table do not add up. In some cases, left- and right-bank levees along the same reach may have different design capacities. Elk Slough design capacity is 0 cfs, based on O&M manuals, and is not listed in the table.

[b] The river mile was estimated at this location.

[c] The capacity is 115,000 cfs at 5 feet of freeboard and 152,000 cfs at 3 feet of freeboard.

Notes:
cfs = cubic feet per second
No. = number
N/A = not applicable
O&M = operations and management
RD = Reclamation District
WPRR = Western Pacific Railroad

3.1.2 San Joaquin River Watershed

The flood management system along the San Joaquin River is intended to manage flood flows originating from an area of approximately 16,700 square miles in the Sierra Nevada, Central Valley, and Coastal Range in Central California. Major tributaries to the San Joaquin River include the Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, and Fresno rivers, which discharge to the San Joaquin River from the east. In addition, during flood release events from Pine Flat Reservoir, about half of Kings River flows are diverted north through the James Bypass into the San Joaquin River.

Unlike the Sacramento River, where SPFC levees are continuous from Ord Ferry to the Delta, San Joaquin River SPFC levees are intermittent from near River Mile 225 to the Delta. The Chowchilla, Eastside, and Mariposa bypasses are the main SPFC facilities for the upstream portion of the San Joaquin River system. For portions of the system, these bypasses are the only SPFC facilities, and the San Joaquin River itself is not part of the SPFC. The bypass system ends upstream from the Merced River.

Figure 3-2 shows an overview of major SPFC facilities in the San Joaquin River Watershed. The design flood flow capacities of the various stream reaches are also shown on Figure 3-2 and listed in Table 3-2. Where available, DWR operates SPFC facilities in the San Joaquin River Watershed based on design flood flows reported in *Design Memorandum No. 1, San Joaquin River Levees, Lower San Joaquin River and Tributaries Project, California General Design* (U.S. Army Corps of Engineers 1955) associated with levee profiles dated December 1955 (1955 Profile) (refer to Chapter 6.2.2), rather than on design flood flows from the O&M manuals.

Where the design flood flow capacities from O&M manuals were different for the left-bank levee and right-bank levee along a particular reach, the lowest design flood flow capacity is shown on Figure 3-2. Appendix A provides detailed maps of the areas shown on Figure 3-2. Similar to the discussion for Table 3-1 in Chapter 3.1.1, Table 3-2 shows design flood flow capacities used to set minimum levee height, without considering geotechnical or geomorphic conditions that may result in lower current flood flow capacities. Refer to the 2022 FSSR Update (California Department of Water Resources 2022) for updated estimates of current actual flood flow capacities, and the CVFPP for resolution of these inconsistencies.

- Chowchilla Bypass (and levees), which begins at the San Joaquin River downstream from Gravelly Ford, diverts San Joaquin River flows, and discharges the flows into the Eastside Bypass.

- Eastside Bypass (and levees), which begins at the Fresno River, collects drainage from the east, and discharges to the San Joaquin River between Fremont Ford and Bear Creek.

- Mariposa Bypass, which begins at the Eastside Bypass and discharges to the San Joaquin River (and levees).

- Approximately 99 miles of levees along the San Joaquin River.
- Approximately 135 miles of levees along San Joaquin River tributaries and distributaries.
- Six instream control structures (Chowchilla Bypass Control Structure, San Joaquin River Control Structure, Mariposa Bypass Control Structure, Eastside Bypass Control Structure, Sand Slough Control Structure, and San Joaquin River Structure).
- Two major pumping plants.

Figure 3-2. Design Flood Flow Capacities within the San Joaquin River, Bypasses, and Major Tributaries and Distributaries in the San Joaquin River Watershed

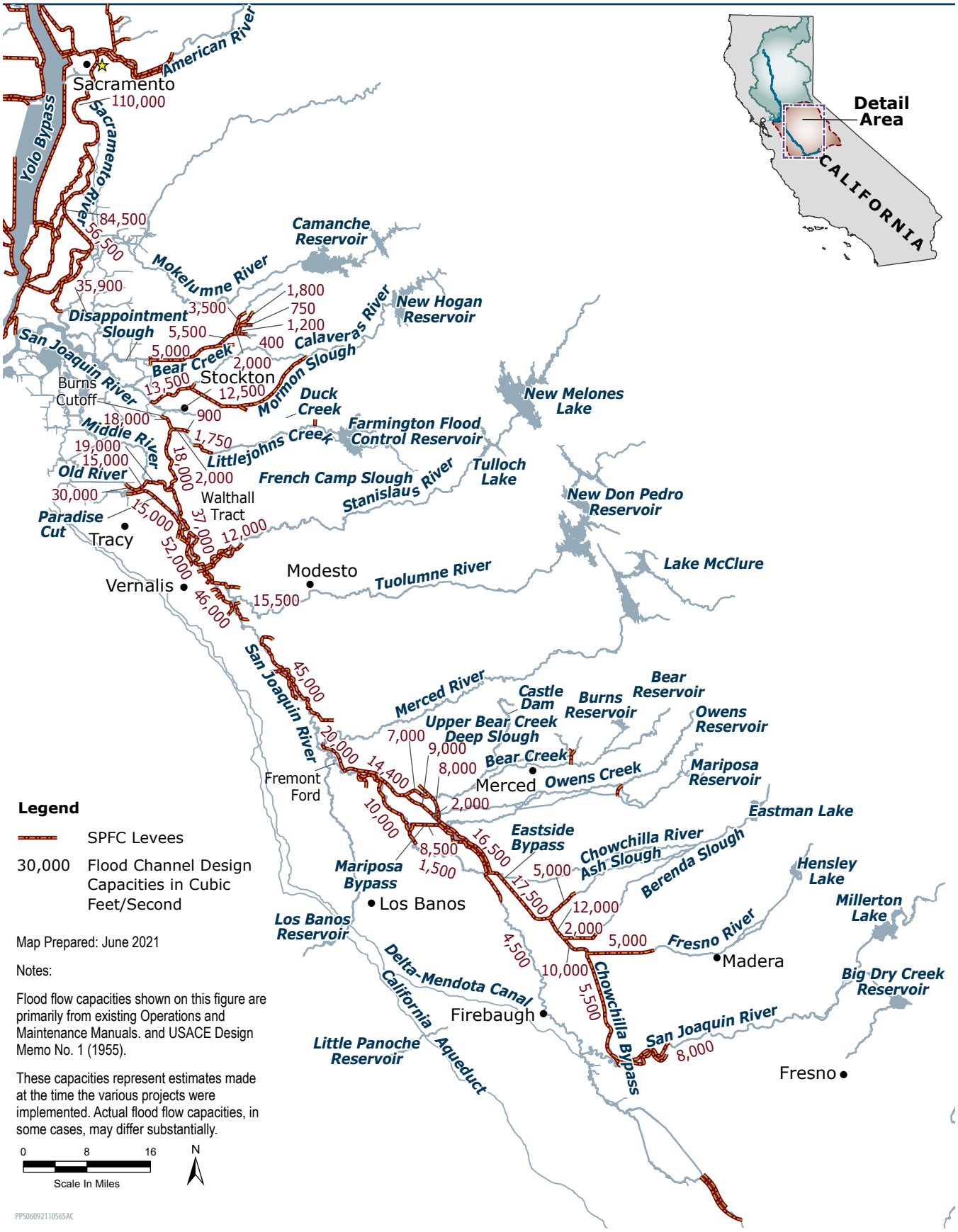


Table 3-2. Design Capacities by Reach in San Joaquin River Watershed

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual[b] Left Bank (cfs)	Design Capacity from O&M Manual[b] Right Bank (cfs)	Design Capacity from Design Memo No. 1, 1955 (Basis of State Operations) (cfs)
San Joaquin River	Friant Dam to Chowchilla Bypass	224.66	214.03	8,000	8,000	No Data
San Joaquin River	Chowchilla Bypass to Sand Slough Control Structure	170[c]	166.44	4,500	4,500	No Data
Chowchilla Bypass	San Joaquin River to Eastside Bypass	32.04	15.85	5,500	5,500	No Data
Eastside Bypass	Fresno River to Berenda Slough	15.85	13.59	10,000	10,000	No Data
Eastside Bypass	Berenda Slough to Ash Slough	13.59	10.48	12,000	12,000	No Data
Eastside Bypass	Ash Slough to Sand Slough	10.48	0.00	17,500	17,500	No Data
Fresno River	Upstream End of SPFC Levees to Eastside Bypass	8.36	0.00	5,000	5,000	No Data
Berenda Slough	Upstream End of SPFC Levees to Eastside Bypass	4.28	0.00	2,000	2,000	No Data
Ash Slough	Upstream End of SPFC Levees to Eastside Bypass	4.52	0.00	5,000	5,000	No Data

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual[b] Left Bank (cfs)	Design Capacity from O&M Manual[b] Right Bank (cfs)	Design Capacity from Design Memo No. 1, 1955 (Basis of State Operations) (cfs)
San Joaquin River	Control Structure to Mariposa Bypass	149.89	145.15	1,500	1,500	No Data
San Joaquin River	Mariposa Bypass to Eastside Bypass	145.15	133.80	10,000	10,000	No Data
San Joaquin River	Eastside Bypass to Merced River	133.80	116.66	22,000	22,000	20,000
Mariposa Bypass	Eastside Bypass to San Joaquin River	4.23	0.00	8,500	8,500	No Data
Eastside Bypass	Control Structure to Mariposa Bypass	8.96	16.00[d]	16,500	16,500	No Data
Eastside Bypass	Mariposa Bypass to Owens Creek	8.96	5[d]	8,000	8,000	No Data
Eastside Bypass	Owens Creek to Bear Creek	5.00[d]	1.00[d]	9,000	9,000	No Data
Eastside Bypass	Bear Creek to San Joaquin River	1.00[d]	0.00	14,400	14,400	No Data
Owens Creek	Upstream End of SPFC Levees to Eastside Bypass	0.98	0.00	No Data	No Data	No Data
Deep Slough	Upstream End of SPFC Levees to Eastside Bypass	6.66	0.00	9,000	9,000	No Data

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual[b] Left Bank (cfs)	Design Capacity from O&M Manual[b] Right Bank (cfs)	Design Capacity from Design Memo No. 1, 1955 (Basis of State Operations) (cfs)
Upper Bear Creek	Upstream End of SPFC Levees to Eastside Bypass	7.98	4.25	7,000	7,000	No Data
Bear Creek	Upstream End of SPFC Levees to Eastside Bypass	4.25	0.00	14,400	14,400	No Data
San Joaquin River	Merced River to Tuolumne River	110.90	81.50	45,000	45,000	45,000
San Joaquin River	Tuolumne River to Stanislaus River	81.50	72.60	46,000	46,000	46,000
Tuolumne River	Upstream End of SPFC Levees to San Joaquin River	0.60	0.00	15,000	15,000	15,000
Stanislaus River	Upstream End of SPFC Levees to San Joaquin River	11.90	0.00	12,000	12,000	12,000
San Joaquin River	Stanislaus River to Paradise Cut	72.60	58.30	52,000	52,000	52,000
San Joaquin River	Paradise Cut to Old River	58.30	53.30	37,000	37,000	37,000
San Joaquin River	Old River to Burns Cutoff	53.30	40.60	18,000	18,000	No Data
French Camp Slough	Upstream End of Project Levees to San Joaquin River	6.40	0.00	3,000	2,000	No Data

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual[b] Left Bank (cfs)	Design Capacity from O&M Manual[b] Right Bank (cfs)	Design Capacity from Design Memo No. 1, 1955 (Basis of State Operations) (cfs)
Littlejohns Creek	Upstream End of Project Levees to French Camp Slough	1.00	0.00	1,750	1,750	No Data
Duck Creek	Upstream End of Project Levees to French Camp Slough	0.90	0.00	900	900	No Data
Paradise Cut	San Joaquin River to Old River	0.00	7.40 or 5.90[d]	15,000	15,000	15,000
Old River	Downstream from Paradise Cut	5.90	8.20	30,000	30,000	No Data
Old River	San Joaquin River to Middle River	No Data	No Data	19,000	19,000	No Data
Old River	Middle River to Paradise Cut	No Data	No Data	19,000	15,000	No Data
Old River/Salmon Slough	Paradise Cut to Grant Line Canal	No Data	No Data	N/A	30,000	No Data
Calaveras River	Mormon Slough to San Joaquin River	5.80	0.00	13,500	13,500	No Data
Mormon Slough	Upstream End of Diversion Canal to Calaveras River	8.40	6.20	12,500	12,500	No Data
Bear Creek	Disappointment Slough to Mosher Creek	No Data	No Data	5,500	5,500	No Data

River	Reach[a]	From River Mile	To River Mile	Design Capacity from O&M Manual[b] Left Bank (cfs)	Design Capacity from O&M Manual[b] Right Bank (cfs)	Design Capacity from Design Memo No. 1, 1955 (Basis of State Operations) (cfs)
Bear Creek	Mosher Creek to Paddy Creek	No Data	No Data	5,000	5,000	No Data
Bear Creek	Upstream of Paddy Creek	No Data	No Data	3,500	3,500	No Data
Paddy Creek	Bear Creek to North Paddy Creek	No Data	No Data	2,000	2,000	No Data
Paddy Creek	Upstream from North Paddy Creek	No Data	No Data	400	400	No Data
Middle Paddy Creek	Upstream from Paddy Creek	No Data	No Data	750	750	No Data
North Paddy Creek	Paddy Creek to Middle Paddle Creek	No Data	No Data	1,800	1,800	No Data
North Paddy Creek	Upstream from Middle Paddy Creek	No Data	No Data	1,200	1,200	No Data

[a] Sequential river reaches were not necessarily designed as a system. Therefore, the capacities in the table do not add up. In some cases, left- and right-bank levees along the same reach may have different design capacities.

[b] Where available, the State operates SPFC facilities in the San Joaquin River Watershed based on the 1955 profile rather than on design flows from the O&M manuals.

[c] The river mile was estimated at this location.

[d] This capacity only applies to the leveed reach upstream from the Chowchilla Bypass.

Notes:
cfs = cubic feet per second
Memo = memorandum
No. = number
O&M = operations and management

3.2 State Plan of Flood Control Facilities in the Sacramento River Watershed

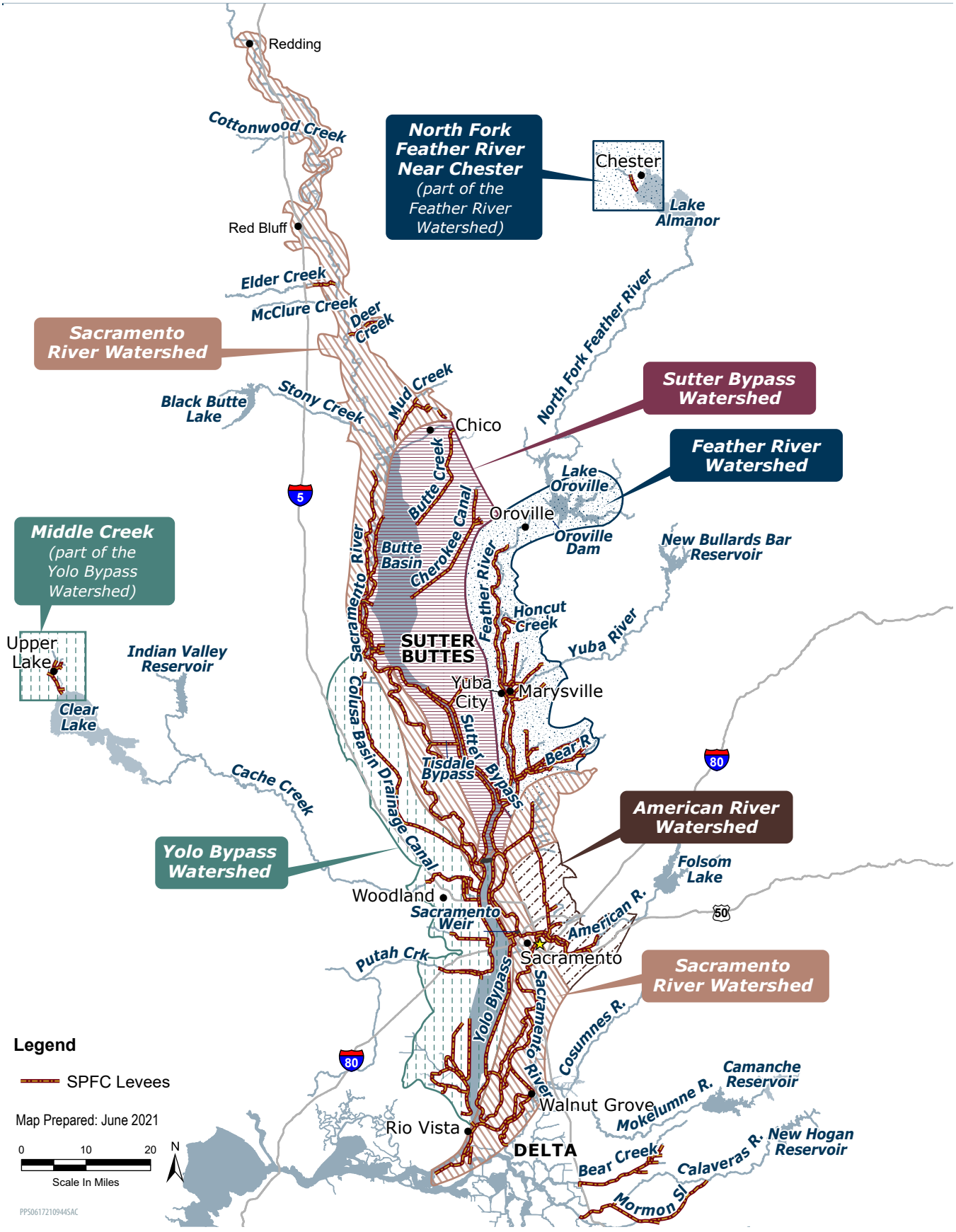
This section describes SPFC facilities in the Sacramento River Watershed by reach. Because there are numerous locations of tributary and distributary flow, the following watersheds are described separately: Feather River watershed, American River Watershed, Sutter Bypass watershed, Yolo Bypass watershed, and Sacramento River Watershed. The description for the Sacramento River Watershed identifies where the Feather River, American River, Sutter Bypass, and Yolo Bypass are either tributary or distributary to the Sacramento River.

The Standard O&M Manual for the SRFCP specifies general levee dimensions that were used for the original project design (U.S. Army Corps of Engineers 1955a). These dimensions include a general crown width of 20 feet, with side slopes of 2 horizontal (H) to (:) 1 vertical (V) on the waterside, and 3H:1V on the landside. Exceptions to these dimensions are noted in the unit-specific O&M manuals[2], and as-constructed dimensions provide an even better indication of how the levees were actually built.

Figure 3-3 is an index map of the Sacramento River Watershed showing the five major watersheds, including SPFC facilities.

[2] All unit specific O&M Manuals are available upon request.

Figure 3-3. Index Map of the Sacramento River Watershed including the Five Major Watersheds with Facilities of the State Plan of Flood Control



3.2.1 Feather River Watershed

The Feather River, a tributary to the Sacramento River, drains a major watershed in the Sierra Nevada and Cascade mountain ranges. Figures 3-4A and Figure 3-4B show SPFC facilities in the Feather River watershed.

3.2.1.1 North Fork Feather River near Chester

SPFC channel improvements and levees (refer to O&M Manual SAC508) are intended to reduce flood risk to the town of Chester, bridges for Highway 36, two county roads, and a railroad. The project (Figure 3-5) consists of a diversion structure, an excavated rock-lined diversion channel, about 3 miles of levees along the channel (about 1.8 miles on the left bank and 1.2 miles on the right bank), and seven drop structures. At design flood flow (based on the O&M manual), an estimated 3,000 cfs would pass through the diversion structure to the North Fork Feather River and to Lake Almanor, and approximately 10,000 cfs would be conveyed by the diversion channel to Lake Almanor. The project is located upstream from Lake Oroville. The Plumas County Department of Public Works performs O&M for the project.

3.2.1.2 Oroville Dam and Facilities

DWR operates Lake Oroville and related facilities to provide multiple benefits, including flood management. With a total storage of 3.5 million acre-feet, the lake (Figure 3-4A) is operated with 750,000 acre-feet available for flood storage during the flood season. Since the State has provided assurances of nonfederal cooperation for flood management operation, Oroville Dam and facilities are included in the SPFC.

3.2.1.3 Feather River from Thermalito to Yuba River

This reach of river has a design channel capacity of 210,000 cfs at 3 feet of freeboard, based on O&M manuals identified here. SPFC facilities include right and left-bank levees along the Feather River and the Sutter-Butte Canal Headgate, a levee on the left bank of Honcut Creek, a back levee for RD 10, and a ring levee around Marysville (Figures 3-4A and 3-4B). The levees were originally built by local interests and enlarged or improved by USACE as project levees.

- The Feather River right-bank levee (refer to O&M Manuals SAC144, SAC152, and SAC154) is about 28 miles long, and is intended to reduce flood risk to adjacent agricultural lands and the towns of Biggs, Gridley, Live Oak, and Yuba City. DWR provides maintenance through Maintenance Areas 7 and 16, and Levee Districts 1 and 9.

- The Feather River left-bank levee (refer to O&M Manual SAC151), which extends about 11.2 miles from Honcut Creek to Jack Slough just north of Marysville, is intended to reduce flood risk for RD 10. Maintenance is provided by RD 10.

- The Sutter-Butte Canal Headgate (refer to O&M Manual SAC160) controls the release of river water to the irrigation canal. The Sutter-Butte Canal now receives water from the Thermalito Afterbay; however, no supplement to O&M Manual SAC160 has been found to document

this change. The structure is operated and maintained by DWR through Sutter Maintenance Yard.

- A left-bank levee (refer to O&M Manual SAC151) along Honcut Creek extends about 4.5 miles from high ground to the confluence with the Feather River. The Honcut Creek design channel capacity is 5,000 cfs, based on the O&M manual. This differs from the design capacity of 25,000 cfs in the 1957 Revised Profile Drawings (U.S. Army Corps of Engineers 1957). The levee is maintained by RD 10.

- The back levee (refer to O&M Manual SAC151) for RD 10 extends about 8 miles along Jack Slough and Simmerly Slough. The levee is intended to reduce flood risk from waters from the east. RD 10 maintains the levee. Together, the Honcut Creek levee, the left-bank levee along the Feather River, and the back levee nearly surround RD 10.

- The ring levee (refer to O&M Manual SAC147) around Marysville is about 7.2 miles long. The levee is intended to reduce flood risk to Marysville from the Feather River, the Yuba River, and Jack and Simmerly sloughs. The levee is maintained by the Marysville Levee Commission.

3.2.1.4 Yuba River

Upstream of its confluence with the Feather River, the Yuba River's channel capacity is 120,000 cfs, based on O&M manuals. SPFC facilities include right- and left-bank levees (Figure 3-4B). The right-bank levee (refer to O&M Manual SAC147) extends about 4 miles upstream from the Marysville ring levee (described in Chapter 3.2.1.3). The levee is maintained by the Marysville Levee Commission. Note, the water control manual for the upstream New Bullards Bar Dam specifies a maximum release of 180,000 cfs for the Yuba River.

The left-bank levee (refer to O&M Manuals SAC145 and SAC149) extends about 6.1 miles from high ground to the confluence connection with the Feather River levees. The levee is maintained by RD 784 and is intended to reduce flood risk to Linda and Olivehurst and adjoining agricultural land. The left-bank levee was originally built by local interests and enlarged or improved to project standards by USACE as a project levee.

3.2.1.5 Feather River from Yuba River to Bear River

Within this reach, the Feather River's design capacity is 300,000 cfs with 3 feet of freeboard, based on O&M manuals. SPFC facilities include right- and left-bank levees (Figure 3-4B). The right-bank levee (refer to O&M Manual SAC144), about 14 miles long, reduces flood risk to Yuba City and adjoining agricultural land. Levee District 1 maintains the right-bank levee. The left-bank levee (refer to O&M Manual SAC145) is about 13 miles long. The levee is maintained by RD 784 and reduces flood risk to Linda and Olivehurst and adjoining agricultural land.

3.2.1.6 Bear River

SPFC facilities in the Bear River watershed include levees along Dry Creek, the Bear River, Yankee Slough, and the WPRR Intercepting Channel (Figure 3-4B). Originally built by local interests, these levees were later repaired or enlarged to project standards by USACE.

- Dry Creek has a design channel capacity of 7,000 cfs based on O&M manuals. This differs from the design capacity of 9,000 cfs estimated in the 1957 Revised Profile Drawings (U.S. Army Corps of Engineers 1957). The 1.5-mile-long right-bank levee (refer to O&M Manual SAC145) extends from high ground to the confluence with the Bear River. The levee is maintained by RD 784 and RD 817. The left-bank levee (refer to O&M Manual SAC146) extends about 8.5 miles from high ground to the confluence with the Bear River. The levee reduces flood risk to Wheatland and adjoining agricultural land. The left-bank levee is maintained by RD 817 and RD 2103.

- Upstream from its confluence with Dry Creek, the Bear River's design channel capacity is 30,000 cfs, based on the O&M manual. The right-bank levee extends about 8.9 miles from high ground to the confluence. The levee is maintained by RD 817 and RD 1001 and is intended to reduce flood risk to Wheatland and adjoining agricultural land. The left-bank levee (refer to O&M Manual SAC141.1) extends about 7.5 miles from high ground to the confluence with Dry Creek.

- Yankee Slough has a design channel capacity of 2,500 cfs based on the O&M manual. The left- and right-bank levees (refer to O&M Manual SAC141.1) each extend about 4 miles from high ground to the confluence with the Bear River. RD 1001 maintains both levees along Yankee Slough.

- The design capacity of the WPRR Intercepting Channel is 10,000 cfs, based on the O&M manual (SAC145). The right-bank levee, about 6.3 miles in length, extends from high ground and serves as a back levee for RD 784. Levee improvements by the Three Rivers Levee Improvement Authority are included in an addendum to the O&M manual. The left-bank levee, about 4.2 miles in length, is intended to reduce flood risk to RD 784. RD 784 maintains these levees.

- Downstream from the Dry Creek confluence, the right-bank levee (refer to O&M Manual SAC145) of the Bear River extends about 4.7 miles to its connection with the Feather River levee. RD 784 maintains the right-bank levee. The WPRR Intercepting Channel enters the Bear River from the north along this reach. Downstream from the WPRR Intercepting Channel, the Bear River has a design capacity of 40,000 cfs with 3 feet of freeboard, based on O&M manuals. Downstream from the Dry Creek confluence, the left-bank levee (refer to O&M Manuals SAC141.1 and SAC141.2) of the Bear River extends about 5 miles to its connection with the Feather River levee. Yankee Slough enters along the left side of this reach. RD 1001 maintains the left-bank levee.

3.2.1.7 Feather River from Bear River to Sutter Bypass

The design channel capacity of the Feather River in this reach is 320,000 cfs with 3 feet of freeboard, based on O&M manuals. SPFC facilities include right- and left-bank levees and a rock weir at Nelson Bend (Figure 3-4B).

The right-bank levee (refer to O&M Manual SAC143) is 5.2 miles long. Levee District 1 and DWR provides maintenance through Maintenance Area 3. The left-bank levee (refer to O&M Manuals SAC141.1 and SAC141.2) is about 5 miles long and is maintained by RD 1001. Originally built by local interests, these levees were later enlarged or improved to project standards by USACE.

The rock weir (refer to O&M Manual SAC501) was constructed in 1970 and 1971 to control flow where the Feather River meets the Sutter Bypass. The improvements of the Nelson Bend Modification Project protect against the formation of Feather River overflow channels into the Sutter Bypass, and act to slow sediment deposition in the Sutter Bypass during flood flows.

3.2.1.8 Joint Feather River/Sutter Bypass Channel to the Sacramento River

From their junction, the Feather River and Sutter Bypass flow in a joint channel to the Sacramento River. The design channel capacity of this reach is 416,500 cfs with 6 feet of freeboard, based on O&M manuals. SPFC facilities include right- and left-bank levees about 1.3 miles apart (Figure 3-4B). The right-bank levee (refer to O&M Manual SAC129) is about 10 miles long and is intended to reduce flood risk to agricultural land in RD 1500. RD 1500 maintains this levee. The left-bank levee (refer to O&M Manual SAC141.1) is about 7 miles long and is intended to reduce flood risk to agricultural land in RD 1001. RD 1001 maintains this levee. The left-bank levee was originally built by local interests and later enlarged or improved to project standards by USACE.

Figure 3-4A. Feather River Watershed – State Plan of Flood Control Facilities along the Feather, Yuba, and Bear Rivers and Tributaries

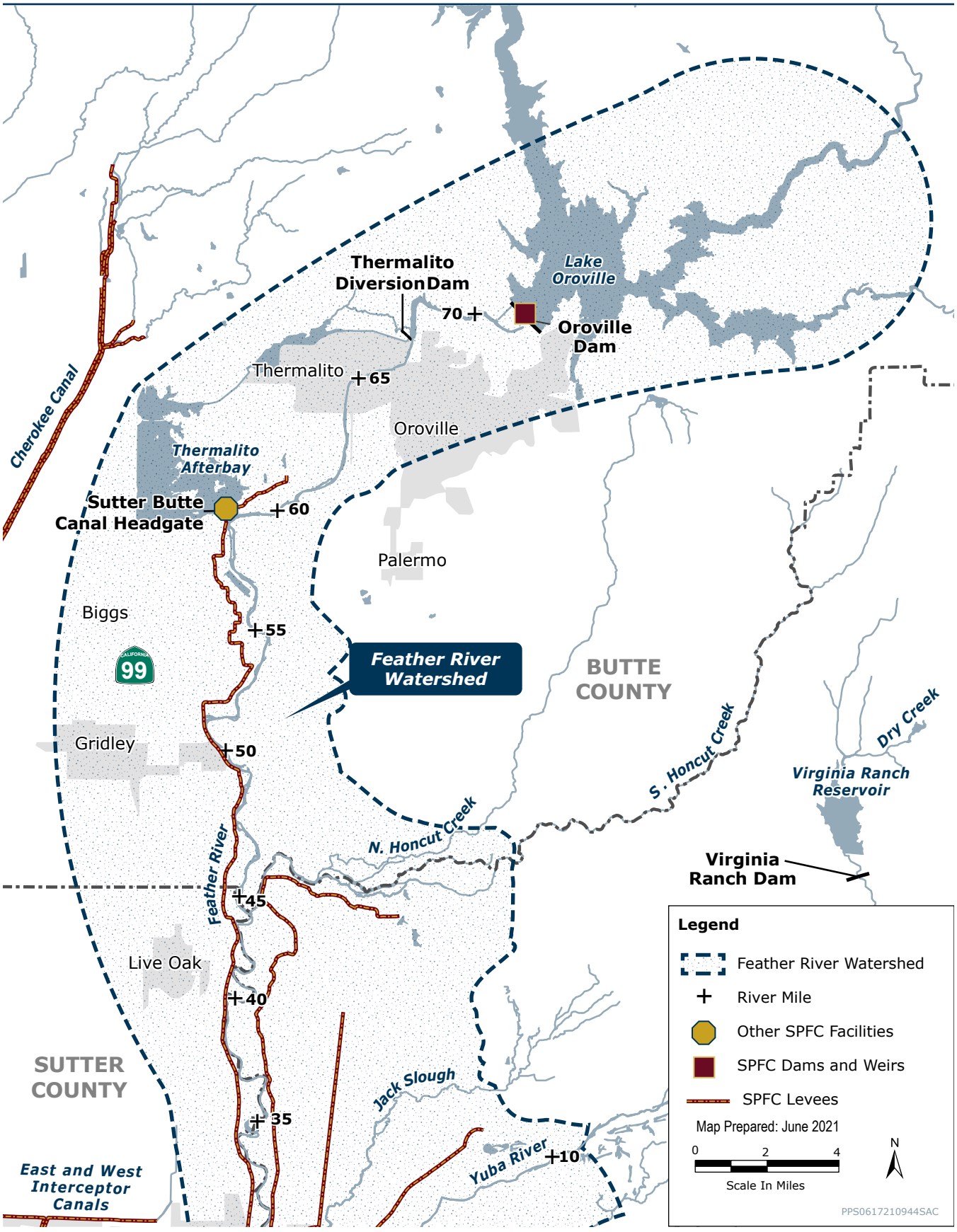


Figure 3-4B. Feather River Watershed – State Plan of Flood Control Facilities along the Feather, Yuba, and Bear Rivers and Tributaries

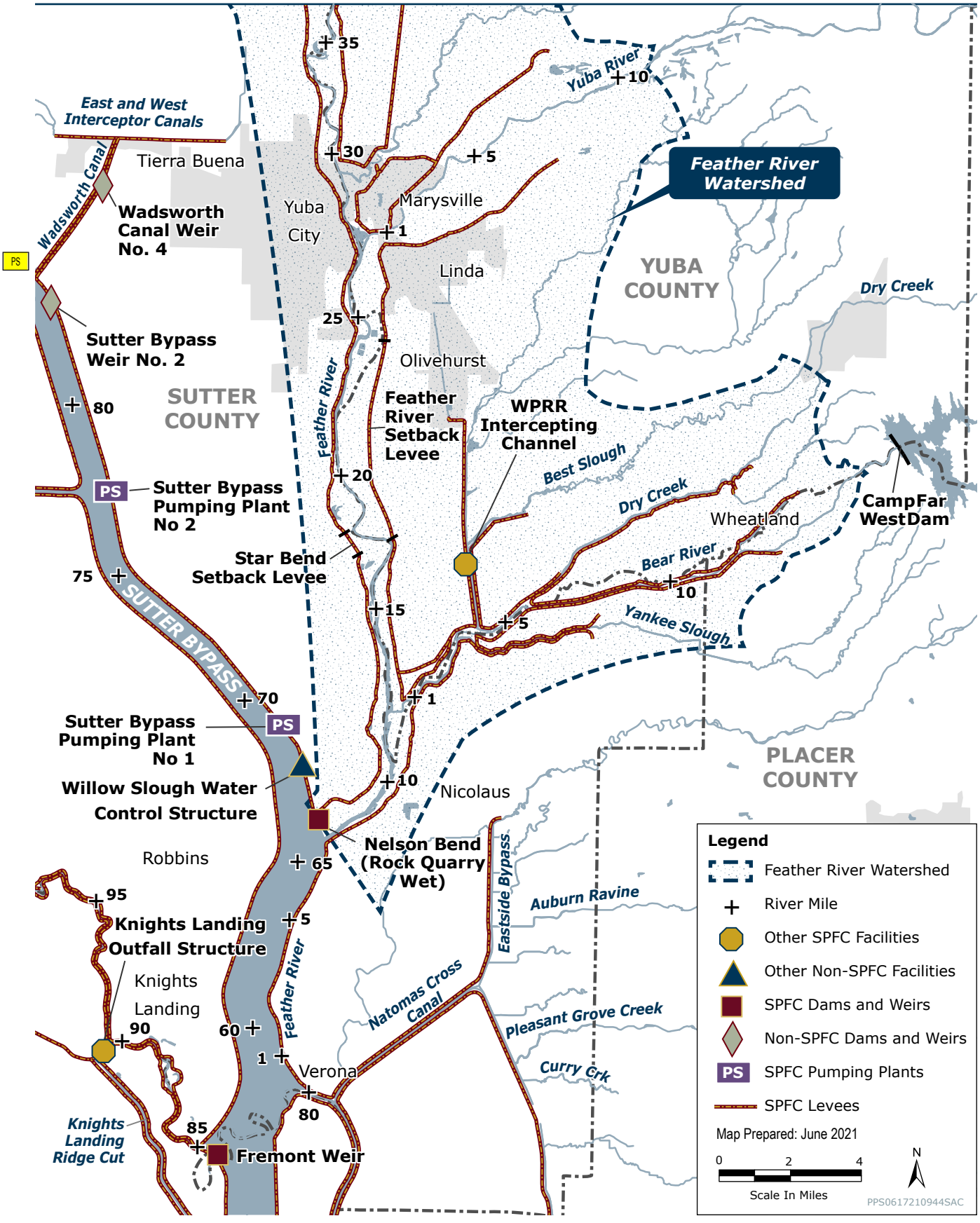
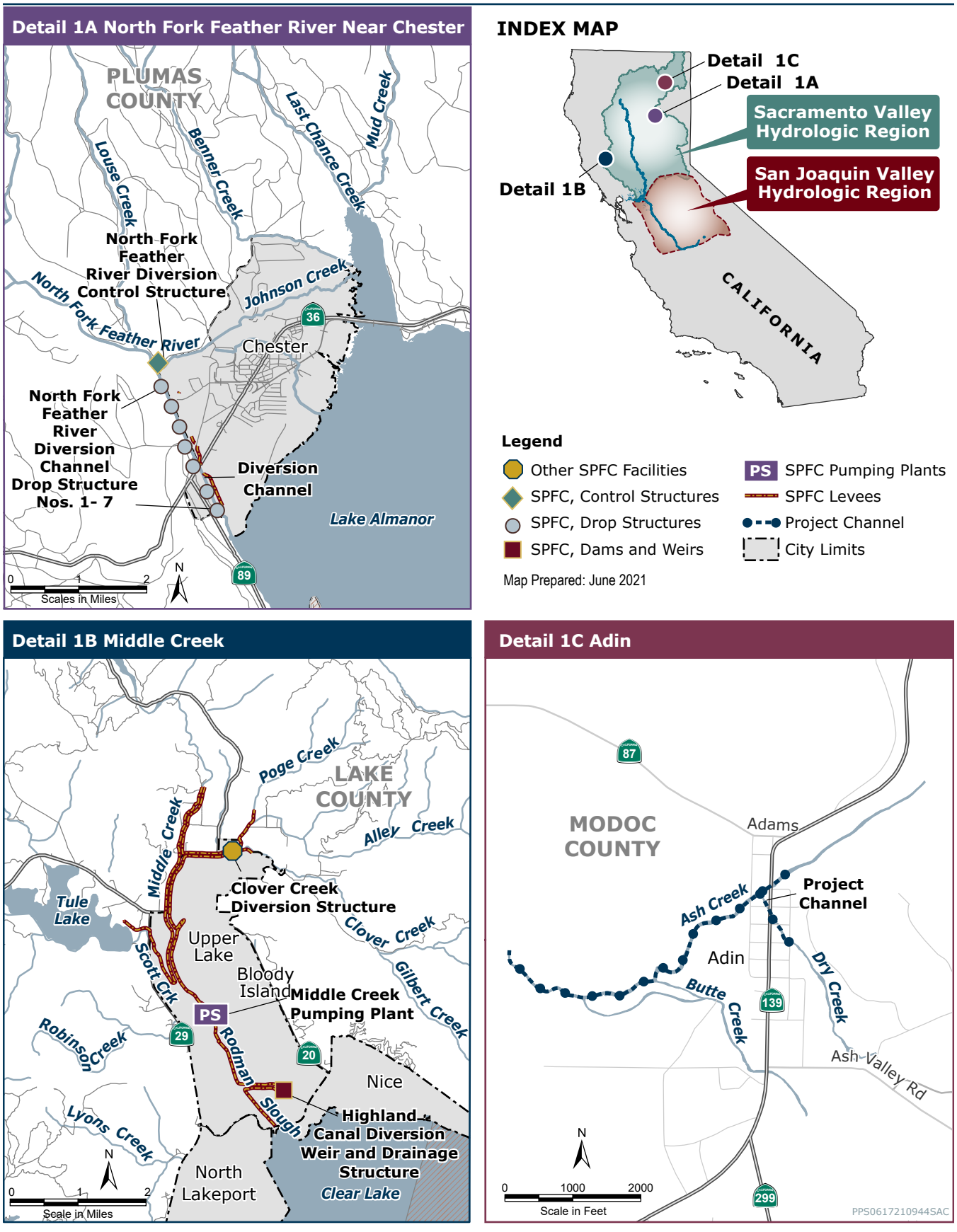


Figure 3-5. State Plan of Flood Control Facilities within the Sacramento River Watershed near Chester, Middle Creek, and Adin



3.2.2 American River Watershed

The American River enters the Sacramento River at the City of Sacramento. Figure 3-6 includes SPFC facilities in the American River Watershed.

3.2.2.1 American River from Carmichael Bluffs to Natomas East Main Drainage Canal

The design capacity of this reach is 115,000 cfs with 5 feet of freeboard and 152,000 cfs with 3 feet of freeboard, based on O&M manuals. SPFC facilities along this reach include right- and left-bank levees, two pumping plants, and vegetation on mitigation sites. The levees and pumping plants are intended to reduce flood risk to urban areas within Sacramento County. Portions of the levees were originally built by local interests, and portions of these levees were enlarged to project standards by USACE.

The right-bank levee (refer to O&M Manuals SAC118.2 and SAC517) extends about 12 miles from high ground to the Natomas East Main Drainage Canal. The American River Flood Control District and DWR maintain this levee through Maintenance Areas 10 and 11. Two SPFC pumping plants (refer to O&M Manual SAC518) are located along the American River and are operated by Sacramento County. Pumping Plant No. 1 is located about 1 mile downstream from the H Street Bridge; Pumping Plant No. 2 is located about 0.25 miles east of the Watt Avenue Bridge. The pumping plants dispose of local drainage water from about 15.5 square miles of the area located behind the levee. Five vegetation mitigation sites (refer to O&M Manual SAC517.3) are located between the Watt Avenue and Howe Avenue bridges.

Based on the O&M manual, the left-bank levee (refer to O&M Manual SAC118.1) begins at Mayhew Road, about 3.5 miles downstream from the right-bank levee and extends about 10 miles from high ground to the Natomas East Main Drainage Canal. The levee has been extended by USACE upstream from Mayhew. Four vegetation mitigation sites (refer to O&M Manual SAC118.1A) are located along this reach of levee. The American River Flood Control District maintains the levee, and DWR maintains the channel.

3.2.2.2 Natomas East Main Drainage Canal

The Natomas East Main Drainage Canal was designed to intercept streams approaching RD 1000 from the east and discharge them into the American River. SPFC facilities are levees and improved channels for the Natomas East Main Drainage Canal and tributaries. With the exception of the left-bank levee along Dry Creek (formerly Linda Creek), right-bank levee along Arcade Creek, and left-bank levee of the Natomas East Main Drainage Canal between Arcade and Dry Creek constructed by USACE, the levees were originally constructed by local interests and rebuilt by USACE to project standards. The levees are maintained by the American River Flood Control District.

- RD 1000 is surrounded entirely by levees. Near Sankey Road on the eastern side of RD 1000, flow along the levee is southerly into the Natomas East Main Drainage Canal and northerly into the Pleasant Grove Creek Canal (described in Chapter 3.2.5). For the reach of the Natomas East Main Drainage Canal from Sankey Road to the Dry Creek north levee, there is

a right-bank levee (refer to O&M Manual SAC125) but no left-bank levee. The design flood capacity of this 9-mile reach of the Natomas East Main Drainage Canal is about 1,500 cfs, based on the O&M manual.

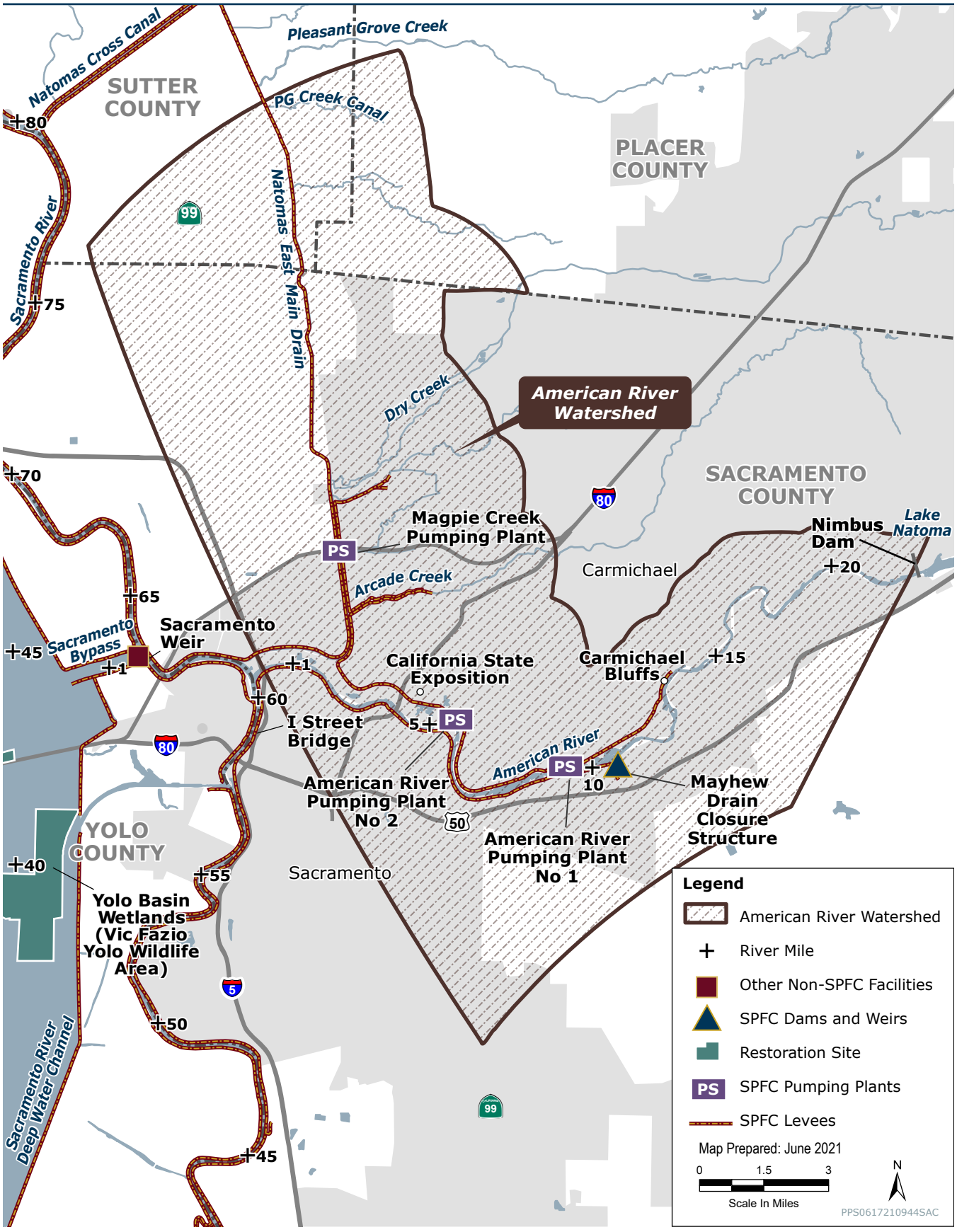
- Dry Creek enters the Natomas East Main Drainage Canal about 4 miles upstream from the American River. A left-bank levee (refer to O&M Manual SAC118.2) extends about 1.3 miles along Dry Creek. The right-bank levee and floodwall of Dry Creek has been constructed as part of the Sacramento Area Flood Control Agency (SAFCA)- and USACE-authorized project, but is not yet turned over to the Central Valley Flood Protection Board (CVFPB) or documented in the O&M manual. The design capacity of Dry Creek upstream from the Natomas East Main Drainage Canal is 15,000 cfs, based on the O&M manual. A 1.4-mile-long diversion channel from Magpie Creek to Dry Creek is intended to limit flood flows in the lower reaches of Magpie Creek. The Magpie Creek diversion channel has a design capacity of 250 cfs.

- From Arcade Creek to the American River, the Natomas East Main Drainage Canal has a capacity of 16,000 cfs, based on the O&M manuals. This reach of the Natomas East Main Drainage Canal has a right-bank levee (refer to O&M Manual SAC125) and a left-bank levee (refer to O&M Manual SAC118.2), each about 4 miles long. Along this reach, Arcade Creek enters from the east. The design capacity of Arcade Creek upstream from the Natomas East Main Drainage Canal is 3,300 cfs. Right- and left-bank levees (refer to O&M Manual SAC118.2) each extend along Arcade Creek about 2 miles from high ground to the Natomas East Main Drainage Canal.

3.2.2.3 American River from Natomas East Main Drainage Canal to Sacramento River

This reach of river has a design capacity of 180,000 cfs with 3 feet of freeboard, based on the O&M manuals. SPFC facilities include levees along both banks of the river. The right-bank levee (refer to O&M Manual SAC124) is about 2.2 miles long. The right-bank levee was originally built by local interests and was accepted into the project without modification because it equaled or exceeded USACE standards. RD 1000 maintains the right-bank levee. A vegetation mitigation site (refer to O&M Manual SAC124.2) is located about 0.9 mile upstream from the Sacramento River. The left-bank levee (refer to O&M Manual SAC118.1) is about 2.5 miles long. The left-bank levee was originally constructed by local interests and rebuilt by USACE to project standards. The levee is intended to reduce flood risk for areas in Sacramento County.

Figure 3-6. American River Watershed – State Plan of Flood Control Facilities along the American River, Natomas East Main Drainage, and Tributaries



3.2.3 Sutter Bypass Watershed

The Sutter Bypass receives water from natural runoff areas south of Chico, overflow and weir flow from the Sacramento River, and drainage from the eastern side of the bypass through the Wadsworth Canal and pumping plants. The bypass joins the Feather River upstream from its confluence with the Sacramento River near the Fremont Weir. Figures 3-7A and 3-7B show SPFC facilities in the Sutter Bypass watershed.

3.2.3.1 Butte Creek Upstream from Butte Basin

SPFC facilities for Butte Creek include a diversion structure on Little Chico Creek, a diversion channel from Little Chico Creek to Butte Creek, and levees along the diversion channel and along Butte Creek (Figure 3-7A). The facilities are intended to reduce flood risk to Chico, Durham, adjoining agricultural land, Highway 99, and several railroads and county roads. Aside from 8 miles of downstream levees from Butte Creek, levees were originally built by local interests and set back or enlarged to project standards by USACE. DWR maintains the facilities through Maintenance Area 5.

- The ungated Little Chico Diversion Structure (refer to O&M Manual SAC516) was designed to limit flood flows through Chico and route excess flood flows to Butte Creek. Upstream from the diversion, Little Chico Creek has a design capacity of 6,700 cfs, based on the O&M manual. The design capacity of Little Chico Creek downstream from the diversion is about 2,200 cfs. The design capacity of the 3-mile-long diversion channel to Butte Creek is about 3,000 cfs with 3 feet of freeboard. According to the O&M manual, the diversion channel can carry 4,500 cfs with no freeboard. The diversion channel has intermittent levees along the right bank (refer to O&M Manual SAC516).

- The design capacity of Butte Creek downstream from the confluence with the Little Chico Creek Diversion Structure is 27,000 cfs with 3 feet of freeboard, based on the O&M manual. According to the O&M manual, the channel can carry 40,000 cfs with no freeboard. Right- and left-bank levees (refer to O&M Manuals SAC515 and SAC516) extend about 15 miles downstream to the Butte Basin.

3.2.3.2 Cherokee Canal

SPFC facilities (refer to O&M Manual SAC519) consist of levees along Cherokee Canal, the lower reaches of Cottonwood Creek and Gold Run Creek, and irrigation and drainage structures from Butte Basin to high ground (Figure 3-7A). The facilities are intended to provide reduced flood risk to adjacent agricultural lands, area transportation facilities, and irrigation canals. DWR maintains the facilities through Maintenance Area 13.

- The right-bank levee along Dry Creek and Gold Run Creek extends about 5.2 miles from high ground to the confluence with Cottonwood Creek. The left-bank levee extends about 3.5 miles from high ground to the confluence with Cottonwood Creek. The design capacity of this reach is about 8,500 cfs with 3 feet of freeboard, based on the O&M manual.

- The lower reach of Cottonwood Creek has a design capacity of about 3,500 cfs. Right- and left-bank levees, each about 1.3 miles long, and extend from high ground to the connection with the Cherokee Canal levees.

- Downstream from Cottonwood Creek, the Cherokee Canal has a design capacity varying from 11,500 cfs to 12,500 cfs, based on the O&M manual. The right-bank levee extends about 14 miles. The left-bank levee is about 17 miles long. About midway along this reach, to allow flow to enter from the east, the left-bank levee is broken into two parallel segments for approximately 1.5 miles.

3.2.3.3 Butte Basin (Including Butte Creek and Butte Slough)

SPFC facilities within the Butte Basin include channel improvements along lower Butte Creek and the Butte Slough Outfall Gates to the Sacramento River (Figure 3-7A).

Water from Butte Creek (refer to O&M Manuals SAC153, SAC515, and SAC516), the Cherokee Canal (refer to O&M Manual SAC519), and other small tributaries from the north and east enter the Butte Basin. Flood flow from the Sacramento River enters the upper end of the Butte Basin (refer to Chapter 3.2.5, Sacramento River Watershed) at three overflow areas below Chico Landing on the Sacramento River.

Flood flow to the Butte Basin from the Sacramento River also occurs from the Moulton Weir (refer to O&M Manual SAC154) and from the Colusa Weir (refer to O&M Manuals SAC155 and SAC502) (discussed in Chapter 3.2.5). The Butte Basin provides about 1 million acre-feet of transitory storage at flood stage.

The following points describe SPFC facilities in the Butte Basin:

- Downstream from the Butte Creek levees, channel improvements (refer to O&M Manual SAC153) extend about 13 miles along lower Butte Creek to the Gridley-Colusa Road. The channel improvements and clearing allow a flow of about 2,500 cfs without extensive overbank flooding. The improvements along this reach also included replacing the old Howard Slough Diversion Structure with a new structure. The diversion structure is located across Butte Creek about 0.5 mile downstream from the bifurcation with Howard Slough. The O&M manual states that the nearby McGowan-Harris Diversion Structure, which was constructed by local interests, is not part of the project, but must be operated in conjunction with the Howard Slough Diversion Structure. Both of these diversion structures are for irrigation and have no flood management role. However, DWR does inspect these structures to be sure that flashboards are removed during the non-irrigation season to minimize their impact on flood stage.

- The Butte Slough Outfall Gates (refer to O&M Manual SAC161) to the Sacramento River control the passage of floodwaters from the Butte Basin to the Sacramento River at a maximum flow of about 3,500 cfs, based on the O&M manual. The gates also allow the passage of Butte Slough drainage water to the Sacramento River during the irrigation season.

Flap gates on the Sacramento River side of the structure prevent Sacramento River floodwaters from entering the Butte Basin.

Floodwater flows in the Butte Basin flow through Butte Slough and into the Sutter Bypass about 8 miles downstream from the Butte Slough Outfall Gates.

3.2.3.4 Butte Slough

SPFC facilities include the right-bank levee (refer to O&M Manual SAC134) from the Butte Slough Outfall Gates to the head of the Sutter Bypass (Figure 3-7A). The levee is about 7.3 miles long; it is intended to reduce flood risk to RD 70 and is maintained by RD 70. The levee was constructed by local interests and was reconstructed to adopted grade and section by USACE. Based on the O&M manual, the design capacity of this reach is 185,000 cfs at the upstream end and 178,000 cfs with 6 feet of freeboard at the beginning of the Sutter Bypass.

3.2.3.5 Sutter Bypass

SPFC facilities along the Sutter Bypass and tributaries include levees and pumping plants. The levees along the Sutter Bypass are about 4,000 feet apart (Figures 3-7A and 3-7B).

- From Long Bridge, just upstream from Highway 20 to the Wadsworth Canal, SPFC facilities include levees and a pumping plant. This reach has a design capacity of 178,000 cfs with 6 feet of freeboard, based on O&M manuals. The right-bank levee (refer to O&M Manuals SAC133 and SAC134) is about 4.5 miles long and is intended to reduce flood risk to the town of Meridian and agricultural land in RD 70 and RD 1660. The left-bank levee (refer to O&M Manual SAC135) is about 4 miles long and is intended to reduce flood risk to adjacent agricultural land south of the town of Sutter and to Yuba City. Pumping Plant No. 3 (refer to O&M Manual SAC159) discharges water to the Sutter Bypass from the area located behind the levee. The plant has a capacity of about 180 cfs. In addition, reverse gravity flow water from the bypass provides irrigation water to adjacent agricultural areas.

- SPFC facilities along the Wadsworth Canal and intercepting canals are levees (refer to O&M Manual SAC135). Based on the O&M manual, the Wadsworth Canal's design capacity is 1,500 cfs with 6 feet of freeboard at the confluence with the Sutter Bypass, and reduces to 3 feet at River Mile 4. Both its right- and left-bank levees are about 4.7 miles long. The Wadsworth Canal levees were built by local interests and were reconstructed to adopted grade and section by USACE. At the upstream end of the Wadsworth Canal, the West Intercepting Canal and levees are about 1.4 miles long and the East Intercepting Canal and levees are about 3.8 miles long. The intercepting canals and levees were built by local interests, and a portion of the West Intercepting Canal was reconstructed by USACE. The levees are intended to reduce flood risk to adjacent agricultural land and to Yuba City. DWR provides maintenance through Maintenance Area 3.

- From the Wadsworth Canal to the Tisdale Bypass, the Sutter Bypass has a design capacity of 178,000 cfs with 6 feet of freeboard, based on O&M manuals. The right-bank levee (refer to O&M Manual SAC133) is about 5.8 miles long. The levee is intended to reduce flood risk to

adjacent agricultural lands and the town of Meridian and is maintained by RD 1660. The left-bank levee (refer to O&M Manual SAC135) is about 6.5 miles long. The levee is intended to reduce flood risk to adjacent agricultural land and Yuba City and is maintained by DWR through Maintenance Area 3. Pumping Plant No. 2 (refer to O&M Manual SAC159) has a capacity of about 775 cfs. In addition, reverse gravity flow water from the bypass provides irrigation water to adjacent agricultural areas. Flow from the Tisdale Weir and Bypass (refer to O&M Manuals SAC129 and SAC135) enters the bypass from the west.

- SPFC facilities along the Sutter Bypass downstream from the Tisdale Bypass to the Feather River include levees and a pumping plant. The Sutter Bypass has a design capacity of 216,500 cfs with 6 feet of freeboard, based on O&M manuals. The right-bank levee (refer to O&M Manual SAC129) is about 12.2 miles long. The levee is intended to reduce flood risk to adjacent agricultural lands and is maintained by RD 1500. The left-bank levee (refer to O&M Manual SAC135) is about 12.9 miles long. The levee is intended to reduce flood risk to adjacent agricultural land and is maintained by DWR through Maintenance Area 3. Pumping Plant No. 1 (refer to O&M Manual SAC159) has a capacity of about 280 cfs from the area located behind the levee into the bypass. In addition, reverse gravity flow water from the bypass provides irrigation water to adjacent agricultural areas.

3.2.3.6 Joint Feather River/Sutter Bypass Channel to Sacramento River

As Chapter 3.2.1 described, from their junction, the Feather River and the Sutter Bypass flow in a joint channel to the Sacramento River (Figure 3-7B). The design channel capacity of this reach is 416,500 cfs with 6 feet of freeboard, based on O&M manuals. This differs from the design capacity of 380,000 cfs estimated in the 1957 Revised Profile Drawings (U.S. Army Corps of Engineers 1957). SPFC facilities include right- and left-bank levees about 1.3 miles apart. The right-bank levee (refer to O&M Manual SAC129) is about 10 miles long; it is intended to reduce flood risk to agricultural land and is maintained by RD 1500. The left-bank levee (refer to O&M Manual SAC141.1) is about 7 miles long; it is intended to reduce flood risk to agricultural land and is maintained by RD 1001. The left-bank levee was originally built by local interests and was later enlarged or improved to project standards by USACE.

Figure 3-7A. Sutter Bypass Watershed – State Plan of Flood Control Facilities along Butte Creek, Cherokee Canal, Sutter Bypass, and Tributaries

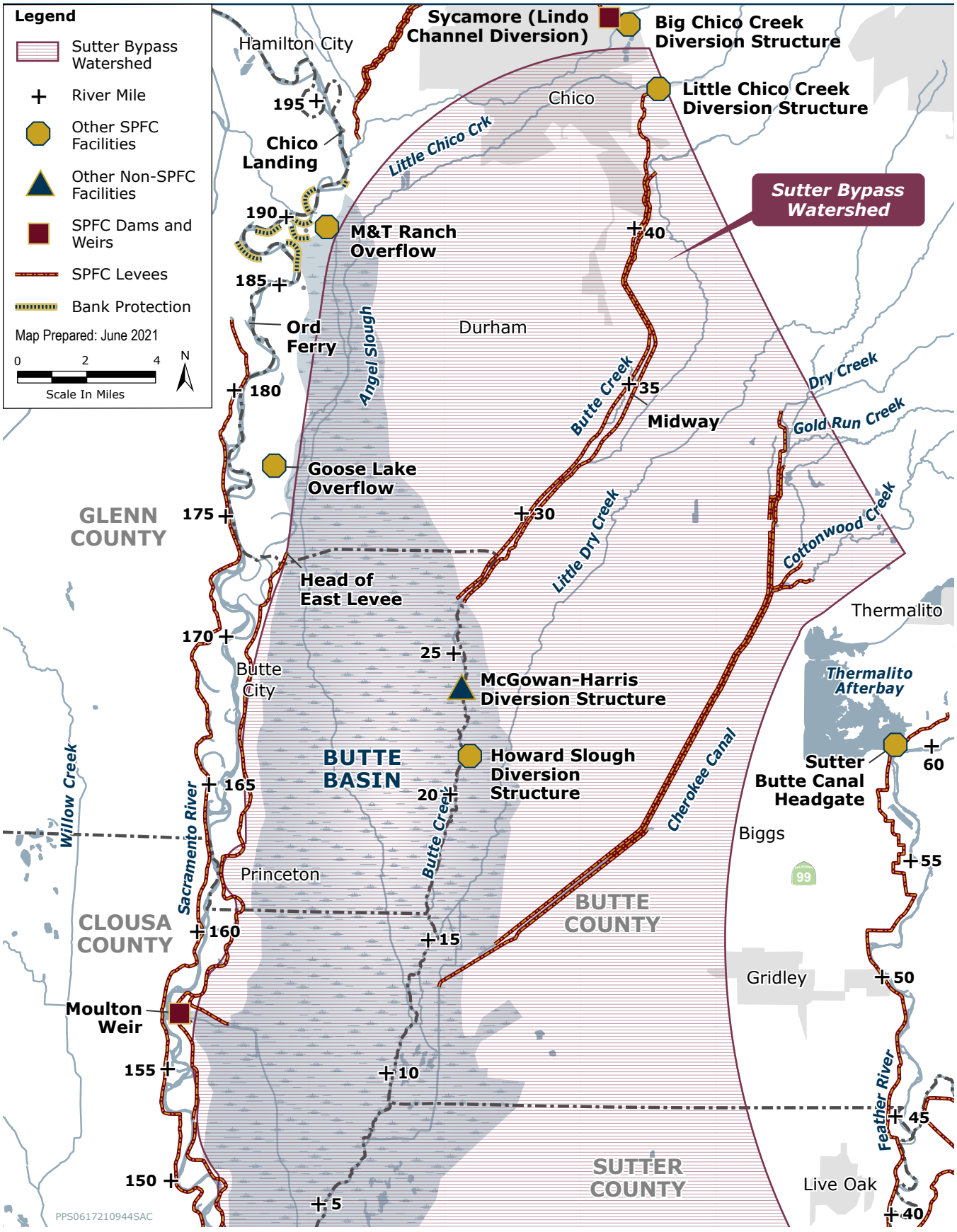
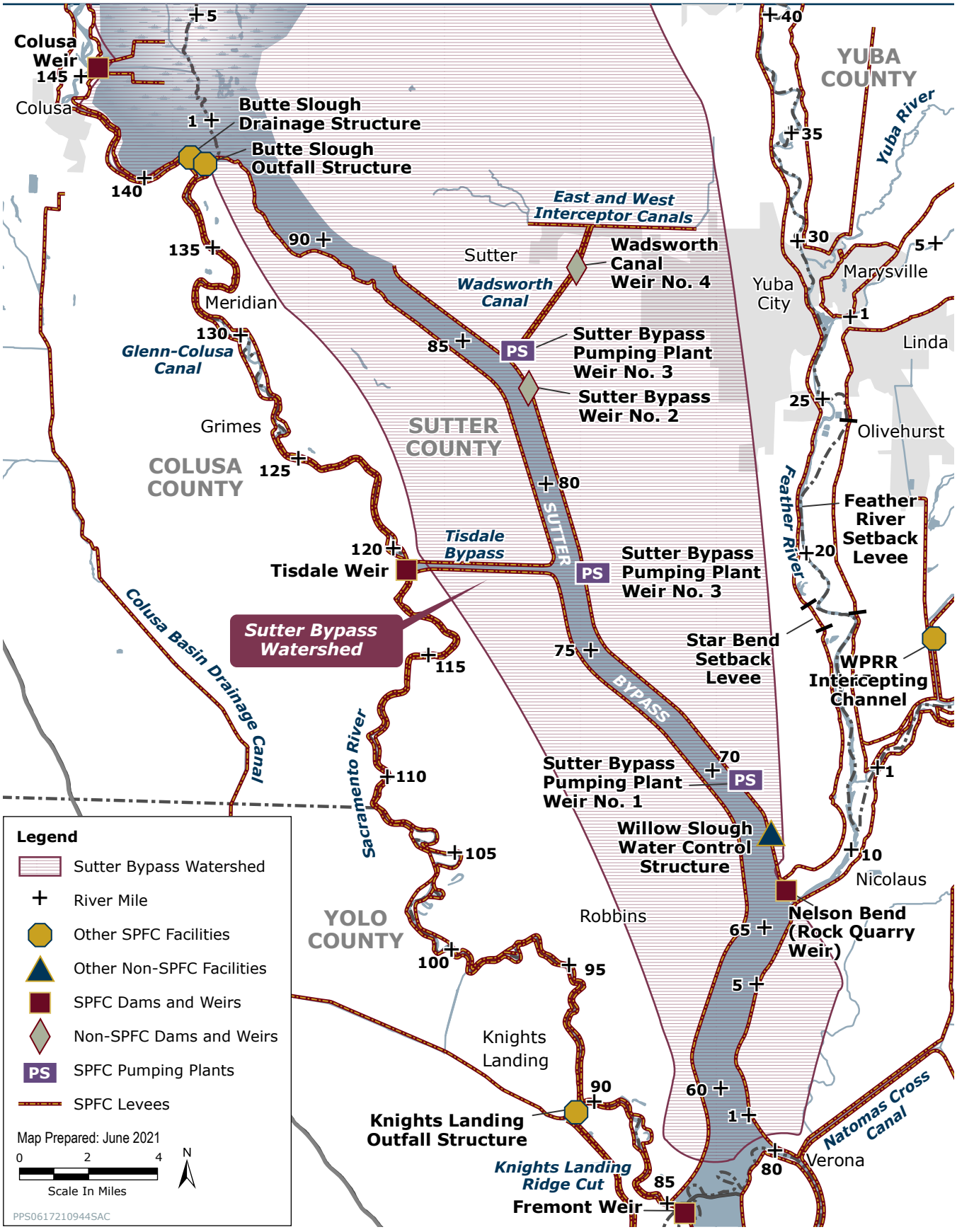


Figure 3-7B. Sutter Bypass Watershed – State Plan of Flood Control Facilities along Butte Creek, Cherokee Canal, Sutter Bypass, and Tributaries



3.2.4 Yolo Bypass Watershed

Fremont Weir is located at the junction of the Sacramento River and the joint Feather River/Sutter Bypass channel. The Yolo Bypass receives most of its flow by spill over the Fremont Weir from the Sacramento/Feather/Sutter Bypass. The Yolo Bypass receives additional flow from smaller tributaries along its length, and from the Sacramento River through the Sacramento Bypass. For this description, the Yolo Bypass watershed begins in the Colusa Basin. Figures 3-8A and 3-8B show SPFC facilities in the Yolo Bypass watershed.

3.2.4.1 Colusa Basin

SPFC facilities in the Colusa Basin include a left-bank levee, outfall gates to the Sacramento River, an excavated channel and levees to the Yolo Bypass, and stone biotechnical levee protection (Figure 3-8A).

- The left-bank levee (refer to O&M Manual SAC132) to the Colusa Basin Drain (Colusa Trough Drainage Canal) is about 36.2 miles long and serves as a back levee for RD 108 and RD 787. The levee's design capacity is 20,000 cfs with 3 feet of freeboard, based on the O&M manual. There is no SPFC right-bank levee. RD 108 and DWR maintain the levee through Maintenance Area 12. About 36 acres of stone biotechnical levee protection (refer to O&M Manual SAC132.1) were added in three sites along this reach.

- The Knights Landing Outfall Gates (refer to O&M Manual SAC162), also known as the Sycamore Slough Outfall Gates, is intended to reduce flood risk to the lower Colusa Basin from Sacramento River backwater but provide drainage to the Sacramento River during low flow. The structure was originally built by local interests. USACE and DWR added flap gates. DWR provides maintenance through the Sacramento Maintenance Yard.

- Knights Landing Ridge Cut (refer to O&M Manual SAC127) provides drainage of the Colusa Basin Drain to the Yolo Bypass. Based on the O&M manual, the cut's design capacity is 20,000 cfs with 3 feet of freeboard at the upstream end, and 6 feet of freeboard at the Yolo Bypass. The channel and its right- and left-bank levees are each about 6.4 miles long length. Maintenance is provided by the Knights Landing Ridge Drainage District.

3.2.4.2 Cache Creek

SPFC facilities on Cache Creek and its tributaries are clustered in two separate areas: first, those of the Middle Creek Project upstream from Clear Lake, and second, those along Cache Creek near the Yolo Bypass (Figure 3-8B). The Cache Creek Settling Basin and adjoining levees are important SPFC facilities that reduce sediment transport into the Yolo Bypass.

- The Middle Creek and Tributaries Project (Figure 3-5) upstream from Clear Lake reduces flood risk for the town of Upper Lake, adjoining agricultural land, Highway 20, and several county roads. The project includes about 14.4 miles of levees (refer to O&M Manual SAC506.2), diversion structures, and a pumping plant. A design freeboard of 3 feet was provided for all levees. Levees exist along Page Creek and Alley Creek (2,800-cfs design

capacity based on the O&M manual), and Clover Creek (500-cfs design capacity). A diversion structure on Clover Creek diverts flood flows to a leveed diversion channel (8,000-cfs design capacity) to Middle Creek. Levees exist along Middle Creek (19,000 and 21,500-cfs design capacities) and Scott Creek (11,000-cfs design capacity). Downstream from Scott Creek, Middle Creek (27,000 cfs design capacity) only has a left-bank levee (refer to O&M Manuals SAC506.2 and SAC506.3). A pumping plant (refer to O&M Manual SAC506.1) is located at Bloody Island to discharge (130-cfs capacity) drainage water from a 3.1-square-mile area from behind project levees into Middle Creek. During low flow, flow direction can be reversed to provide irrigation water from Middle Creek. The left-bank levee continues to Clear Lake. Through its history, the project has been maintained at times by the Lake County Flood Control and Water Conservation District, Lake County Watershed Protection District, and DWR. Since 2000, the project has been operated and maintained by Lake County Water Protection District and DWR. Lake County Watershed Protection District is responsible for operating and maintaining the Upper District (facilities north of the confluence of Scott Creek) and DWR is responsible for operating and maintaining the Lower District (Maintenance Area 17—from Clear Lake north to the confluence of Scott Creek).

- Lower Cache Creek has SPFC levees (refer to O&M Manual SAC126) beginning at high ground about 1.5 miles west of Interstate 5 near Woodland. The design capacity is 30,000 cfs, based on the O&M manual. The right-bank levee leading to the Cache Creek Settling Basin is about 6 miles long and the left-bank levee is about 8 miles long. The levees are intended to reduce the flood risk to Woodland and adjoining agricultural lands. DWR maintains the facilities through the Sacramento Maintenance Yard.

- East and west training levees (refer to O&M Manual SAC120), each about 2.5 miles long, direct flows toward the southern end of the Cache Creek Settling Basin. In addition, the embankments and spillway forming the Cache Creek Settling Basin (refer to O&M Manual SAC120) are about 7.5 miles long. The purpose of the settling basin is to control debris and sediment that would otherwise flow into the Yolo Bypass and compromise its capacity. The O&M manual recognized that the deposition of sediment could not be predicted in advance. The east training levee is designed to be periodically breached to regulate the deposition of sediment within the basin. Discharge from the basin enters the Yolo Bypass directly. The settling basin has been modified several times since its original construction in 1937. In 1991, the basin was enlarged to provide 50-year storage capacity. The basin was authorized and designed with a spillway to the Yolo Bypass to be raised 6 feet when the sediment trapping efficiency of the basin was reduced to a predetermined level. This was estimated to occur around 2017. DWR maintains the facilities through the Sacramento Maintenance Yard.

3.2.4.3 Relocated Willow Slough

SPFC facilities include the relocation of Willow Slough to the Willow Slough Bypass, with levees along the excavated channel (refer to O&M Manual SAC120) (Figure 3-8B). The bypass is intended to reduce the risk of flooding to the City of Davis. A diversion weir is located at the point of bifurcation of the original and relocated channels.

Based on the O&M manual, the relocated channel's design capacity is 6,000 cfs with 3 feet of freeboard at the upstream end, gradually increasing to 6 feet at the Yolo Bypass. The right-bank levee extends about 7.4 miles from high ground to the Yolo Bypass. The left-bank levee extends about 7.6 miles from high ground to the Yolo Bypass. The mouth of Willow Slough is now about 5.5 miles south of the original channel. DWR maintains the project through the Sacramento Maintenance Yard.

3.2.4.4 Putah Creek

SPFC facilities (refer to O&M Manual SAC119) include channel improvements and levees. Based on the O&M manual, the design channel capacity is 62,000 cfs with 3 feet of freeboard from high ground to the Yolo Bypass (Figure 3-8B). Freeboard gradually increases from 3 feet at the upstream end to 6 feet at the Yolo Bypass. The project includes clearing the Putah Creek channel from the highway bridge at Winters to a point about 1 mile upstream from the Interstate 80 crossing of Putah Creek. From that point, 1 mile upstream from Interstate 80, the project includes channel excavation and clearing to the Yolo Bypass and right- and left-bank levees. The facilities are intended to reduce flood risk to southern portions of Davis and adjoining agricultural lands. DWR provides maintenance through the Sacramento Maintenance Yard.

3.2.4.5 Cache Slough and Lindsey Slough

SPFC facilities include levees along sloughs and land tracts near the terminus of the Yolo Bypass. The design capacity of the Lindsey Slough discharge to the Yolo Bypass is 43,500 cfs with 3 feet of freeboard, based on O&M manuals (Figure 3-8B). Levees, maintained by RD 2060, RD 2068, RD 2093, and RD 536, include the following:

- Back levee (refer to O&M Manual SAC109) from RD 2068 and RD 2098.
- Levees around Peters Tract (refer to O&M Manual SAC108).
- Levees around Hastings Tract (refer to O&M Manual SAC107).
- North and south levees of Egbert Tract (refer to O&M Manual SAC106).

3.2.4.6 Yolo Bypass

The Yolo Bypass begins at Fremont Weir (refer to O&M Manual SAC157 and Chapter 3.2.5). SPFC facilities include levees on the right and left sides of the bypass (Figures 3-8A and 3-8B).

From Fremont Weir to the Knights Landing Ridge Cut, the design capacity of the Yolo Bypass is 343,000 cfs with 6 feet of freeboard, based on O&M manuals. The right-bank levee (refer to O&M Manual SAC127) is about 2 miles long and is intended to reduce flood risk to adjacent agricultural land. DWR provides maintenance through the Sacramento Maintenance Yard. The Knights Landing Ridge Cut, with a design capacity of 20,000 cfs, enters the right side of the Yolo Bypass along this reach. The left-bank levee (refer to O&M Manual SAC123) is about 4 miles long and is intended to reduce flood risk to adjacent agricultural land in RD 1600. RD 1600 provides maintenance.

Based on O&M manuals, the design capacity increases to 362,000 cfs from the Knights Landing Ridge Cut to Cache Creek. There is a right-bank levee for the Yolo Bypass between the Knights Landing Ridge Cut and the Cache Creek Settling Basin, but it does not show in the O&M manuals as an SPFC facility. The left-bank levee (refer to O&M Manual SAC123) is about 2 miles long and is intended to reduce flood risk to adjacent agricultural land in RD 1600. RD 1600 provides maintenance.

From Cache Creek to the Sacramento Bypass, the design capacity of the Yolo Bypass is 377,000 cfs with 6 feet of freeboard, based on O&M manuals. SPFC facilities in this reach include levees along both sides of the bypass. The right-bank levee (refer to O&M Manual SAC121) is about 6.4 miles long and is intended to reduce flood risk to agricultural land in RD 2035 and Woodland. RD 2035 maintains the levee. The left-bank levee (refer to O&M Manual SAC122) is about 6.1 miles long and reduces flood risk to adjacent agricultural land. RD 1600 maintains the left-bank levee. Design inflow to the Yolo Bypass from the Sacramento Bypass is 112,000 cfs, based on the O&M manual.

From the Sacramento Bypass to Putah Creek, the design capacity of the Yolo Bypass is 480,000 cfs with 6 feet of freeboard, based on O&M manuals. SPFC facilities in this reach include levees along the sides of the bypass. The right-bank levee (refer to O&M Manuals SAC119, SAC120, and SAC121) is about 5.2 miles long. Willow Slough, with a design flow of 6,000 cfs, enters the Yolo Bypass within this reach. The left-bank levee (refer to O&M Manual SAC116) is about 7 miles long and is intended to reduce flood risk to West Sacramento. The right-bank levee of the bypass is maintained by RD 900 and DWR through the Sacramento Maintenance Yard, and the left-bank levee is maintained by RD 900. The Yolo Basin Wetlands (refer to O&M Manual SAC521, Vic Fazio Yolo Wildlife Area) is located within this reach and lies over the bypass channel. It provides about 3,700 acres of wildlife habitat, including permanent wetlands, seasonal wetlands, grassland/uplands, and riparian woodland. The California Department of Fish and Game operates and maintains the wildlife area in accordance with USACE requirements. The Sacramento Deep Water Ship Channel, completed in 1963, narrowed the channel of the Yolo Bypass and impacted the design profile. The west levee of the ship channel replaced the function of the left levee of the Yolo Bypass. The Deep Water Ship Channel levees are maintained by USACE and are not part of the SPFC because DWR or the CVFPB did not provide assurances of nonfederal cooperation for the levees and are not listed in Section 8316 of the CWC.

From Putah Creek to the Sacramento River, the Yolo Bypass has a design capacity of 490,000 cfs with 6 feet of freeboard, based on O&M manuals. SPFC facilities include right- and left-bank levees. The SPFC right-bank levee (refer to O&M Manuals SAC106, SAC107, and SAC109) begins about 7 miles downstream from Putah Creek and extends about 13 miles to the Sacramento River in the Delta, near Rio Vista. Along this reach, Cache Slough and Lindsey Slough enter the Yolo Bypass. The levee is intended to reduce flood risk to adjacent agricultural land. Maintenance is provided by RD 536, RD 2060, RD 2098, and RD 2068. The left-bank levee (refer to O&M Manuals SAC105 and SAC113) extends about 23 miles to the Sacramento River. Along this reach, Miners Slough has a design inflow of 10,000 cfs from a series of Delta sloughs that

are distributary from the Sacramento River. RD 501 and RD 999 provide maintenance. The Sacramento Deep Water Ship Channel narrowed the channel of the Yolo Bypass and impacted the design profile. The west levee of the ship channel replaced a portion of the left levee of the Yolo Bypass. As mentioned, the Deep Water Ship Channel levees are maintained by USACE and are not part of the SPFC.

Liberty Island, Little Holland Tract, Prospect Island, Little Egbert Tract, and other lands surrounded by non-SPFC private levees lie within the bypass near its southern end. The levees, generally limited in height, restrict low flows in the Yolo Bypass, but overtop during high discharges. Levees on Liberty Island and a portion of Little Holland Tract failed from Yolo Bypass flows in 1995 and 1998, and the lands have remained flooded since that time.

Figure 3-8A. Yolo Bypass Watershed – State Plan of Flood Control Facilities along Yolo Bypass, Cache Creek, and Tributaries

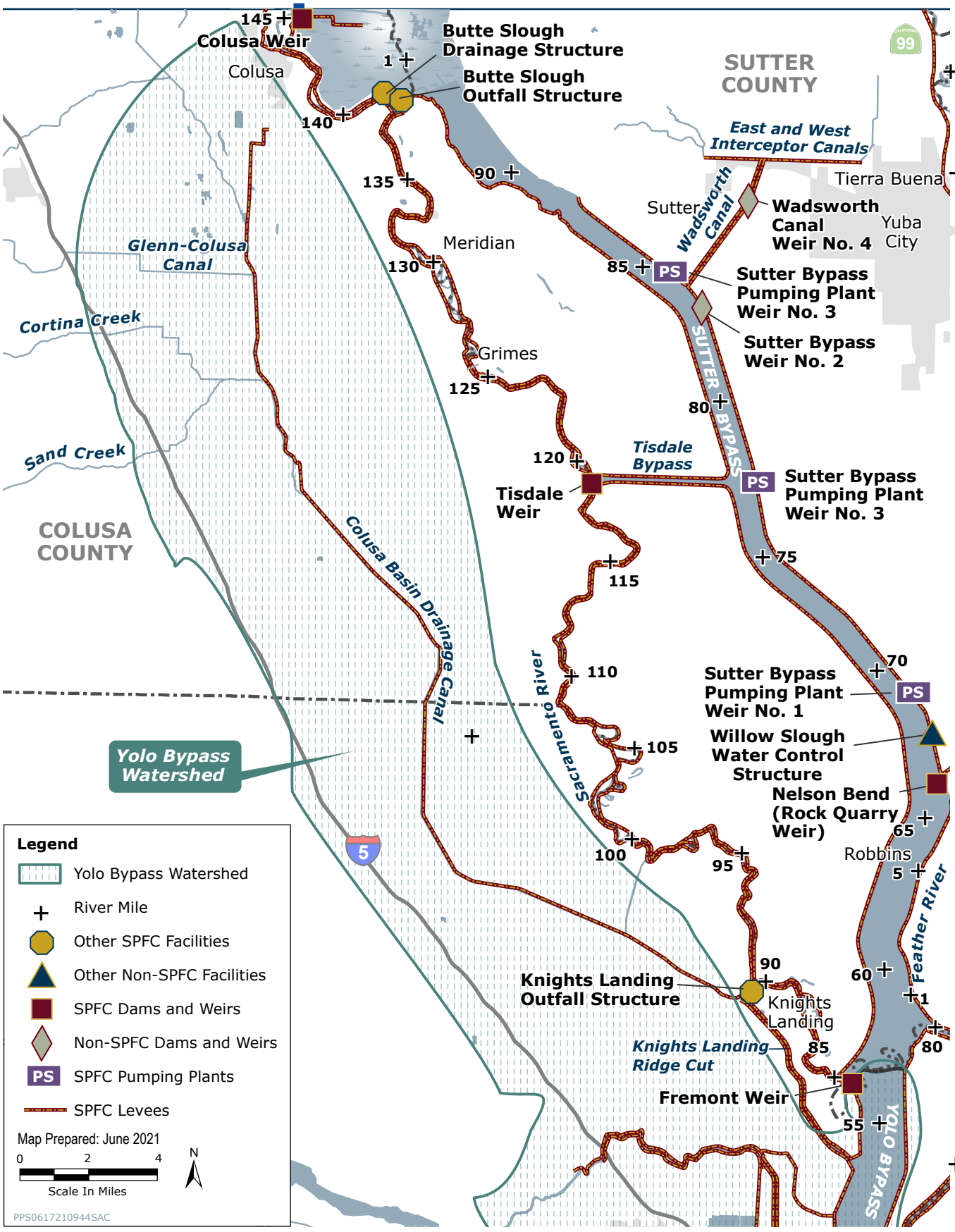
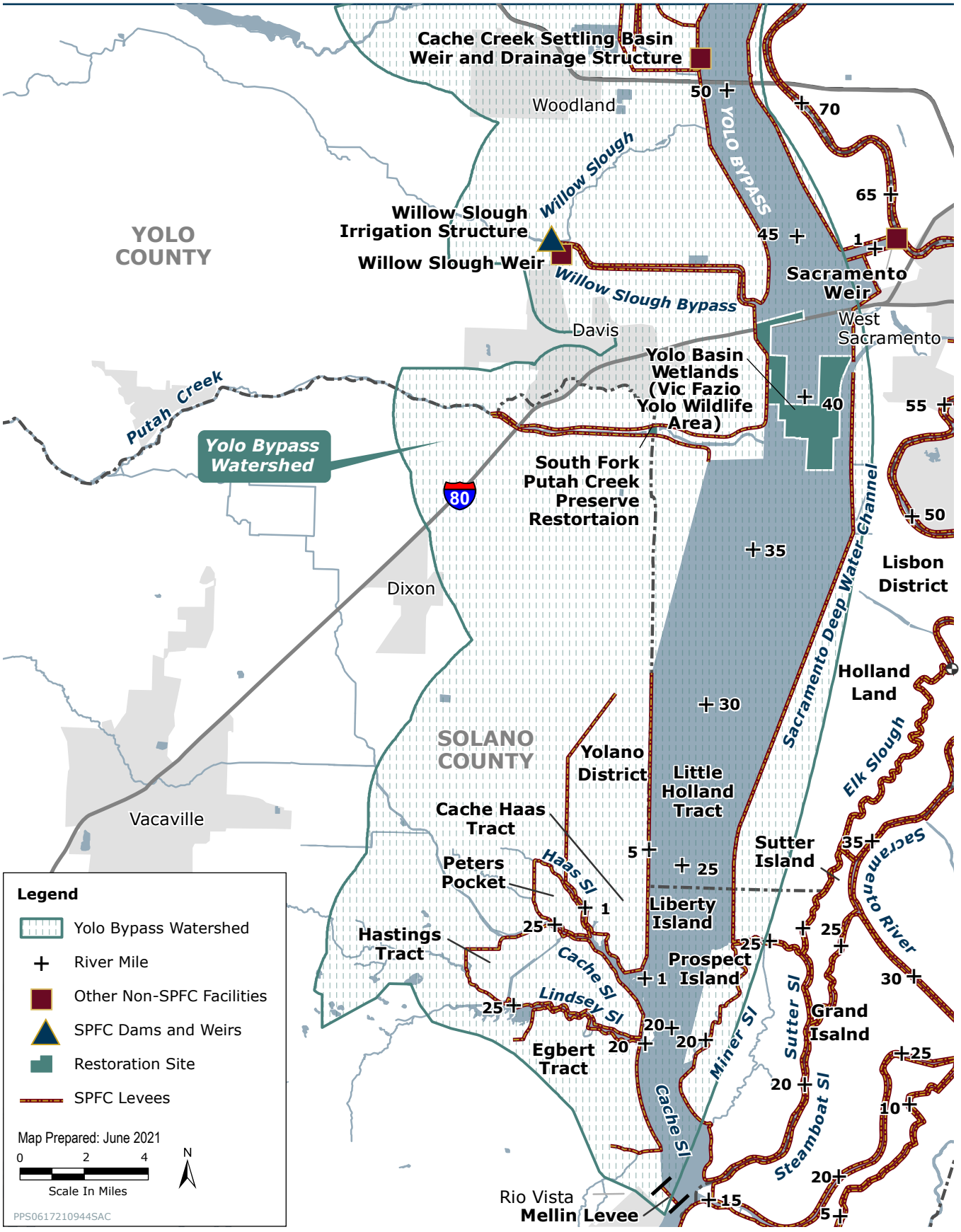


Figure 3-8B. Yolo Bypass Watershed – State Plan of Flood Control Facilities along Yolo Bypass, Cache Creek, and Tributaries



3.2.5 Sacramento River Watershed

The previous sections of this chapter describe the main tributaries that provide flow directly to the Sacramento River or divert flow away from the river. This section completes the description of SPFC facilities within the Sacramento River Watershed in an upstream-to-downstream direction. Figures 3-9A, 3-9B, 3-9C, 3-9D, and 3-9E show SPFC facilities in the main stem of the Sacramento River Watershed.

3.2.5.1 Ash and Dry Creeks at Adin

SPFC channel clearing and snagging (refer to O&M Manual SAC503) was conducted over about 1 mile of Ash Creek downstream from Highway 299 and Dry Creek from its confluence with Ash Creek to a point about 900 feet upstream. The project (Figure 3-5) is intended to reduce flood risk to the town of Adin in Modoc County about 80 miles northeast of Redding. Ash Creek drains into the Pit River, which drains into Shasta Lake. The Adin Community Services District maintains the project.

3.2.5.2 Sacramento River Tributaries Between Red Bluff and Chico Landing

The tributaries to the Sacramento River between Red Bluff and Chico Landing are shown on Figures 3-9A and 3-9B.

There are several SPFC improvements along tributaries to the Sacramento River between Red Bluff and Chico Landing; none of these improvements are connected to the SPFC levee system that begins downstream at Ord Ferry.

Salt Creek enters the Sacramento River about 4 miles downstream from Red Bluff. Channel clearing and shaping (refer to O&M Manual SAC513) of Salt Creek from its confluence with the Sacramento River to about 1.7 miles upstream is intended to reduce flood risk to residences on the eastern side of Salt Creek, as well as agricultural land. The Tehama County Flood Control and Water Conservation District maintains the project.

Elder Creek enters the Sacramento River about 12 miles downstream from Red Bluff. SPFC improvements (refer to O&M Manual SAC510) include channel clearing for about 1.25 miles upstream from the Sacramento River and an adjacent leveed channel reach. The left-bank levee is about 4.1 miles long and the right-bank levee is about 4 miles long. The design capacity of the leveed channel is 17,000 cfs with 3 feet of freeboard, based on the O&M manual. The improvements are intended to reduce flood risk to the town of Garber, adjacent agricultural land, several highways, and a railroad. The Tehama County Flood Control and Water Conservation District maintains the project.

McClure Creek is located in Tehama County. The creek drains from west to east toward the town of Tehama, about 13 miles south of Red Bluff. SPFC improvements (refer to O&M Manual SAC511) include channel clearing along an 8,700-foot-long reach from about 1 mile upstream from U.S. Highway 99 to 0.7 mile downstream from the high-way. The improvements are intended to reduce flood risk to the town of Tehama to the north, bridges for Highway 99,

several county roads, and adjacent agricultural land to the south. The Tehama County Flood Control and Water Conservation District maintains the project.

Deer Creek enters the Sacramento River about 21 miles downstream from Red Bluff. SPFC improvements (refer to O&M Manual SAC509) include channel clearing and levees along Deer Creek. The design capacity of the channel is 21,000 cfs with 3 feet of freeboard, based on the O&M manual. Channel clearing extends from upstream of Delany Slough to the Sacramento River. The right-bank levee is about 1.5 miles long. The left-bank levee extends about 4.3 miles, in two segments, from high ground to the Sacramento River floodplain. The facilities were designed to reduce flood risk to the town of Vina and adjacent agricultural land. The Tehama County Flood Control and Water Conservation District maintains the project.

3.2.5.3 Sacramento River from Red Bluff to Chico Landing

SPFC facilities, including bank protection sites (refer to O&M Manual SAC512), extend intermittently along a 50-mile reach of the Sacramento River between Red Bluff (River Mile 244) and Chico Landing (River Mile 194) (Figures 3-9A and 3-9B). Because of the meandering nature of the river in the reach, USACE identified locations that needed improvement to prevent movement of the river onto adjoining lands.

Specific works completed along this stretch were documented in letters from USACE that are included in Exhibit C of O&M Manual SAC512. Some of the river miles listed in the letters used an older system with numerical values that were approximately 50 to 52 miles less than the current system. For example, River Mile 141.2 in the old system is classified as River Mile 193.12 in the new system. The specific works are listed here, and the old river mileage system is identified, where necessary.

- River banks were shaped and stone protection was placed on the left bank of the Sacramento River at Site No. 8, River Mile 183.4 (old river mileage system); Site No. 9, River Mile 183.9 (old river mileage system); and on the right bank at Site No. 10, River Mile 187.0 (old river mileage system); Site No. 11, River Mile 188.6 (old river mileage system); and Site No. 12, River Mile 189.7 (old river mileage system). This work was completed December 3, 1963.

- River banks were shaped and stone protection was placed on the right bank of the Sacramento River at Site No. 6, River Mile 169.0 (old river mileage system), and Site No. 7, River Mile 169.8 (old river mileage system). This work was completed December 20, 1963.

- River banks were shaped and 500 feet of stone bank protection placed on the right bank of the Sacramento River at Site Mile 177.3 (old river mileage system). This work was completed October 23, 1968.

- River banks were shaped and 525 feet of stone bank protection placed on the left bank of the Sacramento River at Site Mile 218.3. This work was completed June 12, 1970.

- River banks were shaped and stone protection was placed on the left bank of the Sacramento River at Site Mile 185.3 (old river mileage system). This work was completed November 18, 1971.

- River banks were shaped and stone protection was placed on the left bank of the Sacramento River at Site Miles 194.0 (1,900 feet) and 196.3 (875 feet). This work was completed January 4, 1974.

- River banks were shaped and stone protection was placed on the left bank of the Sacramento River at Site Miles 208.4 (4,470 feet) and 213.1 (2,080 feet). This work was completed November 6, 1974.

- River banks were shaped and stone protection was placed on the Sacramento River left bank at Site Miles 194.0 (440 feet) and 230.5 (3,425 feet), and on the right bank at Site Miles 202.0 (600 feet) and 229.0 (3,280 feet). This work was completed November 5, 1975.

- River banks were shaped and 6,500 feet of stone bank protection was placed on the right bank of the Sacramento River at Site Mile 197.0. This work was completed on January 9, 1976.

- River banks were shaped and stone protection was placed on the left bank of the Sacramento River at Site Miles 202.4 (1,300 feet), 207.0 (1,900 feet), and 211.1 (4,000 feet). This work was completed July 29, 1976.

- Repair of 650 feet of stone bank protection took place along the left bank of the Sacramento River at Site Mile 196.3. This work was completed November 15, 1976.

- River banks were shaped and stone protection was placed on the Sacramento River right bank at Site Miles 215.3 (1,320 feet), 226.3 (7,130 feet), and 231.2 (1,550 feet); and on the left bank at Site Miles 233.9 (1,640 feet), 238.1 (710 feet), 239.8 (690 feet), and 242.0 (2,525 feet). This work was completed November 9, 1978.

- River banks were shaped and stone protection was placed on the Sacramento River right bank at Site Mile 204.9 (710 feet), and on the left bank at the Site Mile 242.0 (500 feet) extension. This work was completed June 14, 1979.

- River banks were shaped and stone protection was placed on the Sacramento River right bank at Site Mile 215.0. This work was completed December 17, 1982.

- River bank protection was restored on the Sacramento River left bank at Site Mile 208.4 and on the right bank at Site Mile 226.3. This work was completed February 23, 1984.

- River bank protection was restored on the Sacramento River left bank at Site Miles 219.4 and 240.0 and on the right bank at Site Mile 197.0. This work was completed May 3, 1984.

- River banks were shaped and stone protection was placed on the Sacramento River left bank at Site Mile 227.5 and on the right bank at Site Mile 209.5. This work was completed August 30, 1984.

- River bank protection was restored on the Sacramento River left bank at Site Miles 234.0 and on the right bank at Site Mile 197.0. This work was completed November 2, 1984.

3.2.5.4 Big Chico Creek/Mud Creek

Big Chico Creek/Mud Creek enters the Sacramento River about 600 feet upstream from Chico Landing. SPFC facilities (refer to O&M Manual SAC504) on this stream system include channel clearing, levees, diversion structures, and a diversion channel to reduce flood risk in Chico and local transportation facilities (Figure 3-9B). The project also includes improvements to Big Chico Creek, Sandy Gulch, Sheep Hollow, Sycamore Creek, Dry Creek, and Mud Creek. Butte County is the maintaining agency. Design capacities referenced in the following discussion are from the O&M manual.

- Diversion structures on the eastern side of Chico on Big Chico Creek and Sandy Gulch (Lindo Channel) divert excess flows through a diversion channel to Sycamore Creek. These structures include the Big Chico Creek Gates, Lindo Channel Gates, and the Sycamore Weir. The diversion channel, about 2 miles long, has a design capacity of 8,500 cfs and has a levee along the left bank. Sandy Gulch, Big Chico Creek Gates, Lindo Channel Gates, and the Sycamore Weir are shown in the O&M manual map book included on the reference DVD, on the map for O&M Manual SAC504.

- The project includes the unimproved channels of Big Chico Creek and Lindo Channel that lie between the diversion structures and the Sacramento River.

- Channel improvements and levees extend along both banks of Sycamore Creek, Sheep Hollow, and Mud Creek. About 20 miles of levee are located along these channels, downstream from the diversion channel. Levees line portions of the diversion channel. The design capacity of these levees at their upstream end on Sycamore Creek is 10,000 cfs with 3 feet of freeboard. Sheep Hollow (with a design capacity of 1,400 cfs) and Dry Creek (with a design capacity of 500 cfs) enter Sycamore Creek about 1.8 miles upstream from the Sycamore Creek and Mud Creek confluence. At the confluence, Sycamore Creek has a design capacity of 11,000 cfs and Mud Creek has a capacity of 5,500 cfs. While the design capacity of Mud Creek is 15,000 cfs for most of its length, portions of the channel have a capacity of 13,000 cfs.

3.2.5.5 Butte Basin Overflow Area

The Butte Basin Overflow Area is a historical overflow area where floodwaters from the Sacramento River spill into the Butte Basin periodically (Figure 3-9B). The importance of this river reach to the functioning of the SRFCP was recognized through the CVFPB's 1986 certification of the environmental impact report for the *Plan of Flood Control for the Butte Basin Overflow Area* (1986 Butte Basin Plan), and its concurrent approval of a State

construction project to implement the "Overbank Flow Element" of that plan. DWR's 1988 construction defined and established the M&T and Goose Lake Flood Relief Structures (FRS) to provide overflow into the Butte Basin (along with flow from the Three B's Natural Overflow Area) when the Ord Ferry gauge exceeds 114 feet National Geodetic Vertical Datum (NGVD). DWR also raised the Murphy Slough Plug (a segment of the private Phelan Levee immediately downstream from the M&T FRS) by 2 feet. This fortification reduced the risk of a neck cutoff of the Sacramento River at Monroeville Bend during high water, which would compromise the hydraulic efficiency of the M&T FRS.

USACE implemented the "Bank Stabilization Element" of the 1986 Butte Basin Plan by constructing several bank protection sites during the late 1980s.

DWR's design capacity of the Sacramento River at Chico Landing is about 260,000 cfs; inflow from Stony Creek and Big Chico Creek increase the total design capacity at the latitude of Ord Ferry (where the right-bank, or west levee begins) to about 300,000 cfs. The design capacity of the river where the left-bank, or east levee, begins (7.5 river miles downstream from Ord Ferry, near the Butte-Glenn county line) is about 160,000 cfs, based on the O&M manual. This reduction in river capacity requires that flow leave the river upstream of the dual SPFC levees. Historically, overflow over the east bank of the river has spilled into the Butte Basin during periods of high water. While the magnitude and duration of these flows have been reduced by upstream flow regulation, overflow into the Butte Basin still occurs and is essential to the success of the downstream flood management system along the Sacramento River.

Flows exceeding: 90,000 cfs at Ord Ferry overtop the east bank of the Sacramento River at several locations upstream from the SPFC left-bank levees. The three prominent overflow areas are: the M&T FRS located about 3 river miles downstream from Chico Landing, the Three B's Natural Overflow Area located about 7.5 river miles downstream from Chico Landing, and the Goose Lake FRS located about 15.5 river miles downstream from Chico Landing. As SPFC facilities for which the State has maintenance responsibility under the CWC, DWR maintains both the State-constructed overbank flow features (M&T and Goose Lake FRS) and the USACE-constructed bank stabilization features of the 1986 Butte Basin Plan. CWC Section 8361(p) refers to "the flood relief structures or weirs and other structures or facilities essential for their proper functioning in the vicinity of the Sacramento River between Big Chico Creek and the north boundary of Glenn County Levee District No. 3." CWC Section 9110(f) states that facilities identified in Section 8361 (such as those described here) are part of the SPFC.

The State also included regulation of overflow to the Butte Basin in Title 23 CCR[3]. The standards for the Butte Basin are contained in Section 135, Division 1, 23 CCR. In general, these standards require approval from the CVFPB for any encroachment that could reduce or impede flood flows or would reclaim any of the floodplain within the Butte Basin. The CVFPB also requires the elevation of the roadway downstream from the Goose Lake FRS to remain at or below the elevation required for flood flows to overtop them when flow in the Sacramento

[3] Refer to www.cvfpb.ca.

River exceeds 150,000 cfs; and the elevation of Three B's Natural Overflow to remain at or below the elevation required for flood flows to overtop when the gauge at Ord Ferry Bridge reaches 114 feet NGVD, which is the equivalent to a flood flow of approximately 100,000 cfs.

The current configuration and function of the Butte Basin features are a result of collaboration in planning, design, construction, and maintenance among federal, State, and local entities for the common purpose of providing proper function of the SRFCP.

3.2.5.6 Sacramento River from Ord Ferry to Moulton Weir

Ord Ferry marks the beginning of SPFC levees that extend more than 183 river miles to the Delta. SPFC facilities along the Sacramento River between Ord Ferry and Moulton Weir include levees on both sides of the river. The design capacity of this reach is 160,000 cfs, based on O&M manuals (Figures 3-9B and 3-9C). The right-bank (west) levee (refer to O&M Manuals SAC137, SAC139, and SAC140) begins at Ord Ferry and extends downstream to the Colusa Bridge. The levee is intended to reduce flood risk to adjacent agricultural lands and small communities and is maintained by Glenn County Levee Districts 1 and 2, and by DWR through Maintenance Area 1.

The left-bank (east) levee (refer to O&M Manuals SAC136 and SAC138) begins about 7.5 river miles downstream from Ord Ferry and extends past Moulton Weir to the Butte Slough Outfall Gates. The levee is intended to provide a consistent division of flows between the Butte Basin and Sacramento River. Because water flows on both sides of the levee, the levee does not preclude flood flows to the area east of the levee. Maintenance is performed by Butte County Levee District 3 and by DWR under CWC Section 8361(i). The levees in the reach are generally set back from the river and are about 0.5 mile to 1.5 miles apart.

3.2.5.7 Moulton Weir

Moulton Weir and its training levee are SPFC facilities (Figure 3-9C). The weir (refer to O&M Manual SAC154) is a fixed-crest concrete structure, about 500 feet long, with a design capacity of 25,000 cfs to the Butte Basin (refer to Chapter 3.2.3). The outlet channel is flanked by training levees on the downstream side of the weir. Discharge over the weir occurs when Sacramento River flows exceed about 60,000 cfs at the site. DWR maintains the project through the Sutter Maintenance Yard.

3.2.5.8 Sacramento River from Moulton Weir to Colusa Weir

SPFC facilities along this reach of river include levees (Figure 3-9C). The design capacity of this reach is 135,000 cfs based on O&M manuals. The right-bank levee (refer to O&M Manual SAC137) is about 10 miles long. The levee is intended to reduce flood risk to adjacent agricultural lands and small communities and is maintained by DWR under CWC Section 8361(i) from the Butte Slough Outfall Gates upstream to a point four miles northerly from the Moulton Weir. The levees in the reach are generally set back from the river and are about 0.5 to 1.5 miles apart.

The left-bank levee (refer to O&M Manual SAC136) is about 9 miles long. The levee is intended to reduce flood risk to adjacent agricultural land and small communities. Levee District 3 and DWR provide maintenance through Maintenance Area 1.

3.2.5.9 Colusa Weir and Sediment Basin

Colusa Weir, its training levees, and sediment basin are SPFC facilities (Figure 3-9C). The weir (refer to O&M Manual SAC155) is a fixed-crest concrete structure, about 1,650 feet long, with a design capacity of 70,000 cfs to the Butte Basin (refer to Chapter 3.2.3). Spill over the uncontrolled Colusa Weir begins when Sacramento River flows at the weir exceed about 30,000 cfs.

The bypass channel leading from the weir lies between two training levees that extend about 2 miles into the Butte Basin. A sediment basin (refer to O&M Manual SAC502) was added to limit the discharge of sand into downstream agricultural areas. The basin is operated so that at least 1 million cubic yards of reserve sediment storage are available at the beginning of each flood season. DWR maintains the weir, training levees, and sediment basin through the Sutter Maintenance Yard.

3.2.5.10 Sacramento River from Colusa Weir to Tisdale Weir

SPFC facilities between the Colusa Weir and Tisdale Weir include levees and the Butte Slough Outfall Gates (Figure 3-9C). The design capacity upstream from the outfall gates is 65,000 cfs and the capacity downstream is 66,000 cfs, based on O&M manuals. The right-bank levee (refer to O&M Manuals SAC137 and SAC131) is about 26 miles long. The levee is intended to reduce flood risk to adjacent agricultural lands and the town of Colusa and is maintained by the Sacramento River West Side Levee District, and by DWR through Maintenance Areas 1 and 12.

The left-bank levee (refer to O&M Manuals SAC133, SAC134, and SAC136) is about 25.6 miles long. The levee is intended to reduce flood risk to adjacent agricultural land. Maintenance is performed by RD 70, RD 1660, and by DWR through Maintenance Areas 1 and 12.

The Butte Slough Outfall Gates (refer to O&M Manual SAC161) to the Sacramento River control the passage of floodwaters from Butte Basin to the Sacramento River at a maximum flow of 3,500 cfs. The gates also allow the passage of Butte Slough drainage water to the Sacramento River during the irrigation season.

3.2.5.11 Tisdale Weir

Tisdale Weir and bypass levees to the Sutter Bypass are SPFC facilities (Figure 3-9C). The weir (refer to O&M Manual SAC156) is a fixed-crest concrete structure with a design capacity of 38,000 cfs. The bypass channel is 1,150 feet wide and extends 4 miles to the Sutter Bypass. Levees (refer to O&M Manuals SAC129 and SAC133) are continuous along both sides of the bypass. Both levees are intended to reduce flood risk to adjacent agricultural land in RD 1500 and RD 1660. The weir was originally built by local interests and was improved by USACE to project standards. DWR maintains the facilities through the Sutter Maintenance Yard. Discharge over Tisdale Weir begins when the Sacramento River exceeds 23,000 cfs. During a slow rise on

the river, the weir begins to pass flows before the Moulton and Colusa weirs, 8 to 10 hours after the upstream Colusa gauge exceeds 55.0 feet NGVD 29.

3.2.5.12 Sacramento River from Tisdale Weir to Fremont Weir

SPFC facilities between Tisdale Weir and Fremont Weir include levees and the Knights Landing Outfall Gates (Figures 3-9C and 3-9D). The design capacity of the river downstream from Tisdale Weir is 30,000 cfs, based on O&M manuals. The right-bank levee (refer to O&M Manuals SAC127 and SAC130) is about 32 miles long. The levee is intended to reduce flood risk to adjacent agricultural lands and is maintained by the Sacramento River West Side Levee District. The levees along this reach are generally at the riverbank, about 300 to 400 feet apart.

The Knights Landing Outfall Gates are located along the right-bank levee about 26 miles downstream from Tisdale Weir. The Knights Landing Outfall Gates (refer to O&M Manual SAC162), also known as the Sycamore Slough Outfall Gates, are intended to reduce flood risk to the lower Colusa Basin from Sacramento River backwater but provide drainage to the Sacramento River during low flow. The structure was originally built by local interests. USACE and DWR added flap gates.

The left-bank levee (refer to O&M Manual SAC128) is about 33.6 miles long. The levee reduces flood risk to adjacent agricultural land and is maintained by RD 1500.

3.2.5.13 Fremont Weir

The Sacramento River and the joint channel for the Sutter Bypass and Feather River join at the Fremont Weir (Figure 3-9D). The weir, an SPFC facility, is a fixed-crest concrete structure. At this location, the Sacramento River has a design capacity of 30,000 cfs, and the joint channel for the Sutter Bypass and Feather River has a design capacity of 416,500 cfs, roughly half of which spilled from the Sacramento River to the Butte Basin at the overflow areas south of Chico Landing, and over the Moulton, Colusa, and Tisdale weirs.

The Fremont Weir (refer to O&M Manual SAC157) is a concrete overflow section about 9,120 feet long with a design capacity of 343,000 cfs. The Fremont Weir begins to spill water to the Yolo Bypass (refer to Chapter 3.2.4) when the combined flow from the Sacramento River, Sutter Bypass, and Feather River reaches about 60,000 cfs. This value depends on the amount of flow that each river contributes. The Sacramento River continues on the eastern side of the weir. DWR maintains the weir through the Sutter Maintenance Yard.

3.2.5.14 Sacramento River from Fremont Weir to Sacramento Weir

SPFC facilities along this reach include levees (Figure 3-9D). The design capacity of the Sacramento River in this reach is 107,000 cfs, based on O&M manuals. The right-bank levee (refer to O&M Manuals SAC122 and SAC123) is about 18 miles long. The levee is intended to reduce flood risk to adjacent agricultural land and is maintained by RD 1600 and RD 827. Note, RD 827 and RD 785 were recently annexed to RD 537. However, until updates to the O&M manual have been completed, RD 827 and RD 785 will remain the responsible entities listed within this document.

The left-bank levee (refer to O&M Manuals SAC124 and SAC141.1) is about 17 miles long. The levee is intended to reduce flood risk to the urbanizing area in Natomas and adjoining agricultural land. RD 1000 maintains the levee. Near the upstream end of the levee, the Natomas Cross Canal enters the river from the east with a design capacity of 22,000 cfs, based on the O&M manual.

The 4.8-mile-long East Side Canal and right-bank levee (refer to O&M Manual SAC142) and the 4.3-mile-long Pleasant Grove Creek Canal and left-bank levee (refer to O&M Manual SAC125) collect water from streams approaching RD 1000 (Natomas Basin) and RD 1001, and discharge it into the head of the Natomas Cross Canal. Levees along both sides of the Natomas Cross Canal (refer to O&M Manuals SAC125 and SAC142) are each about 5 miles long. The East Side Canal levee (design capacity of 16,000 cfs, based on the O&M manuals) and the right-bank levee of the Natomas Cross Canal are maintained by RD 1001. The Pleasant Grove Creek Canal levee (design capacity of 6,000 cfs, based on the O&M manual) and left-bank levee of the Natomas Cross Canal are maintained by RD 1000. The Pleasant Grove Creek Canal left levee was raised in the early 1950s by USACE. The levees described here are intended to reduce flood risk to the Natomas area and nearby agricultural land.

3.2.5.15 Sacramento Weir and Bypass

The Sacramento Weir and its bypass levees are SPFC facilities (Figure 3-9D). The weir (refer to O&M Manual SAC158) is a reinforced concrete structure with wooden needles that provide a movable crest. The Sacramento Weir is the only weir and overflow area in the SPFC that requires manual operation for flow release. The weir consists of 48 weir sections, each 38 feet wide, with a total design capacity of 112,000 cfs. Sections of the weir are opened when the Sacramento River reaches or exceeds a stage of 27.5 feet NGVD at the I Street Bridge. The weir was constructed by the City of Sacramento and later adopted into the SRFCP by USACE.

The leveed bypass downstream from the Sacramento Weir extends to the Yolo Bypass. The right-bank levee (refer to O&M Manual SAC116) is about 1.8 miles long, and the left-bank levee (refer to O&M Manual SAC122) is about 1.8 miles long. DWR maintains the Sacramento Weir and bypass through the Sacramento Maintenance Yard.

3.2.5.16 Sacramento River from Sacramento Weir to America River

SPFC facilities along this reach of river include levees on both banks (Figure 3-9D). This reach serves a unique function among all major SPFC channels in that it carries water in both directions, depending on flow conditions. Since the American River enters the downstream end of this reach with a design capacity of 180,000 cfs, and the Sacramento River downstream from the American River has a design capacity of only 110,000 cfs, a portion of the American River must flow upstream to the Sacramento Weir during large flood events.

The right-bank levee (refer to O&M Manual SAC116) of the Sacramento River and the left-bank levee (refer to O&M Manual SAC124) are both about 2.5 miles long. The right-bank levee is intended to reduce flood risk to West Sacramento and is maintained by DWR through

Maintenance Area 4 and RD 537. The left-bank levee is intended to reduce flood risk to the Natomas area and is maintained by RD 1000.

3.2.5.17 Sacramento River from American River to Elk Slough

SPFC facilities along this reach of river include levees. Based on the O&M manuals, the design capacity is 110,000 cfs with 3 feet "or more" of freeboard (transitions to 6 feet near the downstream end of the reach) (Figure 3-9D and 3-9E). The right-bank levee (refer to O&M Manuals SAC113, SAC114, and SAC116) is about 22 miles long. The levee was originally built by local interests and was modified to project standards by USACE. The levee is intended to reduce flood risk to West Sacramento near its upstream end, and to adjacent agricultural land. The levee is maintained by RD 307, RD 537, RD 900, RD 765, RD 999, and DWR through Maintenance Area 4.

The left-bank levee (refer to O&M Manuals SAC111, SAC115, SAC117, and SAC118.1) is about 18 miles long. The levee is intended to reduce flood risk to Sacramento and suburbs to the south. The upstream 4-mile-long (approximately) portion of the left-bank levee was built by local interests and brought into the project without modification since it equaled or exceeded USACE project standards. The City of Sacramento maintains about 3.6 miles of the left-bank levee. The remaining levee was built by local interests and rebuilt to project standards by USACE and is maintained by the American River Flood Control District and DWR through Maintenance Area 9.

3.2.5.18 Sacramento River from Elk Slough to Collinsville

SPFC facilities along this reach include levees (Figures 3-9D and 3-9E).

For most of the reach length, the design capacity decreases because of distributary channels as the river enters the Delta. Based on O&M manuals, the river's design capacity is as follows:

- Downstream from the Elk Slough distributary – 110,000 cfs with 6 feet of freeboard.
- Downstream from the Sutter Slough distributary – 84,500 cfs with 6 feet of freeboard.
- Downstream from the Steamboat Slough distributary – 56,500 cfs with 6 feet of freeboard.
- Downstream from the Georgiana Slough distributary – 35,900 cfs with 6 feet of freeboard.
- Downstream from the confluence with the Yolo Bypass – 579,000 cfs with 6 feet of freeboard.
- Downstream from the 3-Mile Slough distributary – 514,000 cfs with 6 feet of freeboard.

The right-bank levee along the Sacramento River (refer to O&M Manuals SAC104, SAC110, and SAC112) is about 20 miles long. The levee was constructed by local interests and enlarged, set back, or repaired to project standards by USACE. There is no right-bank levee downstream from the confluence with the Yolo Bypass. The levee is intended to reduce flood risk to adjacent agricultural land in the Delta and is maintained by RD 3, RD 150, and RD 349.

The left-bank levee along the Sacramento River (refer to O&M Manuals SAC101, SAC102, SAC103, and SAC111) is about 38 miles long. The levee was constructed by local interests and enlarged, set back, or repaired to project standards by USACE. The levee is intended to reduce flood risk to adjacent agricultural areas in the Delta and is maintained by RD 369, RD 551, RD 554, RD 556, RD 755, the Brannan-Andrus Levee Maintenance District, and DWR through Maintenance Area 9.

SPFC levees on distributary channels include the following:

- Levees on both banks of Elk Slough (refer to O&M Manuals SAC112 and SAC113) have a design capacity of 0 cfs. RD 999 maintains 9.7 miles of right-bank levee and RD 150 maintains 9.6 miles of left-bank levee.

- Levees on both banks of Sutter Slough (refer to O&M Manuals SAC105, SAC110, SAC112, and SAC113) have a design capacity of 25,500 cfs (between Miner Slough and the Sacramento River) and 15,500 cfs (between Steamboat Slough and Miner Slough). RD 999 maintains 3.8 miles of right-bank levee and RD 349 maintains 6.6 miles of left-bank levee. RD 501 maintains 2.3 miles of right-bank levee and RD 150 maintains 0.5 mile of left-bank levee along Sutter Slough.

- Levees on both banks of Miner Slough (refer to O&M Manuals SAC105 and SAC113), a distributary of Sutter Slough, have a design capacity of 10,000 cfs to Yolo Bypass. RD 999 maintains 2.3 miles of right-bank levee and RD 501 maintains 7.8 miles of left-bank levee.

- Levees on both banks of Steamboat Slough (refer to O&M Manuals SAC104, SAC105, SAC110) have a design capacity of 28,000 cfs upstream from Miner Slough and 43,500 cfs downstream from Miner Slough. RD 349 maintains 4.4 miles of right-bank levee, RD 501 maintains 6.8 miles of left-bank levee, and RD 3 maintains 11 miles of left-bank levee along Steamboat Slough.

- Levees on both banks of Georgiana Slough (refer to O&M Manual SAC103) have a design capacity of 20,600 cfs. RD 556 maintains 5.5 miles of right-bank levee, the Brannan-Andrus Maintenance District maintains 6 miles of right-bank levee, and RD 563 maintains 12.4 miles of left-bank levee.

- Levees on both banks of 3-Mile Slough (refer to O&M Manuals SAC101 and SAC102) have a design capacity of 65,000 cfs. RD 341 maintains 3.3 miles of right-bank levee and RD 1601 maintains 2.5 miles of left-bank levee.

3.2.5.19 Sacramento River Bank Protection Project

The Sacramento River Bank Protection Project is a continuing construction project of the CVFPB and USACE. The purpose of the project is to protect and preserve the integrity of the SRFCP's levee system.

Phase 1 of the Sacramento River Bank Protection Project was authorized in1960. It was constructed from 1963 to 1975 and consisted of 430,000 linear feet of completed bank protection work. Phase 2 was authorized in 1974 to construct 405,000 linear feet of bank protection. In 2007, the authorized length was increased by 80,000 linear feet, bringing the authorized bank protection length of Phase 2 to a total of 485,000 linear feet. Construction began in 1976 and, over time, the CVFPB provided assurances of cooperation to USACE separately for each element of the work, as each was developed for construction. For Phase 2, nearly 400,000 linear feet of work have been completed at various locations of the SRFCP to date. The types of bank protection measures varied throughout the system.

Construction included 11 rivers and waterways:

1. American River.
2. Bear River.
3. Colusa Basin.
4. Elder Creek.
5. Feather River.
6. Georgiana Slough.
7. Miner Slough.
8. Murphy's Slough.
9. Sacramento River.
10. Steamboat Slough.
11. Sutter Slough.

The completed works are maintained by the agencies responsible for the maintenance of adjacent levees.

Figure 3-9A. Main-stem Sacramento River Watershed – State Plan of Flood Control Facilities along the Sacramento River and Tributaries

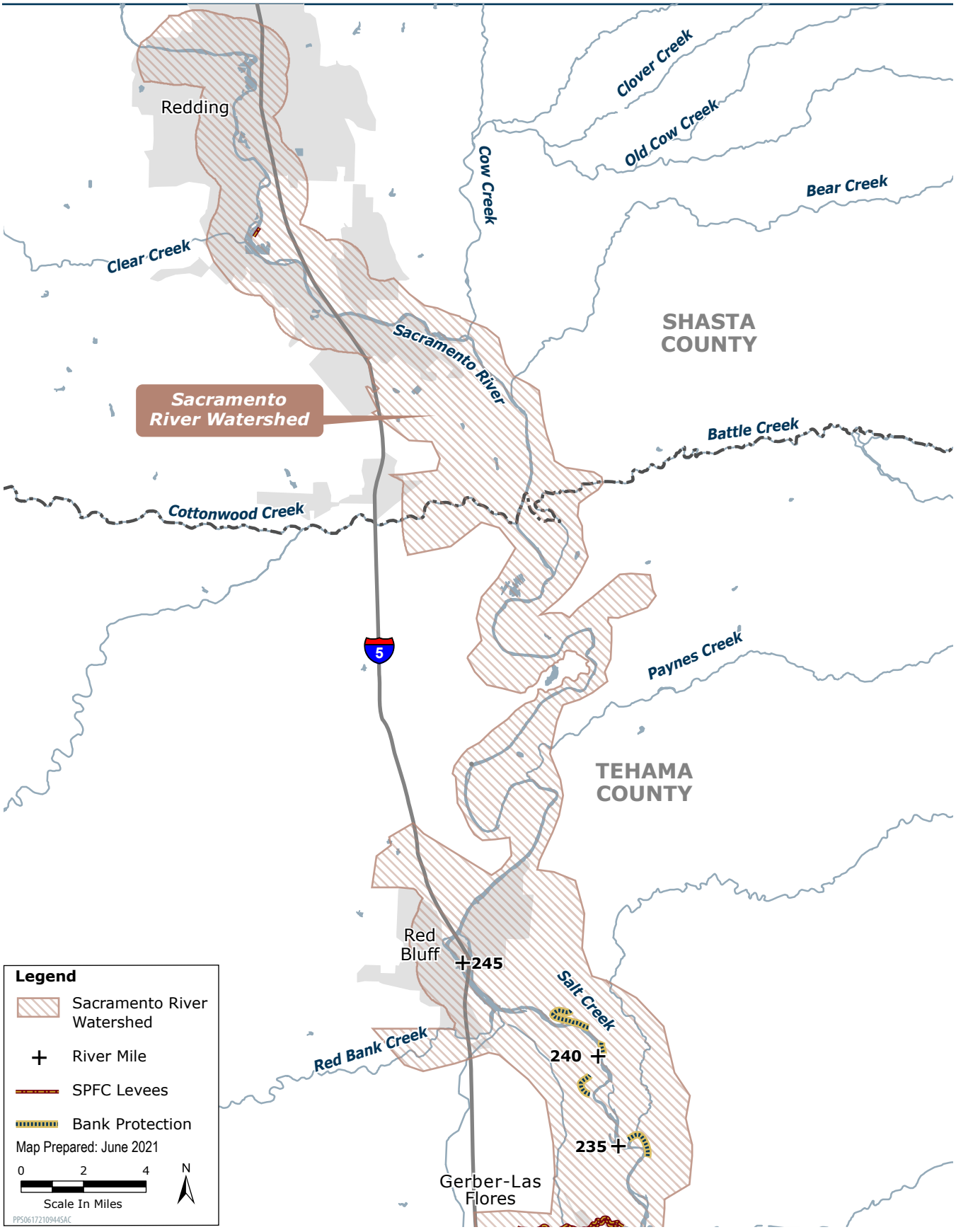


Figure 3-9B. Main-stem Sacramento River Watershed – State Plan of Flood Control Facilities along the Sacramento River and Tributaries

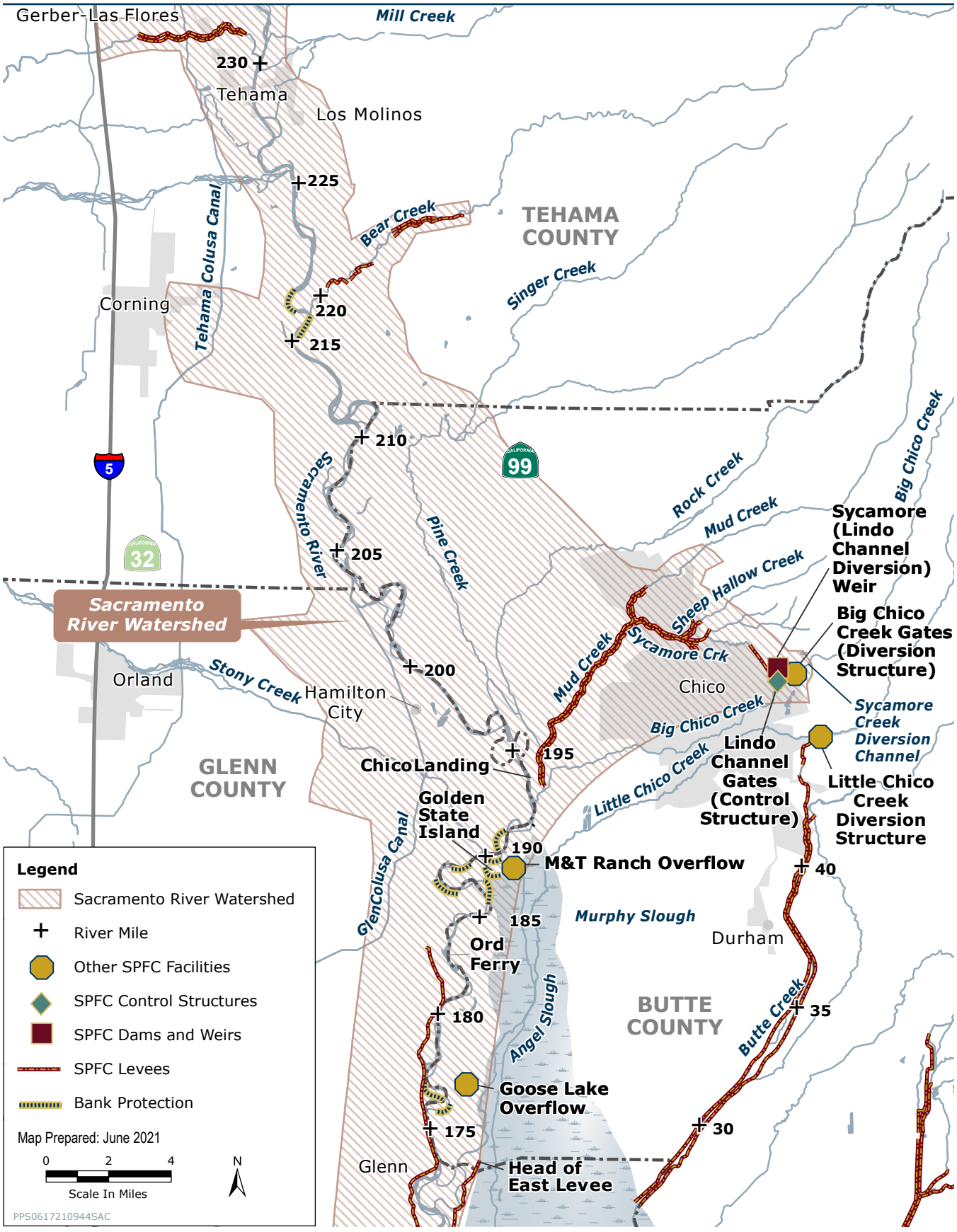


Figure 3-9C. Main-stem Sacramento River Watershed – State Plan of Flood Control Facilities along the Sacramento River and Tributaries

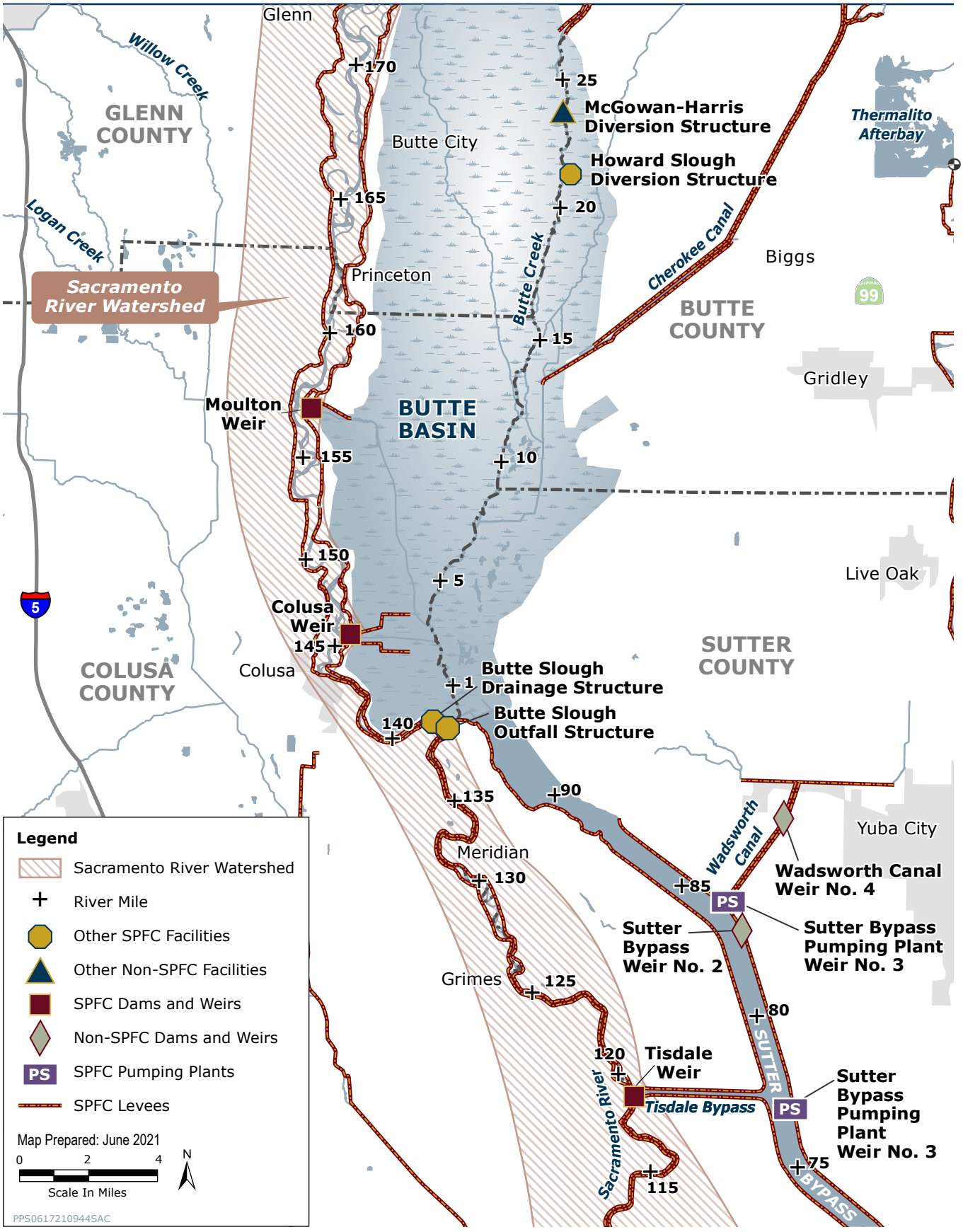


Figure 3-9D. Main-stem Sacramento River Watershed – State Plan of Flood Control Facilities along the Sacramento River and Tributaries

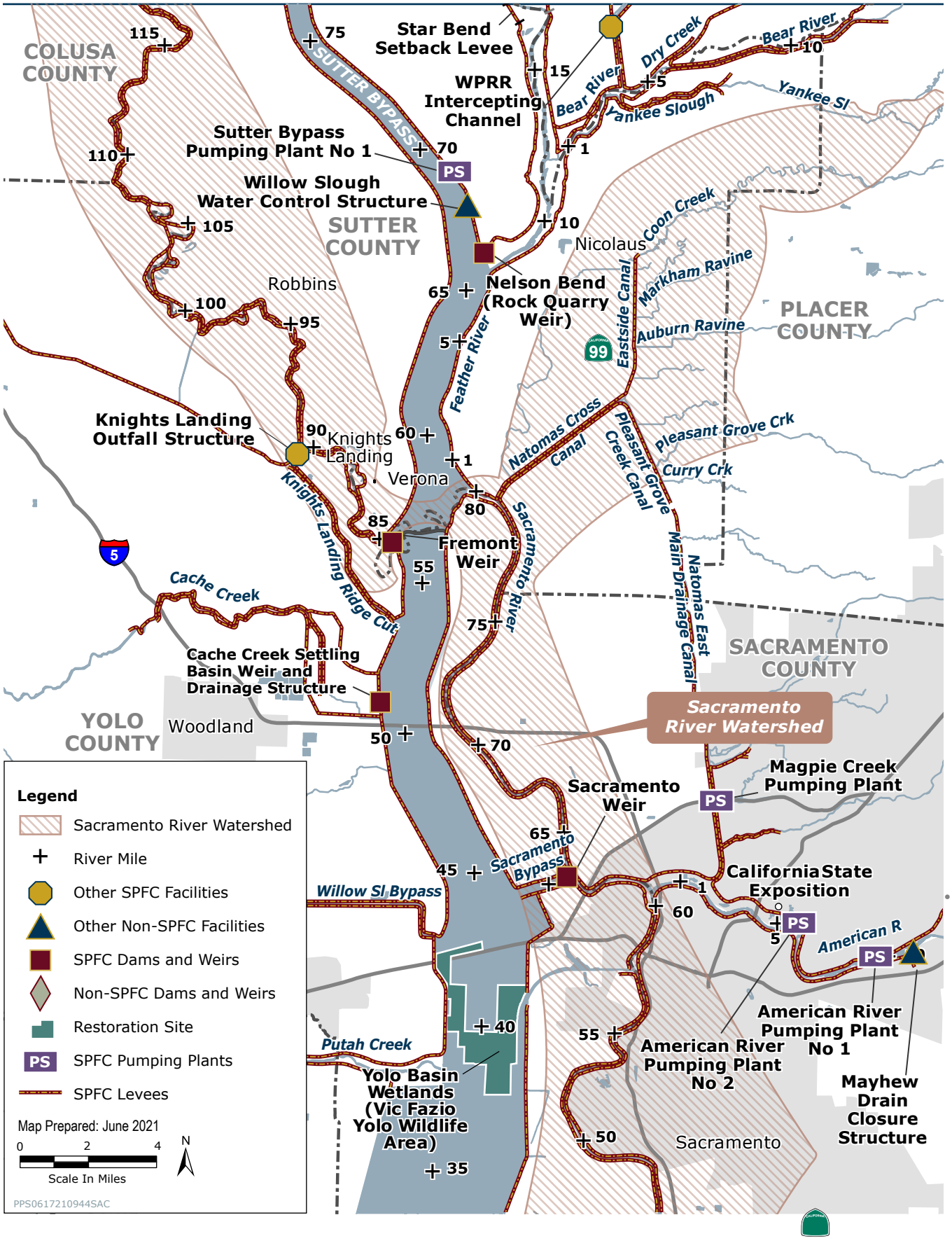
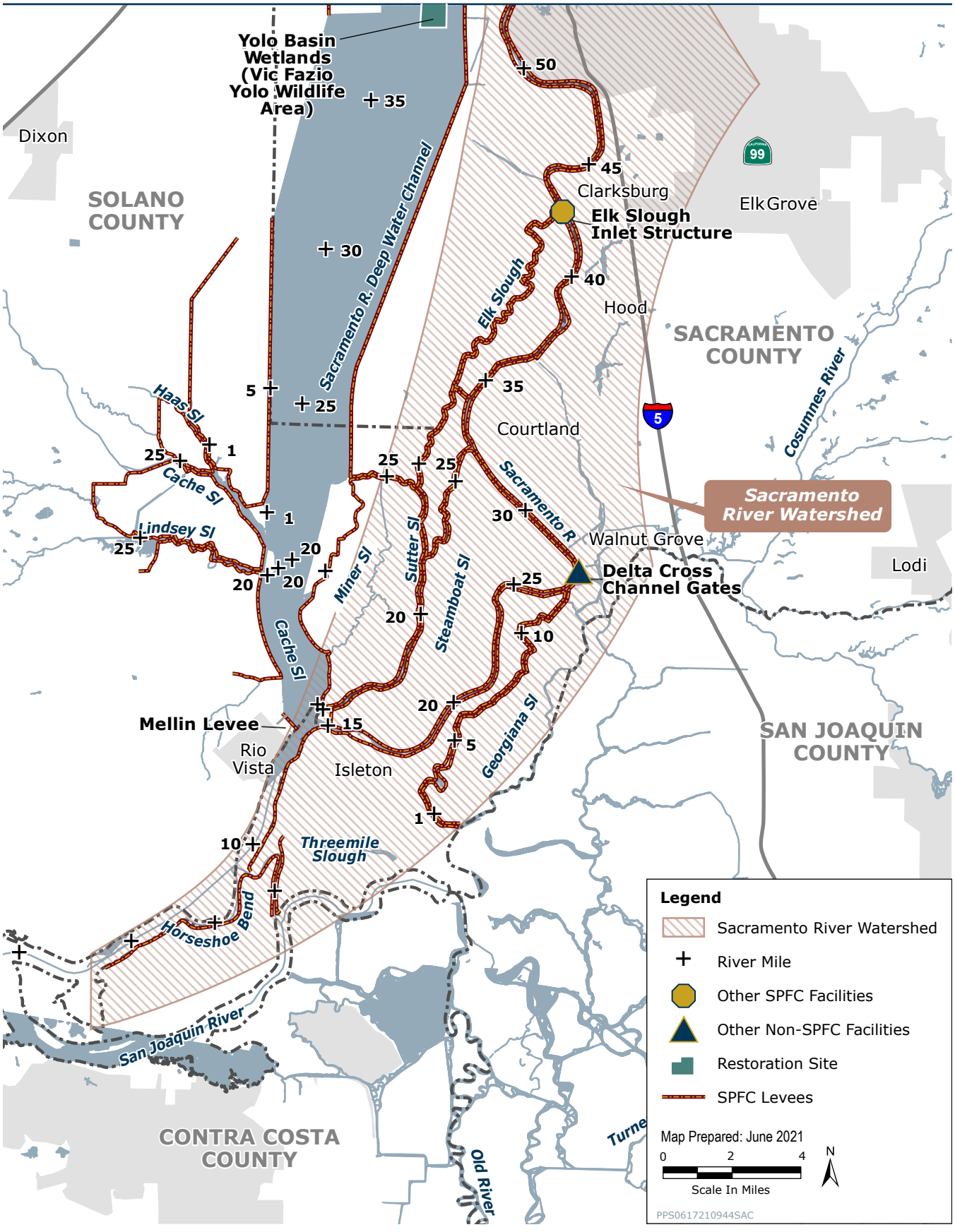


Figure 3-9E. Main-stem Sacramento River Watershed – State Plan of Flood Control Facilities along the Sacramento River and Tributaries



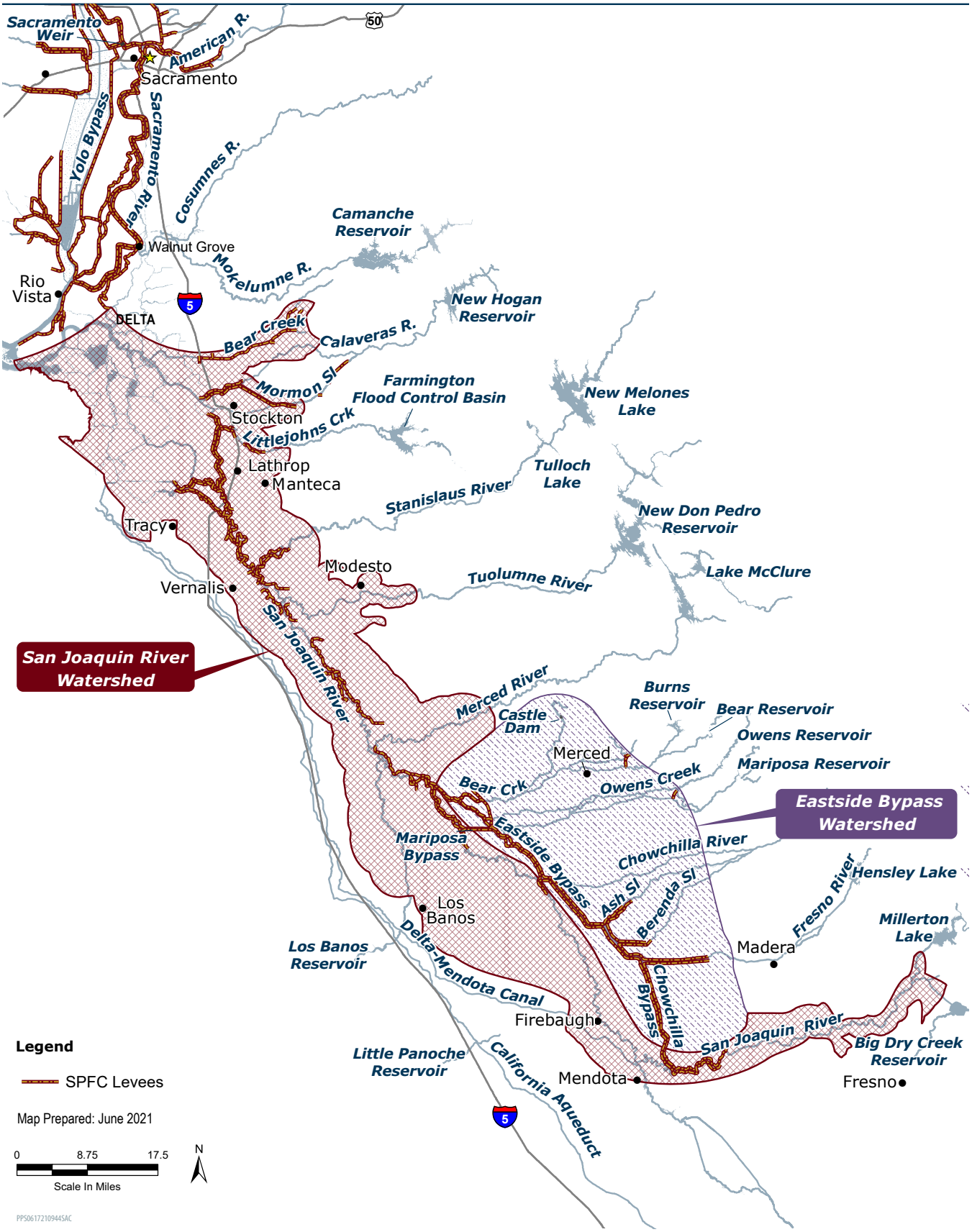
3.3 State Plan of Flood Control Facilities in the San Joaquin River Watershed

This section provides a reach-by-reach description of SPFC facilities in the San Joaquin River Watershed. Descriptions are provided for the Chowchilla and Eastside bypass system and for the San Joaquin River. Tributary and distributary flow points are identified along each flow path.

The Standard O&M Manual for the Lower San Joaquin River and Tributaries Project specifies general levee dimensions that were used for the original project design. These dimensions include a general crown width of 20 feet, with side slopes of 2H:1V on the waterside, and 3H:1V on the landside. Exceptions to these dimensions are noted in the unit-specific O&M manuals, and as-constructed dimensions provide an even better indication of how the levees were built.

Figure 3-10 provides an index map of the San Joaquin River Watershed showing the two major watersheds, which include SPFC facilities.

Figure 3-10. Index Map of the San Joaquin River Watershed including the Two Major Watersheds with Facilities of the State Plan of Flood Control



3.3.1 Chowchilla and Eastside Bypasses Watershed

The bypass system for the San Joaquin River begins at the river about 5 miles east of the town of Mendota. The bypass is designed to carry all flood flows from the San Joaquin River at that location if Kings River floodwater (up to 4,750 cfs) is entering downstream through the North Fork and James Bypass. The bypass system discharges water back to the San Joaquin River at two locations, about 42 miles and 50 miles downstream from the upstream end of the bypass.

This section describes SPFC facilities along the bypass system and on tributary streams to the bypass system. Portions of existing levees along canal banks were rehabilitated, and new reaches of levees were built as part of the project. The bypass system includes about 193 miles of levees. Levees along tributary streams were designed with 3 feet of freeboard. The Lower San Joaquin Levee District is the maintaining agency.

Figures 3-11A and 3-11B show SPFC facilities in the Chowchilla and Eastside bypasses watershed.

3.3.1.1 Chowchilla Canal Bypass Control Structure

The Chowchilla Canal Bypass Control Structure is an SPFC facility (Figure 3-11A). Water enters the bypass system from the San Joaquin River through the Chowchilla Canal Bypass Structure (refer to O&M Manual SJR601B). The structure has four gated bays, each 20 feet wide, with a total design capacity of 5,500 cfs. At times, higher discharges can be diverted into the bypass, depending on sediment movement. While not described in the O&M manual, flows up to 12,000 cfs have been diverted to the bypass. Although the gates were designed for automatic operation, they are currently operated manually. Approach embankments connect the structure with the levee system. The Chowchilla Canal Bypass Control Structure operates in conjunction with a nearby identical structure across the San Joaquin River, described in Chapter 3.3.2.

3.3.1.2 Chowchilla Bypass from Control Structure to Fresno River

SPFC facilities along this reach of the bypass include levees on both banks and a debris settling basin (Figure 3-11A). The design capacity of the reach is 5,500 cfs. The levees (refer to O&M Manual SJR601) in this reach are each about 14.6 miles long. The debris settling basin, with 200,000 cubic yards of storage capacity, is located just downstream from the control structure. This reach of the bypass includes a pilot reach of habitat planting between Avenue 14 and the Madera-Firebaugh Road. The facilities are maintained by the Lower San Joaquin Levee District.

3.3.1.3 Fresno River

The Fresno River enters the bypass system at the downstream end of the Chowchilla Bypass. SPFC facilities (refer to O&M Manual SJR606) include an excavated trapezoidal channel with levees on both banks for a realigned Fresno River and a diversion weir (Figure 3-11A). Based on the O&M manual, the channel has a design capacity of 5,000 cfs and the levees are each about 18.3 miles long. The average levee height is about 7 feet and the maximum height is about 9 feet. The diversion weir provides for the release of flows for riparian water users along the

right and left banks. The facilities are intended to reduce flood risk to adjacent agricultural land and the City of Madera and are maintained by the Madera County Flood Control and Water Conservation District.

3.3.1.4 Eastside Bypass from Fresno River to Berenda Slough

The Eastside Bypass begins at the confluence of the Chowchilla Bypass and Fresno River. SPFC facilities (refer to O&M Manual SJR601) include levees on both banks of the channel and drop structures (Figure 3-11A). Based on the O&M manual, the design capacity of the channel is 10,000 cfs, and the length of the channel and levees is about 4 miles. Two drop structures help control the channel grade. The facilities are maintained by the Lower San Joaquin Levee District.

3.3.1.5 Berenda Slough

Berenda Slough is a distributary channel of the Chowchilla River that enters the bypass system. SPFC facilities (refer to O&M Manuals SJR601 and SJR605) include channel enlargements, levees on both channel banks, and diversion structures (Figure 3-11A). The design capacity of Berenda Slough at its confluence with the Eastside Bypass is 2,000 cfs, based on the O&M manuals. The right-bank levee is about 1.9 miles long, and the left-bank levee is about 2.7 miles long. A diversion dam on Berenda Slough sends excess flows through a diversion channel to Ash Slough. Several other flow diversions move water between streams. The facilities are intended to reduce flood risk to adjacent agricultural land and the City of Chowchilla and are maintained by Madera County.

3.3.1.6 Eastside Bypass from Berenda Slough to Ash Slough

SPFC facilities (refer to O&M Manual SJR601) along this reach of bypass include levees on both banks of the channel and drop structures (Figure 3-11A). Based on the O&M manual, the channel has a design capacity of 12,000 cfs and the levees are about 3.1 miles long. Two drop structures help control the channel grade. Ash Slough enters the bypass at the downstream end of the reach. The levees are maintained by the Lower San Joaquin Levee District.

3.3.1.7 Ash Slough

Ash Slough is a distributary channel of the Chowchilla River that enters the bypass system. SPFC facilities (refer to O&M Manuals SJR601 and SJR605) include channel enlargements, levees on both banks of the channel, diversion structures, and drop structures (Figure 3-11A). The design capacity of Ash Slough at its confluence with the Eastside Bypass is 5,000 cfs, based on the O&M manuals. The right-bank levee is about 2.7 miles long, and the left-bank levee is about 2.3 miles long. Four drop structures help control the channel grade. The facilities are intended to reduce flood risk to the City of Chowchilla and adjacent agricultural land and are maintained by the Lower San Joaquin Levee District.

3.3.1.8 Eastside Bypass from Ash Slough to Sand Slough

SPFC facilities (refer to O&M Manual SJR601) along this reach of bypass include levees on both banks of the channel (Figure 3-11A). Based on the O&M manual, the channel has a design capacity of 17,000 cfs, and the levees are about 10.5 miles long. Water from the San Joaquin

River enters the bypass through the Sand Slough Control Structure (refer to Chapter 3.3.2) at the downstream end of the reach. The design inflow from the San Joaquin River is about 4,500 cfs. The levees are maintained by the Lower San Joaquin Levee District.

3.3.1.9 Eastside Bypass from Sand Slough to Mariposa Bypass

SPFC facilities (refer to O&M Manual SJR601) along this reach of bypass include levees on both banks of the channel (Figure 3-11B). Based on the O&M manual, the channel has a design capacity of 16,500 cfs and the levees are about 8.7 miles long. At the downstream end of this reach, the flow branches – up to 13,500 cfs continue down the Eastside Bypass and up to 8,500 cfs flow into the Mariposa Bypass. Flow in both bypasses is regulated by control structures just downstream from the flow branch. The levees are maintained by the Lower San Joaquin Levee District.

3.3.1.10 Mariposa Bypass

SPFC facilities for the Mariposa Bypass (refer to O&M Manual SJR601) include levees along both banks, a control structure at its upstream end, and a drop structure near its downstream end (Figure 3-11B). Based on the O&M manual, the channel has a design capacity of 8,500 cfs, and the levees are about 3.4 miles long. The Mariposa Bypass Control Structure (refer to O&M Manual SJR601A) consists of fourteen 20-foot-wide bays – eight gated and six ungated. Although the gates were designed for automatic operation, they are currently operated manually. The facilities are maintained by the Lower San Joaquin Levee District.

3.3.1.11 Eastside Bypass from Mariposa Bypass to Bear Creek

SPFC facilities (refer to O&M Manual SJR601) along this reach of bypass include levees on both banks of the channel and the Eastside Bypass Control Structure (Figure 3-11B). Based on the O&M manual, the channel has a design capacity of 13,500 cfs, and the levees are about 6 miles long. The Eastside Bypass Control Structure (refer to O&M Manual SJR601A), located about 1,100 feet downstream from the junction with the Mariposa Bypass, consists of six 20-foot-wide bays. Although the gates were designed for automatic operation, they are currently operated manually. Owens Creek, with a design capacity of 2,000 cfs, enters the bypass on the left bank. Levees on Owens Creek extend about 0.8 miles upstream from the bypass. Bear Creek, with a design capacity of 7,000 cfs, enters the bypass at the downstream end of the reach. Right- and left-bank levees on Bear Creek (refer to O&M Manual SJR601) extend about 3.5 miles upstream from the bypass. The East Side Canal and its left-bank levee extend from the Eastside Bypass to a point approximately 1.7 miles north of Bear Creek. The facilities are maintained by the Lower San Joaquin Levee District.

3.3.1.12 Merced County Stream Project

The Merced County Stream Group project (refer to O&M Manual SJR607) includes two diversion channels with levees and channel clearing, a dam, and channel enlargements intended to reduce flood risk for the City of Merced and adjacent agricultural land. SPFC facilities include a diversion channel from Black Rascal Creek to Bear Creek (Figure 3-11B). The design capacity of the channel is 3,000 cfs, based on the O&M manual. The right-bank levee

along the channel is about 1.6 miles long, and the left-bank levee is about 1.9 miles long. SPFC facilities also include a diversion channel from Owens Creek to Mariposa Creek. The design capacity of the channel is 400 cfs. The right- and left-bank levees along the diversion channel are each about 1.5 miles long. Channel improvements are included along Black Rascal Creek, Bear Creek, Burns Creek, Miles Creek, Owens Creek, and Mariposa Creek. The facilities are maintained by Merced County.

Castle Dam (refer to O&M Manual SJR607A) is located on Canal Creek, a tributary of Black Rascal Creek. Castle Dam (completed in 1992) is located on Canal Creek about 6 miles northeast of Merced. Castle Reservoir has 6,400 acre-feet of flood storage. Castle Dam is owned by the Sacramento-San Joaquin Drainage District and Merced County and is operated and maintained by the Merced Irrigation District (U.S. Army Corps of Engineers 1999).

3.3.1.13 Eastside Bypass from Bear Creek to San Joaquin River

SPFC facilities (refer to O&M Manual SJR601) along this reach of bypass include levees on both banks of the channel (Figure 3-11B). Based on the O&M manual, the channel has a design capacity of 18,500 cfs, and the levees are about 3.6 miles long. The Eastside Bypass ends at its confluence with the San Joaquin River. The facilities are maintained by the Lower San Joaquin Levee District.

Figure 3-11A. Chowchilla and Eastside Bypasses – State Plan of Flood Control Facilities along the Chowchilla and Eastside Bypasses and Tributaries

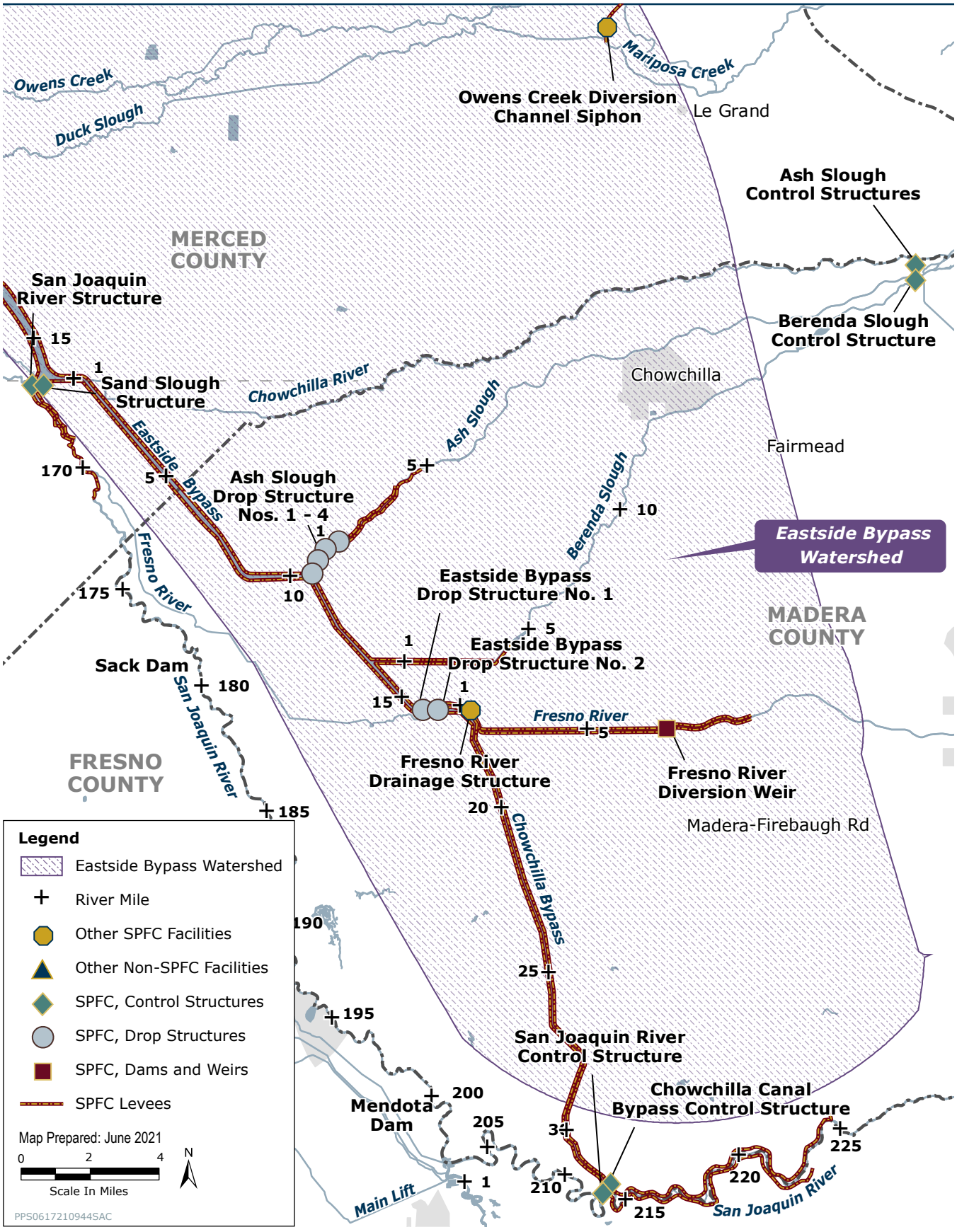
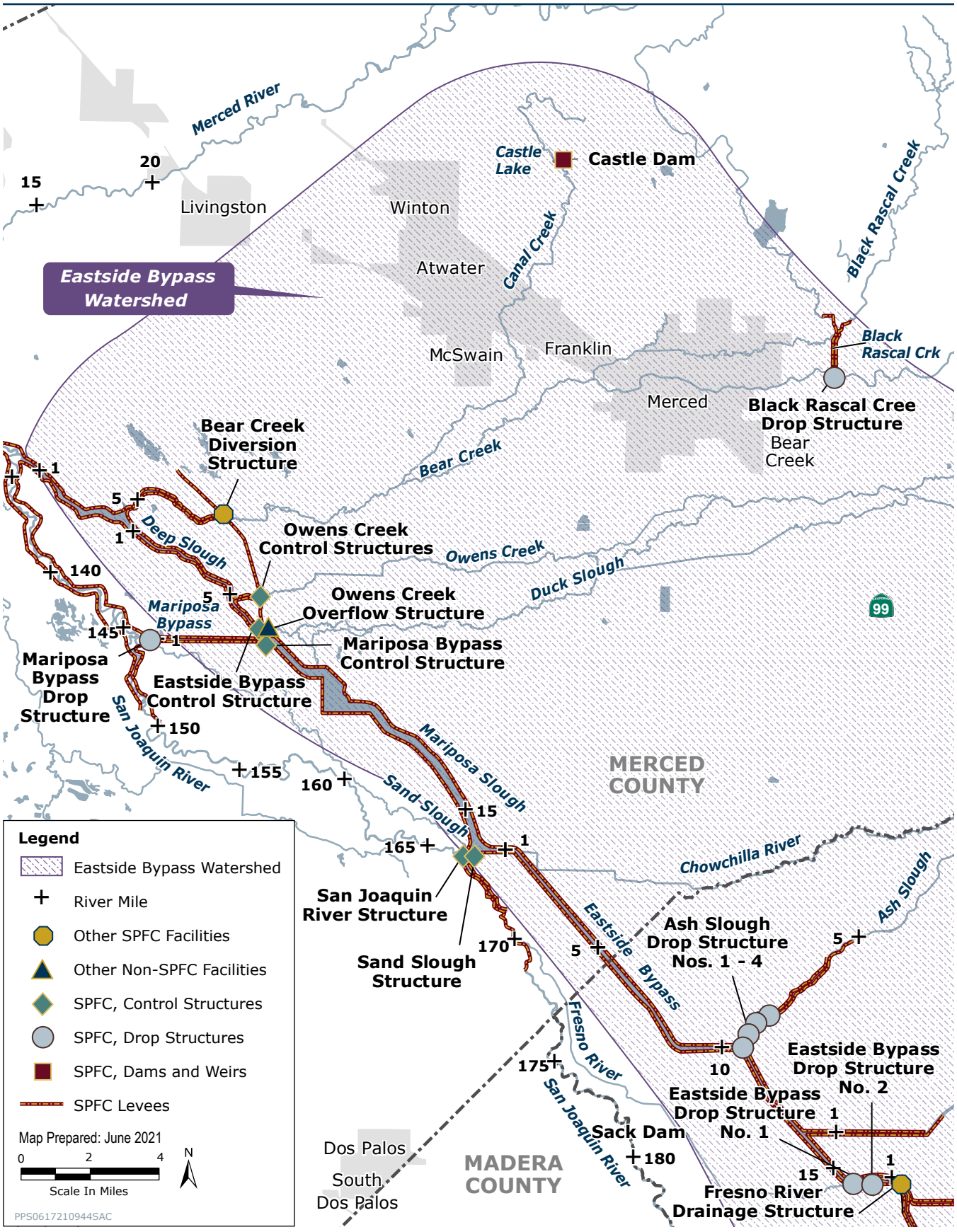


Figure 3-11B. Chowchilla and Eastside Bypasses – State Plan of Flood Control Facilities along the Chowchilla and Eastside Bypasses and Tributaries



3.3.2 San Joaquin River Watershed

Unlike the Sacramento River, where SPFC levees are continuous over about 180 miles from beginning to end, SPFC levees on the San Joaquin River are intermittent. About 45 miles of San Joaquin River from the beginning of the bypass system downstream to near the Sand Slough Control Structure have no SPFC levees or other facilities.

Flow in the San Joaquin River upstream from the control structures for diverting water to the bypass system normally varies from 0 to 8,000 cfs, with infrequent snowmelt flows of up to 12,000 cfs and rain flood flows of up to 50,000 cfs when the capacity of the upstream Millerton Lake behind Friant Dam is exceeded. With a total flow of 8,000 cfs in the river, normal operations would divert 5,500 cfs into the bypass and a maximum of 2,500 cfs down the San Joaquin River. If flows exceed 8,000 cfs at the control structures, or 10,000 cfs at the latitude of Mendota, the Lower San Joaquin Levee District operates the facilities at its own discretion with the objective of minimizing damage to the flood system and to the adjacent area. At times, flows exceeding 5,500 cfs are diverted to the bypass.

Figures 3-12A, 3-12B, 3-12C, and 3-12D show SPFC facilities along the San Joaquin River.

3.3.2.1 San Joaquin River from High Ground to San Joaquin River Control Structure

Levees are the only SPFC facilities along this reach (refer to O&M Manual SJR601) (Figure 3-12A and 3-12B). The design capacity of this reach is 8,000 cfs, based on the O&M manual. The right-bank levee begins at high ground on Road 21, about 9 miles upstream from the control structure. The left-bank levee begins at high ground about 7.5 miles upstream from the control structure. At the downstream end of the reach, flows are divided between the Chowchilla Bypass (refer to Chapter 3.3.1) and the San Joaquin River. The San Joaquin River Control Structure releases water into the San Joaquin River. The levees are maintained by the Lower San Joaquin Levee District.

3.3.2.2 San Joaquin River Control Structure

The San Joaquin River Control Structure (refer to O&M Manual SJR601B) is an SPFC facility, identical to the Chowchilla Bypass Control Structure (Figure 3-12B). The structure has four gated bays, each 20 feet wide. Although the gates were designed for automatic operation, they are currently operated manually. Approach embankments connect the structure with the levee system. The San Joaquin River Control Structure operates in conjunction with the Chowchilla Canal Bypass Control Structure at the head of the Chowchilla Bypass. The San Joaquin River has no SPFC facilities downstream from the control structure for about 33 miles, to near the Sand Slough Control Structure.

3.3.2.3 San Joaquin River from Control Structure to Fresno Slough

There are no SPFC facilities along the San Joaquin River between the San Joaquin River Control Structure and Fresno Slough (Figure 3-12B). The channel capacity downstream from the control structure is about 2,500 cfs. The Kings River Channel Improvement Project (refer to O&M Manuals SJR604 and SJR604A) is a non-SPFC project in the Tulare Lake Watershed, but federally

regulated flows enter the San Joaquin River. During flood release events from Pine Flat Reservoir, most of Kings River flows, up to 4,750 cfs, are diverted north into the San Joaquin River through the North Fork and James Bypass. The next 4,750 cfs flow through south through the Kings River. Any flood flows beyond that are evenly split between the James Bypass and the Kings River.

3.3.2.4 San Joaquin River from Fresno Slough to San Joaquin River Structure at Sand Slough

While local levees extend on both banks of the San Joaquin River downstream from Mendota Dam to near Sand Slough, the only SPFC facilities are near the downstream end of the reach (refer to O&M Manual SJR601) (Figure 3-12B). A 2.2-mile-long right-bank levee and a 1.6-mile-long left-bank levee connect with the Eastside Bypass. The Sand Slough Control Structure spills San Joaquin River water into the bypass. Just upstream from the Sand Slough Control Structure, the San Joaquin River Structure controls flow into the San Joaquin River through operable gates. While the O&M manual describes the flow split between the bypass and the river, the San Joaquin River Structure has remained closed for many years because of the river's limited channel capacity. The design capacity of the San Joaquin River Structure is 1,500 cfs, based on the O&M manual. SPFC facilities are maintained by the Lower San Joaquin Levee District.

3.3.2.5 San Joaquin River from San Joaquin River Structure to Mariposa Bypass

SPFC facilities (refer to O&M Manual SJR601) along this reach are levees just upstream from the junction with the Mariposa Bypass (Figures 3-12B and 3-12C). The levee design capacity is 1,500 cfs, based on the O&M manual. The right-bank levee extends 3 miles upstream from the junction, and the left-bank levee extends 2 miles upstream from the junction. Levees are maintained by Lower San Joaquin Levee District.

3.3.2.6 San Joaquin River from Mariposa Bypass to Outfall of the Eastside Bypass

SPFC facilities (refer to O&M Manual SJR601) are levees along both sides of the river (Figure 3-12C). The design capacity of this reach is 10,000 cfs, based on the O&M manual. The levees are each about 7 miles long and are maintained by Lower San Joaquin Levee District.

3.3.2.7 San Joaquin River from Eastside Bypass to Merced River

The San Joaquin River and the Eastside Bypass join about 11.5 miles upstream from the Merced River. SPFC facilities (refer to O&M Manual SJR601) along this reach include levees (Figure 3-12C). The design capacity of this reach is 26,000 cfs based on the O&M manual. The right-bank levee is continuous from the junction with the Eastside Bypass to the overflow area of the Merced River. The left-bank levee extends from the Eastside Bypass to Salt Slough, about 6 miles downstream. This levee extends upstream on the right bank of Salt Slough for about 2.5 miles. Levees are maintained by Lower San Joaquin Levee District.

3.3.2.8 San Joaquin River from Merced River to Stanislaus River

The river has discontinuous SPFC levees along both banks of this 44-mile-long reach, as well as one pumping plant (Figures 3-12C and 3-12D). Based on O&M manuals, the design channel capacity is 45,000 cfs between the Merced River and Tuolumne River and 46,000 cfs between

the Tuolumne River and Stanislaus River. The design flow of the Tuolumne River at the confluence with the San Joaquin River is 15,000 cfs.

The right-bank levee (refer to O&M Manuals SJR4, SJR5, and SJR6) consists of three discontinuous segments totaling 20.4 miles. The levees are intended to reduce flood risk agricultural land in RD 2031, RD 2063, RD 2091, and RD 2092. At the upstream end of these levee segments is an SPFC pumping plant (also known as Lateral No. Pumping Plant) (refer to O&M Manual SJR6) which diverts local runoff from agricultural land in RD 2063 into the San Joaquin River. The pumping plant (with a capacity of 4,000 gallons per minute) also has gravity drains to supplement pumping operations. About midway between the Merced and Tuolumne rivers, the Lower San Joaquin River Pumping Plant is an SPFC pumping plant (also known as Gomes Lake Pumping Plant) (refer to O&M Manual SJR6A) that allows drainage water to discharge from the levee-protected area to the San Joaquin River. The pumping plant (with a capacity of 30,000 gallons per minute) also has a provision for gravity flow of drainage water when the flow in the San Joaquin River is low and is maintained by RD 2063. The left-bank levee (refer to O&M Manuals SJR12 and SJR13) consists of four discontinuous segments totaling 16.4 miles. The levees are intended to reduce flood risk to agricultural land in RD 1602, RD 2099, RD 2100, RD 2101, and RD 2102, and are maintained by those agencies.

3.3.2.9 Stanislaus River

SPFC facilities on the Stanislaus River include levees on both banks upstream from the San Joaquin River (Figure 3-12D). Under flood control conditions, upstream reservoir release operations are designed not to exceed a flow of 8,000 cfs (channel capacity) in the lower Stanislaus River from Goodwin Dam downstream to the San Joaquin River. The local interest project levees (refer to Chapter 2) have been identified by USACE as adequate to contain this design capacity. The right-bank levee (refer to O&M Manual SJR3) is 6.1 miles long from high ground to its connection with the San Joaquin River levee. The left-bank levee (refer to O&M Manual SJR4) is 7.2 miles long from high ground to its connection with the San Joaquin River levee. Channel maintenance (refer to O&M Manual SJR614) is included downstream from Goodwin Dam.

3.3.2.10 San Joaquin River from Stanislaus River to Paradise Cut

SPFC facilities on this reach of San Joaquin River include levees on both banks of the river (Figure 3-12D). The design capacity of this reach is 52,000 cfs, based on O&M manuals. The right-bank levee (refer to O&M Manual SJR3) is 11.3 miles long. This levee is intended to reduce flood risk to agricultural land in RD 2064, RD 2075, and RD 2094, and is maintained by those agencies. The left-bank levee (refer to O&M Manual SJR11) begins about 2 miles downstream from the Stanislaus River. This levee is intended to reduce flood risk to a State prison, the Deuel Vocational Institution, and agricultural land in RD 2085 and RD 2095. It is maintained by RD 2085 and RD 2095. Paradise Cut is a distributary to the San Joaquin River.

3.3.2.11 Paradise Cut

SPFC facilities along Paradise Cut include levees on both sides of the channel from the San Joaquin River to the confluence with the Old River (Figure 3-12D). The design channel capacity is 15,000 cfs, based on O&M manuals. The right-bank levee (refer to O&M Manual SJR9) is 5.9 miles long and is maintained by RD 2062 and RD 2107. This levee is intended to reduce flood risk to Stewart Tract and Lathrop. The left-bank levee (refer to O&M Manual SJR10) is 6.2 miles long and is maintained by RD 2058 and RD 2095.

3.3.2.12 San Joaquin River from Paradise Cut to Old River

SPFC facilities include levees on both banks of the river and a pumping plant (Figure 3-12D). The design capacity of this reach is 37,000 cfs, based on O&M manuals. The right-bank levee (refer to O&M Manuals SJR2 and SJR3) is about 5.5 miles long and is maintained by RD 17 and RD 2096. The Weatherbee Lake Pumping Plant and Navigation Gate (refer to O&M Manual SJR3A) is located where the right-bank levee crosses Walthall Slough, about 0.8 mile upstream from Mossdale, and is maintained by RD 2096. The pumping plant has a rated capacity of 22,500 gallons per minute. The left-bank levee (refer to O&M Manual SJR9) is 5 miles long and is intended to reduce flood risk to Lathrop. It is maintained by RD 2062 and RD 2107.

3.3.2.13 Old River

SPFC facilities along Old River include levees on both sides of the channel (Figure 3-12D). The right-bank levee (refer to O&M Manuals SJR7 and SJR8) extends about 7.1 miles from the San Joaquin River to the Grant Line Canal. Based on the O&M manuals, the project design capacity for this reach is 19,000 cfs from the San Joaquin River to the Middle River; 15,000 cfs from the Middle River to Paradise Cut; and 30,000 cfs from Paradise Cut to the Grant Line Canal. The left-bank levee (refer to O&M Manual SJR9) extends about 5.6 miles from the San Joaquin River to the confluence with Paradise Cut. The project design capacity for this reach is 19,000 cfs. The levee is intended to reduce flood risk Stewart Tract and the urbanizing area of Lathrop. Levees along Old River are maintained by RD 2062, RD 2089, RD 544, and RD 1.

3.3.2.14 San Joaquin River from Old River to Burns Cutoff

SPFC facilities along this reach of river include levees on both banks (Figure 3-12D). The design capacity of this reach is 18,000 cfs, based on O&M manuals. The right-bank levee (refer to O&M Manuals SJR1 and SJR2) is 12.6 miles long and is maintained by RD 17 and RD 404. French Camp Slough enters the river about 2.3 miles upstream from Burns Cutoff. The left-bank levee (refer to O&M Manual SJR7) is about 12.4 miles long and is maintained by RD 544.

3.3.2.15 French Camp Slough

SPFC facilities within the French Camp Slough drainage include a diversion, channel clearing and excavation, and levees (Figure 3-12D). A dike across Duck Creek and a 5,000-foot-long diversion channel (refer to O&M Manual SJR613B) divert Duck Creek flow to Littlejohns Creek. The channel has a design capacity of 500 cfs, based on the O&M manual. The project included cleared and excavated channels along South Littlejohns Creek and both the north and south

branches. South Littlejohns Creek has a 2.3-mile-long right-bank levee in two segments and a 2.6-mile-long left-bank levee. The project is intended to reduce flood risk to Stockton and its surrounding urban area. Levees along the Duck Creek Diversion and South Littlejohns Creek are maintained by San Joaquin County Flood Control and Water Conservation District.

Both the right-bank (refer to O&M Manual SJR1) and left-bank (refer to O&M Manual SJR2) levees on French Camp Slough extend about 1.8 miles upstream from the San Joaquin River. The project design capacity for the left-bank levee is 3,000 cfs and the project design capacity for the right-bank levee is 2,000 cfs, based on the O&M manuals. The left-bank levee along French Camp Slough is maintained by RD 17, and the right-bank levee is maintained by RD 404.

3.3.2.16 Calaveras River and Mormon Slough

The Calaveras River is a tributary to the San Joaquin River. SPFC facilities within the Calaveras River drainage include facilities of the Mormon Slough Project, composed of a diversion from Mormon Slough, pumping plants, and levees and improved channels along Mormon Slough, Potter Creek, and the Calaveras River (refer to O&M Manual SJR611.1 for channels and levees and O&M Manual SJR611.2 for the pumping plants) (Figure 3-12D). There is also a diversion from the Calaveras River to Mormon Slough at Bellota that is not shown in the O&M manual as an SPFC facility. The Mormon Slough Project is maintained by the San Joaquin County Flood Control and Water Conservation District.

Intermittent spoil dikes and levees are located along about 11 miles of Mormon Slough. Both banks of Mormon Slough have levees for a distance of about 2.3 miles upstream from the Stockton Diverting Canal. Potter Creek has a 0.9-mile-long left-bank levee upstream from its confluence with Mormon Slough. The Stockton Diverting Canal is about 5 miles long and diverts Mormon Slough water to the Calaveras River. Both banks of the diversion canal have levees. The design capacity is 12,500 cfs, based on the O&M manuals. Three pumping plants along the right bank of the Stockton Diverting Canal discharge local drainage water into the canal.

The Calaveras River has levees along both banks for about 6.5 miles upstream from the San Joaquin River. The design capacity of the river is 13,500 cfs. Levees along the Calaveras River are maintained by the San Joaquin County Flood Control and Water Conservation District.

3.3.2.17 Bear Creek

Bear Creek is a tributary to the San Joaquin River; note, this is not the same Bear Creek that is tributary to the Eastside Bypass. SPFC facilities include 15.7 miles of channels and 30.1 miles of levees on Bear Creek, Paddy Creek, Middle Paddy Creek, and North Paddy Creek (Figure 3-12D). O&M Manual SJR612.2 covers the project from high ground to U.S. Highway 99. O&M Manual SJR612.1 covers the project from U.S. Highway 99 to Disappointment Slough. Facilities are maintained by the San Joaquin County Flood Control and Water Conservation District.

Figure 3-12A. San Joaquin River Watershed – State Plan of Flood Control Facilities along the San Joaquin River and Tributaries

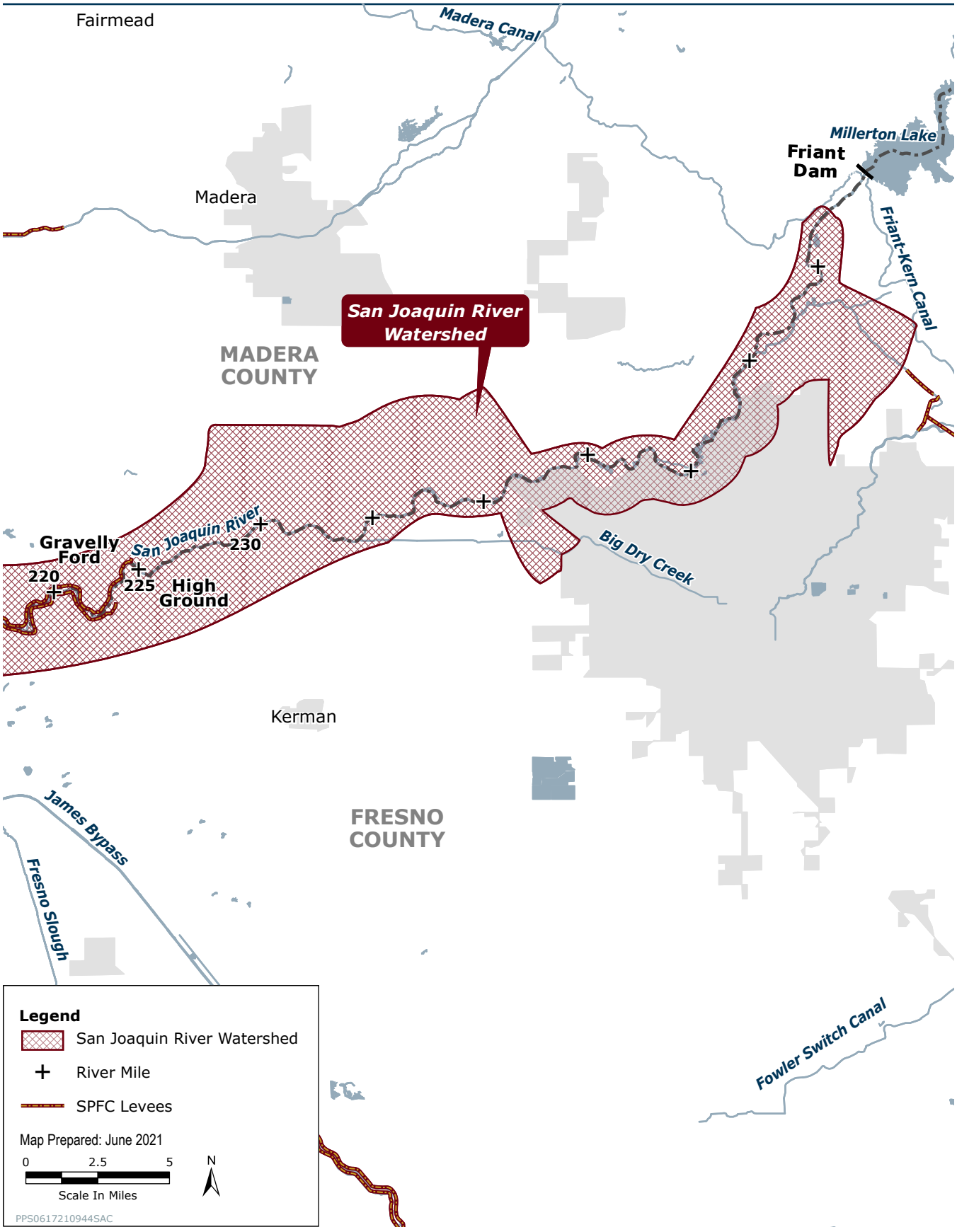


Figure 3-12B. San Joaquin River Watershed – State Plan of Flood Control Facilities along the San Joaquin River and Tributaries

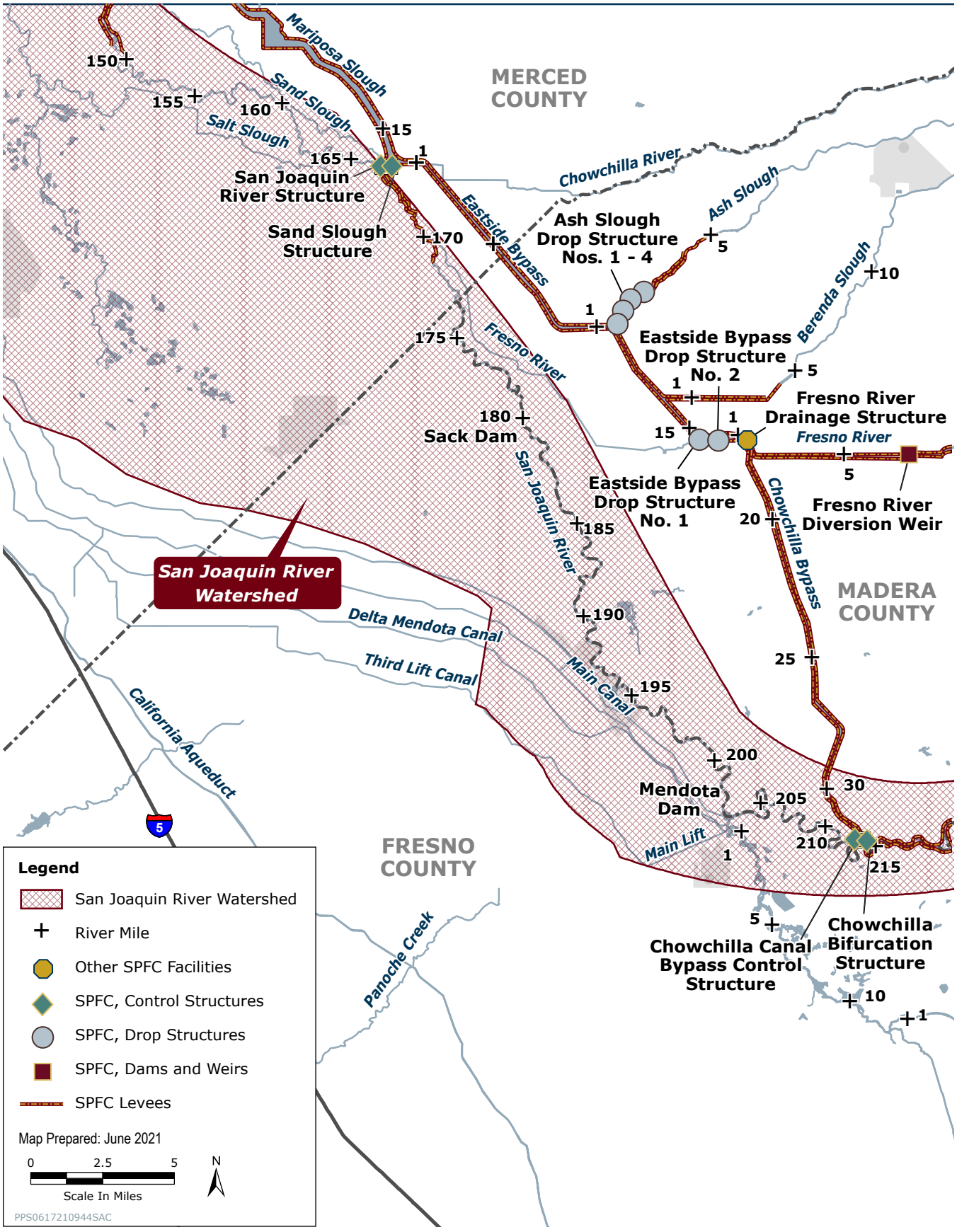


Figure 3-12C. San Joaquin River Watershed – State Plan of Flood Control Facilities along the San Joaquin River and Tributaries

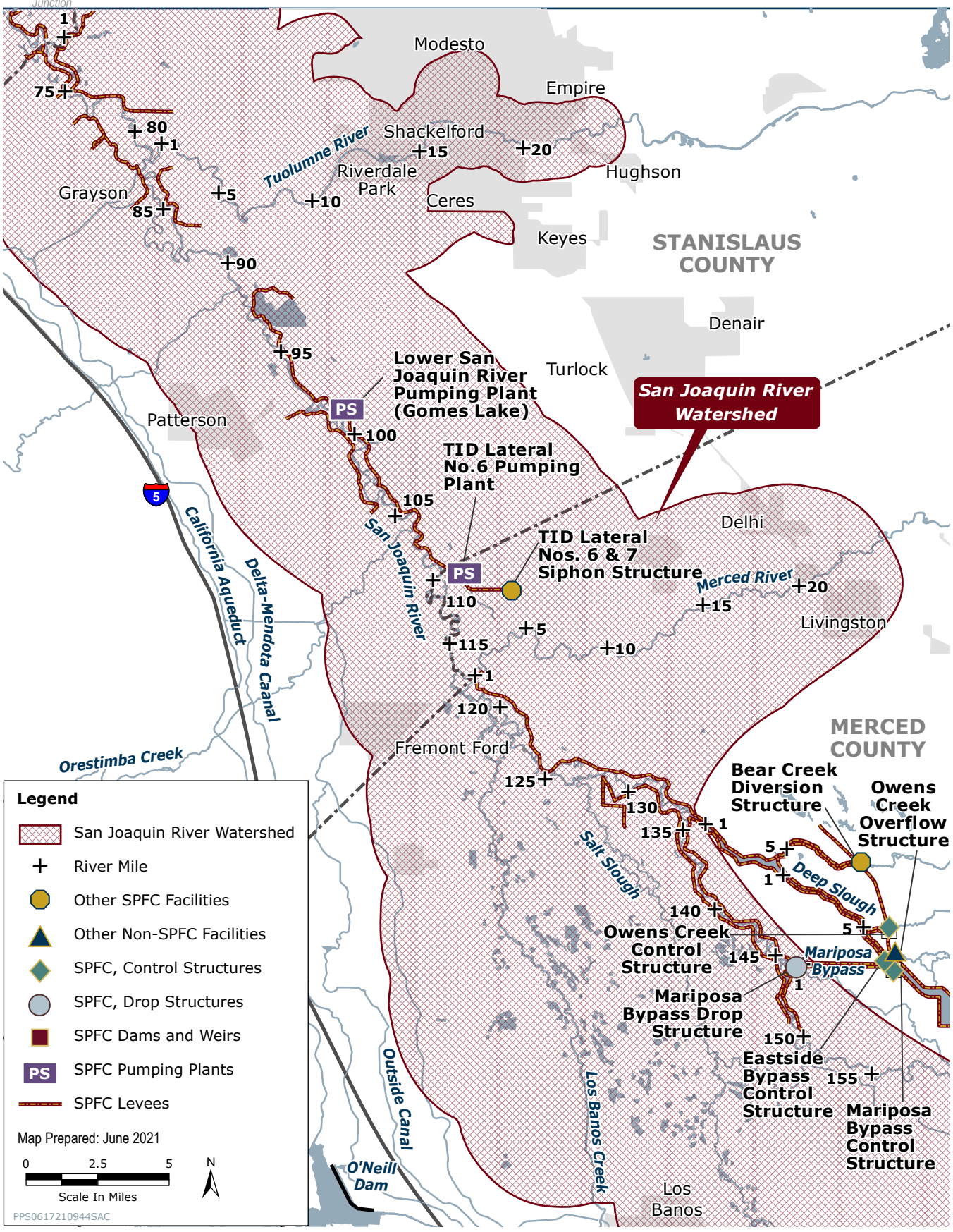
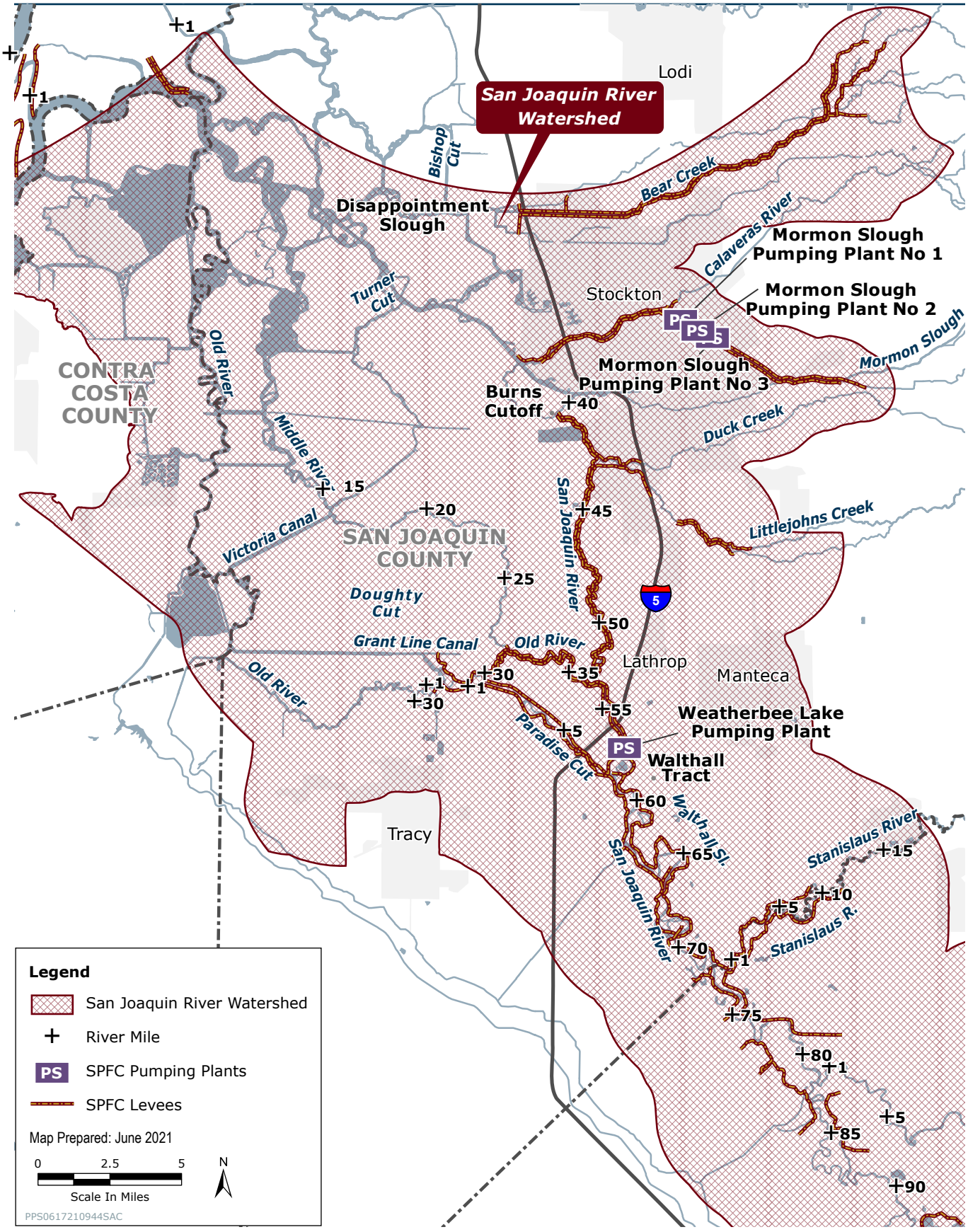


Figure 3-12D. San Joaquin River Watershed – State Plan of Flood Control Facilities along the San Joaquin River and Tributaries



3.4 Other Flood Projects with CVFPB or DWR Assurances of Cooperation

The CVFPB or DWR has provided the federal government assurances of cooperation for other flood management projects in California, but these projects do not meet the definition (refer to Chapter 1.1) of the SPFC because they are not in the Sacramento River or San Joaquin River watersheds; the SPFC is limited to projects within the Sacramento River and San Joaquin River watersheds. Examples of other flood projects with Board or DWR assurances of cooperation that are not in the Sacramento or San Joaquin River watersheds include the following:

- The Truckee River and Tributaries Project was authorized by the Flood Control Act of 1954 (Public Law 780, 83rd Congress). The Truckee River drains into Pyramid Lake in the Great Watershed. While the CVFPB provided assurances of cooperation to the federal government because it is not within the watershed of the Sacramento or San Joaquin rivers, the project is not part of the SPFC.

- The Fairfield Vicinity Streams Project was authorized by House and Senate Public Works Committees' resolutions (adopted December 15, 1970, and December 17, 1970, respectively), under provisions of Section 201 of the Flood Control Act of 1965. The authorization was substantially in accordance with a report of the Secretary of the Army and the USACE Chief of Engineers in House Document 159 (91st Congress). Section 117 of Public Law 99-190 modified the project authorization. Project authorization was also modified under the Supplemental Appropriations Act of 1987 (Public Law 100-71). The project (refer to O&M Manual SAC514) is intended to reduce flood risk to the City of Fairfield and Suisun City. The Fairfield Vicinity Streams Project includes improvements along Avenue Creek, a small unnamed tributary near Highway 80, 1 mile of Ledgewood Creek from Highway 12 to Peytonia Slough, Laurel Creek from just south of Gulf Drive to McCoy Creek, and McCoy Creek south to the Buffer Channel. The peak flow for McCoy Creek upstream to its confluence with Laurel Creek is 3,700 cfs. At this confluence, the peak inflow from McCoy is 2,000 cfs, and 3,700 cfs from the Laurel Diversion. At the Laurel Diversion confluence with the Diversion Stub, the peak inflow is 700 cfs from the Diversion Stub and 2,600 cfs from the channel. While the CVFPB provided assurances of cooperation to the federal government, the project is not part of the SPFC because it does not meet the SPFC definition; the project drains downstream from River Mile 0.0 for the Sacramento River and is therefore not part of the Sacramento River Watershed.

3.5 Other State Plan of Flood Control Facilities

3.5.1 Structures

This section provides a detailed list of structures within the SPFC. These structures include pumping plants, weirs, drop structures, and control gates. Tables 3-3 and 3-4 provide SPFC structure names, local maintaining agencies for each structure, and the O&M manual for each structure. The information in these tables is based on data collected and analysis completed as of June 30, 2021, and future updates could include more SPFC facility data.

Table 3-3. State Plan of Flood Control Structures in the Sacramento River Watershed

Structure Name	Maintaining Agency	O&M Manual
American River Pumping Plants No. 1 and 2	Sacramento County	SAC518
Big Chico Creek Gates (Diversion Control Structure)	Butte County Public Works	SAC504
Butte Slough Outfall Structure	DWR Sutter Maintenance Yard	SAC161
Cache Creek Settling Basin Weir and Drainage Structure	DWR Sacramento Maintenance Yard	SAC126
Clover Creek Diversion Structure	Lake County Watershed Protection District	SAC506.2
Colusa Weir	DWR Sutter Maintenance Yard	SAC155
Elk Slough Inlet Structure	Reclamation District 999	SAC113
Fremont Weir	DWR Sacramento Maintenance Yard	SAC157
Highland Canal Diversion Weir and Drainage Structure	Lake County Watershed Protection District	SAC506.3
Howard Slough Diversion Structure	DWR Sutter Maintenance Yard	SAC 153
Knights Landing Outfall Structure	DWR Sacramento Maintenance Yard	SAC162
Lindo Channel Gates (Control Structure)	Butte County Public Works	SAC504
Little Chico Creek Diversion Structure	DWR Sutter Maintenance Yard	SAC516
Magpie Creek Pumping Plant	City of Sacramento	SAC118.2
Middle Creek Pumping Plant	Lake County Watershed Protection District	SAC506.1
Moulton Weir	DWR Sutter Maintenance Yard	SAC154
Nelson Bend (Rock Quarry Weir)	DWR Sutter Maintenance Yard	SAC501

Structure Name	Maintaining Agency	O&M Manual
North Fork Feather River Diversion Channel Drop Structures No. 1, 2, 3, 4, 5, 6, and 7	Plumas County	SAC508
North Fork Feather River Diversion Structure	Plumas County	SAC508
Oroville Dam	DWR Division of Operations and Maintenance	N/A
Sacramento Weir	DWR Sacramento Maintenance Yard	SAC158
Sutter-Butte Canal Headgate	DWR Sutter Maintenance Yard	SAC 160
Sutter Bypass Pumping Plants No. 1, 2, and 3	DWR Sutter Maintenance Yard	SAC159
Sycamore (Lindo Channel Diversion) Weir	Butte County Public Works	SAC504
Tisdale Weir	DWR Sutter Maintenance Yard	SAC156
Willow Slough Weir	DWR Sacramento Maintenance Yard	SAC120

Notes:
DWR = California Department of Water Resources
No. = number
O&M = operations and maintenance

Table 3-4. State Plan of Flood Control Structures in the San Joaquin River Watershed

Structure Name	Maintaining Agency	O&M Manual
Ash Slough Control Structures	Madera County Flood Control and Water Conservation Agency	SJR605
Ash Slough Drop Structures No. 1, 2, 3, and 4	Lower San Joaquin Levee District	SJR601.1
Berenda Slough Control Structure	Madera County Flood Control and Water Conservation Agency	SJR605
Black Rascal Creek Drop Structure	Merced County Stream Group	SJR607
Castle Dam	Merced Irrigation District	SJR607A
Chowchilla Canal Bypass Control Structure	Lower San Joaquin Levee District	SJR601.3
Duck Creek Diversion Weir and Control Structure	San Joaquin County Flood Control District	SJR613B
Eastside Bypass Control Structure	Lower San Joaquin Levee District	SJR601.2
Eastside Bypass Drop Structures No. 1 and 2	Lower San Joaquin Levee District	SJR601.1
Fresno River Diversion Weir	Lower San Joaquin Levee District	SJR606
Fresno River Drainage Structure	Lower San Joaquin Levee District	SJR601.1

Structure Name	Maintaining Agency	O&M Manual
Lower San Joaquin River (Gomes Lake) Pumping Plant	Reclamation District Number 2091	SJR006A
Mariposa Bypass Control Structure	Lower San Joaquin Levee District	SJR601.2
Mariposa Bypass Drop Structure	Lower San Joaquin Levee District	SJR601.1
Mormon Slough Pumping Plants No. 1, 2, and 3	San Joaquin County Flood Control District	SJR611.2
Owens Creek Control Structure	Lower San Joaquin Levee District	SJR601.1
Owens Creek Diversion Channel Siphon	Merced County Stream Group	SJR607
San Joaquin River Control Structure	Lower San Joaquin Levee District	SJR601.3
San Joaquin River Structure	Lower San Joaquin Levee District	SJR601.1
Sand Slough Structure	Lower San Joaquin Levee District	SJR601.1
Turlock Irrigation District Lateral No. 6 and 7 Siphon Structure	Turlock Irrigation District	SJR006
Turlock Irrigation District Lateral No. 6 Pumping Plant	Not Identified	SJR006
Wetherbee Lake Pumping Plant and Navigation Gate	Reclamation District Number 2096 - Wetherbee Lake	SJR003A

Notes:
No. = number
O&M = operations and maintenance

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CHAPTER 4

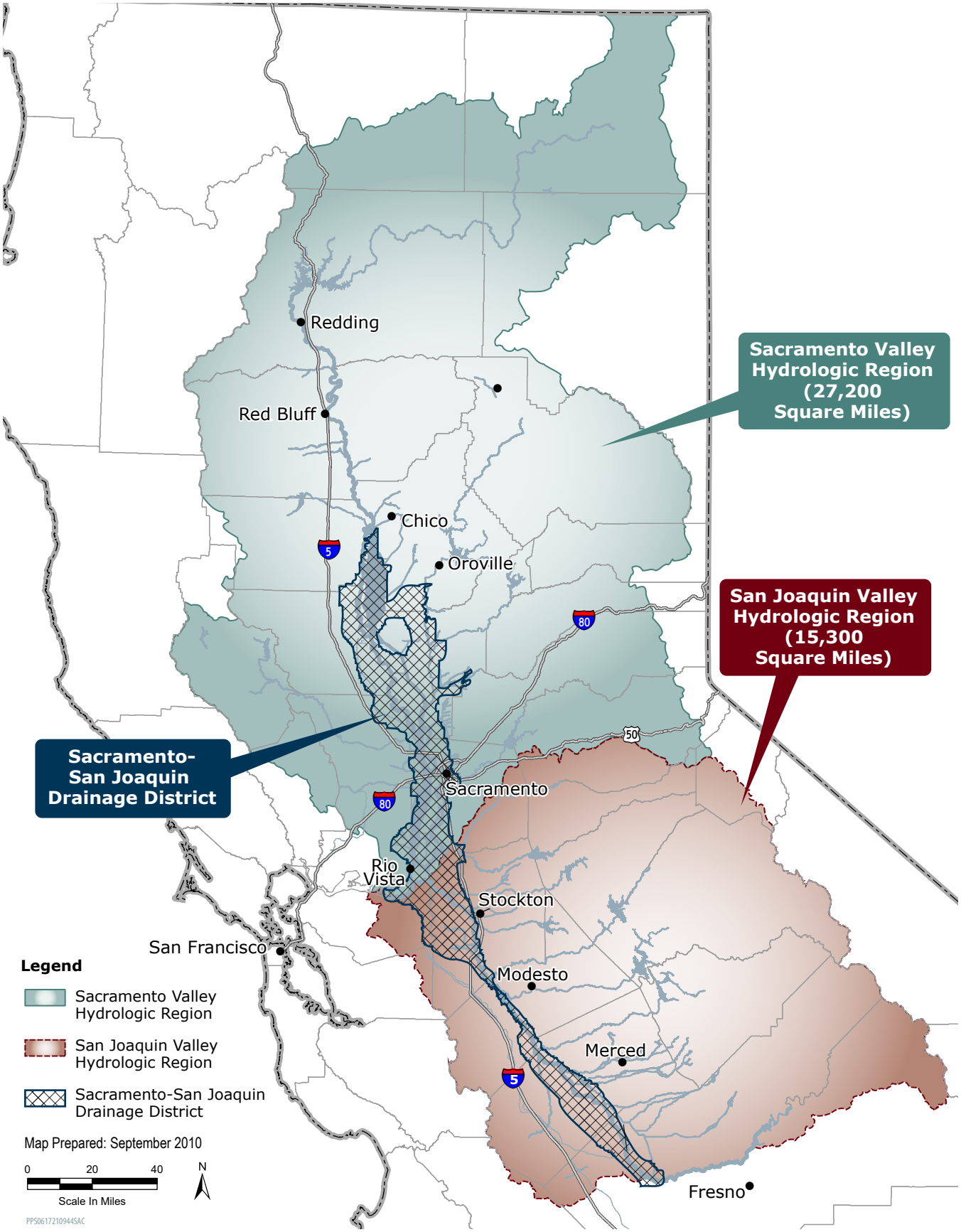
State Plan of Flood Control Lands

In most cases, federal project authorizations require the nonfederal sponsor to provide all lands, easements, and rights-of-way for project construction, maintenance, and operation. Property rights for State Plan of Flood Control (SPFC) lands are held by the Sacramento-San Joaquin Drainage District (SSJDD), which is under the jurisdiction of the Board. The SSJDD was created by State of California (State) legislation in 1913 and has associated property rights going back to 1900. Figure 4-1 shows the SSJDD boundaries.

SPFC property rights extend to about 18,000 parcels of land. All comprehensive property records, indexes, and mapping associated with SPFC lands are maintained by the California Department of Water Resources' (DWR's) Division of Engineering, Geodetic Branch, Cadastral Survey Section. Each parcel of land has a file folder containing hard copies of the parcel description and other pertinent information. About 400 plot maps show the locations of the land parcels. Since the recording system has been in place for more than 100 years, it is set up to identify rights on individual properties at specific locations and is not readily suitable to general queries or other summaries.

This section presents additional information about SSJDD land holdings, types of property rights, agreements for use of easements and properties, lands of designated floodways, and ongoing evaluations.

Figure 4-1. Boundaries of the Sacramento-San Joaquin Drainage District



4.1 Summary

In general, SSJDD or local maintaining agencies (LMAs) acquire and hold property rights necessary for the construction of facilities and ongoing operations and maintenance (O&M). Property rights are held for approximately 210,500 acres of land throughout 19 Central Valley counties. Table 4-1 summarizes, by county, the approximate acreage of land for which SSJDD holds property rights.

Table 4-1. Acres of Land for Which Sacramento-San Joaquin Drainage District Holds Property Rights, by County

County	Acres
Butte	26,510
Colusa	5,272
Fresno	5,018
Glenn	38,000
Lake	174
Madera	5,460
Mariposa	3,246
Merced	10,900
Modoc	2
Placer	95
Plumas	177
Sacramento	8,650
San Joaquin	4,350
Solano	16,100
Stanislaus	500
Sutter	29,200
Tehama	580
Yolo	74,800
Yuba	950

Note:
This table represents approximate acres of land in each county. For more information on property rights, contact DWR Division of Engineering Geodetic Branch, Cadastral Survey Section.

4.2 Data Gaps

The record of SPFC property right holdings is not clear in all areas. Because of the incremental construction of SPFC facilities over almost a century, records are not of uniform quality and records for rights in some areas are missing. SPFC property rights have been acquired and disposed of for various reasons throughout the history of the SPFC in the Sacramento River and San Joaquin River watersheds. For example, property rights may have been acquired for spoiling or borrowing soil material necessary for construction and, in some cases, these rights were disposed of through sale or transfer after construction.

Standards for easements beyond the landside toe of levees for O&M have varied with time. Since the 1980s, a 10-foot-wide easement has been standard. However, most SPFC levee easements were acquired before the 1980s according to standards existing at the time of acquisition. Therefore, 10-foot-wide easements do not exist throughout the system. Similarly, easements to gain access to and from various points along the levee system are not consistent. In some areas, the inventory of unauthorized encroachments on these easements is incomplete.

In some cases, levees were set back by the U.S. Army Corps of Engineers (USACE), and the new levee toe infringed on pre-existing structures and features. Also, in some cases, these features were not previously encroachments, but became encroachments when levees were moved. Many of these features were not removed or relocated as part of a project and were accepted at the time.

4.3 Fee Title Lands

Fee title lands, or fee simple lands, are those with fully vested ownership. Some real property rights for the SPFC are held in fee title, but the current method of record-keeping does not allow an easy summarization of these holdings. Some levees are on State-owned lands. The State also owns the land within the Chowchilla Bypass, and the Eastside Bypass upstream from Sand Slough.

In some areas, the State purchased real property rights State in fee and then disposed them while retaining easement rights.

In 2020 the Central Valley Flood Protection Board (CVFPB) released a geographic information system (GIS) database that summarizes all current real property interests of SSJDD. This application has not been available to the public.

Some SPFC project features were constructed on State-owned lands. These features include, but are not limited to, levees, channels, structures, and environmental mitigation areas. The mitigation areas were established either onsite, at the location of the flood protective facilities, or offsite, away from the location of the flood protective works or project feature. Regardless of their locations, all mitigation sites were established to remain in place in perpetuity. The State

also acquired real property rights in fee to excavate material for construction (borrow) and dispose of excess material (spoil).

4.4 Easements

Easements are limited-use rights to real property owned by others. SSJDD often acquired real property rights in areas where it was determined that acquiring easements was more appropriate than purchasing the land in fee title. Most of SSJDD's real property rights are easements. In these locations (most notably the Butte Basin) ([Colusa and Glenn counties only], the Sutter, Sacramento, Yolo, Butte, Tisdale, and Mariposa bypasses, and the Eastside Bypass downstream from Sand Slough), flowage easements were acquired that compensated property owners for conveying to SSJDD the right to flow or flood water over portions of their real property.

Common easement types used by SSJDD include the following:

- **Levee** – Standard levee easement language has been revised numerous times in the past 100 years. With each revision, the standard version has become more specific and defined. Also, standard language may have been modified or sections deleted in some easement deeds, as requested by the grantor. Because of the revisions and customization, language in each deed must be reviewed and analyzed to determine the extent of SSJDD's real property rights for the parcel. For example, two levee easements (acquired at different times, one 60 years ago to build the levee and the other 5 years ago to enlarge and improve the levee) could be adjacent but specify different real property rights associated with the levee. The latter would have the right to preserve and retain all vegetative growth desirable for project purposes; the older document could only state that SSJDD had the right to build, construct, reconstruct, repair, and maintain, with no mention of replanting or preserving, vegetation. For current levee language, Rights 1 through 8 (revised in 1994) are as follows:

    1. Construct, reconstruct, enlarge, fence, plant with trees, shrubs and other vegetation, preserve and retain all vegetative growth desirable for project purposes, repair and use flood control works, which shall include, but not be limited to, access, haul and patrol roads, levees, ditches, embankments, channels, berms, fences and appurtenant structures, and operate and maintain said flood control works in conformity with the Code of Federal Regulations, Corps of Engineers' Standard O&M Manual, and State of California Standards.

    2. Clear and remove from said flood control works any or all natural or artificial obstructions, improvements, trees and vegetation necessary for construction, operation, maintenance, repair, reconstruction and emergence flood-fight.

    3. Flow waters and materials and by said flow erode.

    4. Place or deposit earth, debris, sediment or other material.

5. Excavate and remove earth, debris, sediment, or other material, including that placed or deposited.

6. Locate or relocate roads and public utility facilities by grantee or others.

7. Restrict the rights of the grantor, his successors and assigns, without limitations, to explore, extract, remove, drill, mine or operate through the surface or upper 100 feet of the subsurface in exercise of the grantor's interest in any minerals, including oil and gas.

8. Restrict any use by others which may interfere with any of the uses listed herein or any use necessary or incidental thereto.

- **Access** – A perpetual easement and right-of-way to construct, reconstruct, operate, maintain, and use an access or service road (or both) over a portion of real property.

- **Canal/Channel** – A perpetual easement and right-of-way to construct, reconstruct, enlarge, operate, and maintain a canal or ditch, and all works necessary and appurtenant to a flood control facility.

- **Drainage and Flowage** – A perpetual easement and right-of-way to construct, reconstruct, enlarge, operate, and maintain drainage facilities, and to flood, seep, pond, and overflow water over a portion of real property.

- **Flowage** – A perpetual easement and right-of-way to flood, seep, pond, and overflow water over, through, and across a portion of real property.

- **Slope** – A perpetual easement, with the right to construct, reconstruct, extend, and maintain cut and fill slopes and drainage facilities over a portion of real property.

- **Temporary** – Other temporary easements and rights-of-way for access, borrow, spoil, staging or construction (or both) may have been acquired. These rights terminated on a specific date or after construction, thus they are no longer part of the SPFC.

4.5 Implied Dedication

In cases where the State or LMA lack recorded real property rights, the State has relied on the doctrine of implied dedication codified in the California Civil Code Section 1009(d) for access to SPFC features for inspections, O&M, flood-fighting, or other activities critical to the function of the system. This code creates, as defined, a vested right for a governmental entity to continue the use of lands where public funds have been used to make improvements on private property.

4.6 Agreements

SSJDD has agreements with public entities (cities, counties, utilities, other State departments, and federal entities) and individual landowners for specified use of easements and properties. Each agreement is unique and allows specific uses and restrictions.

4.7 Designated Floodways

Chapters 2.5.3 and 6.8 describe designated floodways. Designated floodways are not considered lands of the SPFC, but they are a condition for the SPFC's successful operation. They do not carry specific property rights but are a regulatory designation.

4.8 Encroachment Permits

CVFPB is responsible for controlling encroachments on SPFC lands and rights-of-way. Title 33 Code of Federal Regulations (CFR), Section 208.10 (33 CFR 208.10) requires that "no encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities." CVFPB, following USACE's determination of the proposed encroachments potential effects on the functioning of the protective facilities, may issue encroachment permits. All CVFPB-issued encroachment permits are revocable and include standard and encroachment-specific special conditions. CVFPB is also responsible for enforcing permit conditions. More information about CVFPB enforcement is in Section 5.2.5.

In 2019, CVFPB implemented fees for permitting and inspection activities. This update was reflected in the California Code of Regulations, Title 23 Waters, Division 1 Central Valley Flood Protection Board. The fees apply to all new or re-issued applications received. New inspection staff were permanently hired to assist in oversight of new construction and follow-up permitted feature inspections.

4.9 Ongoing Evaluation

Each individual property the SSJDD holds property rights to represents an agreement between the previous owner of the rights and SSJDD or a Final Order of Condemnation that forcibly transfers property rights to the government. While SSJDD has used standard ownership and easement right agreements, these agreements have changed throughout the years. In addition, individual property owners may have negotiated modified agreement terms. While the types of property rights may be aggregated into groups of similar rights, each individual deed must be reviewed to understand the specific rights held for the parcel.

The documentation and analysis of SPFC lands is extremely complex. More than 100 years of records exist that document thousands of land acquisitions and disposal actions. Over this period, record-keeping protocols, technology, surveying accuracy and methods, and legal language have all changed and developed significantly. Many early records use descriptive

language that leaves significant interpretation to the boundary delineation of a parcel or the rights conferred by the deed. Compiling, rectifying, and standardizing these records into a state--of-the-art electronic database is an ongoing activity underway by DWR. This effort has been initiated, but substantial work remains to be completed so records can be analyzed in detail. In the absence of this completed GIS database, only approximate conclusions can be drawn from the existing data. DWR's Division of Engineering, Geodetic Branch, Cadastral Survey Section addresses specific inquiries into the rights of individual parcels or groups of parcels.

Based on rights that can be quantified, additional property rights may need to be obtained, especially for gaining access to SPFC facilities and for adequate easements along the landside toes of levees. Therefore, the State and LMAs may not have the land rights necessary for SPFC facility O&M as intended.

CHAPTER 5

State Plan of Flood Control Operations and Maintenance

The modes of operations and maintenance (O&M) are part of the State Plan of Flood Control (SPFC). Modes of O&M for the completed facilities of the SPFC the U.S. Army Corps of Engineers (USACE) has turned over to the Central Valley Flood Protection Board (CVFPB) include O&M manuals, inspections and maintenance of SPFC facilities by DWR and local maintaining agencies (LMAs), and flood operations.

This section presents information about O&M manuals, inspections, maintenance, and operations for the SPFC.

5.1 Summary

The California Department of Water Resources (DWR) depends on 87 LMAs to keep the SPFC levees in good condition. In addition, DWR maintains structures, channels, and levees in specific sections of the SRFCP. USACE does not perform O&M on SPFC facilities.

O&M manuals specify needed inspections and O&M for each SPFC unit. A unit may be a reach of levee along a waterway, a pumping plant, a weir, a control structure, a dam and reservoir, or another facility.

5.2 Operations and Maintenance Manuals

O&M manuals describe actions that LMAs are to follow during high-water events and for keeping SPFC project facilities in good working condition. USACE has prepared two standard O&M manuals for Sacramento River and San Joaquin River facilities, respectively. These standard O&M manuals are supported by more detailed O&M manuals for each unit of the State of California (State)-federal flood management system in the Sacramento River and San Joaquin River watersheds.

5.2.1 Standard Operations and Maintenance Manuals

The two standard USACE O&M manuals present requirements that apply to all LMAs that operate and maintain the various geographical SPFC units. The two standard USACE O&M manuals are listed here:

- *Standard Operation and Maintenance Manual for the Sacramento River Flood Control Project (USACE, revised May 1955)*
- *Standard Operation and Maintenance Manual for the Lower San Joaquin River Levees, Lower San Joaquin River and Tributaries Project, California (USACE, April 1959)*

The standard O&M manuals apply to all units of each project and conform to Section 208.10, Title 33 of the Code of Federal Regulations (CFR), as approved by the Acting Secretary of the Army on August 9, 1944, and published in the Federal Register on August 17, 1944. Each of the two manuals includes a copy of the regulation.

Examples of general rules for O&M of local flood control works (facilities) specified in the two standard manuals are as follows:

- O&M for maximum benefits.
- O&M in accordance with USACE-prescribed regulations.
- Reserve supply of materials for flood emergencies.
- No encroachments that adversely affect O&M.
- No improvements without USACE approval.
- Semiannual report.
- USACE access at all times.
- Maintenance and repairs performed by maintaining agencies, as deemed necessary by USACE.
- Coordination during flood periods.

Examples of more detailed O&M information contained in the two USACE standard manuals include the following:

- Conditions requiring facility maintenance such as erosion, vegetation, burrowing animals, degradation of levee crown.
- Need for patrols during floods.
- Need for inspections.
- Procedures to combat flood conditions.

5.2.2 Unit-specific Operations and Maintenance Manuals

USACE prepared detailed O&M manuals for each separate unit of the State-federal flood management system when the unit was completed. Unit-specific O&M manuals were incrementally prepared for specific O&M requirements that apply to the unit. These O&M manuals supplement information included in the two USACE standard O&M manuals. Each unit-specific manual includes information on authorization, location, project description, protection provided, assurances of cooperation provided by the nonfederal sponsor (usually the CVFPB), maintenance methods, operation methods, and inspection and reporting.

The O&M manuals generally include the as-constructed drawings as an appendix, but the drawings are filed separately because of their large sizes. Some manuals include information about reconstruction or improvements completed following the construction of the original facilities, but not all O&M manuals are up to date. The unit-specific O&M manuals do not include Levee repairs, such as the construction of seepage berms and relief wells in 1997 and 1998, many repairs under Public Law 84-99, or other levee modifications. Considering the levees' ages, there are likely other levee modifications that have not been documented in the manuals or records that may no longer exist.

Most of the unit-specific O&M manuals were prepared for individual segments of levees, often aligned to the LMA responsible for their maintenance. Other unit-specific O&M manuals were prepared for pumping plants along a given reach of stream channel, or for weirs, diversions, storage reservoirs, or other features of the SPFC.

Each unit-specific O&M manual also includes information about their ancillary features, such as bridges, culverts, and other minor drainage facilities, and hydrographic features, such as gauges necessary for operation. This information should be viewed as a general inventory of these facilities, not a definitive list of existing features.

5.2.3 Updated Operations and Maintenance Manuals

Many levees have been modified subsequent to original construction throughout the system. The common practice is for USACE to prepare supplements to the standard O&M manual to cover work by USACE under a separate project. DWR and USACE assembled a set of these supplements for the 2017 SPFC Descriptive Document Update.

The most current O&M manual database can be found on the California Data Exchange Center (CDEC) website (refer to Footnote 1). Maps showing the applicable supplemental manuals by location can be found in the SPFC Mapbook, also located on CDEC.

Table 5-1 lists O&M manuals with changes since the 2017 Descriptive Document in the Sacramento River Watershed. There have been no changes to O&M manuals within the San Joaquin River Watershed. Potential changes include, but are not limited to, additions of contracts, additions of drawings, additions of letters, and changes to paragraphs. (Refer to the Additions/Revisions page of the respective O&M manuals for more information on specific additions and revisions within each manual.)

Table 5-1. Operations and Maintenance Manuals with Additions or Revisions Since 2017 in the Sacramento River Watershed

Number	Title
SAC121	Right Levee of Yolo Bypass from Willow Slough Bypass to Woodland Road, Reclamation District 2035
SAC123	West Levee Sacramento River from East End Fremont Weir to Mile 70.8 and East Levee Yolo Bypass from East End Fremont Weir to Woodland Highway, Levees of Reclamation District 1600
SAC127	Levees of Knights Landing Ridge Cut and Sacramento River and Yolo Bypass Levees of Reclamation Districts 730 and 819 and South Levee of Sycamore Slough
SAC129	South Levee of Tisdale Bypass from the East Levee of Sacramento River to the West Levee of Sutter Bypass and West Levee Sutter Bypass Downstream to East Levee of Sacramento River
SAC132	Back Levees of Reclamation District 108
SAC134	East Levee of Sacramento River from Winship School to Tisdale Bypass and North Levee of Tisdale Bypass and West Levee of Sutter Bypass from Long Bridge to Tisdale Bypass
SAC141.1	East Levee of Feather River from Bear River to Natomas Cross Canal and South Levee of Bear River and Both Levees of Yankee Slough
SAC141.2	East Levee of Feather River and South Levee of Bear River
SAC142	Back Levee of Reclamation District 1001
SAC145	East Levee of Feather River, South Levee of Yuba River, Both Levees of W.P.R.R. [sic] Intercepting Channel, West Levee of South Dry Creek and North Levee of Bear River
SAC146	North Levee of Bear River and South Levee of South Dry Creek Reclamation District 817 and Vicinity of Wheatland
SAC148	West Levee of the Feather River from North Boundary of Reclamation District 777 to North Boundary of Levee District 1
SAC149	South Levee of Yuba River Maintenance Area 8
SAC151	East Levee of Feather River from Honcut Creek to Marysville and South Levee of Honcut Creek and East levee of Reclamation District 10
SAC509	Deer Creek Tehama County, CA

Notes:
CA = California
W.P.R.R. [sic] = Western Pacific Railroad

5.2.3.1 Inspections

Each individual unit-specific O&M manual includes requirements for SPFC facility inspections. DWR is responsible for the inspections of all SPFC facilities. DWR inspects levees that are maintained by DWR and LMAs, and then reports the findings to USACE and CVFPB. DWR has implemented a self-inspection program that requires LMAs to inspect their levees in the summer and winter, while DWR conducts inspections in the spring and fall. From the inspection information submitted, USACE may choose to conduct follow-up inspections in certain areas. USACE uses the State's inspection findings and its own follow-up inspections to make Public Law 84-99 eligibility determinations.

While each O&M manual contains specific inspection criteria, the following are examples of items included in inspections:

- Debris.
- Channel vegetation.
- Levee vegetation.
- Encroachments.
- Sedimentation.
- Settlement.
- Erosion.
- Rodent damage.
- Condition of structures.
- Other conditions specified in each O&M manual.

The maintenance status of project channels and structures is reported in an annual Inspection Report. Each annual report includes criteria for inspections of levee maintenance, channels, and structures[4].

5.2.4 Vegetation Inspection Criteria

In April 2007, USACE released a draft white paper, *Treatment of Vegetation Within Local Flood Damage Reduction Systems* (U.S. Army Corps of Engineers 2007), which called for the removal of wild growth, trees, and other encroachments that might impair levee integrity or flood-fighting access to reduce the risk of flood damage. Guidance on vegetation standards for flood control structures can be found in USACE *Engineering Technical Letter (ETL) 1110-2-571* (U.S. Army Corps of Engineers 2009) and *Engineering Manual (EM) 1110-2-301* (U.S. Army Corps of Engineers 2000). These standards limit uncontrolled vegetation growth (brush, weeds, or trees) to smaller than 2 inches in diameter. USACE notified sponsors that levees that fail to meet these existing standards would be rated as unacceptable, with the consequence that the

[4] Annual inspection reports and a variety of other inspection reports prepared by DWR's Flood Project Integrity and Assessment Unit can be found on the CDEC website: http:/cdec.water.ca.gov/fsir.html

sponsors could lose eligibility for federal assistance (Public Law 84-99) in post-flood levee rehabilitation.

In response to USACE vegetation criteria, DWR revised its levee inspection criteria for vegetation in fall 2007. The inspection criteria were aimed at improving public safety by providing visibility for inspections, eliminating vegetation conflicts and encroachments that could hamper flood-fight activities, and improving access for overall maintenance.

DWR's Interim Vegetation Inspection Criteria, now adopted as the Levee Vegetation Management Strategy, applied on the entire landside slope, plus a 10-foot-wide easement beyond the landside toe. On the waterside, these criteria only apply to vegetation on the top 20 feet (slope length) of the levee slope. Trees within these areas must be trimmed up to 5 feet above the ground (12 feet above the crown road) and thinned enough for visibility and access. Brush, weeds, or other vegetation more than 12 inches high blocking visibility and access within these levee areas should be trimmed, thinned, mowed, burned, dragged, or otherwise removed in an allowed manner.

CVFPB Resolution Number (No.) 2012-25 directed DWR to implement the proposed interim vegetation management strategy while scientific studies progressed to determine whether vegetation removal or attrition are necessary for public safety considerations, are appropriate, and are the best use of limited funds (Central Valley Flood Protection Board 2012).

DWR's inspection staff continues to conduct its inspections based on the requirements of USACE O&M manuals, apart from revised levee inspection criteria for vegetation. These revisions aim to improve public safety by providing visibility for inspections, eliminating vegetation conflicts and encroachments that could hamper flood-fighting activities, and improving access for overall maintenance.

The Water Resources Reform and Development Act (WRRDA) of 2014, enacted June 2014 by Public Law 113-121 (House Transportation and Infrastructure Committee 2014), directed USACE to provide new guidance for management of vegetation on levees. The legislation set a deadline of 18 months from the date of enactment. Due to other priorities, USACE did not begin the review process until mid-2016. This effort may result in an update to the *USACE Engineering Technical Letter (ETL) 1110-2-583, Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams and Appurtenant Structures* (U.S. Army Corps of Engineers 2014a) stating that vegetation on the levee and within 15 feet of the levee toe does not meet USACE engineering standards. These guidelines expired on April 30, 2019. The review mandated by WRRDA 2014, Section 2013, is still in progress, and the information described in those guidelines was published in *Engineer Pamphlet (EP) 1110-2-18*. This is a temporary extension to continue the vegetation policy until the review is completed. The review could also lead to changes in the Program Guidance Letter published in the Federal Register on February 17, 2012 (U.S. Army Corps of Engineers 2012), describing the process for requesting a variance from vegetation standards for levees and floodwalls.

5.2.5 Enforcement

During the spring and fall inspection cycles, DWR identifies and documents inspection items as acceptable (A), minimally acceptable (M), or unacceptable (U) considering USACE inspection rating criteria.

CVFBP, in conjunction with DWR and LMAs, addresses deficient items, including the following:

- Critical items impacting the structural integrity of a levee.
- Vegetation not in compliance with Levee Vegetation Management Strategy or determined to critically weaken a levee and lower public safety.
- Critical erosion issues.
- Aggressive rodent control and repair of levee damage by rodents.
- Encroachments affecting flood-fighting activities or levee integrity.

To address deficiencies identified in inspections, CVFPB, in conjunction with DWR, completes the following tasks:

- Notifies USACE of inspection findings.
- Requires submittal of an LMA Corrective Action Plan consistent with the agency's O&M responsibility.
- Identifies a time period required to correct deficiencies.
- Sends notification letters to appropriate LMAs indicating inspection status, maintenance history, and impacts on Public Law 84-99 eligibility through DWR's Flood Risk Notification Program.

To enforce compliance regarding deficiencies, DWR will rate items that are minimally acceptable (M) as unacceptable (U) if they are not corrected within the time period in the notification, unless work is scheduled or in progress. This may lead to an overall rating of unacceptable (U), resulting in loss of Public Law 84-99 eligibility.

Levees in maintenance areas (refer to Chapter 5.4.1) and LMAs and channels ranked unacceptable (U) because of vegetation will be expected to remedy deficiencies. To remain eligible for the Public Law 84-99 program, CVFPB expects these issues to be addressed expeditiously, and in compliance with all appropriate environmental laws.

5.3 Maintenance

As mentioned, DWR and 87 different LMAs maintain SPFC facilities. USACE Regulation 33, CFR 208.10, separates responsibilities into two categories: levees, and channels. In addition, DWR and LMAs are responsible for satisfying all environmental and resource agency requirements or laws that apply during maintenance activities.

5.3.1 Maintenance by California Department of Water Resources

In the Sacramento River Watershed, DWR maintains levees in accordance with USACE O&M manuals for approximately 288 miles of levees under DWR jurisdiction. DWR also maintains 16 SPFC structures, four pumping plants, and SPFC channels specified under the California Water Code (CWC) as DWR's responsibility for compliance with the O&M manuals.

DWR is responsible for maintaining SRFCP channels specified by CWC Section 8361. DWR is responsible for controlling vegetation, sediment, fallen trees, and other debris affecting channel capacity. DWR performs maintenance through its Sacramento and Sutter Maintenance Yards on a continuing basis.

In the San Joaquin River Watershed, CVFPB generally has passed all maintenance responsibility to the LMAs. However, DWR has performed some critical erosion repairs identified under the Governor's Executive Order S-01-06; these repairs were funded through a legislative appropriation by Assembly Bill (AB) 142.

5.3.1.1 State Responsibility in California Water Code 8361

CWC Section 8361 specifies the portions of the SRFCP for which DWR has O&M responsibility:

> *8361. The department shall maintain and operate on behalf of the state the following units or portions of the works of the Sacramento River Flood Control Project, and the cost of maintenance and operation shall be defrayed by the state:*
>
> *(a) The east levee of the Sutter Bypass north of Nelson Slough.*
>
> *(b) The levees and channels of the Wadsworth Canal, Willow Slough Channel downstream from the Southern Pacific Railroad from Davis to Woodland except that portion of the north levee thereof lying within Reclamation District No. 2035, Putah Creek downstream from Winters, the intercepting canals draining into them, and all structures incidental thereto.*
>
> *(c) The collecting canals, sumps, pumps, and structures of the drainage system of Project No. 6 east of the Sutter Bypass.*
>
> *(d) The bypass channels of the Butte Slough Bypass, the Sutter Bypass, the Tisdale Bypass, the Yolo Bypass, and the Sacramento Bypass with all cuts, canals, bridges, dams, and other structures and improvements contained therein and in the borrow pits thereof.*

(e) The levees of the Sacramento Bypass.

(f) The channels and overflow channels of the Sacramento River and its tributaries and the major and minor tributaries' flood control projects as authorized and defined in Sections 12648, 12648.1, and 12656.5.

(g) The Knights Landing Ridge Cut flowage area.

(h) The flood relief channels controlled by the Moulton and Colusa Weirs and the training levees thereof.

(i) The levee on the left bank of the Sacramento River adjoining the Butte Basin, from the Butte Slough Outfall Gates upstream to a point four miles northerly from the Moulton Weir, after completion.

(j) All weirs and flood relief structures.

(k) The west levee of the Yolo Bypass, extending from the west end of the Fremont Weir southerly to the Cache Creek Settling Bypass and from Willow Slough Channel to Putah Creek and the east levee of the Yolo Bypass from Fremont Weir southerly two miles.

(l) The levee on the west bank of Feather River extending a distance of about two miles southerly from the Sutter-Butte Canal Headgate.

(m) The levees of Cache Creek and the easterly and westerly levees of Cache Creek Settling Basin; excepting the portion of the southerly levee of Cache Creek lying upstream from State Highway Route 7 (U.S. 99W).

(n) The flowage area of Western Pacific Intercepting Canal extending northerly for five miles from Bear River.

(o) The levees of Tisdale Bypass from Tisdale Weir 4.5 miles easterly to Sutter Bypass.

(p) The flood relief structures or weirs and other structures or facilities essential for their proper functioning in the vicinity of the Sacramento River between Big Chico Creek and the north boundary of Glenn County Levee District No. 3.

5.3.1.2 Channel Maintenance

DWR is responsible for maintaining SPFC channels within the SRFCP to control vegetation, sedimentation, fallen trees, and other debris affecting channel capacity. CWC Sections 8361 (b), (d) and (f) and (h) require DWR to carry out the necessary functions to maintain the channels' and overflow channels' carrying capacities. Table 5-1 lists the channels DWR maintains.

5.3.1.3 Maintenance Areas

When an LMA cannot operate or maintain project facilities to acceptable standards, DWR or CVFPB is authorized to form a maintenance area and take responsibility for those facilities in the best interest of the State. DWR is also authorized to form a Maintenance Area if an LMA requests the State take over maintenance. CWC Section 12878 defines a maintenance area as follows:

"Maintenance area" means described or delineated lands that are found by the board or department to be benefited by the maintenance and operation of a particular unit of a project.

The procedure for forming a maintenance area is covered in CWC Sections 12878 through 12878.21. The flood management benefit of this program is that it addresses sections of levee that are not being maintained by either: identifying another maintaining agency willing to accept the maintenance responsibility or turning over maintenance responsibilities to the State to be paid for by local beneficiaries. Ten maintenance areas (1, 3, 4, 5, 7, 9, 12, 13, 16, and 17) are currently active within CVFPB's jurisdictional boundaries (Figures 5-1 and 5-2). Based on their location, levees within these maintenance areas are maintained by either the DWR Sacramento or Sutter Maintenance Yards.

5.3.2 Maintenance by Local Maintaining Agencies

Most levees in the SPFC are maintained by LMAs that fund maintenance activities through assessing landowners within their boundaries. These LMAs primarily comprise levee districts and Reclamation Districts (RDs). A variety of cities, counties, and other public agencies and municipalities also maintain SPFC levees and other facilities. In addition, DWR maintains specific facilities defined in CWC Section 8361 and for specific maintenance areas (refer to Chapter 5.4.1). Figures 5-1A, 5-1B, and 5-1C show LMA and DWR maintenance areas for the Sacramento River Watershed and Figures 5-2A and 5-2B show these for the San Joaquin River watershed. Table 5-2 also lists LMAs, along with the SPFC facilities they maintain.

Figure 5-1A. Locations of Maintaining Agencies within the Sacramento River Watershed

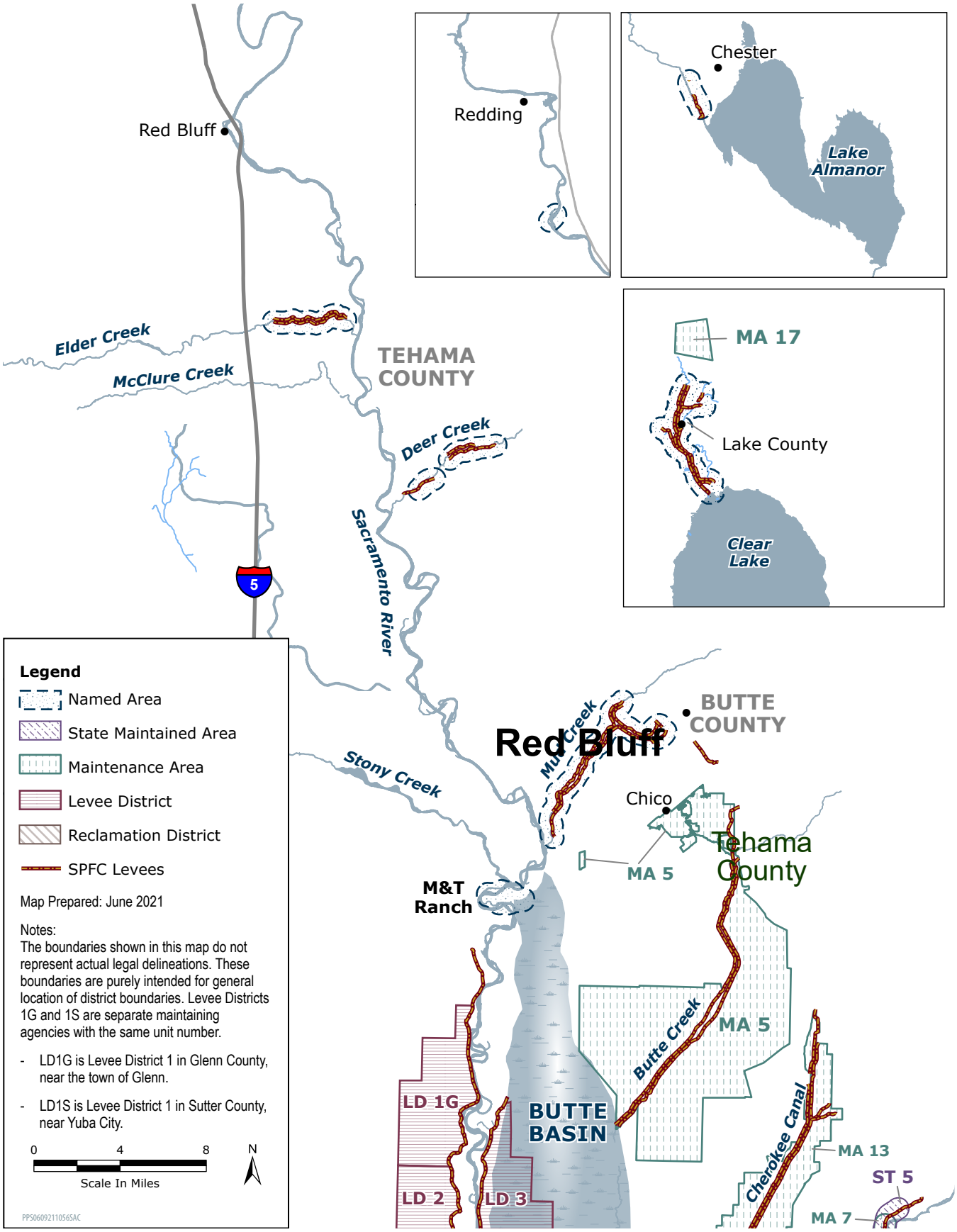


Figure 5-1B. Locations of Maintaining Agencies within the Sacramento River Watershed

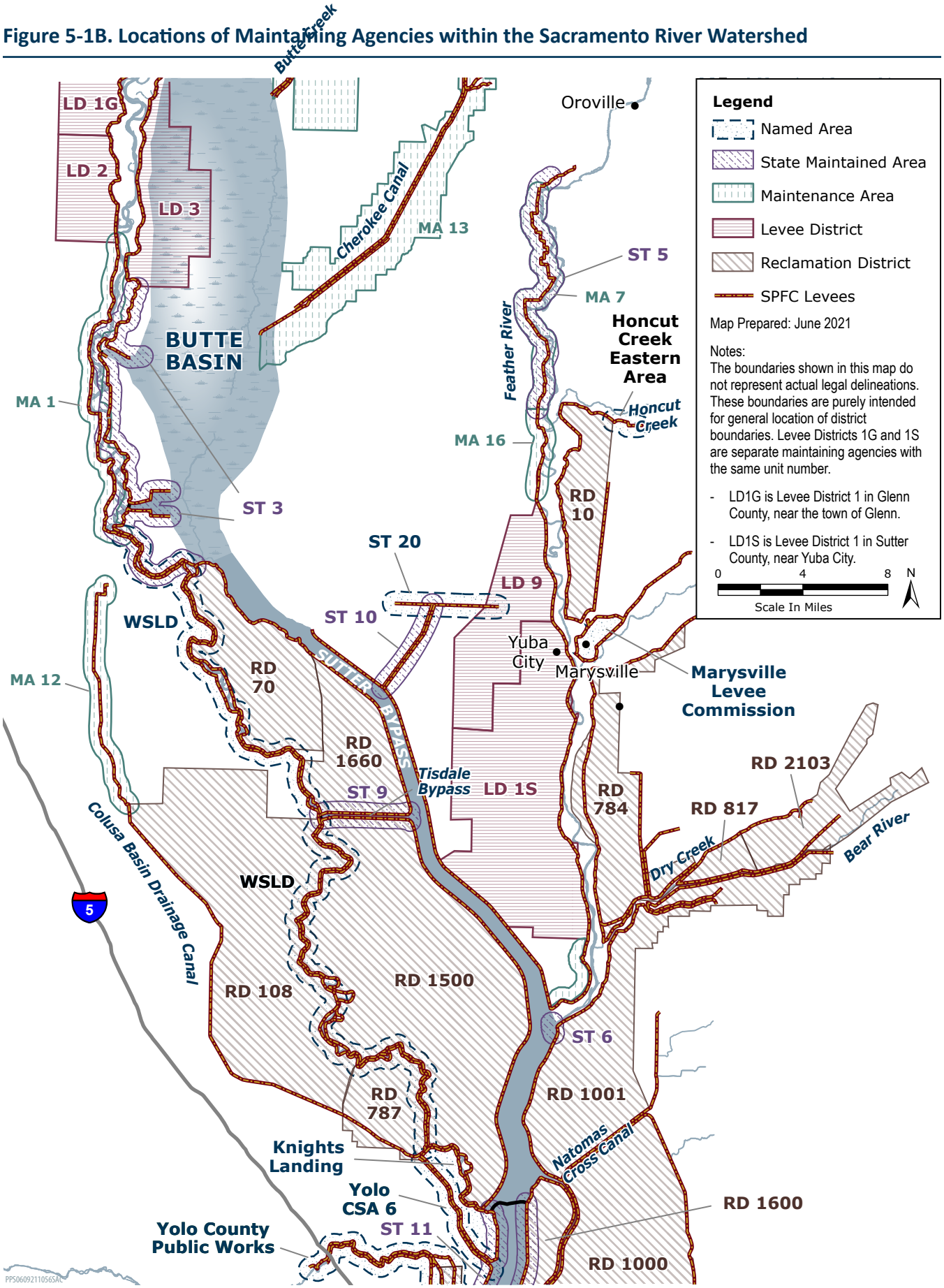


Figure 5-1C. Locations of Maintaining Agencies within the Sacramento River Watershed

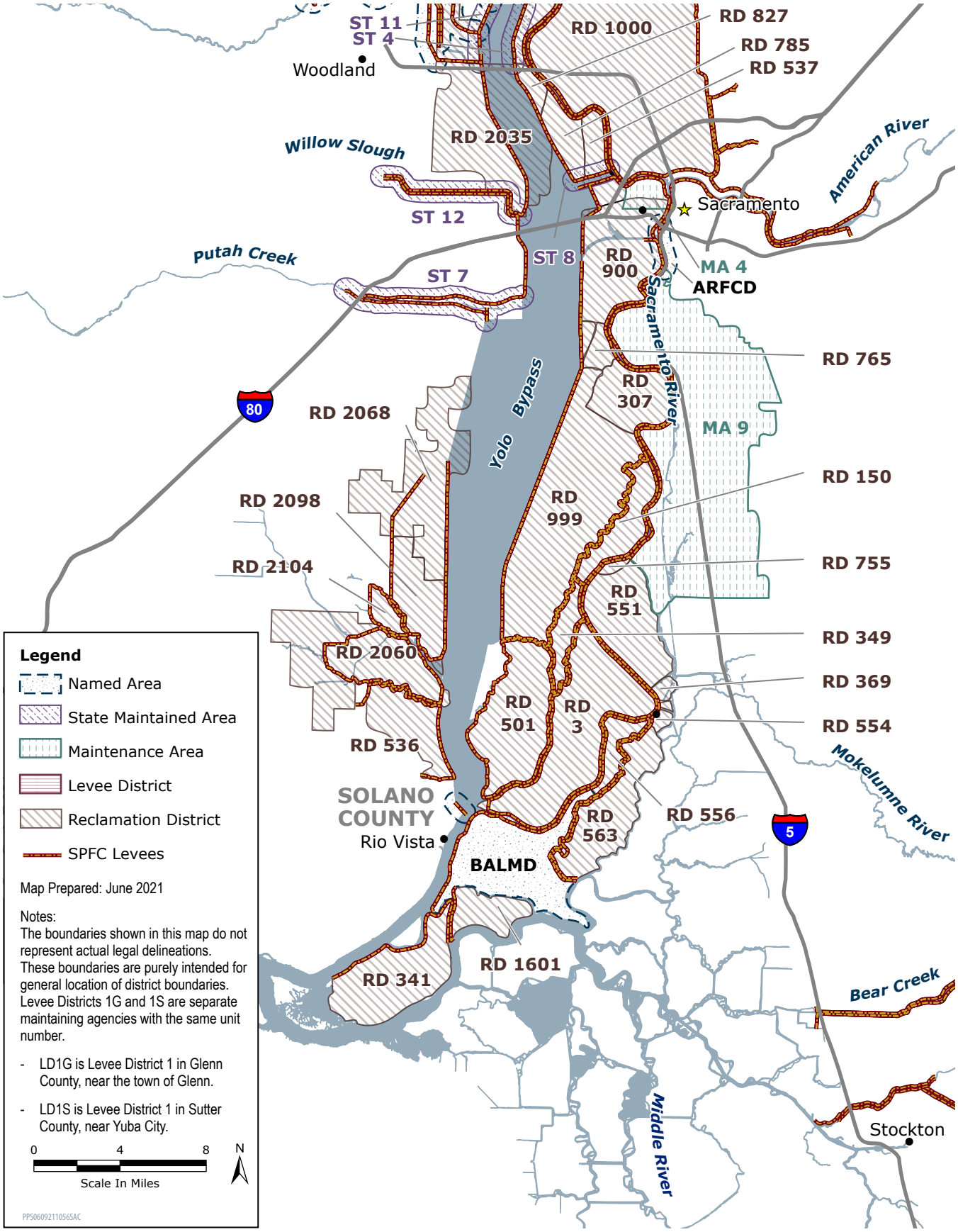


Figure 5-2A. Locations of Maintaining Agencies within the Sacramento River Watershed

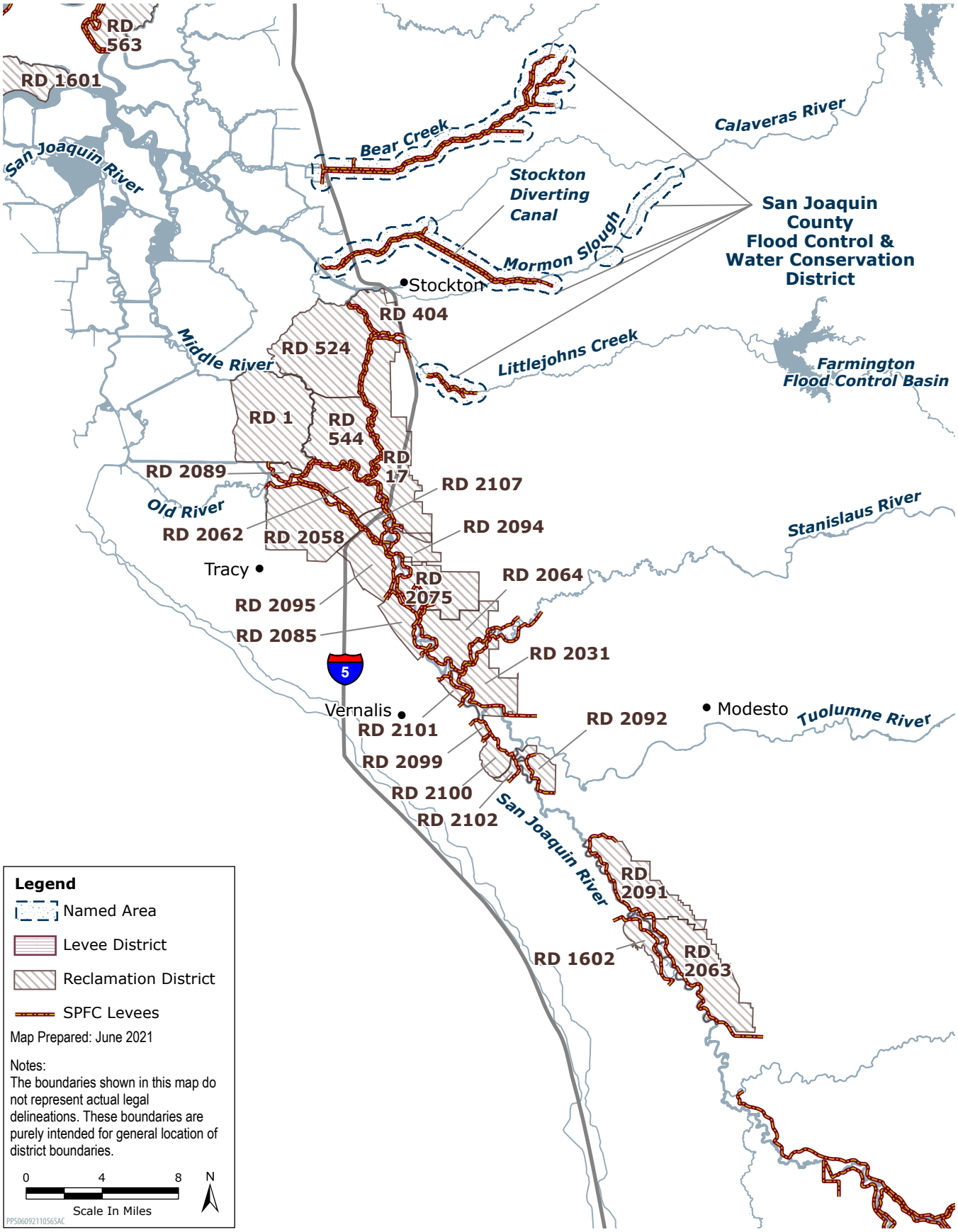


Figure 5-2B. Locations of Maintaining Agencies within the Sacramento River Watershed

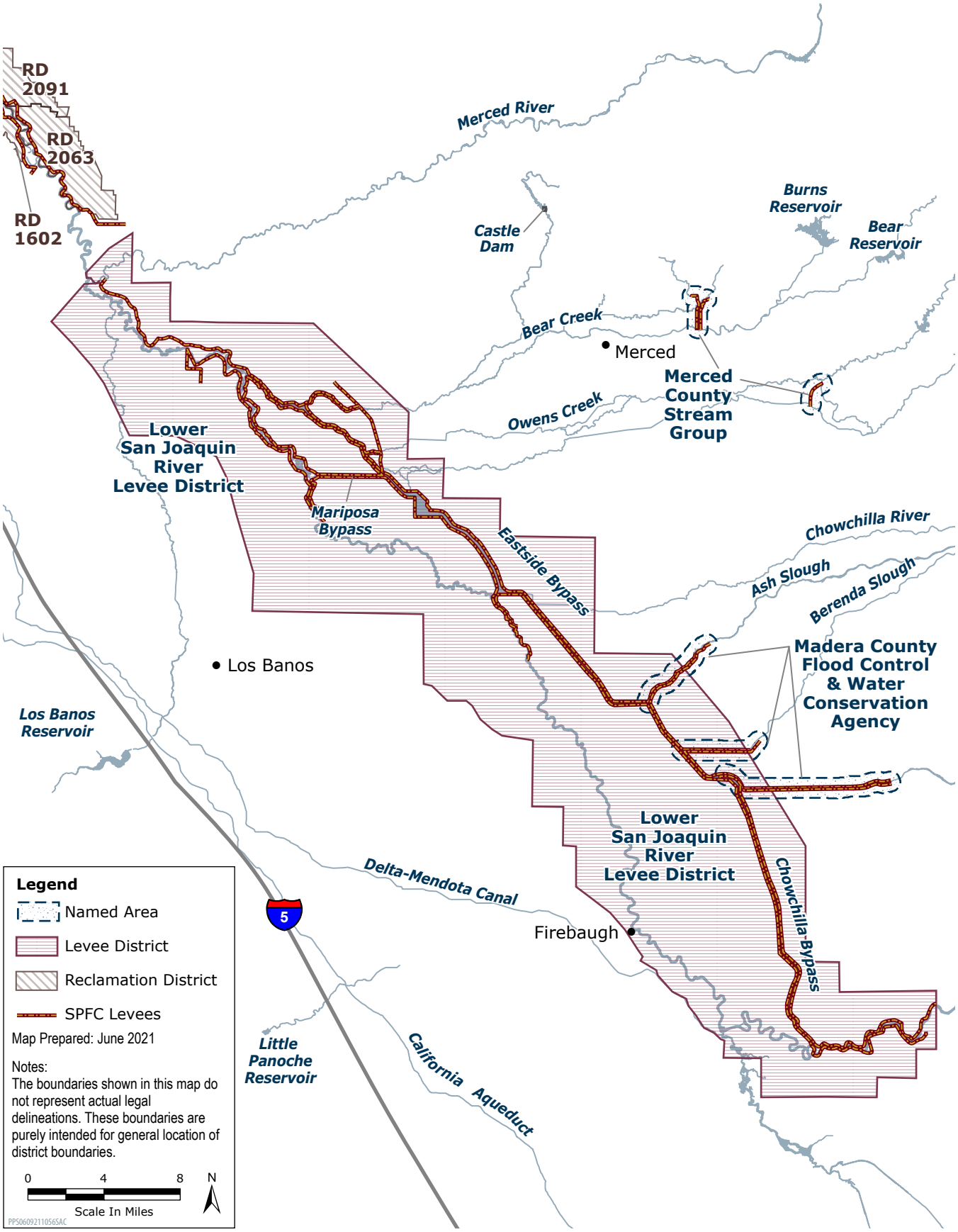


Table 5-2. Maintaining Agencies for State Plan of Flood Control Facilities

State Plan of Flood Control Facility	Maintaining Agency
Sacramento River bank protection, Red Bluff to Chico Landing	DWR – Sutter Maintenance Yard
North Fork Feather River channel improvements, including a diversion structure, an excavated rock-lined diversion channel, seven drop structures, and levees	Plumas County Department of Public Works
Feather River right-bank levee, high ground to Yuba City	DWR – Sutter Maintenance Yard, LD 9
Feather River right-bank levee, Yuba City to Sutter Bypass	LD 1 (Sutter County)
Feather River left-bank levee, Honcut Creek to Jack Slough	RD 10
Feather River left-bank levee, Yuba River to Bear River	RD 784
Sutter-Butte Canal Headgate	DWR – Sutter Maintenance Yard
Honcut Creek left-bank levee, upstream from Feather River confluence	RD 10
Back levee for RD 10, along Jack and Simmerly sloughs	RD 10
Ring levee around City of Marysville	Marysville Levee Commission
Yuba River right-bank levee, upstream from Marysville ring levee	Marysville Levee Commission
Yuba River left-bank levee, upstream from Feather River confluence	RD 784
Feather River left-bank levee	RD 784
Feather River right-bank levee	LD 1 (Sutter County)
Dry Creek left-bank levee, upstream from Bear River confluence	RD 817, RD 2103
Dry Creek right-bank levee, upstream from Bear River confluence	RD 784, RD 817
Bear River right- and left-bank levees, upstream from Dry Creek confluence	RD 784, RD 817, RD 1001
Yankee Slough right- and left-bank levee, upstream from Bear River confluence	RD 1001
WPRR Intercepting Channel right-bank levee	RD 784
WPRR Intercepting Canal Bridge (WI-1)	DWR – Sutter Maintenance Yard
WPRR Intercepting Canal Bridge (WI-2)	DWR – Sutter Maintenance Yard
WPRR Intercepting Canal Bridge (WL-1)	DWR – Sutter Maintenance Yard

State Plan of Flood Control Facility	Maintaining Agency
Bear River right-bank levee, downstream from Dry Creek confluence	RD 784
Bear River left-bank levee, downstream from Dry Creek confluence	RD 1001
Feather River right-bank levee from Bear River to Sutter Bypass	LD 1 (Sutter County), DWR – Sutter Maintenance Yard
Feather River left-bank levee from Bear River to Sutter Bypass	RD 1001
Nelson Bend Rock weir on Feather River at Sutter Bypass	DWR – Sutter Maintenance Yard
Sutter Bypass channel	DWR – Sutter Maintenance Yard
Sutter Bypass Toe Drain Bridge (EL-1A)	DWR – Sutter Maintenance Yard
Sutter Bypass East Borrow Canal Bridge (EL-2)	DWR – Sutter Maintenance Yard
Sutter Bypass East Borrow Canal Bridge (EL-3)	DWR – Sutter Maintenance Yard
Sutter Bypass East Borrow Canal Bridge (EL-6)	DWR – Sutter Maintenance Yard
East Interceptor Canal and Sand Creek Bridge (EI-2)	DWR – Sutter Maintenance Yard
East Interceptor Canal Bridge (EI-5)	DWR – Sutter Maintenance Yard
State Drain Bridge (CC-4)	DWR – Sutter Maintenance Yard
Feather River and Sutter Bypass right-bank levee, upstream from Sacramento River confluence	RD 1500
Feather River and Sutter Bypass left-bank levee, upstream from Sacramento River confluence	RD 1001
American River right-bank levee, upstream from Natomas East Main Drainage Canal	American River Flood Control District
Vegetation mitigation, five sites between H Street and Watt Avenue	American River Flood Control District
Pumps along American River at H Street and Watt Avenue	Sacramento County
American River left-bank levee, upstream from Natomas East Main Drainage Canal	American River Flood Control District
American River channel	DWR – Sacramento Maintenance Yard
Natomas East Main Drainage Canal right-bank levee at Sankey Road	RD 1000

State Plan of Flood Control Facility	Maintaining Agency
Dry (Linda) Creek left-bank levee, upstream from Natomas East Main Drainage Canal	American River Flood Control District
Magpie Creek diversion channel	American River Flood Control District
Natomas East Main Drainage Canal right- and left-bank levees, from Arcade Creek to American River	RD 1000
Arcade Creek right- and left-bank levees, upstream from Natomas East Main Drainage Canal	American River Flood Control District
American River right-bank levee, from Natomas East Drainage Canal to Sacramento River	RD 1000
Lower Butte Creek channel improvements and Howard Slough Diversion Structure	DWR – Sutter Maintenance Yard
Butte Slough Outfall Gates	DWR – Sutter Maintenance Yard
Butte Slough Bypass channel	DWR – Sutter Maintenance Yard
Right-bank levee from Butte Slough Outfall Gates to Sutter Bypass	RD 70
Sutter Bypass channel	DWR – Sutter Maintenance Yard
Sutter Bypass pumps and right- and left-bank levees from State Route 20 to Wadsworth Canal	DWR – Sutter Maintenance Yard, RD 70, RD 1660
Wadsworth Canal right- and left-bank levees and channel, West Intercepting Canal, and East Intercepting Canal right- and left-bank levees	DWR – Sutter Maintenance Yard
Sutter Bypass right-bank levee from Wadsworth Canal to Tisdale Bypass	RD 1660
Sutter Bypass left-bank levee from Wadsworth Canal to Tisdale Bypass and Pumping Plant No. 2	DWR – Sutter Maintenance Yard
Sutter Bypass right-bank levee downstream from Tisdale Bypass to Feather River confluence	RD 1500
Sutter Bypass left-bank levee downstream from Tisdale Bypass to Feather River confluence and Pumping Plant No. 1	DWR – Sutter Maintenance Yard
Feather River and Sutter Bypass right-bank levee, upstream from Sacramento River confluence	RD 1500
Feather River and Sutter Bypass left-bank levee, upstream from Sacramento River confluence	RD 1001

State Plan of Flood Control Facility	Maintaining Agency
Colusa Basin Drain left-bank levee	RD 108 and DWR - Sutter Maintenance Yard
Knights Landing Outfall Gates	DWR – Sacramento Maintenance Yard
Knights Landing Ridge Cut channel and right- and left-bank levees	Knights Landing Ridge Drainage District
Knights Landing Ridge Cut channel	DWR – Sacramento Maintenance Yard
Middle Creek and Tributaries Project (levees, channels, diversion structures, and pumping plant)	Lake County Watershed Protection District and DWR – Sutter Maintenance Yard
Willow Slough Diversion Weir, right- and left-bank levees to confluence with Yolo Bypass, and channel downstream from Southern Pacific Railroad from Davis to Woodland	DWR – Sacramento Maintenance Yard
Putah Creek channel and levees from Interstate 505 highway bridge in Winters to Yolo Bypass	DWR – Sacramento Maintenance Yard
Cache Slough and Lindsey Slough levees	RD 2068, RD 2098, RD 2093, RD 536
Yolo Bypass right-bank levee from Fremont Weir to Cache Creek Settling Basin	DWR – Sacramento Maintenance Yard
Yolo Bypass left-bank levee from Knights Landing Ridge Cut to Cache Creek Settling Basin	RD 1600
Cache Creek Settling Basin, east and west training levees	DWR – Sacramento Maintenance Yard
Yolo Bypass right-bank levee from Cache Creek to Sacramento Bypass	RD 2035
Yolo Bypass left-bank levee from Cache Creek to Sacramento Bypass	RD 785, RD 827, RD 2035
Yolo Bypass right-bank levee from Sacramento Bypass to Putah Creek	RD 900 and DWR - Sacramento Maintenance Yard
Yolo Bypass left-bank levee from Sacramento Bypass to Putah Creek	RD 900
Yolo Bypass right-bank levee from Putah Creek to Sacramento River	RD 536, RD 2060, RD 2068, RD 2098
Yolo Bypass left-bank levee from Putah Creek to Sacramento River	RD 501, RD 999

State Plan of Flood Control Facility	Maintaining Agency
Yolo Bypass channel	DWR – Sacramento Maintenance Yard
Ash Creek and Dry Creek channel clearing	Adin Community Services District
Salt Creek channel clearing, upstream from Sacramento River confluence	Tehama County Flood Control and Water Conservation District
Elder Creek channel clearing and left-bank levee upstream from Sacramento River confluence	Tehama County Flood Control and Water Conservation District
Elder Creek channel	DWR – Sutter Maintenance Yard
McClure Creek channel clearing near U.S. Highway 99	Tehama County Flood Control and Water Conservation District
Deer Creek channel clearing and right and left-bank levees upstream from Delany Slough to Sacramento River	Tehama County Flood Control and Water Conservation District
Deer Creek channel	DWR – Sutter Maintenance Yard
Cherokee Canal channel	DWR – Sutter Maintenance Yard
Big Chico and Sandy Gulch (Lindo Channel) left-bank levee and Big Chico Creek Gates, Lindo Channel Gates, and Sycamore Weir diversion structures	Butte County Public Works
Big Chico Creek, Sandy Gulch (Lindo Channel), Little Chico Creek channels	DWR – Sutter Maintenance Yard
Yolo Bypass right-bank levee from Fremont Weir to Cache Creek Settling Basin	DWR – Sacramento Maintenance Yard
Yolo Bypass left-bank levee from Knights Landing Ridge Cut to Cache Creek Settling Basin	RD 1600
Cache Creek Settling Basin, east and west training levees	DWR – Sacramento Maintenance Yard
Yolo Bypass right-bank levee from Cache Creek to Sacramento Bypass	RD 2035
Yolo Bypass left-bank levee from Cache Creek to Sacramento Bypass	RD 785, RD 827, RD 2035
Yolo Bypass right-bank levee from Sacramento Bypass to Putah Creek	RD 900 and DWR - Sacramento Maintenance Yard
Yolo Bypass left-bank levee from Sacramento Bypass to Putah Creek	RD 900

State Plan of Flood Control Facility	Maintaining Agency
Yolo Bypass right-bank levee from Putah Creek to Sacramento River	RD 536, RD 2060, RD 2068, RD 2098
Yolo Bypass left-bank levee from Putah Creek to Sacramento River	RD 501, RD 999
Yolo Bypass channel	DWR – Sacramento Maintenance Yard
Ash Creek and Dry Creek channel clearing	Adin Community Services District
Salt Creek channel clearing, upstream from Sacramento River confluence	Tehama County Flood Control and Water Conservation District
Elder Creek channel clearing and left-bank levee upstream from Sacramento River confluence	Tehama County Flood Control and Water Conservation District
Elder Creek channel	DWR – Sutter Maintenance Yard
McClure Creek channel clearing near U.S. Highway 99	Tehama County Flood Control and Water Conservation District
Deer Creek channel clearing and right and left-bank levees upstream from Delany Slough to Sacramento River	Tehama County Flood Control and Water Conservation District
Deer Creek channel	DWR – Sutter Maintenance Yard
Cherokee Canal channel	DWR – Sutter Maintenance Yard
Big Chico and Sandy Gulch (Lindo Channel) left-bank levee and Big Chico Creek Gates, Lindo Channel Gates, and Sycamore Weir diversion structures	Butte County Public Works
Big Chico Creek, Sandy Gulch (Lindo Channel), Little Chico Creek channels	DWR – Sutter Maintenance Yard
Sycamore, Sheep Hollow and Mud creeks right- and left-bank levees	Butte County Public Works
Sacramento River channel, as included in the Sacramento River Flood Control Project	DWR – Sutter and Sacramento Maintenance Yards
Sacramento River bank protection, Chico Landing to Goose Lake Flood Relief Structure	DWR – Sutter Maintenance Yard
M&T and Goose Lake Flood Relief Structures	DWR – Sutter Maintenance Yard
Sacramento River right-bank levee from Ord Ferry to Moulton Weir	LD 1 (Glenn County), LD 2
Sacramento River left-bank levee from Ord Ferry to Moulton Weir	LD 3
Moulton Weir	DWR – Sutter Maintenance Yard

State Plan of Flood Control Facility	Maintaining Agency
Sacramento River right-bank levee from Moulton Weir to Colusa Weir	DWR – Sutter Maintenance Yard
Sacramento River left-bank levee from Moulton Weir to Colusa Weir	LD 3, DWR – Sutter Maintenance Yard
Colusa Weir, sediment basin, and training levees	DWR – Sutter Maintenance Yard
Sacramento River left-bank levee from Colusa Weir to Tisdale Weir	RD 70, RD 1660
Sacramento River right-bank levee from Colusa Weir to Tisdale Weir	Sacramento River West Side LD
Tisdale Weir and Tisdale Bypass, including right-bank, and left-bank levees	DWR – Sutter Maintenance Yard
Sacramento River right-bank levee from Fremont Weir to Sacramento Weir	RD 1600, RD 827
Sacramento River left-bank levee from Fremont Weir to Sacramento Weir	RD 1000
Sacramento Weir and Sacramento Bypass channel	DWR – Sacramento Maintenance Yard
East Side Canal and Natomas Cross Canal right-bank levee	RD 1001
Pleasant Grove Canal and Natomas Cross Canal left-bank levee	RD 1000
Sacramento River left-bank levee from Sacramento Weir to American River confluence	RD 1000
Sacramento River right-bank levee from Sacramento Weir to American River confluence	RD 537, DWR – Sacramento Maintenance Yard
Sacramento River right-bank levee from American River to Elk Slough	DWR – Sacramento Maintenance Yard, RD 307, RD 537, RD 900, RD 765, RD 999
Sacramento River left-bank levee from American River to Elk Slough	City of Sacramento, American River Flood Control District, DWR –Sacramento Maintenance Yard
Sacramento River right-bank levee from Elk Slough to Collinsville	RD 3, RD 150, RD 349
Sacramento River left-bank levee from Elk Slough to Collinsville	RD 369, RD 407, RD 551, RD 554, RD 556, RD 755, Brannan-Andrus Levee Maintenance District
Elk Slough right- and left-bank levees	RD 150, RD 999

State Plan of Flood Control Facility	Maintaining Agency
Sutter Slough right- and left-bank levees	RD 349, RD 999, RD 150, RD 501
Miner Slough right- and left-bank levees	RD 501, RD 999
Steamboat Slough right- and left-bank levees	RD 3, RD 349, RD 501
Georgiana Slough right- and left-bank levees	RD 556, RD 563, Brannan-Andrus Levee Maintenance District
Three Mile Slough right- and left-bank levees	RD 341, RD 1601
Chowchilla Bypass right- and left-bank levees, Chowchilla Canal Bypass Control Structure and Debris Settling Basin, San Joaquin River Control Structure	Lower San Joaquin LD
Fresno River right- and left-bank levees	Madera County Flood Control and Water Conservation Agency
Berenda Slough right- and left-bank levees from levee mile 0 to levee mile 2.03	Lower San Joaquin LD
Berenda Slough right- and left-bank levees in Madera County Flood Control and Water Conservation Agency	Madera County Flood Control and Water Conservation Agency
Ash Slough right- and left-bank levees from levee mile 0 to levee mile 1.28, Ash Slough Drop Structures No. 1 through 4	Lower San Joaquin LD
Ash Slough right- and left-bank levees in Madera County Flood Control and Water Conservation Agency	Madera County Flood Control and Water Conservation Agency
Eastside Bypass right- and left-bank levees, Eastside Bypass Control Structure, Eastside Bypass Drop Structures No. 1 and 2	Lower San Joaquin LD
Mariposa Bypass right- and left-bank levees, Mariposa Bypass Control Structure	Lower San Joaquin LD
San Joaquin River right- and left-bank levees in Lower San Joaquin LD, Sand Slough Control Structure, San Joaquin River Structure	Lower San Joaquin LD
Owens Creek Diversion Channel right- and left-bank levees	Merced Irrigation District
Merced County Stream Group Project (Black Rascal Creek, Bear Creek Burns Creek, Mariposa Creek and Duck Slough, Miles Creek, Owens Creek) channels	Merced County
Black Rascal Diversion Channel	Merced Irrigation District
Castle Dam	Merced Irrigation District
San Joaquin River left-bank levee in RD 1602	RD 1602

State Plan of Flood Control Facility	Maintaining Agency
San Joaquin River right-bank levee in RD 2063 and Lower San Joaquin River (RD 2063) pumping plant	RD 2063
Mormon Slough Project (diversion, Pumping Plants No. 1, 2, and 3, right and left- bank levees, and channels)	San Joaquin County Flood Control and Water Conservation District
San Joaquin River right-bank levee in RD 2091	RD 2091
San Joaquin River right-bank levee in RD 2092	RD 2092
San Joaquin River left-bank levee in RD 2102	RD 2102
San Joaquin River left-bank levee in RD 2100	RD 2100
San Joaquin River left-bank levee in RD 2099	RD 2099
San Joaquin River left-bank levee in RD 2101	RD 2101
San Joaquin River right-bank levee in RD 2031	RD 2031
Stanislaus River left-bank levee from levee mile 0 to levee mile 7.15	RD 2031
Stanislaus River right-bank levee from levee mile 6.06 to San Joaquin River	RD 2064
San Joaquin River right-bank levee in RD 2064	RD 2064
San Joaquin River right-bank levee in RD 2075	RD 2075
San Joaquin River left-bank levee in RD 2085	RD 2085
San Joaquin River right-bank levee in RD 2094	RD 2094
Weatherbee Lake Pumping Plant and Navigation Gate and San Joaquin River right-bank levee in RD 2096	RD 2096
San Joaquin River left-bank levee in RD 2095	RD 2095
Paradise Cut left-bank levee in RD 2095	RD 2095
Paradise Cut left-bank levee in RD 2058	RD 2058
Paradise Cut right-bank levee in RD 2107	RD 2107
Paradise Cut right-bank levee in RD 2062	RD 2062
San Joaquin River left-bank levee in RD 2107	RD 2107
San Joaquin River left-bank levee in RD 2062	RD 2062
Old River left-bank levee from San Joaquin River to Paradise Cut	RD 2062
Old River right-bank levee from San Joaquin River to Middle River	RD 544

State Plan of Flood Control Facility	Maintaining Agency
Old River right-bank levee in RD 1	RD 1
Old River and Salmon Slough right-bank levees in RD 2089	RD 2089
San Joaquin River left-bank levee from Old River to Howard Road	RD 544
San Joaquin River right-bank levee from Walthall Slough to French Camp Slough	RD 17
San Joaquin River left-bank levee from Howard Road to Burns Cutoff	RD 524
French Camp Slough right-bank levee	RD 404
French Camp Slough left-bank levee	RD 17
San Joaquin River right-bank levee from French Camp Slough to Burns Cutoff	RD 404
South Littlejohns Creek right- and left-bank levees	San Joaquin County Flood Control and Water Conservation District
Duck Creek Diversion Channel	San Joaquin County Flood Control and Water Conservation District
Potter Creek right- and left-bank levees	San Joaquin County Flood Control and Water Conservation District
North Paddy Creek right- and left-bank levees	San Joaquin County Flood Control and Water Conservation District
Middle Paddy Creek right- and left-bank levees	San Joaquin County Flood Control and Water Conservation District
Paddy Creek right- and left-bank levees	San Joaquin County Flood Control and Water Conservation District
Bear Creek right- and left-bank levees	San Joaquin County Flood Control and Water Conservation District

Notes:
DWR = California Department of Water Resources
LD = Levee District
No. = number
RD = Reclamation District
WPRR = Western Pacific Railroad

Fifty-seven LMAs perform maintenance for the SRFCP. Twenty-five LMAs perform maintenance for the SPFC in the San Joaquin River Watershed. *AB 156, Local Agency Annual Report 2020* (California Department of Water Resources 2020) provides maps and available reports for each entity.

5.3.2.1 Local Maintaining Agency Responsibility in California Water Code Section 8370

The LMAs are responsible for maintaining SRFCP facilities not included in the section about DWR responsibility in CWC Section 8361. CWC Section 8370 specifies the LMAs' responsibilities: It is the responsibility, liability, and duty of the RDs, LDs, protection districts, drainage districts, municipalities, and other public agencies within the SRFCP limits, to maintain and operate the works of the project within the boundaries or jurisdiction of such agencies. The only exception are works enumerated in Section 8361 and works whose O&M are provided for by federal law.

5.3.2.2 Local Reporting Requirements

The CWC requires LMAs to submit specific information relative to the SPFC levees they operate and maintain to DWR by September 30 of each year. In turn, DWR must summarize this information in an annual report to CVFPB each year. Required information includes the following:

- Information known to the LMA that is relevant to the condition or performance of an SPFC levee.
- Information identifying known conditions that might impair or compromise the level of flood protection provided by an SPFC levee.
- Summary of maintenance performed by the LMA during the previous fiscal year.
- Statement of work and estimated cost for O&M of an SPFC levee for the current fiscal year.
- Any other readily available information contained in records of the LMA relevant to the condition or performance of an SPFC levee.

5.4 Operations

The standard O&M manuals and unit-specific O&M manuals specify necessary operations during high water. In most cases for levees, the operation is limited to patrolling at specified river stages and flood-fighting, as necessary. Other facilities, such as pumping plants, control structures, and the Sacramento Weir, require additional facility-specific operations.

5.4.1 Real-time Gauges

Real-time gauges for stream stage and flow are essential to successful SPFC facility operation. Most unit-specific O&M manuals include specific stream gauges (called hydrographic facilities in most manuals). The condition or existence of these gauges may have changed over time, evolving to the set of stream gauges, precipitation stations, snow accumulation stations, and other tools used by the State-federal Flood Operations Center (FOC) (refer to Chapter 5.5.2) during flood operations[5]. These represent baseline data that may be revised after analysis[6].

5.4.2 State-federal Flood Operations Center

The FOC, located in Sacramento, California, is a component of DWR's Division of Flood Management. While actions of the FOC are not specifically performed for the SPFC, these actions are essential for SPFC operations.

As major storms approach California, forecasters from the National Weather Service and DWR forecast the location, amount, and timing of expected precipitation, river flows, and stages and, when needed, prepare emergency notifications to local agencies so they can respond and inform the public. In addition to the National Weather Service, many agencies cooperate with DWR during flood emergencies and some send representatives to work at the FOC. Figure 5-3 provides an overview of local, State, and federal cooperating agencies with co-located agencies depicted by shaded boxes.

5.4.3 High-water Levee Patrols

Each unit-specific O&M manual provides information about required high-water patrols, generally keyed to water stages at stream gauges. LMAs perform these patrols beginning at river stages specified in the unit-specific O&M manuals.

5.4.4 Flood-fights

DWR is the lead State agency for flood emergency response, including flood-fight assistance in California. The FOC serves as DWR's Emergency Operations Center and leads the statewide flood emergency operations responsibility. Each of the two USACE standard O&M manuals contains methods for combating floods.

5.4.5 Facilities Requiring Active Operations

The following SPFC pumping plants require active operation by DWR or local agencies. Active operation in this case means DWR or local agencies control the operations, either manually or remotely. The procedures for operation are included in the unit-specific O&M manuals. Chapter 3 and Appendix A includes maps showing more detailed locations of these facilities.

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[5] These tools and historical records can be found on the CDEC website: http://www.cdec.ca/

[6] Data for DWR-maintained gauges can be found on DWR's Water Data Library website (http://www.water.ca.gov/waterdatalibrary/) and data for U.S. Geological Survey -maintained gauges can be found on the U.S. Geological Survey website (http://waterdata.usgs.gov/ca/nwis/rt).

5.4.5.1 Pumping Plants

The following SPFC pumping plants require active operation:

- Two pumping plants along the American River (refer to O&M Manual SAC518).
- Three pumping plants along the Sutter Bypass (refer to O&M Manual SAC159).
- Pumping plant along Middle, Scott, Clover, Alley, and Poge Creeks near the town of Upper Lake (refer to O&M Manual SAC506.1).
- Pumping plant along the Lower San Joaquin River between the Merced and Tuolumne rivers (refer to O&M Manual SJR6A).
- Pumping plant along the Lower San Joaquin River between Paradise Cut and Old River (refer to O&M Manual SJR3A).
- Three pumping plants along the Mormon Slough Diversion Channel (refer to O&M Manual SJR611.2).

5.4.5.2 Weirs

Three SPFC weirs require operation to release flow:

1. Howard Slough Diversion Structure (refer to O&M Manual SAC153).
2. Sacramento Weir (refer to O&M Manual SAC158).
3. Willow Slough Weir (refer to O&M Manual SAC120).

5.4.5.3 Dams

There are four SPFC dams in the system:

1. Oroville Dam.
2. North Fork Feather River Diversion (refer to O&M Manual SAC508).
3. Cache Creek Settling Basin (refer to O&M Manual SAC120).
4. Castle Creek Dam (refer to O&M Manual SJR607A).

5.4.5.4 Control Structures

Several SPFC water control structures require operation:

- Sutter-Butte Canal Headgate (refer to O&M Manual SAC160).
- Butte Slough Outfall Gates (refer to O&M Manual SAC161).
- Knights Landing Outfall Gates (refer to O&M Manual SAC162).
- Lindo Channel and Big Chico Creek diversion gates (refer to O&M Manual SAC504).
- Chowchilla Canal Bypass Control Structure (refer to O&M Manual SJR601B).
- San Joaquin River Control Structure (refer to O&M Manual SJR601B).
- Mariposa Bypass Control Structure (refer to O&M Manual SJR601A).
- Eastside Bypass Control Structure (refer to O&M Manual SJR601A).
- Sand Slough Control Structure (refer to O&M Manual SJR601).
- San Joaquin River Structure (refer to O&M Manual SJR601).

CHAPTER 6

State Plan of Flood Control Conditions

This section presents the conditions, or terms, of the State Plan of Flood Control (SPFC) set forth by the federal government and the State of California (State).

6.1 Summary

The U.S. Army Corps of Engineers (USACE) sets federal requirements for the construction of federal flood damage reduction projects in accordance with federal laws, regulations, and policies. USACE constructs federal projects in partnership with nonfederal sponsors. The nonfederal partners are required to enter into agreements with USACE and agree to adhere to the federal requirements. Federal requirements have evolved over the years, as reflected in the form and contents of the agreements. Among these requirements are the acceptance of the completed works and their operations and maintenance (O&M) throughout the life of the projects. For the State, the Central Valley Flood Protection Board (CVFPB) has given assurances of cooperation to USACE in the form of signed Memorandums of Understanding and agreements.

6.2 Assurances of Cooperation

Chapter 1.4 describes State assurances of cooperation to the federal government.

6.3 Federal Flood Control Regulations

Nonfederal sponsors abiding by the federal flood control regulations are a condition for federal participation in the development of flood damage reduction (formerly flood control) projects. Federal flood control regulations are contained in 33 Code of Federal Regulations (CFR) Section 208. Federal requirements for O&M are contained in 33 CFR Section 208.10. The regulations apply to all entities responsible for maintaining the completed and "turned-over" federal facilities.

6.4 Standard Operations and Maintenance Manuals

As Chapter 5.2.1 discussed, the two USACE standard O&M manuals present requirements that apply to all maintaining agencies that operate and maintain the various geographical SPFC units. Fulfilling the requirements outlined in the two USACE standard O&M manuals is a condition for federal projects.

6.5 Unit-specific Operations and Maintenance Manuals

As Chapter 5.2.2 discussed, unit-specific O&M manuals supplement information included in the two USACE standard O&M manuals with O&M requirements applicable to each unit. Fulfilling the requirements outlined in the unit-specific O&M manuals is a condition for federal projects.

6.6 Design Profiles

USACE has prepared design water surface elevation profiles for much of the Sacramento River, the San Joaquin River, and the major tributaries of the flood management system. The primary published profiles are the 1957 Revised Profile Drawings (described in Chapter 6.6.1), the 1955 Profile (described in Chapter 6.6.2), Cache Creek Watershed, Middle Creek Project profiles (described in Chapter 6.6.3), and Mormon Slough Project profiles (described in Chapter 6.6.4). The design profiles discussed here do not reflect flood system improvements that occurred after the 1950s. For channels not delineated in the profiles mentioned, the as-constructed plans are assumed to take precedence.

DWR operates SPFC facilities based on the design profiles, rather than on design flows from the O&M manuals (U.S. Army Corps of Engineers 1969)[7].

CVFPB uses designated floodways (refer to Chapter 2.5.3) as a management tool for passage of design flood flows shown by the design profiles described here.

Note, USACE now employs uncertainty analyses that no longer use a single flow value for a river reach. This may require revisions to how the following flow profiles are used in the future.

6.6.1 1957 Revised Profile Drawings

For the SRFCP, USACE requires that channels pass design flood flows for stages at or below the 1957 Revised Profile Drawings (U.S. Army Corps of Engineers 1957). The reference DVD contains 1969 and 2006 letters from USACE to CVFPB with this directive (U.S. Army Corps of Engineers 1969 and 2006). The 1957 profile is shown in the Sacramento River Flood Control Project, California, Levee and Channel Profiles (U.S. Army Corps of Engineers 1957) (recreated in 2006). The profiles are contained on four sheets identified as File Number (No.) 50-10-3334.

[7] The profiles are on the can be viewed on the CVFPB website at https://www.cvfpb.ca.gov/profiles-maps/.

The profiles include the design flows at various locations throughout the system and are listed in Table 3-1.

6.6.2 1955 Profile

For the San Joaquin River and its tributaries, USACE requires that channels pass design flood flows for stages at or below the 1955 Profile. The 1955 Profile for the Merced River and downstream is shown in the San Joaquin River and Tributaries Project, California, Levee Profiles (U.S. Army Corps of Engineers 1955). The profiles are contained on one sheet identified as Sheet SJ-20-60. The profiles do not include the design flood flows.

6.6.3 Profiles for Middle Creek Project

Profiles for the Middle Creek Project are shown in Cache Creek Watershed California, Middle Creek Project, Stream Profiles (U.S. Army Corps of Engineers 1957a) on one sheet, File No. CC-4-20-16 (recreated in 2006).

6.6.4 Profiles for Mormon Slough Project

Profiles for the Mormon Slough Project are shown on Mormon Slough Project, San Joaquin County, Plan of Improvement, Profile and Flood Plane on six sheets (U.S. Army Corps of Engineers 1965), File No. 3-20-142 (recreated in 2006).

6.7 Project Cooperation Agreements

Project cooperation agreements (PCAs) specify other conditions that must be met by parties to such agreements. These PCAs have evolved over time and are especially important before new project construction is started.

6.7.1 Federal/State Project Cooperation Agreement

The Project Partnership Agreement, formerly Local Cooperation Agreement and PCA, between the Department of the Army and the State[8], is a contract for project construction. While the agreements vary by time and project, they contain specific provisions. Examples include the following:

- Obligations of both parties, including cost-sharing of project cost.
- Compliance requirements for land right acquisition and relocation.
- Compliance requirements with federal flood insurance programs and floodplain management.
- Project coordination.
- Method of payment.
- Dispute resolution.
- Requirement for nonfederal operation, maintenance, repair, replacement, and rehabilitation (OMRR&R).

[8] The State is named as either the State Reclamation Board or the Central Valley Flood Protection Board, depending on the date of the agreement.

- Indemnification of the federal government.
- Other contract terms.

When a functional portion of projects is complete, USACE turns over that portion of the project by a letter to CVFPB for OMRR&R. CVFPB, in turn, sends USACE a letter saying that CVFPB may accept the project as constructed or accept the completed portion of the project while other portions are completed. Concurrent with CVFPB' acceptance of a completed portion of a project, it transfers that portion to the LMA for OMRR&R.

6.7.2 Local Project Cooperation Agreement

The Local Project Partnership Agreement (formerly Agreement and Local Project Cooperation Agreement) between CVFPB and an LMA is a legally binding document for federal project sponsorship. Among many provisions, the agreement outlines specific conditions for the local sponsor to fulfill, such as cost-sharing, OMRR&R, holding the State harmless, and other conditions. Recent agreements have included requirements to participate in federal floodplain management and flood insurance programs, to publicize floodplain information, and for the local sponsor to pay the total cost of its requested betterments.

Concurrent with CVFPB's acceptance of a completed portion of a project, it transfers that portion to the LMA for OMRR&R.

6.8 State-adopted Conditions

The SPFC's successful operation requires many other conditions that do not meet the strict definition of the SPFC provided by the Legislature (refer to Chapter 1.1). One of the most important conditions to operate the SPFC is that the upstream reservoirs operate in compliance with the flood storage rules established by USACE. Except for Oroville Dam (refer to Chapter 3.2.1) and Castle Dam (refer to Chapter 3.3.1), the State has no direct responsibility for O&M of flood control reservoirs that regulate flow to the SPFC; federal agencies and local agencies are responsible for their operation. Similarly, the State has no direct operational responsibility for many other non-SPFC facilities.

CVFPB considers its Designated Floodway Program (refer to Chapter 2.5.3) as a condition for the successful operation of the SPFC. Where implemented, the program is important and necessary in helping to limit further development into active floodways. The program is also considered necessary to help provide for the passage of project design flood flows (refer to Chapter 6.6) along many reaches of the SPFC system. As mentioned, Figure 2-3 shows the location of designated floodways within the Sacramento River and San Joaquin River watersheds[9]. Maps of designated floodways by county can also be found at DWR's Best Available Maps website: https://gis.bam.water.ca.gov/bam/.

[9] Maps of designated floodways by county can also be found at CVFPB's website: https://www.cvfpb.ca.gov/profiles-maps/.

CHAPTER 7

Programs and Plans Related to State Plan of Food Control

This section provides information about programs and plans related to the State Plan of Flood Control (SPFC), which include State of California (State) and federal oversight and management of the flood system. Ongoing State-federal projects, the Early Implementation Program (EIP), and Section 221 of the Flood Control Act of 1970 (Section 221) are described as plans and programs related to the SPFC. Ongoing State-federal projects in the Sacramento River and San Joaquin River watersheds are expected to become part of the SPFC after they are completed and turned over to the State. While projects being completed through the EIP and Section 221 of the Flood Control Act are also not part of the SPFC, they may become part of the SPFC in the future after undergoing any necessary changes for them to do so. As additional programs and plans related to the SPFC are developed in the future, information will be incorporated into updates to the Flood System Status Report (FSSR), as necessary.

7.1 Summary

The California Department of Water Resources (DWR), the Central Valley Flood Protection Board (CVFPB), and the U.S. Army Corps of Engineers (USACE) are the main partners in SPFC oversight and management. Programs and plans related to the SPFC are both historical and ongoing. Historical documents include the following:

- Federal legislation for authorizing specific projects and setting partnership requirements for project development.
- State legislation establishing the roles and responsibilities of the Board and DWR regarding flood control.
- State legislation for authorizing specific projects and establishing requirements for partnering with the federal government and local entities for project development.
- Partnership agreements with USACE and local maintaining agencies.
- As-constructed project documents.
- Operations and maintenance (O&M) manuals.

- *Master Plan for Flood Control in the Butte Watershed* (1964).
- *Interim Plan of Flood Control for the Sacramento River from the Butte County Line to Chico Landing* (1984) and *Butte Basin Plan of Flood Control* (1986).

Ongoing programs and plans include the following:

- The FSSR, Central Valley Flood Protection Plan (CVFPP), and California Water Plan.
- Ongoing projects that have been federally and State-authorized, as well as plans related to the SPFC.
- The EIP and Section 221 of the Flood Control Act, as well as programs related to the SPFC.

7.2 State Oversight and Management of State Plan of Flood Control

CVFPB is the State agency responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of existing facilities, and for working with USACE to develop flood damage reduction projects. DWR assists CVFPB with project development, inspections, and the operation of the flood center. Other State agencies assist CVFPB and DWR. The following sections summarize State agencies whose responsibilities (at least in part) include flood management in the Central Valley.

7.2.1 Central Valley Flood Protection Board

The following points provide CVFPB's mission:

- To control flooding along the Sacramento River and San Joaquin Rivers and their tributaries in cooperation with USACE.
- To cooperate with various agencies of local, State, and federal governments in establishing, planning, constructing, operating, and maintaining flood control works.
- To maintain the integrity of the existing flood control system and designated floodways through CVFPB's regulatory authority by issuing permits for encroachments.
- CVFPB requires permits for any project that may affect how the existing flood system functions. A permit is required for any project or plan of work that meets the following criteria:
  - Is within federal flood control project levees and within a board easement.
  - May have an effect on the flood control functions of project levees.
  - Is within a Board-designated floodway.
  - Is within regulated Central Valley streams listed in Table 8.1, Title 23, California Code of Regulations (CCR).

These projects include any project proposed for a regulated stream, in a designated floodway on federal flood management project levee slopes, within 10 feet of a levee toe, or in a location that may have an effect on flood control facilities. Examples of activities might include, but are not limited to, boat docks, ramps, bridges, sand and gravel mining, placement of fill, fences, and landscaping and irrigation facilities. Streams regulated by CVFPB are listed in Table 8-1, Title 23, CCR.

With this responsibility, CVFPB reviews encroachment permit applications and approves permits when encroachment will not affect O&M of the flood management system. CVFPB also approves or adopts the flood-related technical work prepared by DWR or other agencies.

7.2.2 California Department of Water Resources

DWR's Division of Flood Management and Division of Multi-benefit Initiatives provide staff support to CVFPB and is responsible for managing a variety of programs related to flood management. Other DWR divisions, such as the Division of Engineering and Division of Safety of Dams, may provide technical support. The following points provide examples the Division of Flood Management's and Division of Multi-benefit Initiatives' work:

- Development and maintenance of the California Levee Database.
- Emergency preparedness, and emergency response and participation in post-emergency recovery.
- O&M of some of the facilities.
- Inspections.
- Floodplain management, planning, and delineation.
- Flood management and multi-benefit planning.
- Flood and multi-benefit project funding and grant administration.

7.2.3 California Department of Fish and Wildlife

The California Department of Fish and Wildlife assists DWR in its environmental stewardship responsibilities, including the following tasks:

- Provide input on mitigation strategies, including banking opportunities and possible partnerships.
- Identify specific habitat and species restoration and enhancement opportunities.
- Provide input on modeling for impact assessment.
- Provide input on and reviewing environmental documentation under the California Environmental Quality Act.
- Provide permits under California Endangered Species Act and Department of Game and Fish Code 1600 for implementation of flood-related projects.

7.2.4 Other Assisting State Agencies

Several other State agencies assist CVFPB and DWR in their management and oversight of the SPFC:

- California Office of Emergency Services.
- California Building Standards Commission.
- State Lands Commission.
- State Historic Preservation Office.
- Office of the Attorney General.
- Department of Finance.

7.3 Federal Oversight and Management of State Plan of Flood Control

Federal agencies are partners with State agencies in overnight and management of the SPFC.

7.3.1 U.S. Army Corps of Engineers

USACE is the nation's flood control agency. The USACE Sacramento District is the district directly involved with the SPFC, and partners with CVFPB to develop new flood management projects in the Sacramento River and San Joaquin River watersheds. USACE has prepared O&M manuals that guide O&M of the various SPFC units.

Part of the assurances of nonfederal cooperation CVFPB provided to the federal government for the SPFC is that the State will maintain and operate all works after completion in accordance with regulations prescribed by the Secretary of the Army. Title 33 CFR, Chapter II Corps of Engineers, Part 208, prescribes flood control regulations the SPFC must follow. USACE headquarters in Washington, District of Columbia (D.C.), prepares, and periodically updates, policies, standards, and guidance documents on special flood-related subjects.

DWR inspects levees maintained by many separate local agencies, and then reports its findings to USACE. From the inspection information submitted, USACE may choose to conduct follow-up inspections in certain areas. USACE uses its own follow-up inspections and the State's inspection findings to make Public Law 84-99 eligibility determinations for each local agency.

USACE provides the following additional assistance to the State in support of project planning and implementation:

- Assists in statewide and regional planning efforts.
- Partners with CVFPB in project development, and plans, designs, and constructs flood damage reduction facilities.
- Funds the federal share of costs of project development (up-front funds, credits, and reimbursements).

- Permits project modifications.
- Manages Public Law 84-99 programs, including flood-fight and rehabilitation assistance.
- Funds the federal share of Public Law 84-99 program.
- Inspects and coordinates inspection of completed works and rehabilitation for compliance with regulations and O&M manual requirements to maintain Active status for Public Law 84-99.
- Regulates projects with regard to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.
- Reviews and, as necessary, modifies reservoir water control manuals for improved flood management, including consideration of climate change.
- Maintains current O&M manuals for completed works.
- Assists in interpreting federal laws, regulations, policies.

7.3.1.1 Public law 84-99 Rehabilitation Assistance of Flood Control Works

Federal and nonfederal flood control works in the Rehabilitation and Inspection Program that have been damaged by floods may be repaired at up to 100 percent of federal cost for federal projects. For nonfederal projects, the repairs are cost-shared at 80-percent federal and 20-percent nonfederal sponsor. To be eligible for these repairs, the projects must be in "Active" status, and the assistance is limited to restoration of pre-disaster condition and level of protection. Any deferred maintenance is the sponsor's responsibility. The intent of the program is to make the damaged flood control works operationally effective before the next flood season. Refer to USACE's emergency response provisions (ER 500-1-1 and EP 500-1-1) for details.

Eligible projects must have an overall system rating of Acceptable or Minimally Acceptable. A Minimally Acceptable project must have deficiencies corrected within 2 years. An unacceptable system has an Inactive status in the Rehabilitation and Inspection Program, and the eligibility status will remain Inactive until the sponsor submits proof that all items rated unacceptable have been corrected. Inactive systems are ineligible for rehabilitation assistance. An LMA can enter into a process called a Letter of Intent/Systemwide Improvement Framework (LOI/SWIFF) where the LMA lays out a plan to correct deficiencies to get them to an Acceptable Rating, while keeping the system eligible. The LMA must then implement the LOI/SWIFF within several years or else it will lose eligibility.

7.3.1.2 U.S. Army Corps of Engineers Levee Safety Program

The USACE Levee Safety Program works to better understand, manage, and reduce the flood risks associated with levees. USACE maintains a national inventory of levee systems and makes the information available in the National Levee Database (U.S. Army Corps of Engineers 2016). USACE inspects and assess about 2,500 levee systems nationwide and uses the data to prioritize action. USACE communicates risk-related issues and concerns, holding life safety as paramount, and supports USACE and State/local decisions aimed at reducing risk. Recognizing that managing risk is a shared responsibility, USACE works closely with federal, State, local, and international partners to share information and develop solutions.

7.3.2 Federal Emergency Management Agency

The Federal Emergency Management Agency assists DWR with floodplain issues in the following ways:

- Produces digital flood hazard data, provides access to flood hazard data and maps via the Internet, and leads the Map Modernization Program. DWR is a Federal Emergency Management Agency Cooperating Technical Partner for floodplain mapping.
- Continues partnership with DWR to provide accurate flood hazard maps, develops and maintains a geographic information system database of California levees and flood management structures, provides technical outreach to communities and citizens on floodplain management issues, and supports the National Flood Insurance Program.
- Provides other services, including levee accreditation.

7.3.3 National Weather Service

The National Weather Service and the River Forecast Center work with DWR on technical studies, flood forecasting and warning, and related activities. The National Weather Service is a co-lead agency with DWR in the FOC.

7.3.4 Other Assisting Federal Agencies

Several other federal agencies assist the Board and DWR in their management and oversight of the SPFC:

- U.S. Department of the Interior, Bureau of Reclamation.
- U.S. Fish and Wildlife Service.
- National Marine Fisheries Service.

7.4 As-constructed Drawings

As-constructed drawings are on file with the USACE Sacramento District for each unit of the SPFC, but some O&M manuals also include as-constructed drawings. In general, these are large--sized drawings that are physically detached from the O&M manuals. These include original drawings prepared when a unit was accepted into a project and modifications, repairs, and other changes made since originally constructed. The drawings often include profiles along the project reach. The State has collected copies of the as-constructed drawings to prepare electronic copies for its records.

In many cases within the SRFCP, levees and other facilities were originally constructed by local interests before a federally authorized project was initiated. In some cases, facilities met or exceeded project standards and were made part of the project by USACE wit out modification. In other cases, USACE repaired, enlarged, or otherwise modified these existing facilities to bring them to project standards at the time of construction, or USACE-constructed new facilities.

7.5 Authorizing Legislation

Chapter 2.2 summarizes the State and federal authorizing legislation and supporting USACE Chief of Engineers reports for each of the projects in the SPFC. Authorized projects that are completed are considered facilities of the SPFC, and authorized projects that are not completed are considered plans related to the SPFC.

7.6 Ongoing State-federal Projects

State and federally authorized flood projects in the Sacramento River and San Joaquin River watersheds that have not been completed are not yet considered part of the SPFC. After the execution of project participation agreement by the State, and upon the completion of a flood project by the USACE, the projects are turned over to the State and become facilities (or accepted modifications to facilities) of the SPFC. The FSSR includes the current status of ongoing State-federal projects and will be included in updates to that document. Chapter 2.3 describes ongoing State-federal projects (or elements of State-federal projects that have not been completed) at this time.

7.7 Early Implementation Program

The EIP is a State program related to the SPFC, which was created to fund high-priority projects to restore or improve flood protection in advance of the 2012 CVFPP. Projects designed and constructed under the EIP in urban areas generally provide, or are consistent with providing, flood protection to at least the 200-year level of protection required for urban areas. While projects being completed under the EIP are not part of the SPFC because the projects are not federally and State-authorized at the onset, many of these projects are likely to become part of the SPFC after completion.

The EIP was created as a result of the passage of the Disaster Preparedness and Flood Prevention Bond Act of 2006 (Proposition 1E) and the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006 (Proposition 84). These propositions authorized DWR to make funds available to local agencies for, among other purposes, flood protection work. These funds may be used for (1) repair, rehabilitation, reconstruction or replacement of levees, weirs, bypasses, and facilities of the SPFC; and (2) improving or adding facilities to the SPFC to increase levels of flood protection for urban areas. This program applies only to certain portions of the Central Valley and adjacent areas. Ongoing EIP projects at the time of this report include the following:

- Levee District 1 Setback Levee at Star Bend (Feather River).
- SBFCA Feather River West Levee Project.
- Reclamation District (RD) 17 100-Year Levee Seepage Project.
- SJAFCA Smith Canal Gate Project.
- RD 2103 Bear River North Levee Rehabilitation Project.
- SAFCA Natomas Sacramento River East Levee and Cross Canal South Levee.
- SAFCA Levee Accreditation Project (LAP).
- Three Rivers Levee Improvement Authority (RD 784) Feather River Levee Improvement Project.
- Three Rivers Levee Improvement Authority (RD 784) Upper Yuba Levee Improvement Project.
- Knights Landing Levee Repair.
- Three Rivers Levee Improvement Authority Goldfields Project.
- West Sacramento Area Flood Control Agency West Sacramento Levee Improvement Project.

To become part of the SPFC, projects under the EIP must complete the following process:

- After construction is complete, the project finishes the closeout phase.
- USACE prepares a Chief of Engineers Report to recommend to Congress that the completed works be incorporated into the federal project.
- Once the project has been authorized by both the State and federal governments, a State agency executes a project participation or similar agreement, and the project becomes part of the SPFC.

The process to close out a completed project and incorporate into the SPFC may take three or more years.

Since adoption of the CVFPP in 2012, the Urban Flood Risk Reduction Program has extended the work begun under the EIP to support implementation of regional flood damage reduction projects for urban areas protected by the SPFC. Chapter 8.4.4 provides more details about Urban Flood Risk Reduction projects.

7.8 Section 221 of the Flood Control Act of 1970

Local flood management agencies may implement flood management projects without State and federal authorization and apply for cost-share credit under Section 221 of the Flood Control Act of 1970, as amended (42 United States Code 1962d-5b). These criteria for projects to be completed and eligible for cost-share credit are detailed in Section 221 cited here, including a written partnership agreement with the Secretary of the Army (unless the administrative costs associated with negotiating, executing, or administering the agreement would exceed the amount of the contribution required from the nonfederal interest and are less than $25,000).

Although projects completed under Section 221 are not part of the SPFC because the projects are not federally and State-authorized at the onset, many of these projects may become part of the SPFC after completion by following the process outlined in Chapter 7.7.

7.9 Urban Levee Evaluations and Non-Urban Levee Evaluations Update

The Urban and Non-Urban Levee Evaluation Program was completed in early 2016. For further details on results refer to the 2022 FSSR (California Department of Water Resources 2022).

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CHAPTER 8

State Plan of Flood Control Updates

The 2022 Descriptive Document includes a description for the State Plan of Flood Control (SPFC) as of June 30, 2021. This chapter describes information that may be considered in future updates.

For some projects, timeframes for expected completion are included, as is status of certain projects within those programs. Many ongoing activities will lead to improvements to existing SPFC facilities by either adding new facilities or modifying existing SPFC facilities. Also, information about and data generated for the existing SPFC facilities may result in the formal removal of certain features from the SPFC. The removal of a facility from the SPFC may consist of physical and administrative actions or only administrative actions (e.g., an entity other than the California Department of Water Resources [DWR] or Central Valley Flood Protection Board [CVFPB] provides assurances directly to the federal government for a project).

As the SPFC changes, it will be necessary to update the Descriptive Document in the next version, which would be the 2027 Descriptive Document.

8.1 Implementation of the Central Valley Flood Protection Plan

The delivery of program activities and implementing near-term and long-term actions requires a wide range of program expertise to plan, design, finance, construct, and operate improvements to the flood management system. At the State of California (State) level, this work is organized into five major DWR flood management programs (commonly referred to as mega programs) and implemented while working closely with CVFPB and in close coordination with local, State, and federal partnering agencies. Each program implements different types of actions (together, they cover all work required for implementing actions identified in the Central Valley Flood Protection Plan [CVFPP]) and for overall flood management in the areas protected by SPFC facilities.

8.1.1 California Department of Water Resources Flood Management Programs

DWR has five major flood management programs, described in the following sections:

1. Flood Emergency Response Program.
2. Flood System Operations and Maintenance Program.
3. Floodplain Risk Management Program.
4. Flood Management Planning.
5. Flood Risk Reduction.

8.1.1.1 Flood Emergency Response Program

The responsibility of the Flood Emergency Response Program is to prepare for floods, effectively respond to flood events, and quickly recover when flooding occurs. This program will implement flood emergency response enhancements included in the CVFPP, including providing technical and financial assistance to local agencies to improve local flood emergency response.

8.1.1.2 Flood System Operations and Maintenance Program

The Flood System Operations and Maintenance Program includes work to keep specific flood management facilities (as defined in the California Water Code) in good, serviceable condition so that facilities continue to function as designed. In addition to its routine responsibilities, this program will implement the actions identified for improved maintenance of the SPFC facilities in the CVFPP.

8.1.1.3 Floodplain Risk Management Program

The Floodplain Risk Management Program strives to reduce the consequences of riverine flooding in the Central Valley. A major focus of this work is the delineation and evaluation of floodplains to assist local decision makers with their near-term and long-term land-use planning efforts. In addition to its routine activities, this program will implement floodplain management enhancement activities included in the CVFPP.

8.1.1.4 Flood Management Planning Program

This program conducts planning and feasibility assessments for SPFC facilities and formulates necessary refinements of these facilities. The program provides the rationale, engineering support, and feasibility evaluations to support development of site-specific improvements for the CVFPP. Feasibility studies and updates to the CVFPP are prepared under this program. This program also performs flood system engineering and modeling assessments of existing facility conditions for use in identifying areas needing improvements.

8.1.1.5 Flood Risk Reduction Program

The Flood Risk Reduction Program conducts the work necessary to implement on-the-ground projects that are consistent with the CVFPP. State investments in system improvements may be through direct investment in new or improved facilities or through grant programs. System improvements will generally be implemented through partnership among DWR, the CVFPB, and the U.S. Army Corps of Engineers (USACE), and in coordination with other federal, State, and local agencies.

8.2 2022 Flood System Status Report

The 2022 *Flood System Status Report* (FSSR) (California Department of Water Resources 2022) contains information on the current status of the SPFC. Information is sourced from the *2020 Inspections Report* (California Department of Water Resources 2020) and completed evaluations programs.

8.3 2022 Central Valley Flood Protection Plan Update

The CVFPP represents the State's evolving blueprint for reducing the chance of flooding and the damages caused by floods, while improving river system management to achieve multiple resource benefits for the Sacramento River and San Joaquin River systems. The CVFPP was adopted by CVFPB in June 2012 through Resolution Number (No.) 2012-25 (Central Valley Flood Protection Board 2012), meeting the requirements of the Central Valley Flood Protection Act of 2008.

The 2022 CVFPP Update is the second of a series of 5-year updates of the CVFPP, as required by the Central Valley Flood Protection Act of 2008. Future updates will continue to document implementation progress and evolution of program priorities and phasing to implement the CVFPP over its 30-year planning horizon. DWR is required to update the CVFPP every 5 years.

8.4 Ongoing Evaluations, Projects, and Repairs

8.4.1 Sacramento River Bank Protection Program

The Sacramento River Bank Protection Program consists of long-term flood-risk-management projects designed to enhance public safety and help protect property along the Sacramento River and its tributaries (refer to California Department of Water Resources 2022).

8.4.2 Flood System Repair Project

The Flood System Repair Project consists of long-term flood-risk-management projects to reduce flood risk primarily in rural areas of the SPFC (refer to California Department of Water Resources 2022).

8.4.3 Levee Penetrations Rehabilitation Program

New Levee Penetrations Rehabilitation Projects will begin under the Flood System Repair Project Deferred Maintenance Program (refer to California Department of Water Resources 2022).

8.4.4 Urban Flood Risk Reduction Program

The Urban Flood Risk Reduction (UFRR) Program was created to address State investment priorities as a result of the adoption of the CVFPP. The UFRR Program supports the implementation of regional flood damage reduction projects for urban areas protected by SPFC

facilities in the Sacramento-San Joaquin Valley to achieve at least a 200-year level of flood protection. The UFRR Program provides cost-share funding to local agencies to repair and improve the SPFC's levees and facilities. The UFRR Program is based on competitively awarded funding agreements and directed funding for planning, design, and construction projects. Projects must be multi-benefit flood projects consistent with the CVFPP and State Systemwide Investment Approach. The program is continuing the work begun under the Early Implementation Program (EIP) developed in 2007 in response to the passage of Propositions 1E and 84.

The following EIP projects have completed construction, but have pending revised operations and maintenance (O&M) manuals, turnover letters, and board resolutions accepting the project:

- SAFCA Natomas Levee Improvement Program.
- Sutter Butte Flood Control Agency Feather River West Levee Repair Project Reaches B and C.
- Three Rivers Levee Improvement Authority Yuba and Feather River Levee Improvement Project.
- West Sacramento Area Flood Control Agency Levee Repair and Improvement Project – I Street Bridge, The Rivers, California Highway Patrol Academy.
- Reclamation District (RD) 2103 Bear River North Levee Rehabilitation Project.
- Knights Landing Levee Repair Project.
- Sutter Butte Flood Control Agency Feather River West Levee Repair Project Reaches A and D.
- Three Rivers Levee Improvement Authority Yuba Goldfields 200-Year Levee Project.
- West Sacramento Area Flood Control Agency Levee Repair and Improvement Project – Sacramento River Southport.
- Woodland Study and Preliminary Design Project.

The following are ongoing EIP and UFRR Program projects:

- Lathrop Study and Preliminary Design.
- RD 17 100-Year Levee Seepage Remediation Project.
- SAFCA Levee Accreditation Project.
- San Joaquin Area Flood Control Agency Smith Canal Closure Structure Project.

8.4.5 Small Community Flood Risk Reduction Program

This program will coordinate the development of local flood damage reduction projects for small communities. The program activities include working with local agencies to achieve a 100-year flood protection by constructing new ring levees around small communities and improving existing levees and floodwalls, where feasible. In addition to feasible structural improvements, small communities may consider nonstructural flood risk reduction measures, such as flood proofing, raising structures, and relocating structures. This program is being implemented in partnership with CVFPB, local agencies, Federal Emergency Management Agency, and USACE.

8.4.6 Flood Maintenance Assistance Program

Starting in 2019, DWR implemented the Flood Maintenance Assistance Program. This program provides financial assistance to Levee Maintaining Agencies to do routine maintenance on levees including vegetation management, crown regrading, and burrowing animal control among other activities.

DWR created the Storm Damage DWR Emergency Repair Program (SDDER) in response to extensive levee damage caused by the 2017 flood event. SDDER identified and initiated repairs to damaged sites that were not approved and repaired by USACE PL84-99.

Under SDDER, 39 critical and 17 serious sites have been repaired, which includes 56 waterside erosion repairs.

DWR is planning to repair additional 17 sites by end of 2023, which includes 15 waterside erosion repairs and 2 seepage repairs.

8.4.7 Delta Levees Maintenance Subventions Program

The Delta Levee Maintenance Subventions Program provides funding to LMAs, on a cost-share basis, for the maintenance and rehabilitation of levees specifically in the Sacramento-San Joaquin Delta. This program is open to LMAs that maintain SPFC or non-SPFC levees.

8.5 Addition and Removal of State Plan of Flood Control Facilities

As the CVFPP is implemented, some features of the SPFC may prove obsolete and slated for removal, while other features may be added. Ongoing State-federal projects in the Sacramento River and San Joaquin River watersheds are expected to become a part of the SPFC after completion and turned over to the State and Levee Maintaining Agencies. Also, while some projects completed through DWR-sponsored programs (i.e., EIP and UFRR Program) are not currently part of the SPFC, they may become part of the SPFC in the future after undergoing the appropriate processes. These processes include authorization by both the State and federal governments and formal project participation agreements between both governments. The process to close out a completed project and incorporate into the SPFC may take three or more years.

8.5.1 Addition of State Plan of Flood Control Facilities

As ongoing State-federal projects in the Sacramento River and San Joaquin River watersheds are implemented, they may become new additions or modifications of facilities to the existing SPFC, or both. The formal process to add or include (or both) modifications to the existing SPFC involves State-federal authorizations and formal project agreements and assurances between the State and federal governments and State and local governments. This process can take three or more years.

To become part of the SPFC, EIP and UFRR Program projects must complete the following process:

- The local agency requests CVFPB to ask USACE permission under Title 33 of the United States Code Section 408 to complete a modification of an existing project.
- After the CVFPB request, the local agency completes the Section 408 process.
- After construction and O&M manuals are complete and the other parts of the project closeout is finished, the project is sequentially turned over by USACE to CVFPB, which then turns it over to the local agency.

8.5.2 Removal of State Plan of Flood Control Facilities

California Water Code Section 9614 (h) requires that the CVFPP include an evaluation of facilities recommended to be removed from the SPFC.

The removal of a facility from the SPFC may consist of physical removal and administrative actions or only administrative actions. To be considered for removal from the SPFC, candidate facilities need to meet one or more of the following criteria:

- Physical removal of the SPFC facility would result in improving the flood management system.
- Removal of the SPFC facility is in the mutual interest of the State and the local maintaining agency.
- Physical removal of the facility has already been initiated or completed.

An example of an SPFC facility that may be removed is the Non-Structural Alternative (NSA) at the San Joaquin River National Wildlife Refuge, also known as Three Amigos. Three Amigos covers an area of approximately 3,200 acres. During the 1997 flood event, four failures occurred on the west or left-bank levee along the San Joaquin River and flooded RDs 2099, 2100, 2101, and 2102. After the flood event, steps were being taken to implement the NSA. This alternative includes breaching existing main-stem San Joaquin River levees on refuge land to protect and restore riverine and riparian habitat and requires modification to the O&M manuals for these RDs to eliminate the need to perform levee maintenance (i.e., the levees would be maintained in a breached condition as the levees no longer provide flood protection to the district lands).

This proposed NSA will provide floodplain inundation behind project levees of up to 3,100 acres on the refuge in some years.

CHAPTER 9

Observations Update

Because this State Plan of Flood Control (SPFC) Descriptive Document is intended as a reference document for the existing SPFC, no recommendations for improvements are provided. However, while compiling material for the document, some observations were noted that could facilitate the presentation of SPFC materials.

1. While SPFC property right records are based on physically accessing information about a specific parcel of land, electronic access to that information and electronic representation would make the information more useful.

2. Easements along levee toes appear insufficient. A plan for securing needed easements, including access to various levee reaches, as part of the Central Valley Flood Protection Plan (CVFPP), could improve the SPFC's long-term operations and maintenance (O&M). The State of California (State) and Local Management Agencies may not have the necessary land rights to operate and maintain SPFC facilities as intended.

3. Some of the bank protection sites along the Red Bluff to Chico Landing reach of the Sacramento River (O&M Manual SAC512) no longer appear to be effective but are still part of the SPFC. These may be candidate features for removal from the SPFC.

4. While some O&M manuals include information on improvements since original construction, other O&M manuals may not be up to date and could benefit from this supplemental information.

5. There may be supplemental O&M manuals that have either not been located or have not been produced.

6. Unpermitted encroachments on SPFC facilities are incompatible with O&M of SPFC facilities and should be removed.

7. Some projects like Salt Creek, McClure Creek, and Dry Creek at Adin currently meet the definition of the SPFC, but clearly perform no significant function regarding the flood control system as a whole along the Sacramento River, and perhaps are candidates for removal from the SPFC.

8. River mile numbers for the 1957 Revised Profile Drawings for the SRFCP and other sources are not consistent (U.S. Army Corps of Engineers 1957).

9. Design flood flows contained in O&M manuals are often different than design flows obtained from the 1957 Revised Profile Drawings. In addition, results from local, State, federal, and agency studies indicate that actual flow capacities at time of project completion do not agree with either the O&M design capacities or 1957 design flood capacities, in many cases.

10. DWR operates SPFC facilities based on the 1957 and 1955 profiles rather than on design flows from the O&M manuals, but it is unknown whether the Central Valley Flood Protection Board (CVFPB) officially adopted the profiles for operation.

11. The U.S. Army Corps of Engineers' (USACE's) use of uncertainty analysis to characterize the system is inconsistent with the system's characterization in the O&M manuals. Future reconciliation may be required.

12. Channel maintenance responsibilities for much of the San Joaquin River Flood Control System should be more clearly identified.

13. The 1991 Aerial Atlas should be updated as a reference document, and coverage extended to include tributary streams.

9.1 Definition of State Plan of Flood Control

A definition of the SPFC is found in the California Water Code Section 9110 (f) and Section 9651, and Public Resources Code Division 5, Chapter 1, Article 2 Section 5096.805 subdivision (j). The "policies" referred to in California Water Code 9651 are assumed to be intricately tied to SPFC conditions discussed in Chapter 6.

9.2 Lower San Joaquin River Flood Control Project

USACE, Sacramento District stated to CVFPB, by letter dated July 23, 2015, that in its view, the levees and channels of the San Joaquin River system upstream of the Merced River have not been congressionally authorized and, therefore, are not federal flood risk reduction structures (U.S. Army Corps of Engineers 2015). The Flood Control Act of 1955 allowed local interests to construct levees and channels at their own expense in lieu of purchasing the flowage easements as laid out in the original plan and authorization. The levees and channels, in the opinion of USACE, did not become federally authorized with the Flood Control Act of 1955. According to USACE, four separate federally authorized levee systems remain in this geographic area. The levees and channels in the following systems were authorized by the Flood Control Act of 1960:

- Fresno River left bank.
- Fresno River right bank to Berenda Slough left bank.
- Berenda Slough right bank to Ash Slough left bank.
- Ash Slough right bank.

As of the date of the letter, USACE does not consider the Lower San Joaquin Levee District (LSJLD) levees as federal levees except the approximately 2 miles (11,400 feet) of channel clearing in the Eastside Bypass near Sand Slough authorized by the Supplemental Appropriations Act of 1983 and constructed by USACE in 1984. The levees of the LSJLD are no longer being shown by USACE as federal levees in the National Levee Database (U.S. Army Corps of Engineers 2016).

SPFC projects in the San Joaquin River were authorized pursuant to California Water Code Division 6, Part 6, Chapter 2. The Lower San Joaquin River Tributaries Project was authorized pursuant to California Water Code Section 12651 and the Federal Control Acts of 1944 and 1950. At the time of the writing of this document, DWR, and CVFPB are continuing to investigate whether the Lower San Joaquin River Flood Control Project is part of the SPFC. Both DWR and the CVFPB continue to assert that the LSJLD is part of the SPFC. For the purposes of the 2022 CVFPP Update, DWR is assuming no change to the SPFC Planning Area until a definitive finding is made as a result of the State's investigation.

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CHAPTER 10

References

10.1 References Cited

California Department of Water Resources. 2010. *2010 State Plan of Flood Control Descriptive Document*. November.

California Department of Water Resources. 2017. *2017 State Plan of Flood Control Descriptive Document Update.* August.

California Department of Water Resources. 2020. *Inspection and Local Maintaining Agency Report of the Central Valley State-Federal Flood Protection System.*

California Department of Water Resources. 2022. *2022 Flood System Status Report.* September.

Central Valley Flood Protection Board. 1952. Letter from The Reclamation Board to U.S. Army Corps of Engineers. April 2.

Central Valley Flood Protection Board. 1953. Letter from The Reclamation Board to U.S. Army Corps of Engineers. March 9.

Central Valley Flood Protection Board. 2012. *Providing The Board's Vision For And Adoption Of The 2012 Central Valley Flood Protection Plan And Providing A Framework For The Interpretation And Implementation Of The Plan.* Resolution No. 2012-25. June.

Central Valley Flood Protection Board. 2013. *Findings and Decision Authorizing Transfer of Operations and Maintenance Responsibilities for the Feather River Setback Levee at Star Bend Project to Levee District Number 1, Sutter County.* Resolution No. 2013-21. December 20.

Central Valley Flood Protection Board. 2014. *Findings and Decision Authorizing Transfer of Operations and Maintenance Responsibilities for the Natomas Cross Canal South Levee to Reclamation District Number 1000, Sutter County.* Resolution No. 2014-22. June 27.

House Transportation and Infrastructure Committee. 2014. *The Water Resources Reform and Development Act of 2014*. House of Representatives Report 3080. Public Law 113-121. Enacted June 2014. Available at <https://www.congress.gov/113/bills/hr3080/BILLS-113hr3080enr.pdf>. December.

U.S. Army Corps of Engineers. 1955. *Design Memorandum No. 1, San Joaquin River Levees, Lower San Joaquin River and Tributaries Project, California, Levee Profiles.* December 23.

U.S. Army Corps of Engineers. 1955a. *Standard Operation and Maintenance Manual for the Sacramento River Flood Control Project*. USACE Sacramento District. Revised May.

U.S. Army Corps of Engineers.1957. *Sacramento River Flood Control Project, California, Levee and Channel Profiles*. March 15. File No. 50-10-334. Created August 1969. Revised 2006.

U.S. Army Corps of Engineers.1957a. *Cache Creek Basin California, Middle Creek Project, Stream Profiles*. February 20.

U.S. Army Corps of Engineers. 1971. *Supplement to Standard Operation and Maintenance Manual, Sacramento River Flood Control Project Unit No. 106 South Levee of Lindsey Slough and West Levee of Yolo Bypass From Lindsey Slough to Watson Hollow and North Levee Of Watson Hollow Drain.* Sacramento District, Sacramento, California. Available upon request. December.

U.S. Army Corps of Engineers. 2012. Program Guidance Letter. *Federal Register*. February 17. Available at <https://www.nws.usace.army.mil/Portals/27/docs/Levees/veg_variance_request_federal_register_posting.pdf>. December.

U.S. Army Corps of Engineers. 2014. *Supplement to Standard Operations and Maintenance Manual, Sacramento River Flood Control Project, Unit No. 125, Back Levee of Reclamation District No. 1000.* U.S. Army Corps of Engineers, Sacramento, California, April 2014.

U.S. Army Corps of Engineers. 2014a. *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams and Appurtenant Structures*. Engineering Technical Letter (ETL) 1110-2-583. Available at <https://www.publications.usace.army.mil/Portals/76/Publications/EngineerTechnicalLetters/ETL_1110-2-583.pdf>. December.

U.S. Army Corps of Engineers. 2015. Letter from USACE to Central Valley Flood Protection Board. July 23.

U.S. Army Corps of Engineers. 2016. National Levee Database. Available at <https://levees.sec.usace.army.mil/#/>.

10.2 Additional References

California Department of Water Resources. 2012. 2012 *CVFPP and Related Documents. Central Valley Flood Management Planning (CVFMP) Program*. Available at <https://cawaterlibrary.net/wp-content/uploads/2017/05/2012-CVFPP_June.pdf>.

California Department of Water Resources. 2016. 2017 Central Valley Flood Protection Update. Central Valley Flood Management Planning (CVFMP) Program. Available at <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Flood-Management/Flood-Planning-and-Studies/Central-Valley-Flood-Protection-Plan/Files/2017-CVFPP-Update-FINAL_a_y19.pdf>.

California Department of Water Resources. 2016a. SPFC Operations & Maintenance Manuals. California Data Exchange Center. Available upon request.

California Department of Water Resources. 2017a. *2017 Flood System Status Report.* August.

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Appendix A
State Plan of Flood Control Index and Location Maps

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APPENDIX A

State Plan of Flood Control Index and Location Maps

This appendix provides an index map and eighteen location maps that illustrate features of the State Plan of Flood Control (SPFC) and important related features in the Central Valley. Figure A-1 shows the location of the detail maps; this is followed by 18 maps of SPFC facilities, all at the same scale, starting from the northern end of the Central Valley near Red Bluff, and continuing south to the San Joaquin River near Gravelly Ford. In addition to showing levees and related SPFC features, these maps show important non-SPFC levees.

- **Figure A-2.** Detail 1A, 1B, 1C: Map of three outlying projects: North Fork Feather River Near Chester, Middle Creek near Clear Lake, and Adin channels.
- **Figure A-3.** Detail 2: Sacramento River from Red Bluff to River Mile 195.
- **Figure A-4.** Detail 3: Sacramento River from Hamilton City to River Mile 165.
- **Figure A-5.** Detail 4: Sacramento River from River Mile 170 to Tisdale Weir.
- **Figure A-6.** Detail 5: Sacramento River from Moulton Weir to River Mile 100.
- **Figure A-7.** Detail 6: Feather River from Oroville Dam to Marysville.
- **Figure A-8.** Detail 7: Feather River from Marysville to Natomas Cross Canal.
- **Figure A-9.** Detail 8: American River from Carmichael Bluffs to Sacramento River at River Mile 50.
- **Figure A-10.** Detail 9: Sacramento River from Levee Mile 100 to Clarksburg.
- **Figure A-11.** Detail 10: Sacramento River from Clarksburg to River Mile 5.
- **Figure A-12.** Detail 11: Levees around Suisun Marsh.
- **Figure A-13.** Detail 12: Delta Islands.
- **Figure A-14.** Detail 13: San Joaquin River from River Mile 65 to Disappointment Slough.

- **Figure A-15.** Detail 14: San Joaquin River from River Mile 105 to River Mile 40.
- **Figure A-16.** Detail 15: Mariposa Bypass to San Joaquin River at River Mile to 95.
- **Figure A-17.** Detail 16: Fresno River to Mariposa Slough.
- **Figure A-18.** Detail 17: San Joaquin River at Chowchilla Canal Bypass Control Structure to San Joaquin River Structure.
- **Figure A-19.** Detail 18: Chowchilla Canal Bypass Control Structure to Fresno River Drainage Structure.

Figure A-1. Location of the Detail Maps

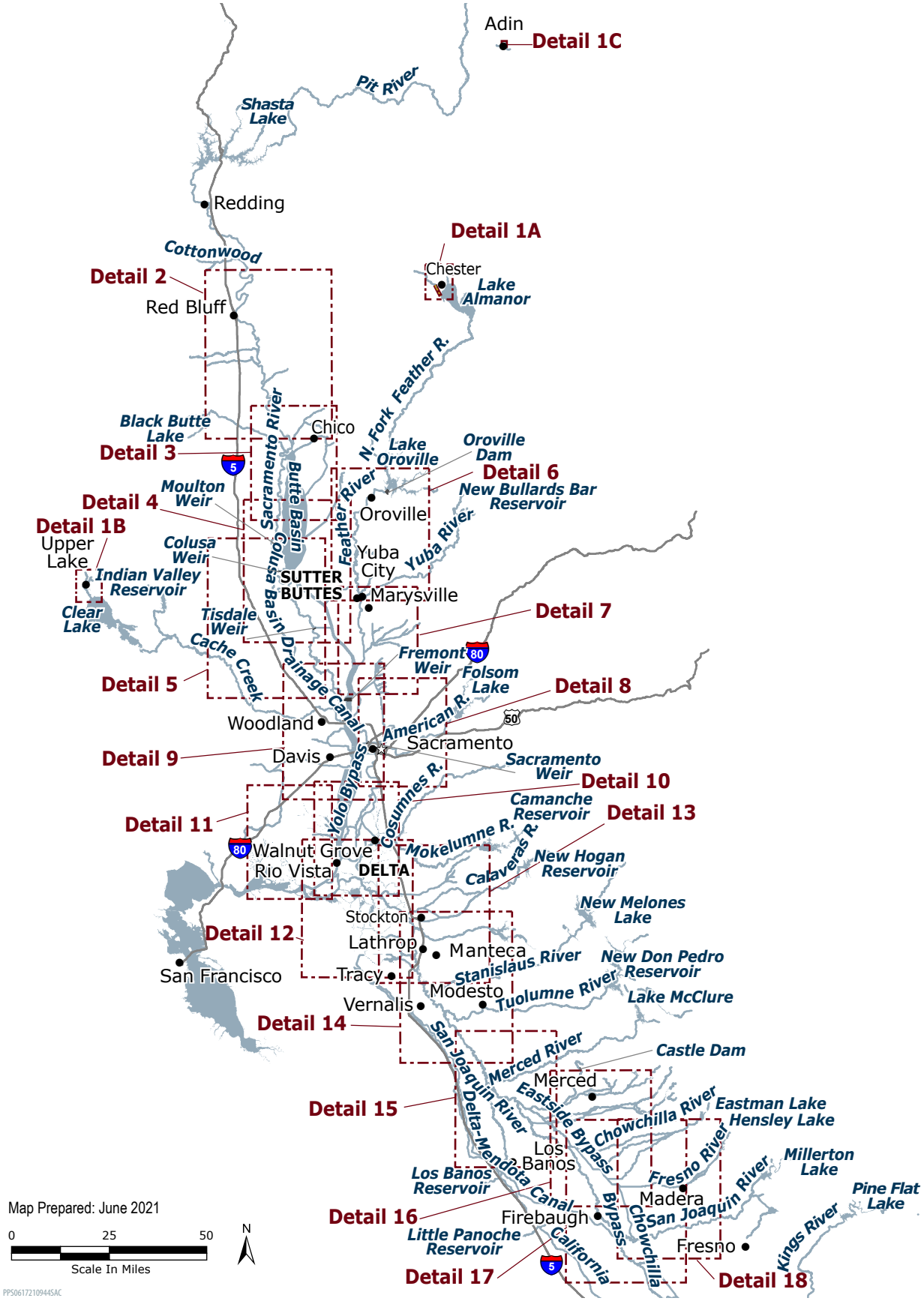


Figure A-2. Detail 1A, 1B, 1C: Map of Three Outlying Projects: North Fork Feather River Near Chester, Middle Creek near Clear Lake, and Adin Channels

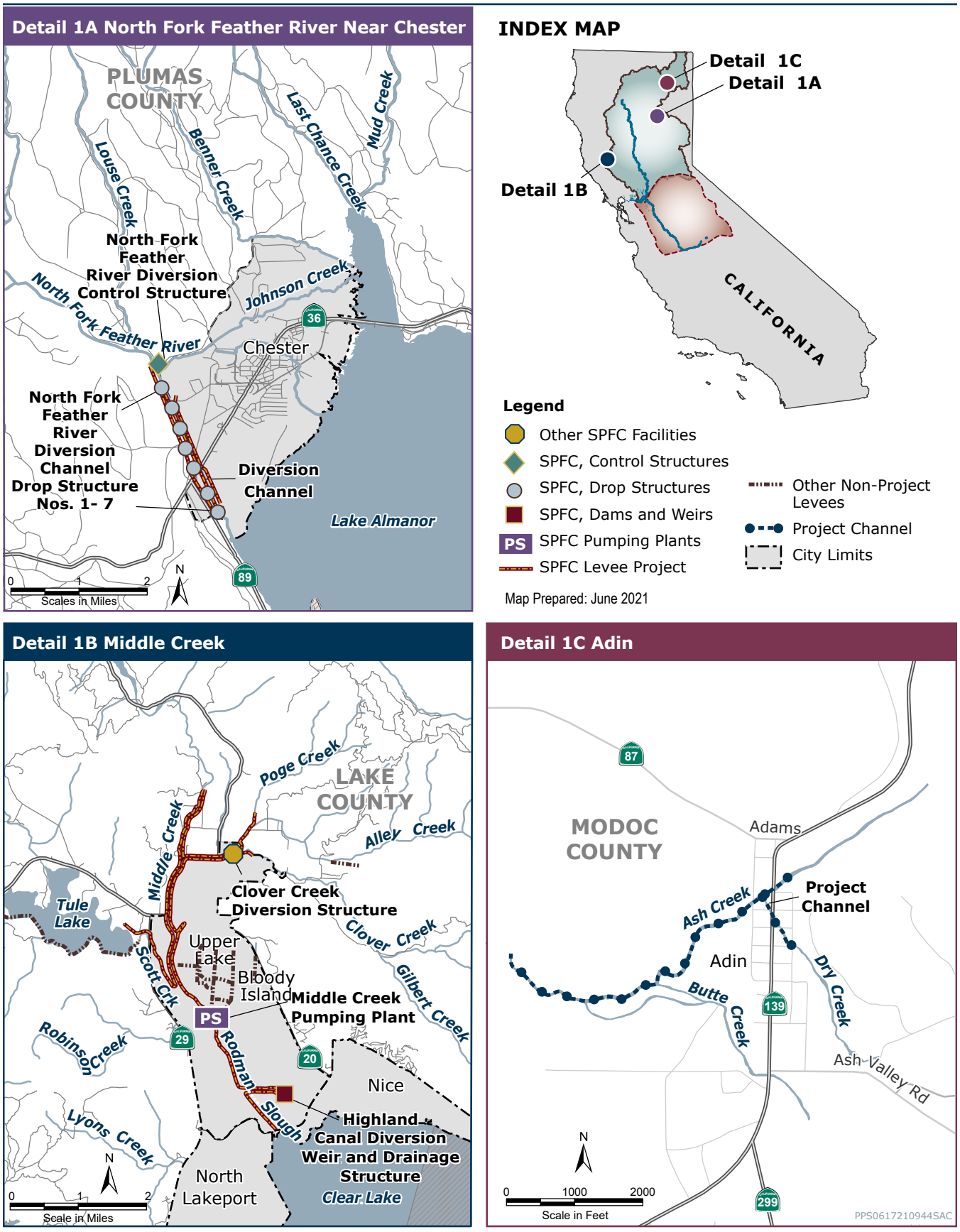


Figure A-3. Detail 2: Sacramento River from Red Bluff to River Mile 195

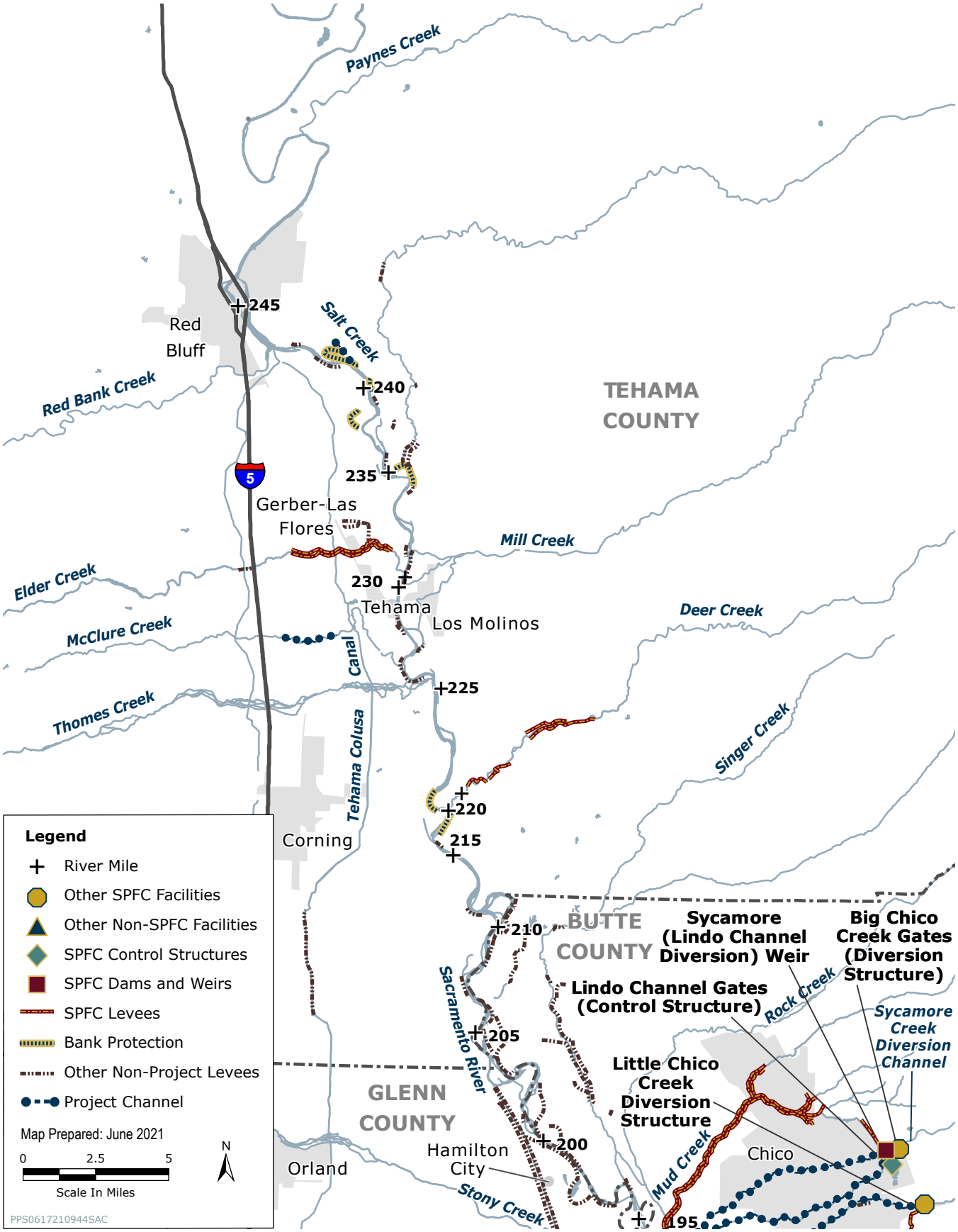


Figure A-4. Detail 3: Sacramento River from Hamilton City to River Mile 165

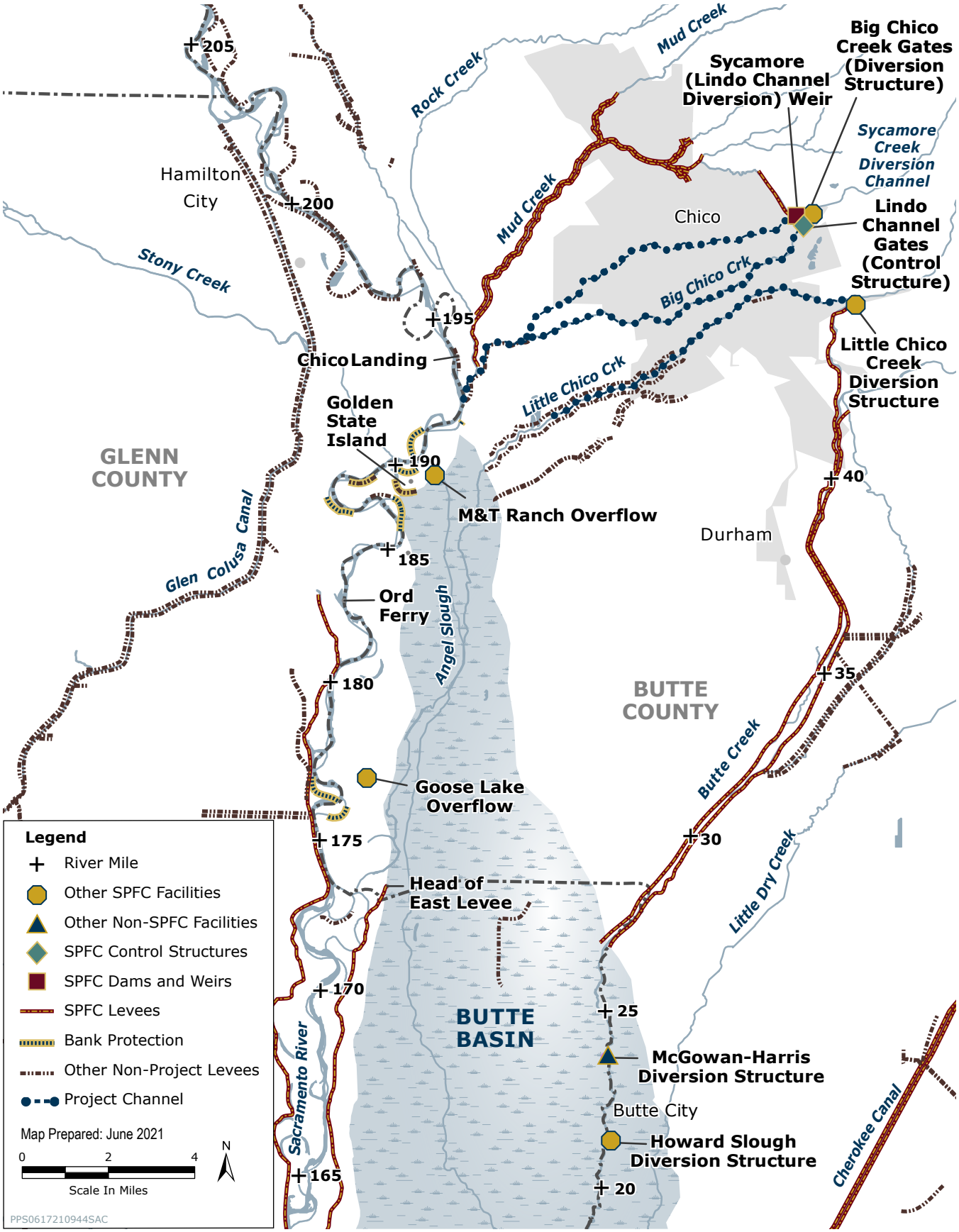


Figure A-5. Detail 4: Sacramento River from River Mile 170 to Tisdale Weir

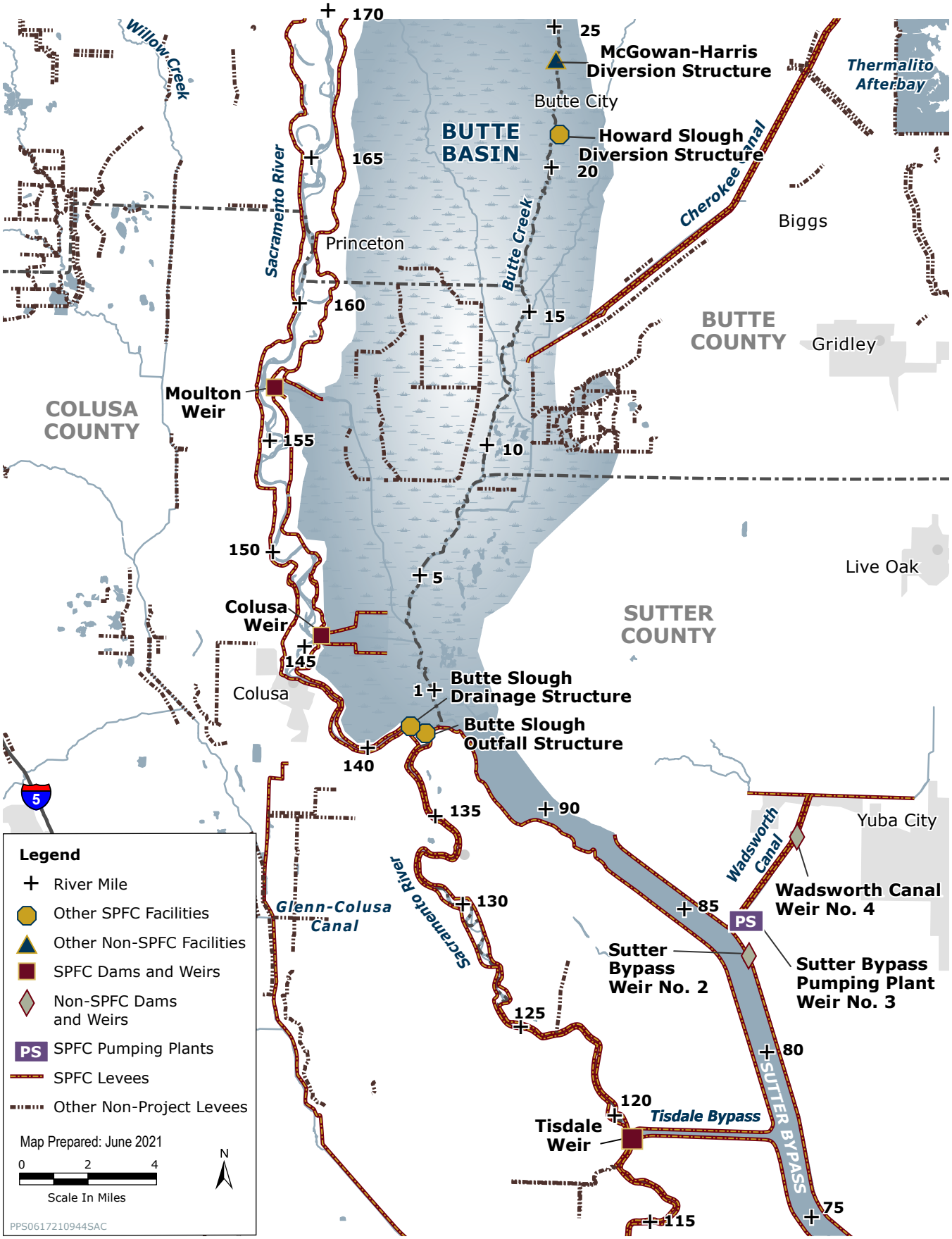


Figure A-6. Detail 5: Sacramento River from Moulton Weir to River Mile 100

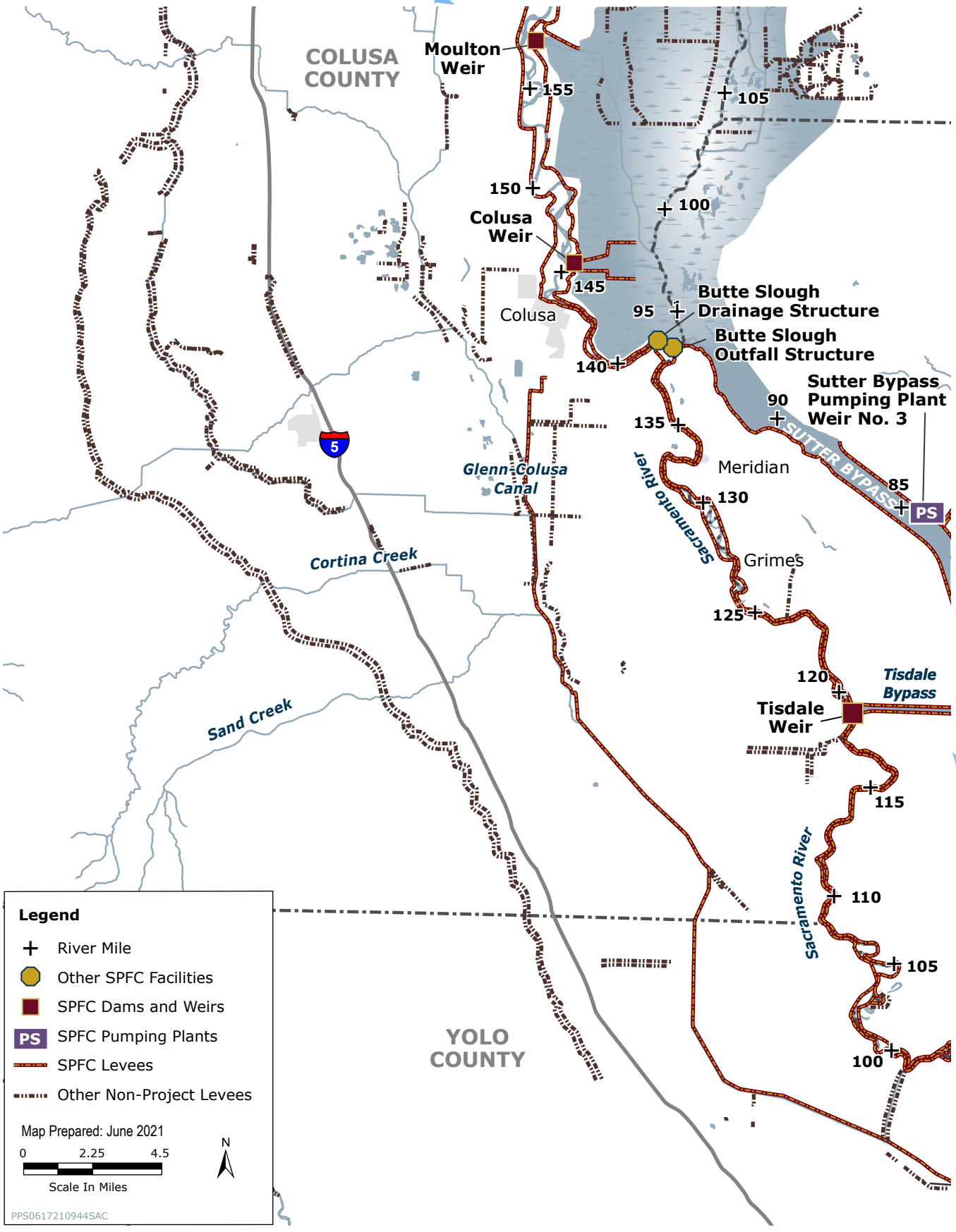


Figure A-7. Detail 6: Feather River from Oroville Dam to Marysville

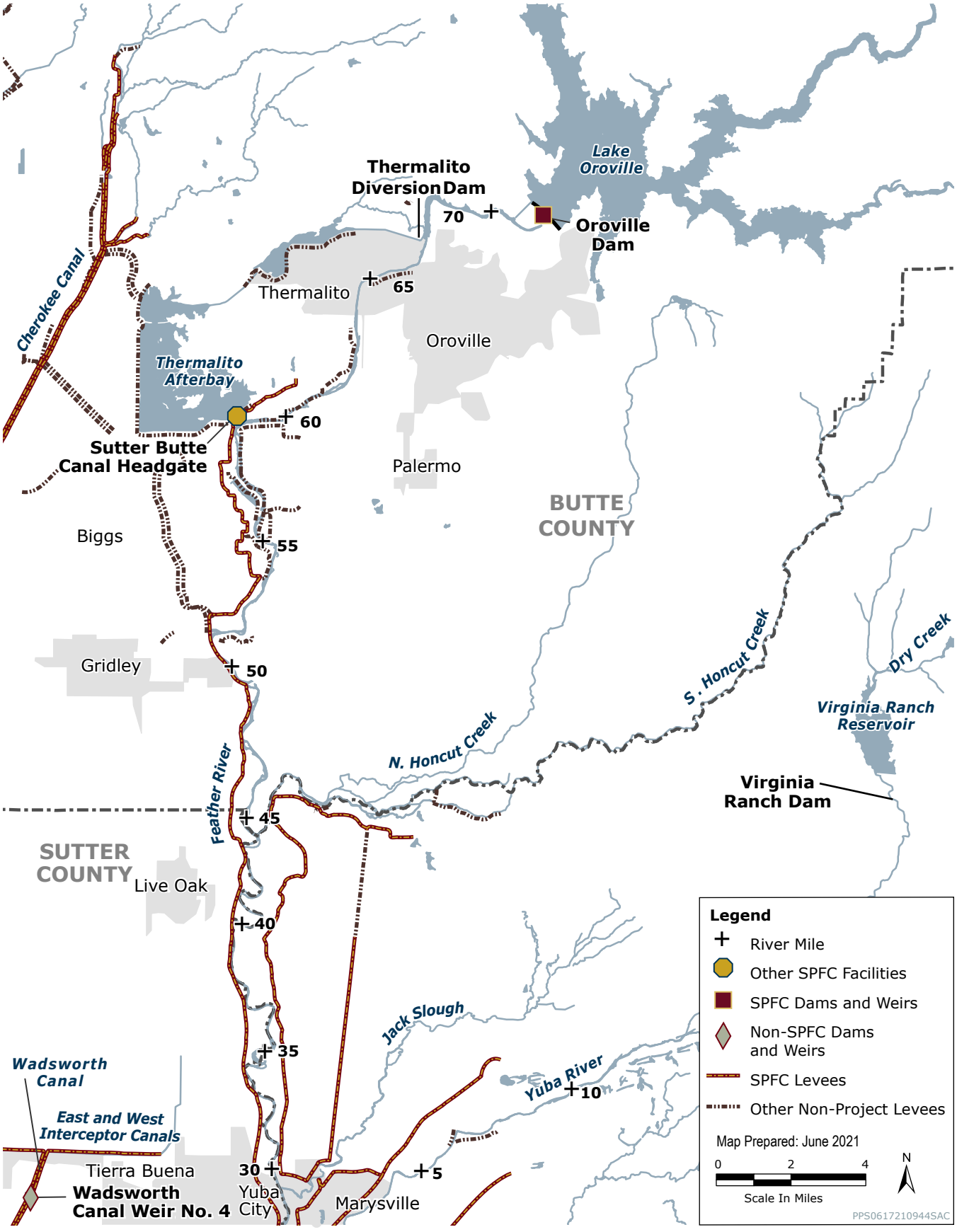


Figure A-8. Detail 7: Feather River from Marysville to Natomas Cross Canal

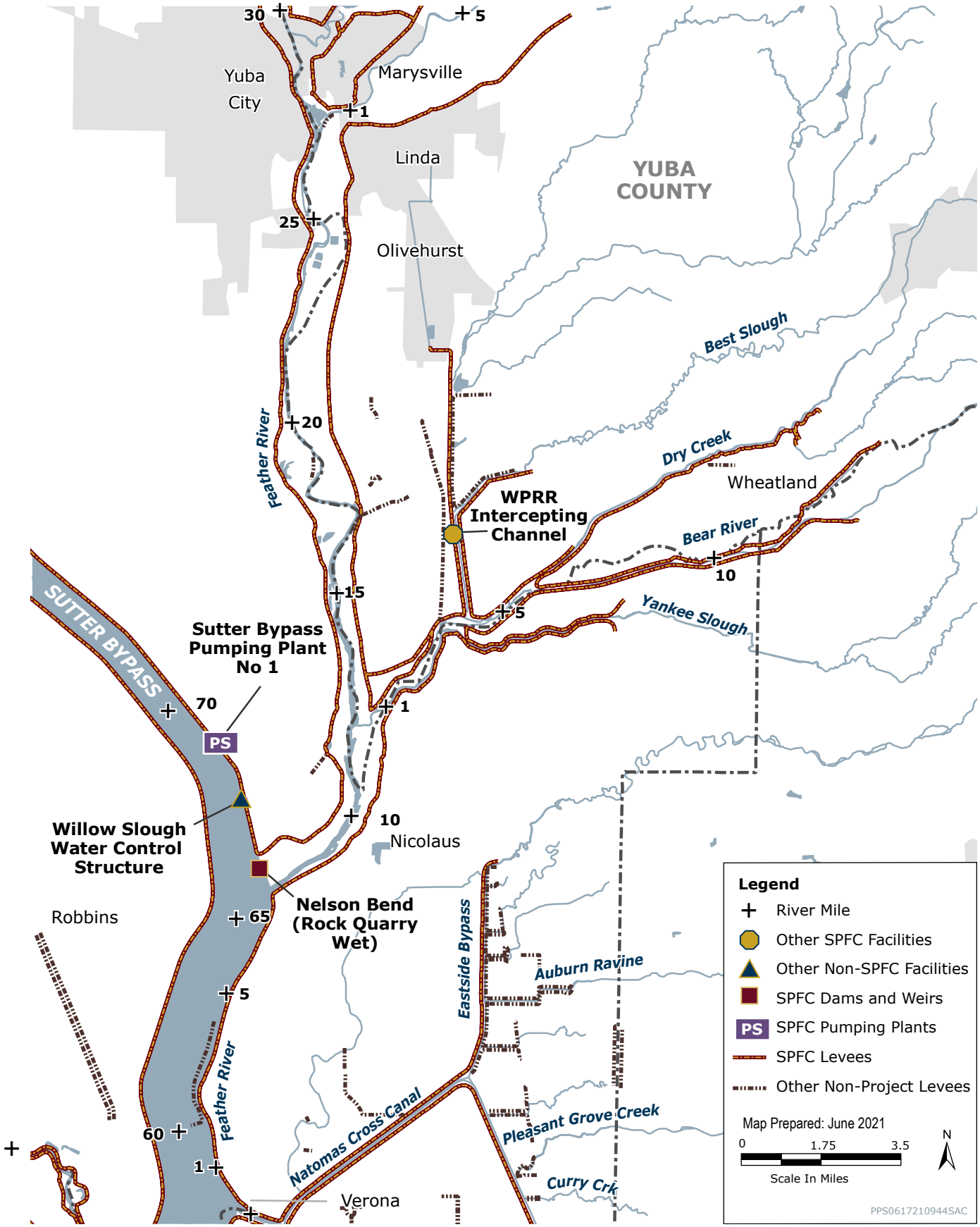


Figure A-9. Detail 8: American River from Carmichael Bluffs to Sacramento River at River Mile 50

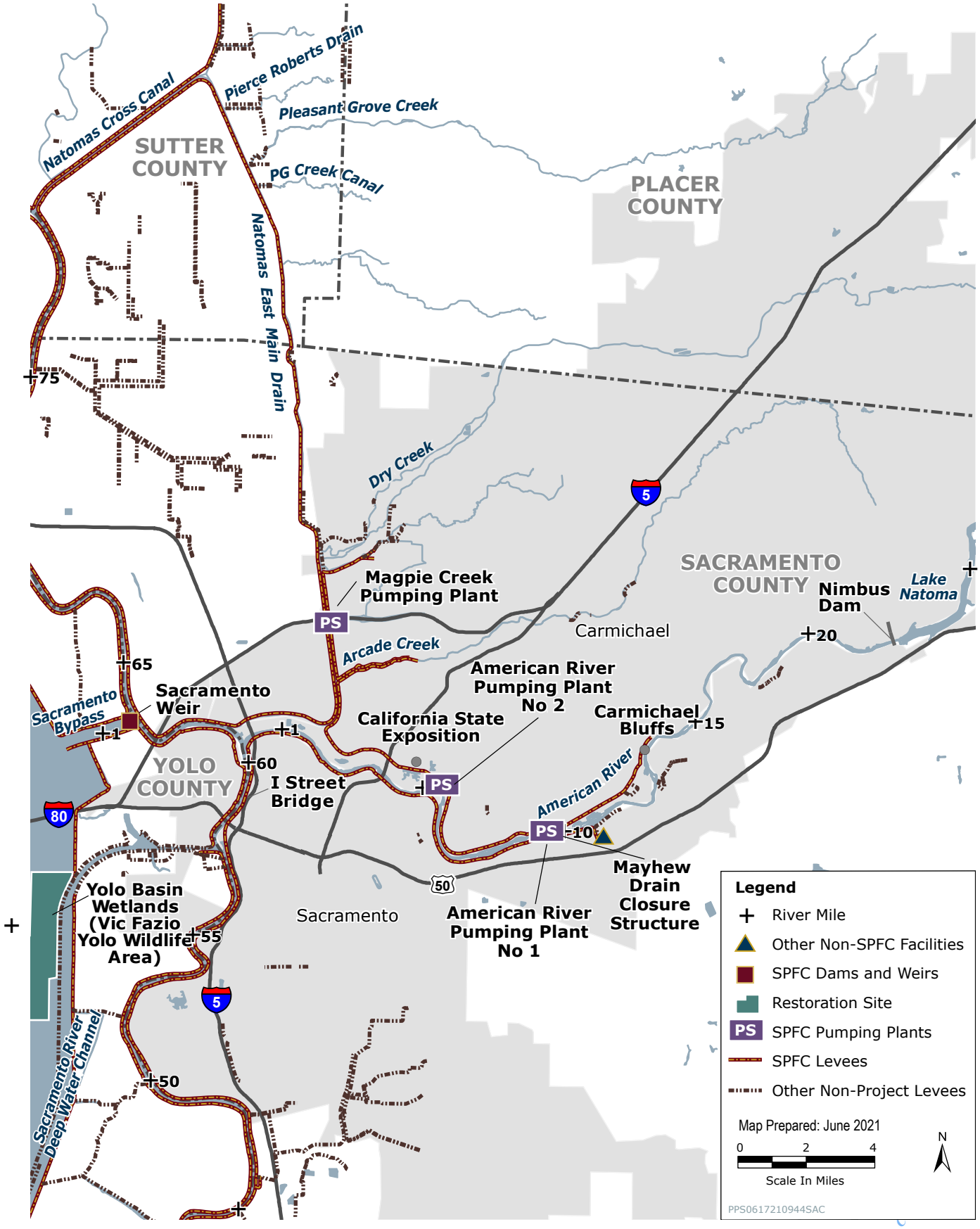


Figure A-10. Detail 9: Sacramento River from Levee Mile 100 to Clarksburg

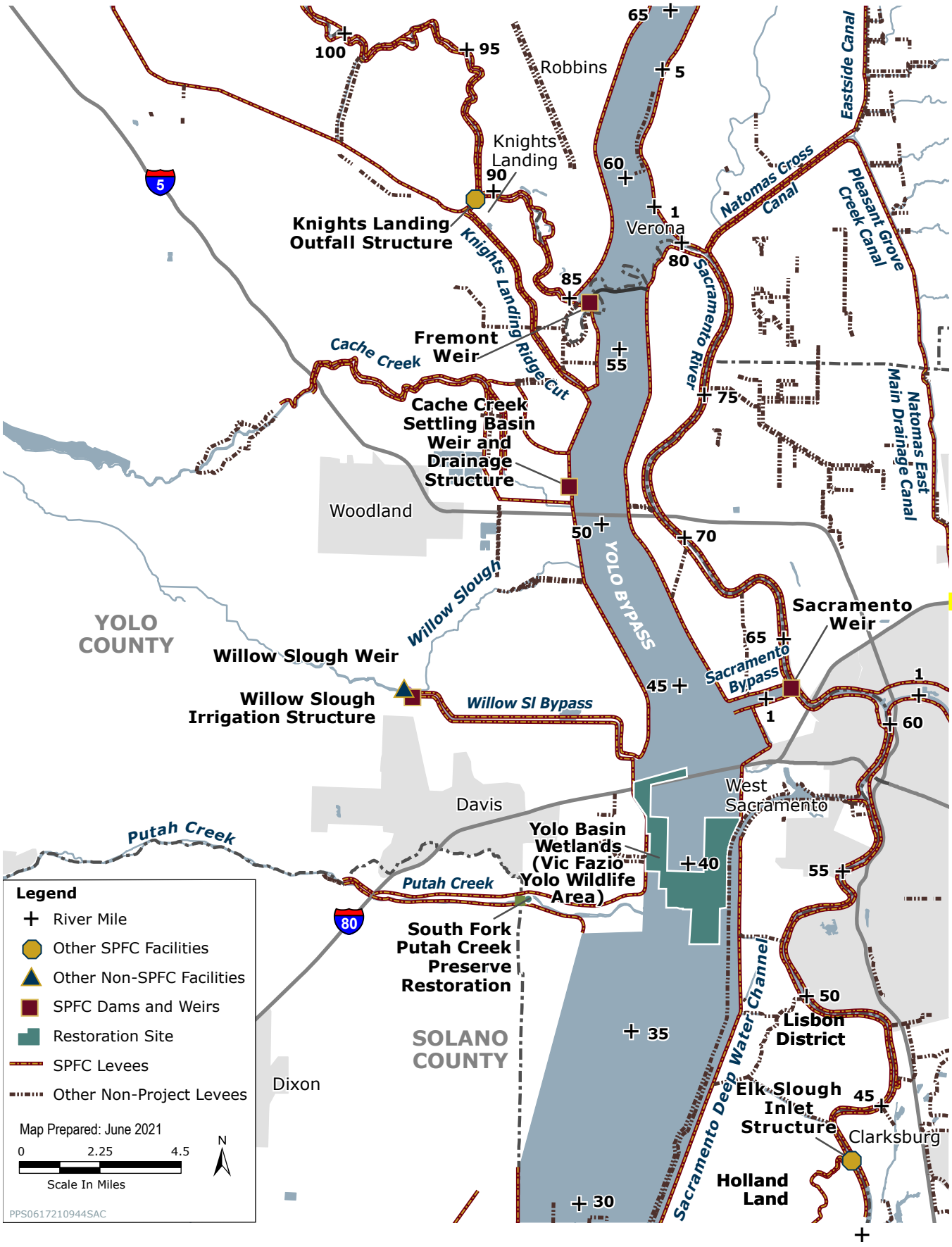


Figure A-11. Detail 10: Sacramento River from Clarksburg to River Mile 5

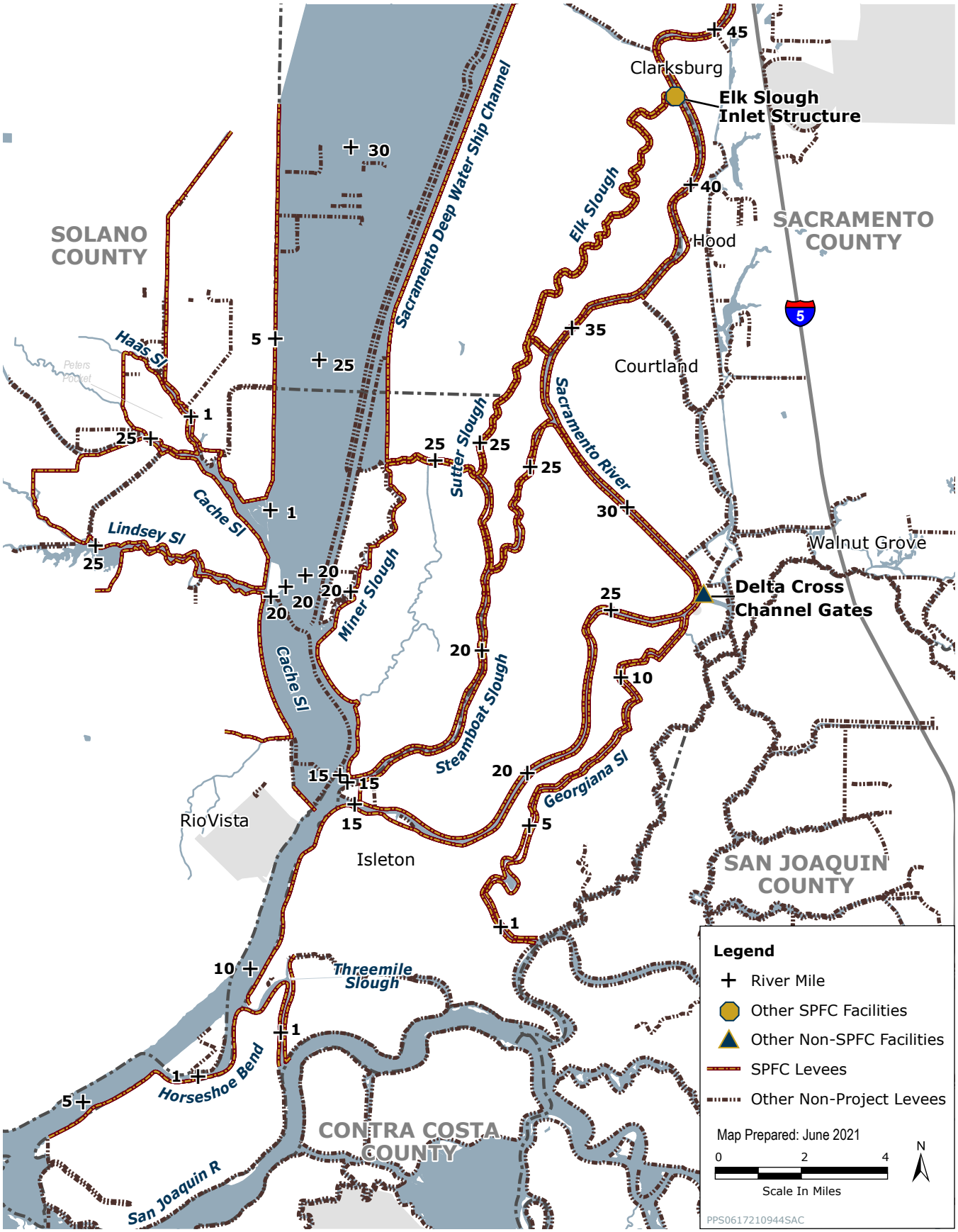


Figure A-12. Detail 11: Levees around Suisun Marsh

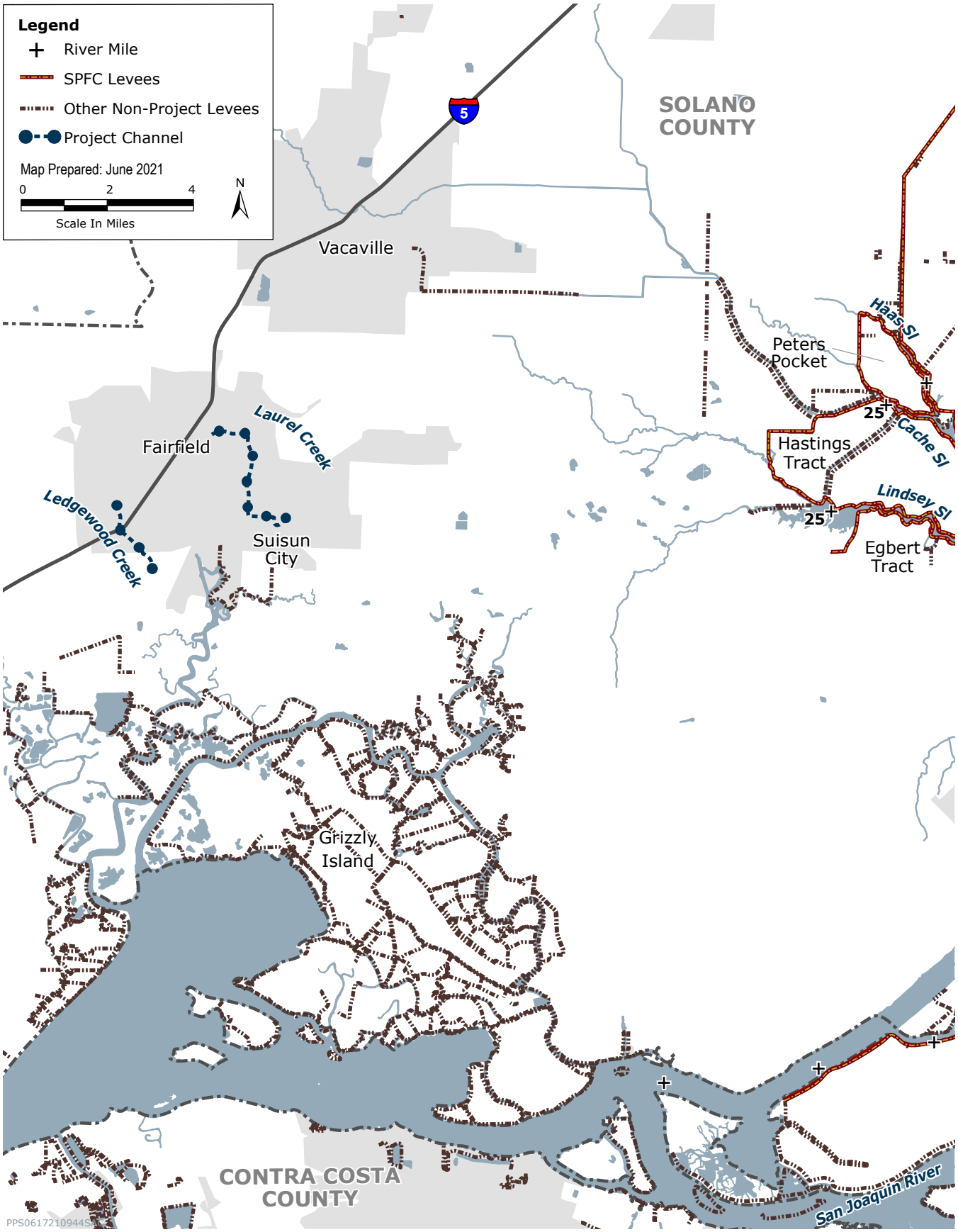


Figure A-13. Detail 12: Delta Islands

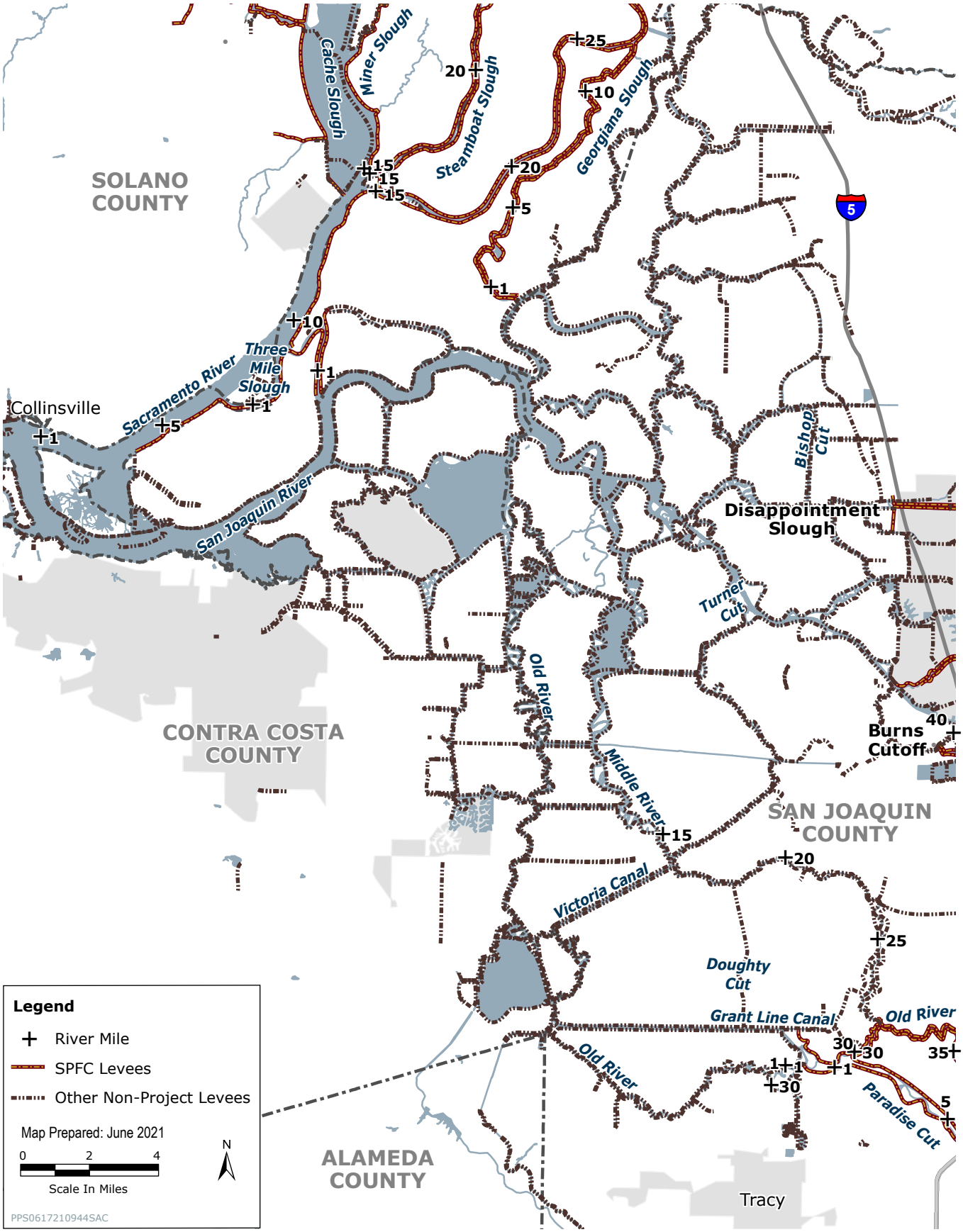


Figure A-14. Detail 13: San Joaquin River from River Mile 65 to Disappointment Slough

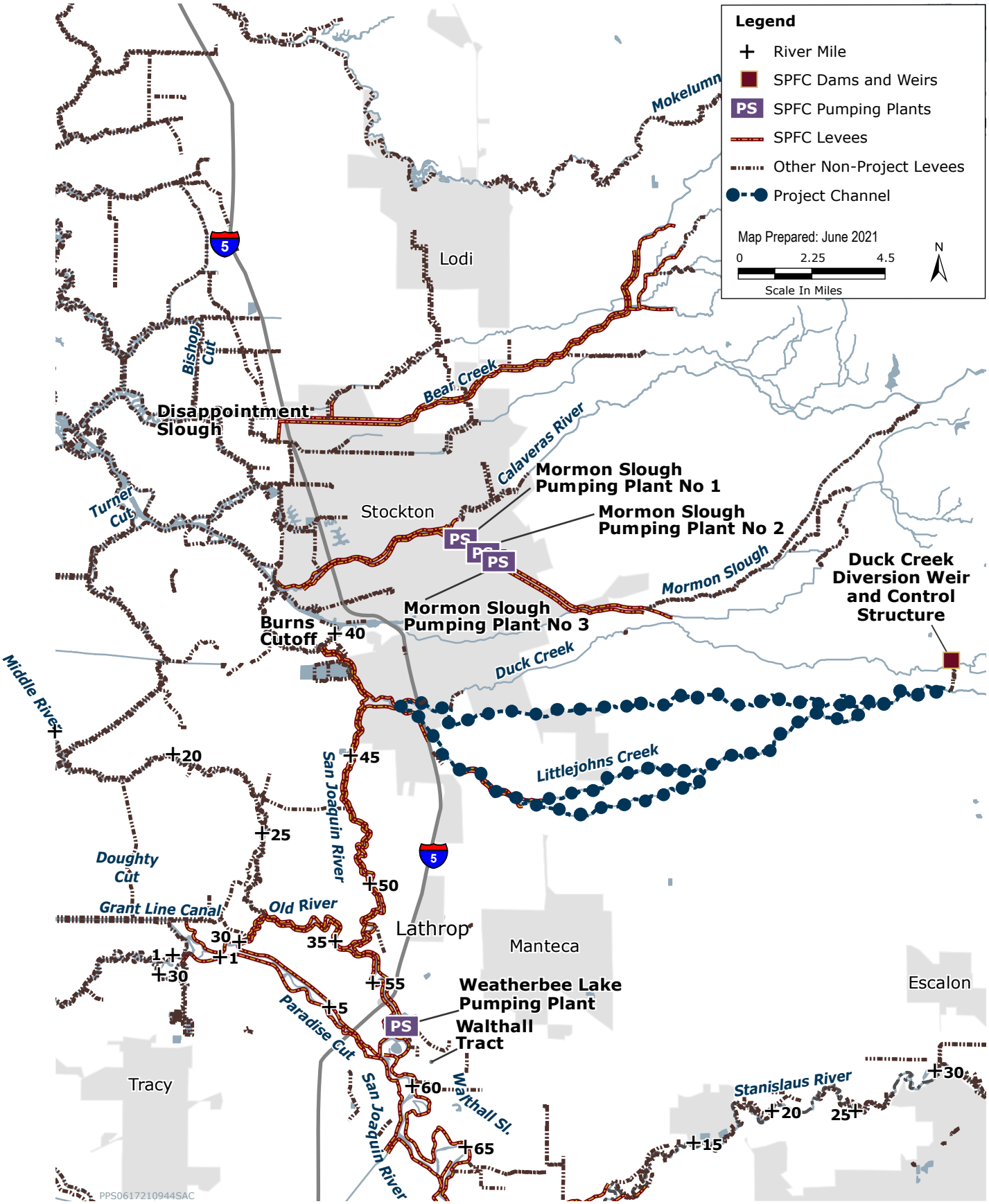


Figure A-15. Detail 14: San Joaquin River from River Mile 105 to River Mile 40

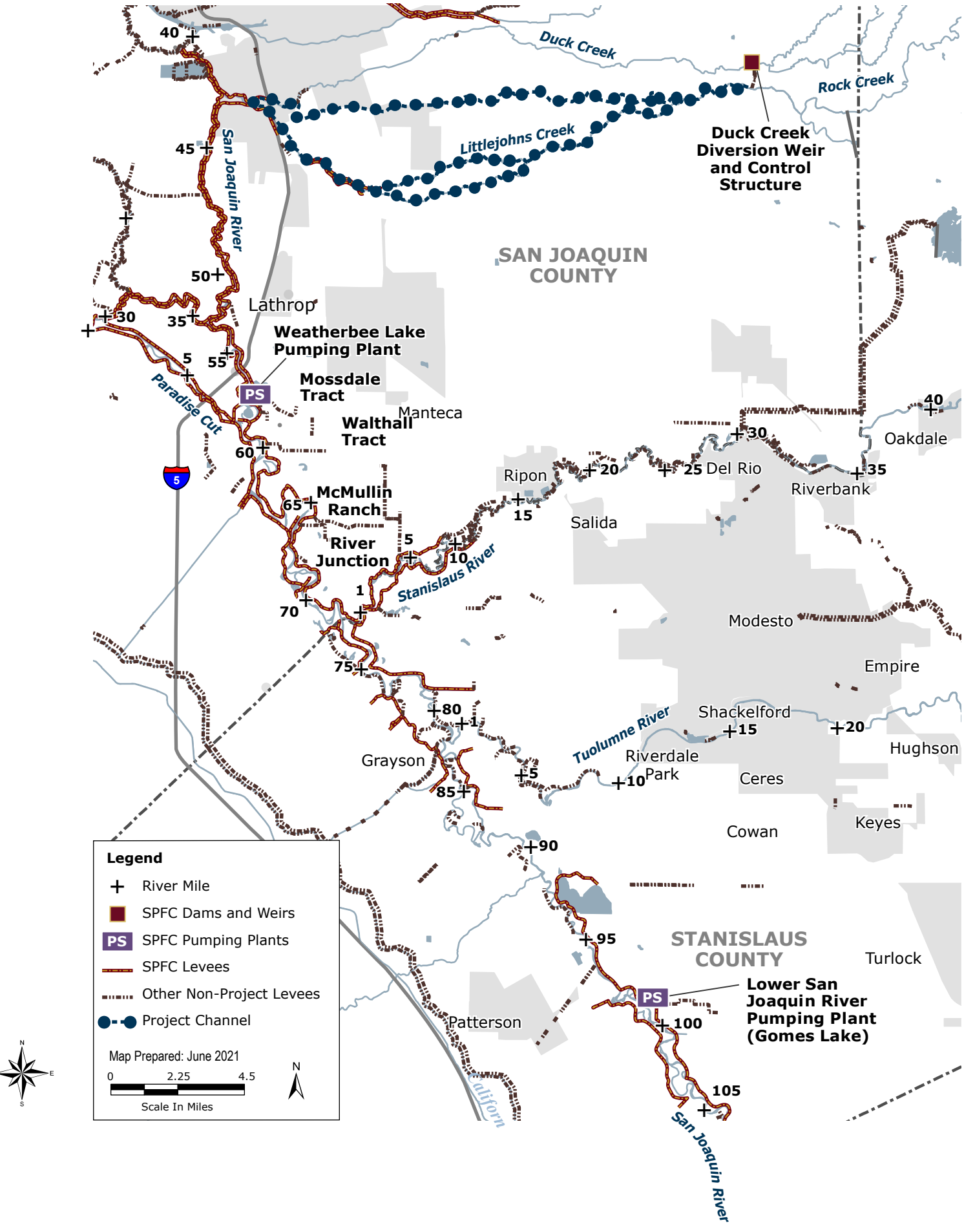


Figure A-16. Detail 15: Mariposa Bypass to San Joaquin River at River Mile to 95

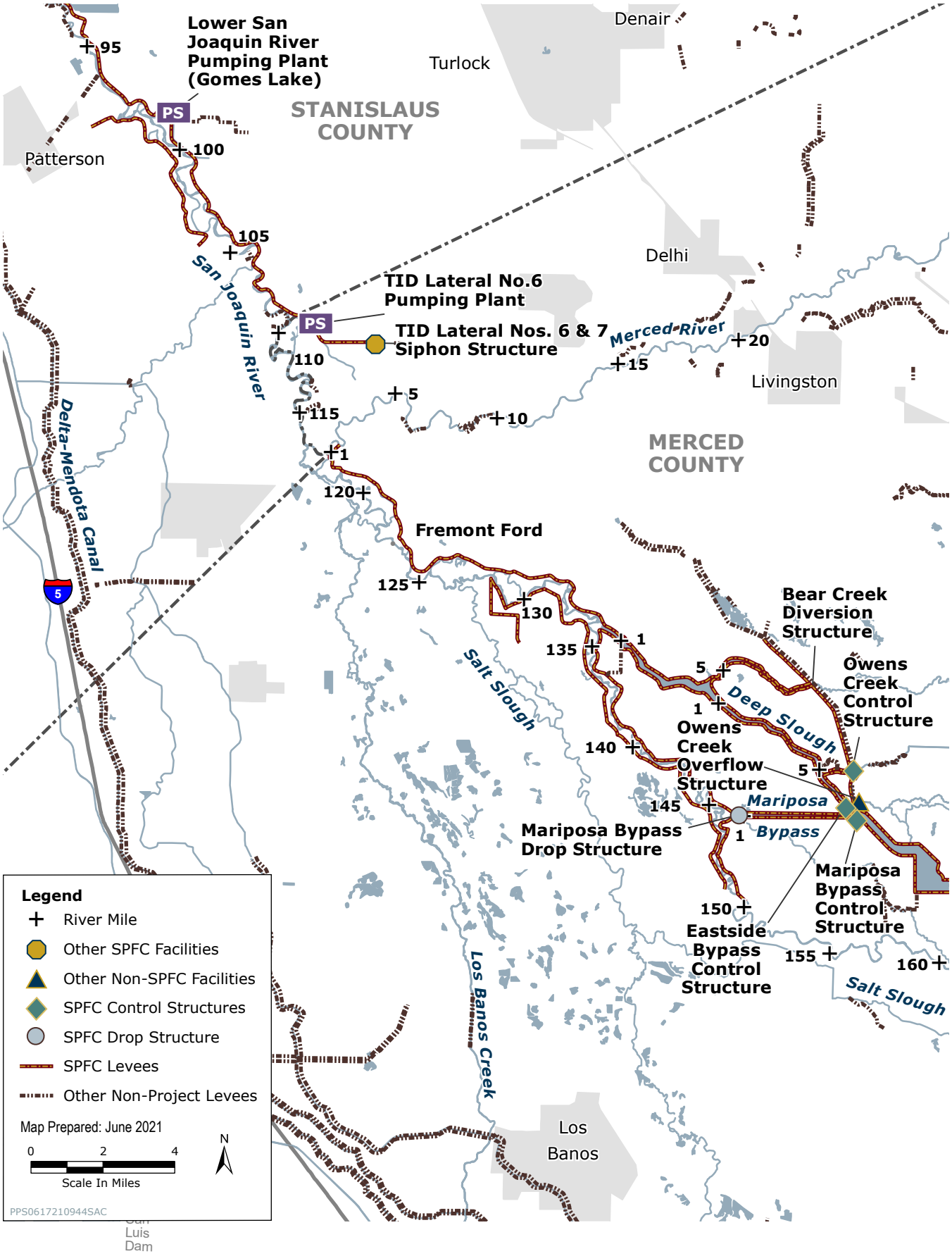


Figure A-17. Detail 16: Fresno River to Mariposa Slough

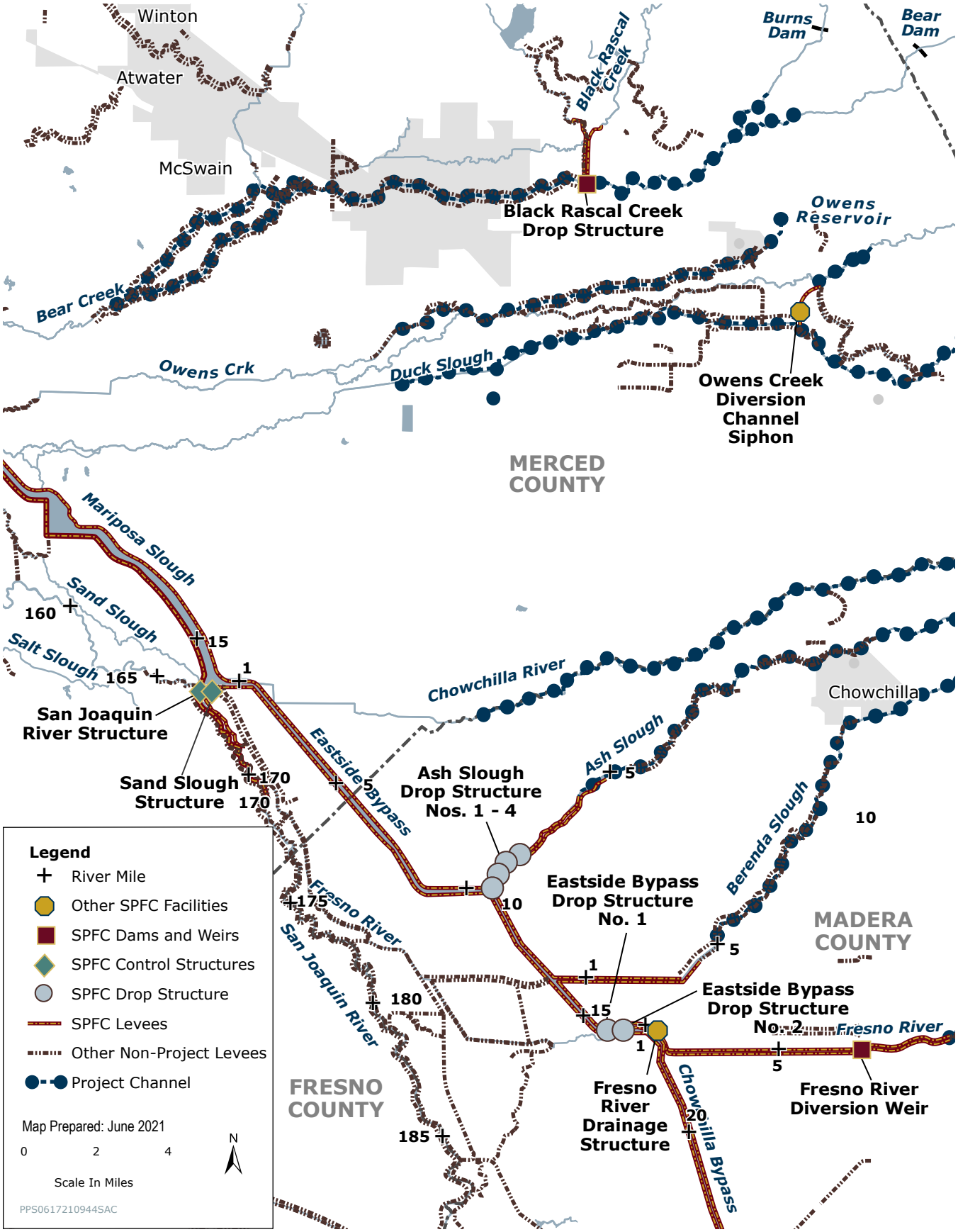


Figure A-18. Detail 17: San Joaquin River at Chowchilla Canal Bypass Control Structure to San Joaquin River Structure

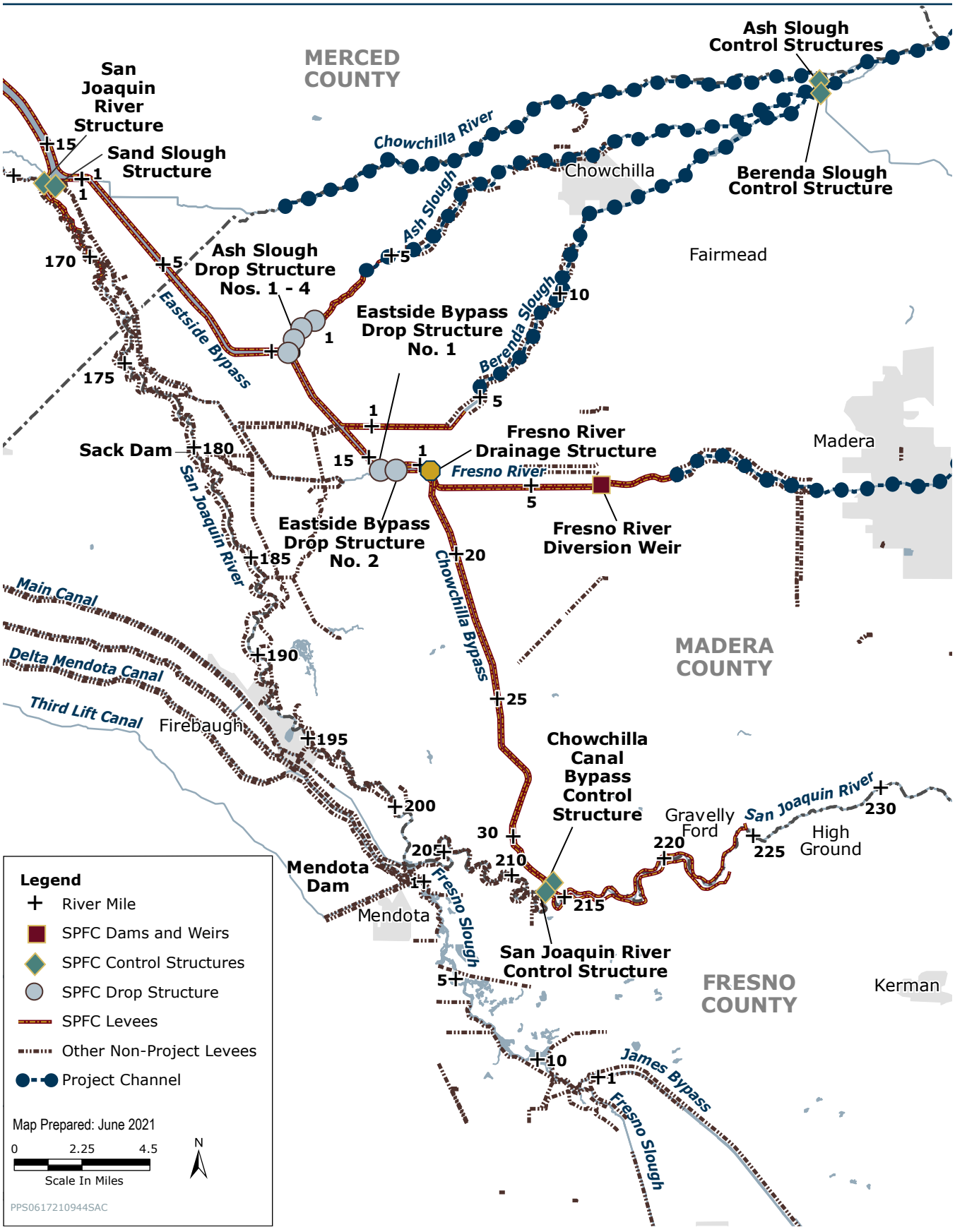
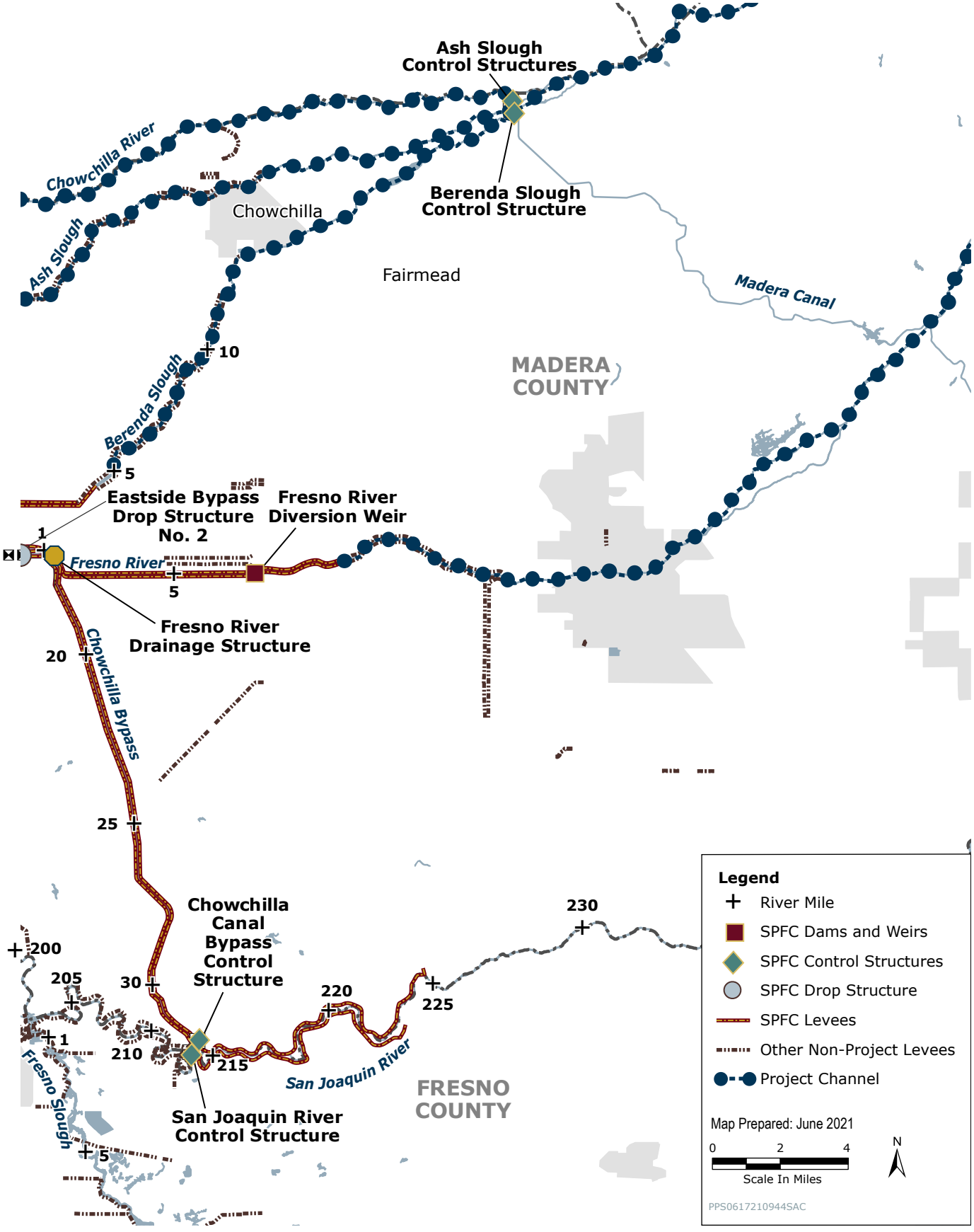


Figure A-19. Detail 18: Chowchilla Canal Bypass Control Structure to Fresno River Drainage Structure



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