- SPFC facilities along the Wadsworth Canal and intercepting canals are levees (see O&M Manual SAC135). Based on the O&M manual, the design capacity of the Wadsworth Canal 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 the right- and left-bank levees of the Wadsworth Canal are about 4.7 miles long. The Wadsworth Canal levees were built by local interests and 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 reduce flood risk to adjacent agricultural land and to Yuba City. Maintenance is by DWR 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 the O&M manuals. The right-bank levee (see O&M Manual SAC133) is about 5.8 miles long. The levee reduces flood risk to adjacent agricultural lands and the town of Meridian, and is maintained by RD 1660. The left-bank levee (see O&M Manual SAC135) is about 6.5 miles long. The levee reduces flood risk to adjacent agricultural land and Yuba City, and is maintained by DWR through Maintenance Area 3. Pumping Plant No. 2 (see 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 (see 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 the O&M manuals. The right-bank levee (see O&M Manual SAC129) is about 12.2 miles long. The levee reduces flood risk to adjacent agricultural lands and is maintained by RD 1500. The left-bank levee (see O&M Manual SAC135) is about 12.9 miles long. The levee reduces flood risk to adjacent agricultural land and is maintained by DWR through Maintenance Area 3. Pumping Plant No. 1 (see 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.

Joint Feather River/Sutter Bypass Channel to the Sacramento River

As described under the Feather River watershed, from their junction, the Feather River and the 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 the O&M manuals. This differs from the design capacity of 380,000 estimated in the 1957 revised profile. SPFC facilities include left- and right-bank levees about 1.3 miles apart. The right-bank levee (see O&M Manual SAC129), about 10 miles long, reduces flood risk to agricultural land and is maintained by RD 1500. The left-bank levee (see O&M Manual SAC141.1), about 7 miles long, reduces flood risk to agricultural land and is maintained by RD 1001. The left-bank levee was originally built by local interests and later enlarged or improved to project standards by USACE.

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 the majority 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. Figure 3-8 shows SPFC facilities in the Yolo Bypass watershed.

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.

- The left-bank levee (see 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 design capacity of the levee is 20,000 cfs with 3 feet of freeboard, based on the O&M manual. There is no SPFC right-bank levee. Maintenance is performed by RD 108 and DWR through Maintenance Area 12. About 36 acres of stone biotechnical levee protection (see O&M Manual SAC132.1) were added in three sites along this reach.

- The Knights Landing Outfall Gates (see O&M Manual SAC162), also known as the Sycamore Slough Outfall Gates, 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. Flap gates were added by USACE and the State. Maintenance is conducted by DWR – Sacramento Yard.

- Knights Landing Ridge Cut (see O&M Manual SAC127) provides drainage of the Colusa Basin Drain to the Yolo Bypass. Based on the O&M manual, the capacity of the cut 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 in length. Maintenance is conducted by the Knights Landing Ridge Drainage District.

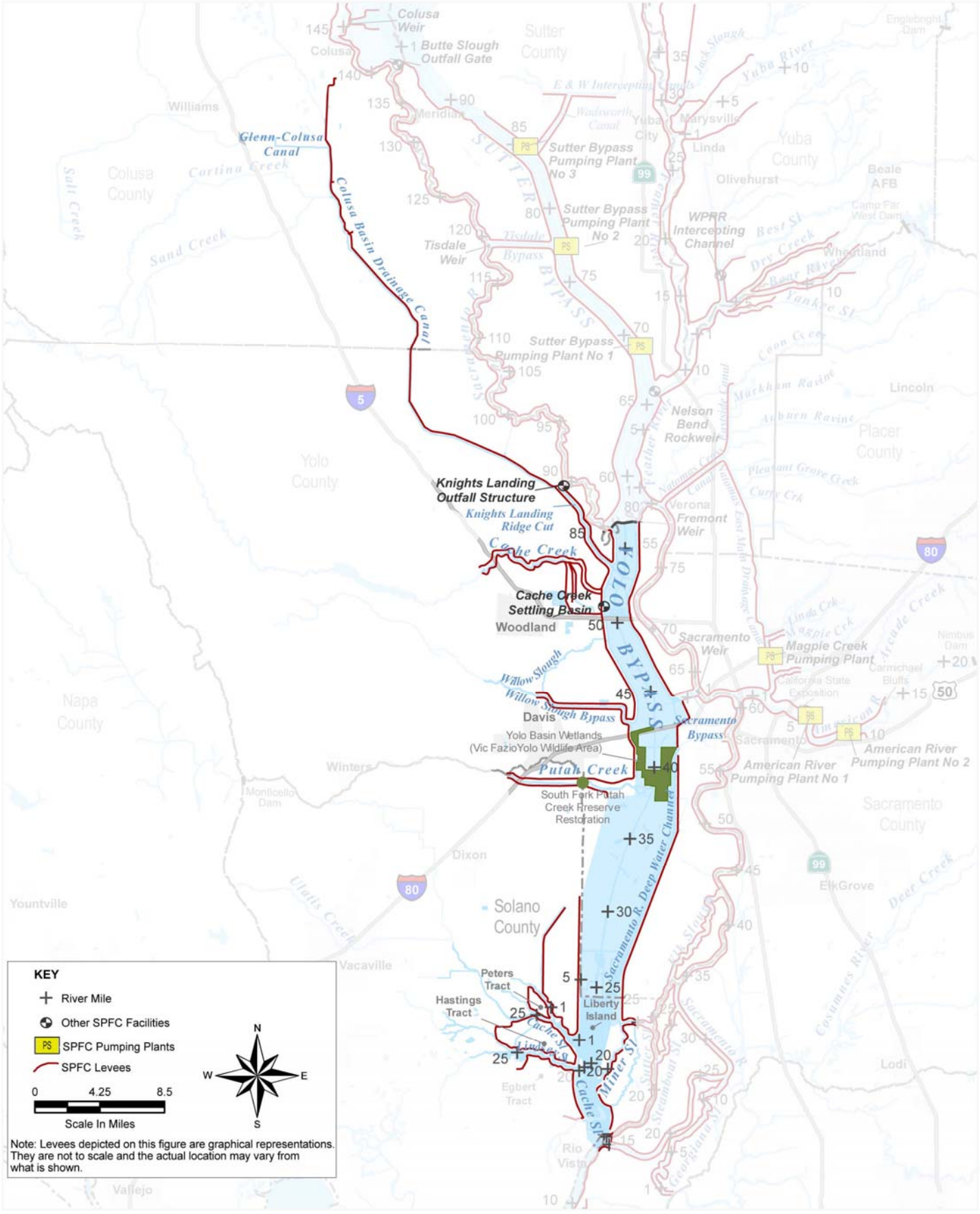

Figure 3-8. Yolo Bypass Watershed – State Plan of Flood Control Facilities Along the Yolo Bypass, Cache Creek, and Other Tributaries

Cache Creek

SPFC facilities on Cache Creek and tributaries are clustered in two separate areas, those of the Middle Creek Project upstream from Clear Lake, and those along Cache Creek near the Yolo Bypass. The Cache Creek Settling Basin and adjoining levees are important SPFC facilities to reduce sediment transport into the Yolo Bypass.

- The Middle Creek and Tributaries Project (see Figure 3-1) 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 (see O&M Manual SAC506.2), diversion structures, and a pumping station. A design freeboard of 3 feet has been provided for all levees. Levees are along Poge Creek/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 in 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) has only a left-bank levee (see O&M Manuals SAC506. 2 and SAC506.3). A pumping plant (see 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 at times. Since 2000, DWR has maintained project channels through Assessment District 17. A 2003 Environmental Impact Statement (EIS) for an ecosystem restoration project may lead to deauthorization of a portion of the project and breach existing levees along Rodman Slough (USACE, 2002).

- Lower Cache Creek has SPFC levees (see 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 facilities reduce the flood risk to Woodland and adjoining agricultural lands. The facilities are maintained by DWR.

- East and west training levees (see 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 (see 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 deposition of sediment within the basin. Discharge from the basin directly enters the Yolo Bypass. 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 designed with the spillway to the Yolo Bypass to be raised in increments. The initial raise is complete and the additional raise will be completed by DWR when the sediment levels in the basin reach predetermined levels. The facilities are maintained by DWR.

Relocated Willow Slough

SPFC facilities include relocation of Willow Slough and levees along the excavated channel (see O&M Manual SAC120). A diversion weir is located at the point of bifurcation of the original and relocated channels. Based on the O&M manual, the design capacity of the relocated channel 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. The project is maintained by DWR's Sacramento Yard.

Putah Creek

SPFC facilities (see O&M Manual SAC119) include channel improvements and levees. Based on the O&M manual, the design channel capacity is 40,000 cfs with 3 feet of freeboard from high ground to the Yolo Bypass. 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 reduce flood risk to southern portions of Davis and adjoining agricultural lands. Maintenance is conducted by DWR.

The South Fork Putah Creek Preserve Restoration (see O&M Manual SAC119A) includes 84 acres adjacent to the south bank of South Putah Creek and north of the levee. The project includes a lower vegetated riparian bench area and upper terrace area.

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 the O&M manuals. Levees, maintained by RD 2060, RD 2068, RD 2093 and RD 536, include the following:

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

Yolo Bypass

The Yolo Bypass begins at Fremont Weir (see O&M Manual SAC157 and description under Section 3.2.5). SPFC facilities include levees on the left and right sides of the bypass.

- From Fremont Weir to Knights Landing Ridge Cut, the design capacity of the Yolo Bypass is 343,000 cfs with 6 feet of freeboard, based on the O&M manuals. The right-bank levee (see O&M Manual SAC127) is about 2 miles long and reduces flood risk to adjacent agricultural land. Maintenance is performed by DWR. 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 (see O&M Manual SAC123) is about 4 miles long and reduces flood risk to adjacent agricultural land in RD 1600. Maintenance is conducted by RD 1600 and DWR.

- Based on the 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 a SPFC facility. The left-bank levee (see O&M Manual SAC123) is about 2 miles long and reduces flood risk to adjacent agricultural land in RD 1600. Maintenance is conducted by RD 1600 and DWR.

- 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 the O&M manuals. SPFC facilities in this reach include levees along both sides of the bypass. The right-bank levee (see O&M Manual SAC121) is about 6.4 miles long and reduces flood risk to agricultural land in RD

2035 and Woodland. Maintenance of the levee is by DWR and RD 2035. The left-bank levee (see O&M Manual SAC122) is about 6.1 miles long and reduces flood risk to adjacent agricultural land. Maintenance of the left-bank levee is conducted by RD 1600, while DWR maintains the floodway and the right-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 the O&M manuals. SPFC facilities in this reach include levees along the sides of the bypass. The right-bank levee (see 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 (see O&M Manual SAC116) is about 7 miles long and reduces flood risk to West Sacramento. The left-bank levee is maintained by DWR. The Yolo Basin Wetlands (see O&M Manual SAC521; Vic Fazio Yolo Wildlife Area) is located within this reach and provides about 3,400 acres of wildlife habitat, including permanent wetlands, seasonal wetlands, grassland/uplands, and riparian woodland. Although the wetlands are part of the SPFC, they are subordinate to the flood purposes of the Yolo Bypass because of a flowage easement over the area. 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 a portion of the left levee of the Yolo Bypass.

- 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 the O&M manuals. SPFC facilities include levees. The SPFC right-bank levee (see 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 reduces flood risk to adjacent agricultural land. Maintenance is conducted by DWR, RD 536, RD 2060, and RD 2068. The left-bank levee (see 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. Maintenance is conducted by RD 501 and RD 999. 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.

- Liberty Island, Little Holland Tract, Prospect Island Little Egbert Tract, and other lands surrounded by private levees lay 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 during Yolo Bypass flows in 1998 and the lands have remained flooded since that time.

3.2.5 Sacramento River Watershed

The previous sections 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 Basin in an upstream-to-downstream direction. Figures 3-9, 3-10, and 3-11 include SPFC facilities in the main stem of the Sacramento River watershed.

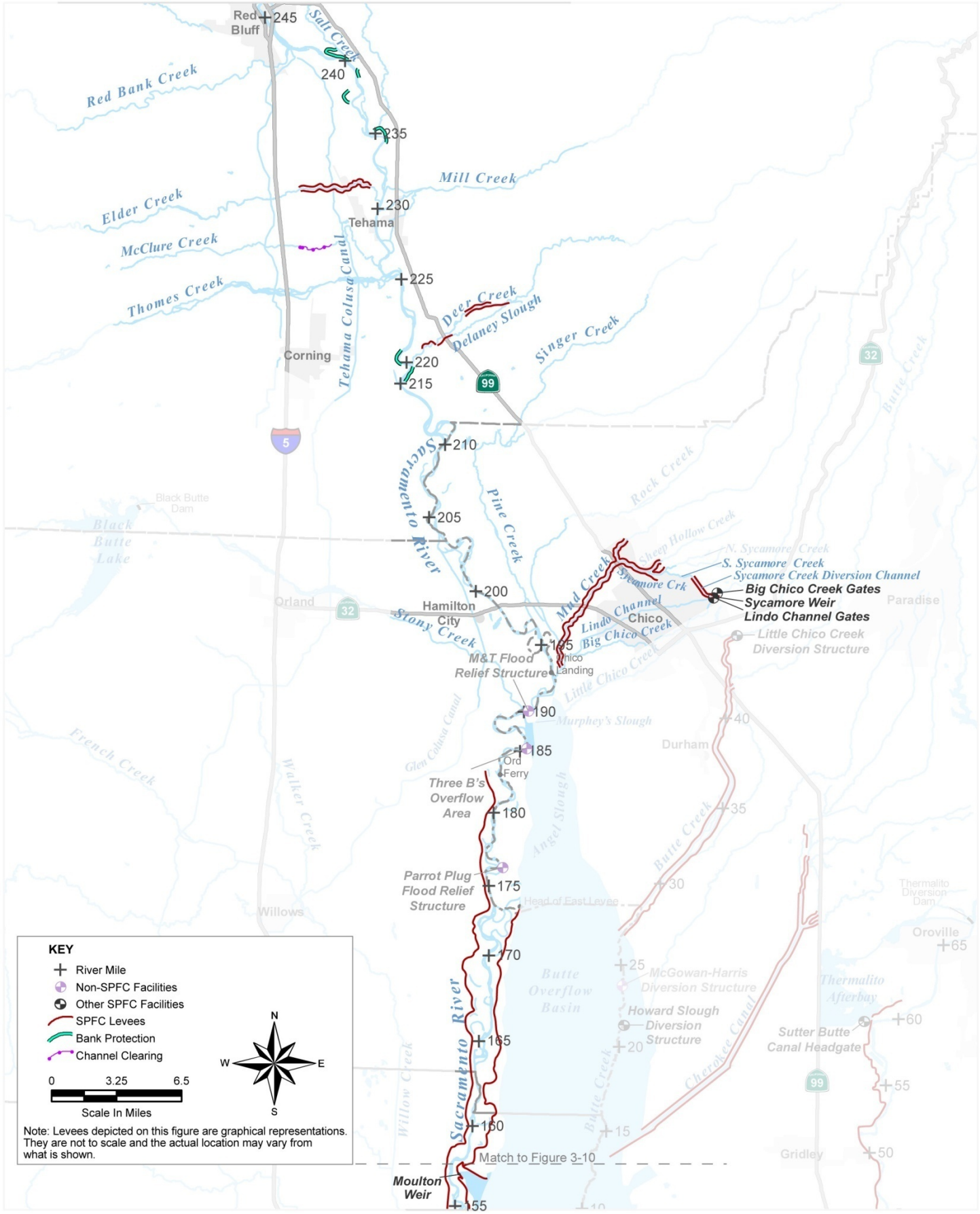

Figure 3-9. Main Stem Sacramento River Watershed – State Plan of Flood Control Facilities Along the Sacramento River and Certain Tributaries from Red Bluff to Moulton Weir

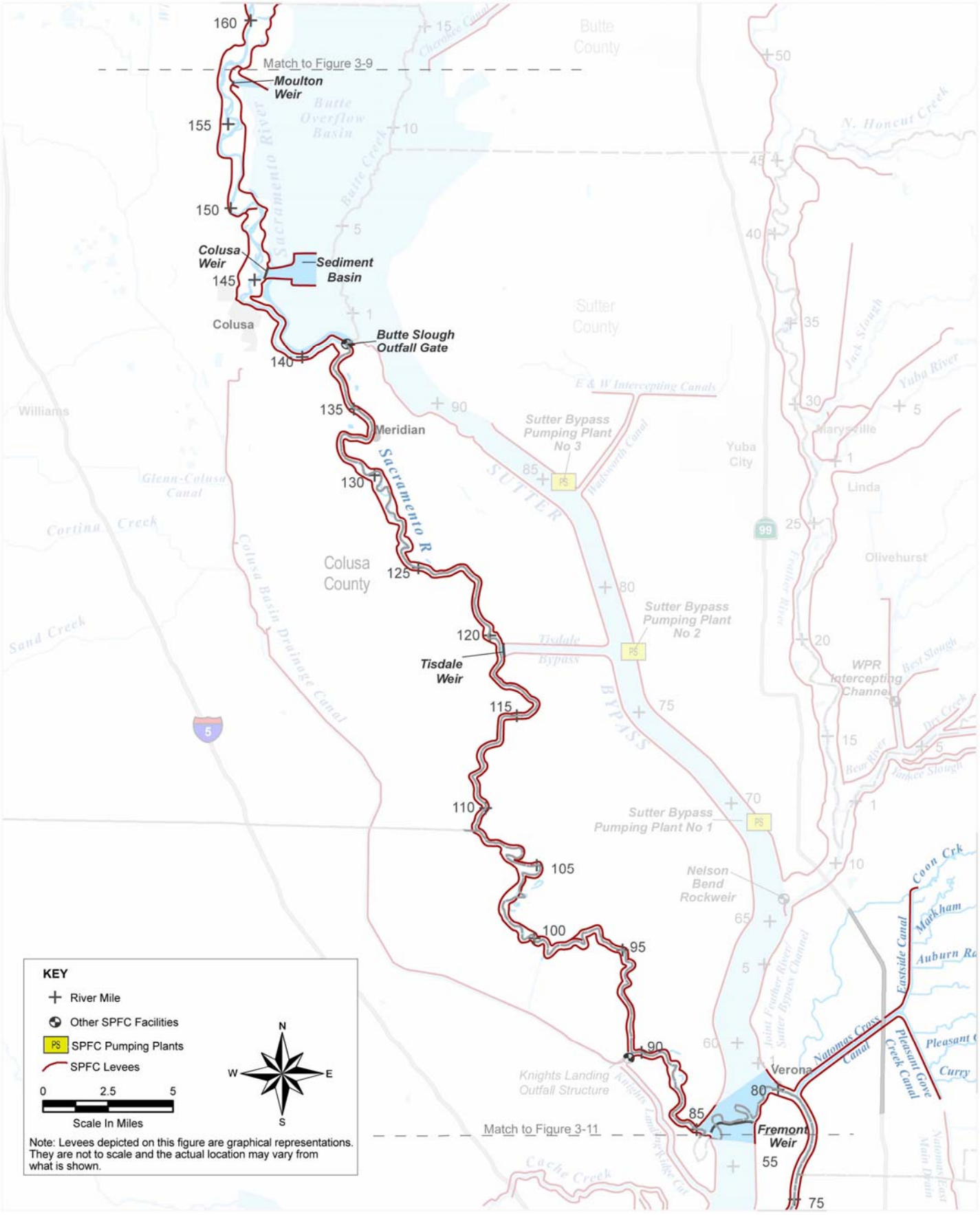

Figure 3-10. Main Stem Sacramento River Watershed – State Plan of Flood Control Facilities Along the Sacramento River from Moulton Weir to Fremont Weir

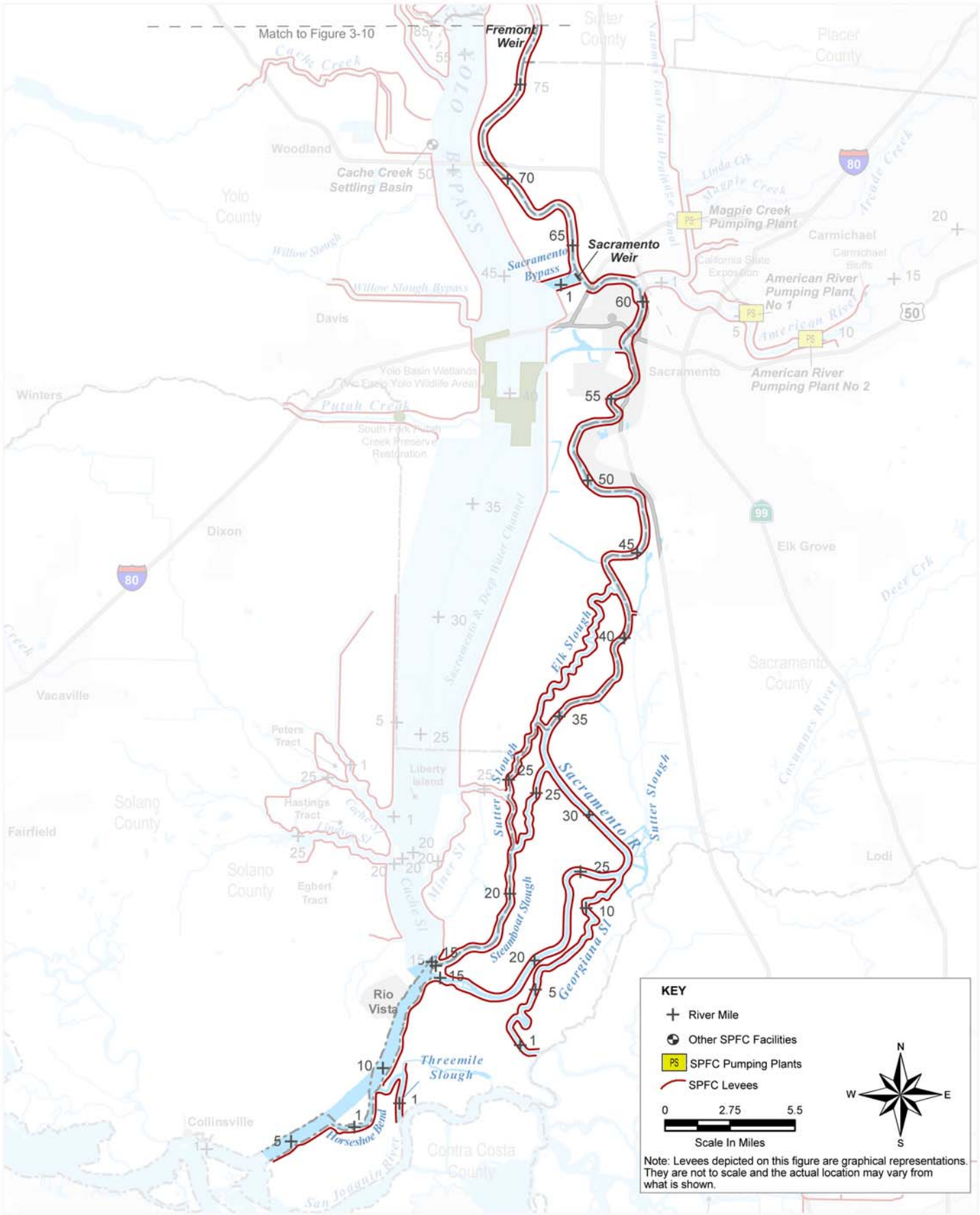

Figure 3-11. Main Stem Sacramento River Watershed – State Plan of Flood Control Facilities Along the Sacramento River and Certain Tributaries and Distributaries from Fremont Weir to Collinsville

Ash and Dry Creeks at Adin

SPFC channel clearing and snagging (see 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 (see Figure 3-1) reduces flood risk to the town of Adin located in Modoc County about 80 miles northeast of Redding. Ash Creek drains into the Pit River, which drains into Shasta Lake. The project is maintained by the Adin Community Services District.

Sacramento River Tributaries Between Red Bluff and Chico Landing

There are several SPFC improvements along tributaries to the Sacramento River between Red Bluff and Chico Landing, none of which is 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 (see O&M Manual SAC513) of Salt Creek from its confluence with the Sacramento River to about 1.7 miles upstream reduces flood risk to residences on the east 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 (see 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 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 (see O&M Manual SAC511) include channel clearing along an 8,700-foot reach from about 1 mile upstream from U.S. Highway 99 to 0.7 mile downstream from the highway. The improvements 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 (see 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 from 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.

Aerial view of the Sacramento River where the river meanders near River Mile 239

Sacramento River from Red Bluff to Chico Landing

SPFC facilities, including bank protection sites (see 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). Because of the meandering nature of the river in the reach, USACE identified locations that needed improvement to prevent movement of the river into adjoining lands.

Specific works completed between River Miles 169 and 242 are listed below:

- 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; and Site No. 9, River Mile 183.9; and on the right bank at Site No. 10, River Mile 189.7; Site No. 11, River Mile 188.6; and Site No. 12, River Mile 189.7. 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; and Site No. 7, River Mile 169.8. 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. 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. 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. 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). 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). 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 right bank at Site Miles 202.0 (600 feet) and 229.0 (3,280 feet). Completed November 5, 1975.

- River banks were shaped and 6,500 feet of stone bank protection placed on the right bank of the Sacramento River at Site Mile 197.0. Complete 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). 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. 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). 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. Completed June 14, 1979.

While some of these sites have failed because of river meander, all sites are still included in the SPFC because no specific action has been taken to remove them. Other bank protection sites have been built along the leveed section of the Sacramento River that begins at Ord Ferry (see SRBPP at the end of Section 3.2.5).

Big Chico Creek/Mud Creek

Big Chico Creek/Mud Creek enters the Sacramento River about 1 mile downstream from Chico Landing. SPFC facilities (see 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. The project includes improvement on Big Chico Creek, Sandy Gulch, Sheep Hollow, Sycamore Creek, Dry Creek, and Mud Creek. Butte County is the maintaining agency. Design capacities shown below 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.

Butte Basin Overflow Area

No SPFC facilities are located on the east side of the Sacramento River between Chico Landing and the start of SPFC left-bank levees near River Mile 175. The design flow of the Sacramento River at Chico Landing is about 260,000 cfs and the design flow of the river at Ord Ferry is about 160,000 cfs, based on the O&M manual. This reduction in river capacity requires flow to leave the river. Historically, overflow over the east bank of the river flowed into the Butte Basin. 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 above 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 Flood Relief Structure (adjacent to the Murphy Slough Plug) located about 3 miles downstream from Chico Landing, the Three B's Overflow Area located about 7.5 miles downstream from Chico Landing, and the Parrot Plug Flood Relief Structure (also known as "Goose Lake Flood Relief Structure") located about 15.5 miles downstream from Chico Landing. While these are State-constructed facilities (thus not meeting the SPFC definition of State-federal facilities for which the State provided assurances to the federal government), both USACE and the State have performed work related to the overflow and the State continues to perform maintenance. The State has included regulation of the overflow areas and the Butte Basin in 23 CCR. See Section 6.8 for a description of how flow to and through the Butte Basin is a condition of meeting the SPFC design profiles.

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. The design capacity of this reach is 160,000 cfs, based on the O&M manuals. The right-bank levee (see O&M Manuals SAC137, SAC139, and SAC140) begins at Ord Ferry and extends about 24 miles downstream to a point opposite Moulton Weir. The levee reduces flood risk to adjacent agricultural lands and small communities, and is maintained by Levee Districts 1 and 2, and by DWR through Maintenance Area 1.

The left-bank levee (see O&M Manuals SAC136 and SAC138) begins about 7.5 miles downstream from Ord Ferry and extends about 16.3 miles to Moulton Weir. The levee assures a consistent division of flows between the Butte Basin and the Sacramento River. Since 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 Levee District 3 and DWR through Maintenance Area 1. The levees in the reach are generally set back from the river and are about 0.5 to 1.5 miles apart.

Moulton Weir spills water into the Butte Basin

Moulton Weir

Moulton Weir and its training levee are SPFC facilities. The weir (see 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 (see Section 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. Maintenance is conducted by DWR.

Sacramento River from Moulton Weir to Colusa Weir

SPFC facilities along this reach of river include levees. The design capacity of this reach is 135,000 cfs, based on the O&M manuals. The right-bank levee (see O&M Manual SAC137) is about 10 miles long. The levee reduces flood risk to adjacent agricultural lands and small communities, and is maintained by DWR through Maintenance Area 1. 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 (see O&M Manual SAC136) is about 9 miles long. The levee reduces flood risk to adjacent agricultural land and small communities. Maintenance is conducted by Levee District 3 and DWR through Maintenance Area 1.

The Colusa Weir, its training levees, and sediment basin are SPFC facilities

Colusa Weir and Sediment Basin

Colusa Weir, its training levees, and sediment basin are SPFC facilities. The weir (see O&M Manual SAC155) is a fixed crest concrete structure, about 1,650 feet long, with a design capacity of 70,000 cfs to Butte Basin (see Section 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 Butte Basin. A sediment basin (see O&M Manual SAC502) was added to limit the discharge of sand into downstream agricultural areas. The basin is operated to assure that at least 1 million cubic yards of reserve sediment storage are available at the beginning of each flood season. The weir, training levees, and sediment basin are maintained by DWR.

Tisdale Weir spills into the Sutter Bypass (photo courtesy of Sutter County)

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. The design capacity upstream from the outfall gates is 65,000 cfs and downstream is 66,000 cfs, based on the O&M manuals. The right-bank levee (see O&M

Manuals SAC137 and SAC131) is about 26 miles long. The levee reduces flood risk to adjacent agricultural lands and Colusa, and is maintained by DWR through Maintenance Areas 1 and 12 and the Sacramento River West Side Levee District.

The left-bank levee (see O&M Manuals SAC133, SAC134, and SAC136) is about 25.6 miles long. The levee reduces 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 (see O&M Manual SAC161) to the Sacramento River control passage of floodwaters from Butte Basin to the Sacramento River at a maximum flow of 3,500 cfs. The gates also allow passage of Butte Slough drainage water to the Sacramento River during the irrigation season.

Tisdale Weir

Tisdale Weir and bypass levees to the Sutter Bypass are SPFC facilities. The weir (see 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 (see O&M Manuals SAC129 and SAC133) are continuous along both sides of the bypass. Both levees reduce flood risk to adjacent agricultural land in RD 1500 and RD 1660. The weir was originally built by local interests and improved by USACE to project standards. The facilities are maintained by DWR.

Sacramento River from Tisdale Weir to Fremont Weir

SPFC facilities between Tisdale Weir and Fremont Weir include levees and the Knights Landing Outfall Gates. The design capacity of the river downstream from Tisdale Weir is 30,000 cfs, based on the O&M manuals. The right-bank levee (see O&M Manuals SAC127 and SAC130) is about 32 miles long. The levee reduces 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.

Sacramento River near Knight's Landing, courtesy of Julia Fredenberg (http://www.flickr.com/photos/julia_fredenburg/2212323091/)

The Knights Landing Outfall Gates are located along the right-bank levee about 26 miles downstream from Tisdale Weir. The Knights Landing Outfall Gates (see O&M Manual SAC162), also known as the Sycamore Slough Outfall Gates, 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. Flap gates were added by USACE and the State.

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

Fremont Weir

The Sacramento River and the joint channel for the Sutter Bypass and Feather River join at the Fremont Weir. 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 Sacramento River and the joint channel for the Sutter Bypass and Feather River join at the Fremont Weir

The Fremont Weir (see 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 (see Section 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 and the flow in the American River. The Sacramento River continues on the east side of the weir. The weir is maintained by DWR.

Sacramento River from Fremont Weir to Sacramento Weir

SPFC facilities along this reach include levees. The design capacity of the Sacramento River in this reach is 107,000 cfs, based on the O&M manuals. The right-bank levee (see O&M Manuals SAC122 and SAC123) is about 18 miles long. The levee reduces flood risk to adjacent agricultural land and is maintained by RD 1600 and RD 827.

The left-bank levee (see O&M Manuals SAC124 and SAC141.1) is about 17 miles long. The levee reduces flood risk to the urbanizing area in Natomas and adjoining agricultural land. The levee is maintained by RD 1000. 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 (see O&M Manual SAC142) and the 4.3-mile-long Pleasant Grove Creek Canal and left-bank levee (see 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 canal (see 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 and reduces flood risk to the Natomas area. RD 1000 assists with the maintenance of the right levee, which is not part of the SFPC.

The Sacramento Weir is the only weir that requires manual operation for flow release

Sacramento Weir and Bypass

The Sacramento Weir and its bypass levees are SPFC facilities. The weir (see 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 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 National Geodetic Vertical Datum (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 (see O&M Manual SAC116) is about 1.8 miles long and the left-bank levee (see O&M Manual SAC122) is about 1.8 miles long. The Sacramento Weir and bypass are maintained by DWR.

Sacramento River from Sacramento Weir to American River

SPFC facilities along this reach of river include levees on both banks. 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 Sacramento River near Walnut Grove, courtesy of Aquafornia: http://www.flickr.com/photos/aquafornia/2398065

The right-bank levee (see O&M Manual SAC116) of the Sacramento River and the left-bank levee (see O&M Manual SAC124) are both about 2.5 miles long. The right-bank levee reduces flood risk to West Sacramento and is maintained by DWR. The left-bank levee reduces flood risk to the Natomas area and is maintained by RD 1000 and DWR through Maintenance Area 4.

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). Based on the 1957 profile, the reach appears to have 6 feet of freeboard. Improvements have been made to both the left- and right-bank levees to improve stability since the development of the 1957 profile.

The right-bank levee (see O&M Manuals SAC113, SAC114, and SAC116) is about 22 miles long. The levee was originally built by local interests and repaired with bank protection, levee setbacks, and levee enlargements to project standards by USACE. The levee reduces 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 (see O&M Manuals SAC111, SAC115, SAC117, and SAC118.1) is about 18 miles long. The levee reduces 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 remaining levee was built by local interests and rebuilt to project standards by USACE. The levee is maintained by the American River Flood Control District and DWR through Maintenance Area 9.

Sacramento River from Elk Slough to Collinsville

SPFC facilities along this reach include levees. 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 design capacity of the river 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 Three Mile Slough distributary – 514,000 cfs with 6 feet of freeboard

The right-bank levee along the Sacramento River (see O&M Manuals SAC104, SAC110, and SAC112) is about 20 miles long. The levee was constructed by local interests and enlarged, setback, or repaired to project standards by USACE. There is no right-bank levee downstream from the confluence with the Yolo Bypass. The levee reduces 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 (see 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 reduces 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 (see O&M Manuals SAC112 and SAC113); design capacity 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 (see O&M Manuals SAC105, SAC110, SAC112, and SAC113); design capacity 25,500 (between Miner Slough and the Sacramento River) cfs and 15,500 cfs (between Steamboat Slough and Miner Slough). RD 999 maintains 3.8 miles of right-bank levee and RD 3439 maintains 6.6 miles of left-bank levee.

- Levees on both banks of Miner Slough (see O&M Manuals SAC105 and SAC113), a distributary from Sutter Slough; design capacity 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 (see O&M Manuals SAC104, SAC105, SAC110); design capacity of 28,000 cfs upstream from Miner Slough and 43,500 cfs downstream from Miner Slough. RD 249 maintains 4.4 miles of right-bank levee; RD 501 maintains 6.8 miles of left-bank levee.

- Levees on both banks of Georgiana Slough (see O&M Manual SAC103); design capacity 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 Three Mile Slough (see O&M Manuals SAC101 and SAC102); design capacity 65,000 cfs. RD 341 maintains 3.3 miles of right-bank levee and RD 1601 maintains 2.5 miles of left-bank levee.

Sacramento River Bank Protection Project

The SRBPP is a continuing construction project to provide protection for the existing levees and flood control facilities of the SRFCP. The purpose of the bank protection work is to correct erosion problems on levees and immediately adjacent banks that may lead to levee breaks and resulting losses of life and property. Other SRBPP bank protection work has been aimed at maintaining sufficient overflows into the bypass system and Butte Basin so that excessive flood flows do not cause failures of downstream levees.

Phase I of the SRBPP was constructed from 1963 to 1975, and consisted of 430,000 feet of completed levee protection. In 1974, repair of 405,000 levee feet was authorized for SRBPP Phase II. Construction began in 1976 and is nearly complete. Bank protection at these waterways varied by location, but in general included the following measures:

- Setback levees – New levees constructed behind existing levees.

- Meanderbelt program – Allowed stream channels to meander within existing levees to maintain the dynamic natural system.

- Channel stabilization program – Construction of bank protection at the outside of each river bend not currently protected.

- Limited bank protection (urban areas) – Construction of rock revetment to the sustained high-water mark at critical erosion sites along the levee systems protecting urban areas.

- Bank protection – Including revetment, modified revetment, and nonrevetment.

- Mitigation – Including vegetation plantings, establishment and maintenance of wildlife habitat, and recreational facility development.

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, and (11) Sutter Slough.

USACE and the Board will begin investigation of Phase III of the SRBPP in 2010.

3.3 SPFC Facilities in the San Joaquin River Basin

This section provides a reach-by-reach description of SPFC facilities in the San Joaquin River Basin. 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.

An index map of the San Joaquin River Basin showing the two major watersheds, which include SPFC facilities, is included as Figure 3-12.

Figure 3-12. Index Map of the San Joaquin River Basin 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 San Joaquin 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 Fresno Slough. 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. The project used portions of levees already in place along canal banks, rehabilitated them, and built new reaches of levees. 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.

Figure 3-13 shows SPFC facilities in the Chowchilla and Eastside Bypass watershed.

Chowchilla Canal Bypass Control Structure

The Chowchilla Canal Bypass Control Structure is an SPFC facility. Water enters the bypass system from the San Joaquin River through the Chowchilla Canal Bypass Structure (see 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. While the gates were designed for automatic operation, the gates 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.

The Chowchilla Canal Bypass Control Structure is an SPFC facility

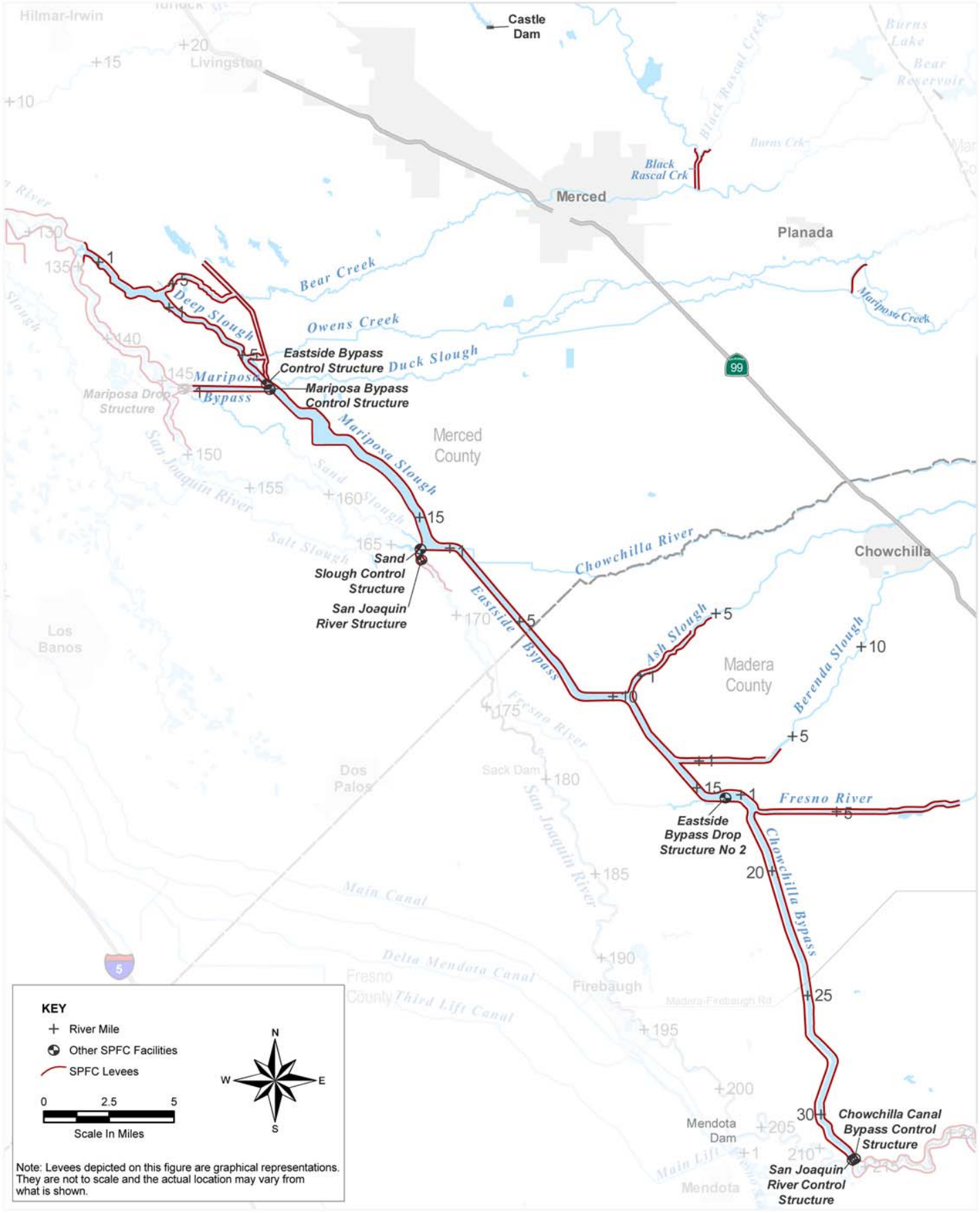

Figure 3-13. Chowchilla and Eastside Bypasses – State Plan of Flood Control Facilities Along the Chowchilla and Eastside Bypasses and Tributaries

Chowchilla Canal 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. The design capacity of the reach is 5,500 cfs. The levees (see O&M Manual SJR601) in this reach are each about 14.6 miles long. The debris and 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.

Fresno River

The Fresno River enters the bypass system at the downstream end of the Chowchilla Bypass. SPFC facilities (see O&M Manual SJR606) include an excavated trapezoidal channel with levees on both banks for a realigned Fresno River and a diversion weir. Based on the O&M manual, the channel and levees, with a design capacity of 5,000 cfs, 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 release of flows for riparian water users along the right and left banks. The facilities reduce flood risk to adjacent agricultural land and the City of Madera. The facilities are maintained by the Madera County Flood Control & Water Conservation District.

Levees line the channel downstream from the Chowchilla Bypass Control Structure

Eastside Bypass from Fresno River to Berenda Slough

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

Berenda Slough

Berenda Slough is a distributary channel of the Chowchilla River that enters the bypass system. The design capacity of Berenda Slough at its confluence with the Eastside Bypass is 2,000 cfs, based on the O&M manual. SPFC facilities (see O&M Manuals SJR601 and SJR605) include channel enlargements, levees on both channel banks, and diversion structures. 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 reduce flood risk to

the City of Chowchilla and adjacent agricultural land, and are maintained by Madera County.

Eastside Bypass from Berenda Slough to Ash Slough

SPFC facilities (see O&M Manual SJR601) along this reach of bypass include levees on both banks of the channel. The channel and levees, with a design capacity of 12,000 cfs, based on the O&M manual, 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.

Ash Slough

Ash Slough is a distributary channel of the Chowchilla River that enters the bypass system. The design capacity of Ash Slough at its confluence with the Eastside Bypass is 5,000 cfs, based on the O&M manuals. SPFC facilities (see O&M Manuals SJR601 and SJR605) include channel enlargements, levees on both banks of the channel, diversion structures, and drop structures. 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 reduce flood risk to the City of Chowchilla and adjacent agricultural land, and are maintained by the Lower San Joaquin Levee District.

Eastside Bypass from Ash Slough to Sand Slough

SPFC facilities (see O&M Manual SJR601) along this reach of bypass include levees on both banks of the channel. The channel and levees, with a design capacity of 17,000 cfs based on the O&M manual, are about 10.5 miles long. Water from the San Joaquin River enters the bypass through the Sand Slough Control Structure (see description under Section 3.3.2, San Joaquin River Watershed) at the downstream end of the reach. Design inflow from the San Joaquin River is about 4,500 cfs. The levees are maintained by the Lower San Joaquin Levee District.

Eastside Bypass from Sand Slough to Mariposa Bypass

SPFC facilities (see O&M Manual SJR601) along this reach of bypass include l**e**vees on both banks of the channel. The channel and levees, with a design capacity of 16,500 cfs based on the O&M manual, 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.

Mariposa Bypass

SPFC facilities for the Mariposa Bypass (see O&M Manual SJR601) include levees along both banks, a control structure at its upstream end, and drop structure near its downstream end. The channel and levees, with a design capacity of 8,500 cfs based on the O&M manual, are about 3.4 miles long. The Mariposa Bypass Control Structure (see O&M Manual SJR601A) consists of 14 equal 20-foot-wide bays – eight gated and six ungated. While the gates were designed for automatic operation, the gates are currently operated manually. The facilities are maintained by the Lower San Joaquin Levee District.

Eastside Bypass from Mariposa Bypass to Bear Creek

SPFC facilities (see O&M Manual SJR601) along this reach of bypass include levees on both banks of the channel and the East Side Bypass Control Structure. The channel and levees, with a design capacity of 13,500 cfs based on the O&M manual, are about 6 miles long. The Eastside Bypass Control Structure (see O&M Manual SJR601A), located about 1,100 feet downstream from the junction with the Mariposa Bypass, consists of six equal 20-foot-wide bays. While the gates were designed for automatic operation, the gates 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 mile upstream from the bypass. Bear Creek, with a design capacity of 7,000 cfs, enters the bypass at the downstream end of the reach. Levees on Bear Creek (see O&M Manual SJR601) extend about 3.5 miles upstream from the bypass. The East Side Canal and left-bank levee extends 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.

The Merced County Stream Group project (see O&M Manual SJR607) includes two diversion channels with levees and channel clearing, a dam, and channel enlargements to reduce the flood risk for the City of Merced and adjacent agricultural land. SPFC facilities include a diversion channel from Black Rascal Creek to Bear Creek. 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 (see 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 State and Merced County, and is operated and maintained by the Merced Irrigation District (USACE, 1999).

Eastside Bypass from Bear Creek to San Joaquin River

SPFC facilities (see O&M Manual SJR601) along this reach of bypass include levees on both banks of the channel. The channel and levees, with a design capacity of 18,500 cfs based on the O&M manual, 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.

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 up to 12,000-cfs flows 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 3-14, 3-15, and 3-16 show SPFC facilities along the San Joaquin River.

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

Levees are the only SPFC facilities along this reach (see O&M Manual SJR601). The design capacity of the levees 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 (see Section 3.3.1) and the San Joaquin River. The San Joaquin

River Control Structure releases water into the San Joaquin River. Levees are maintained by the Lower San Joaquin Levee District.

San Joaquin River Control Structure

The San Joaquin River Control Structure (see O&M Manual SJR601B) is an SPFC facility, identical to the Chowchilla Bypass Control Structure. The structure has four gated bays, each 20 feet wide. While the gates were designed for automatic operation, the gates 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 downstream from the control structure for about 33 miles to near the Sand Slough Control Structure has no SPFC facilities.

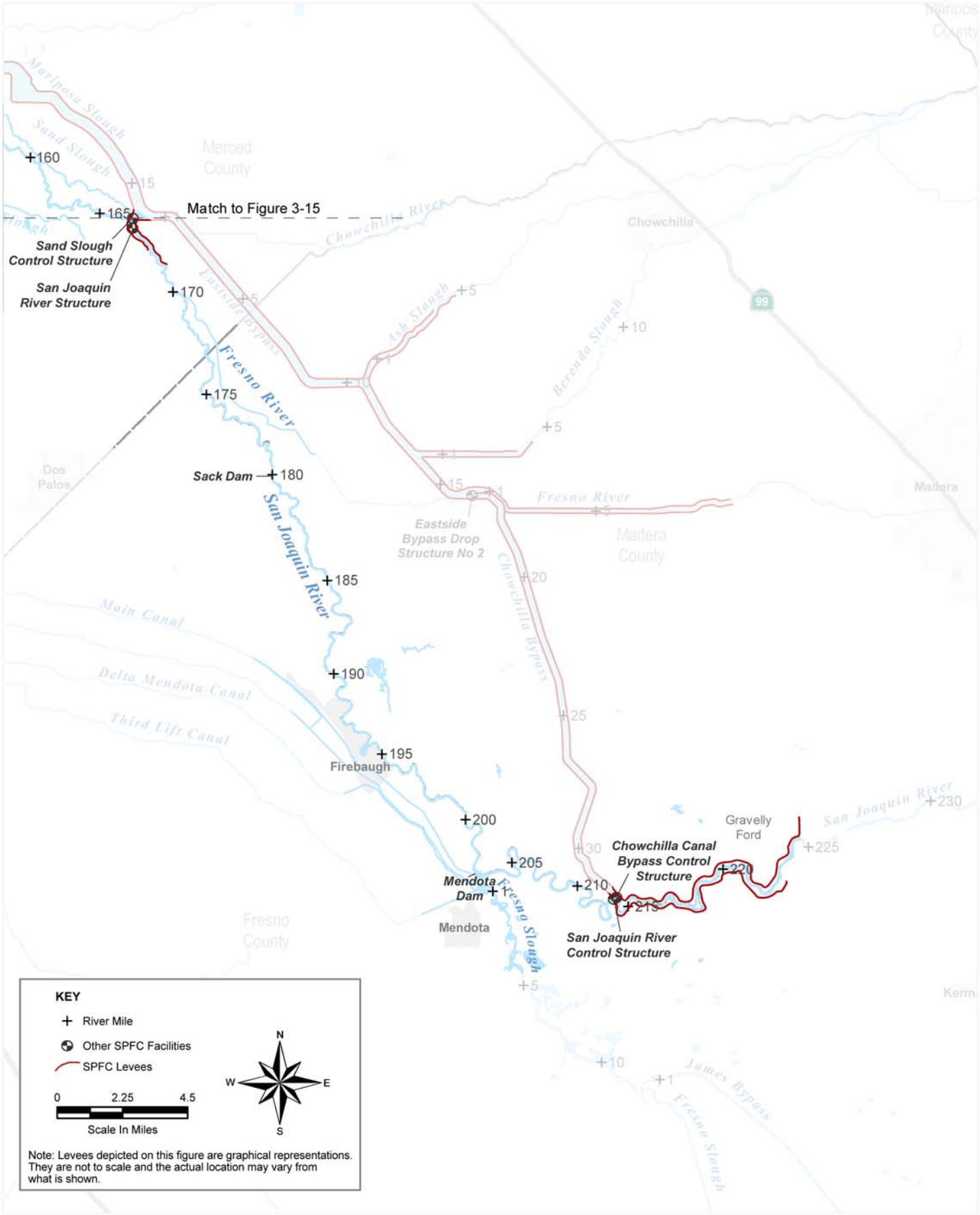

Figure 3-14. San Joaquin River Watershed – State Plan of Flood Control Facilities Along the San Joaquin River from Gravelly Ford to the Sand Slough Control Structure

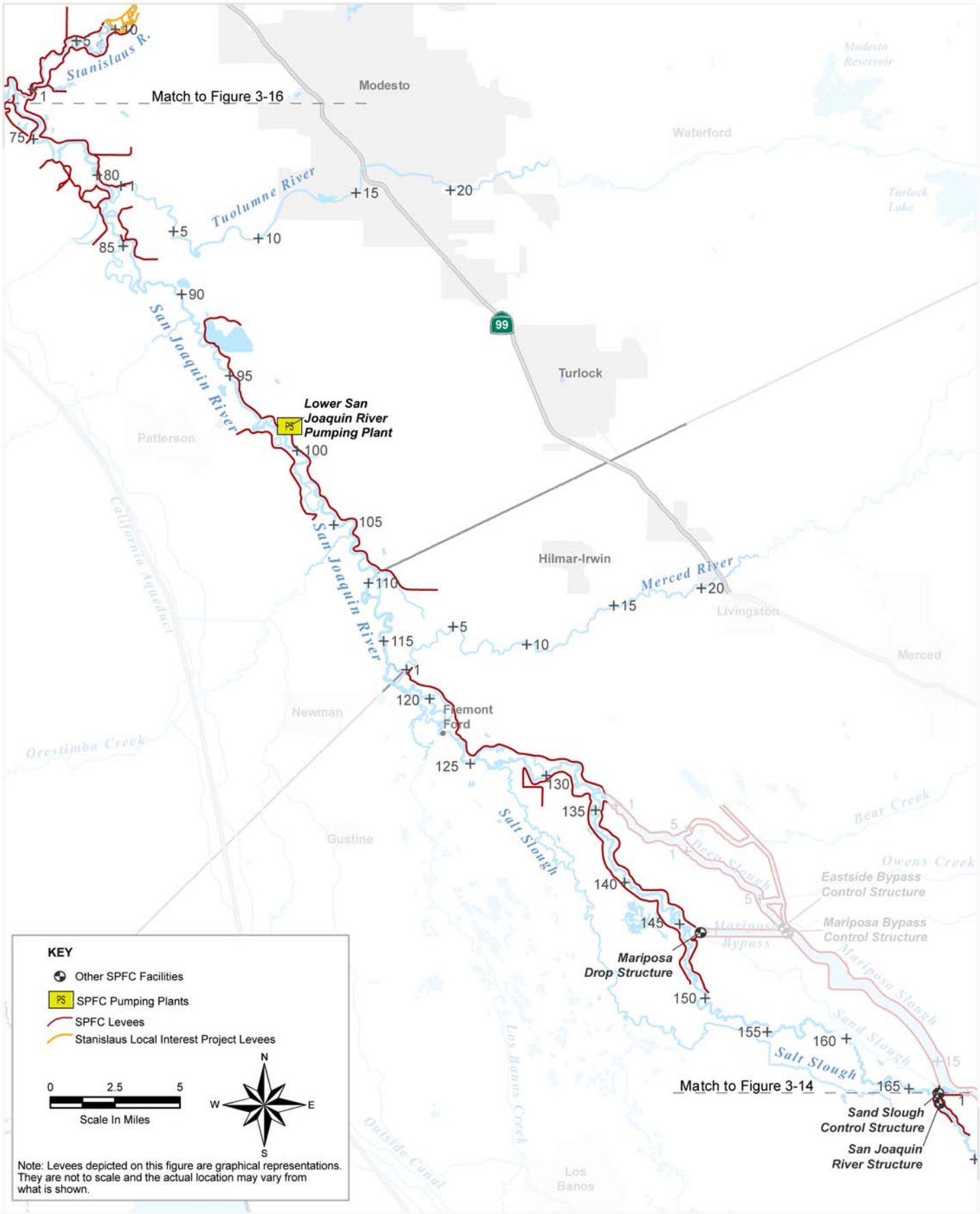

Figure 3-15. San Joaquin River Watershed – State Plan of Flood Control Facilities Along the San Joaquin River from the Sand Slough Control Structure to Stanislaus River

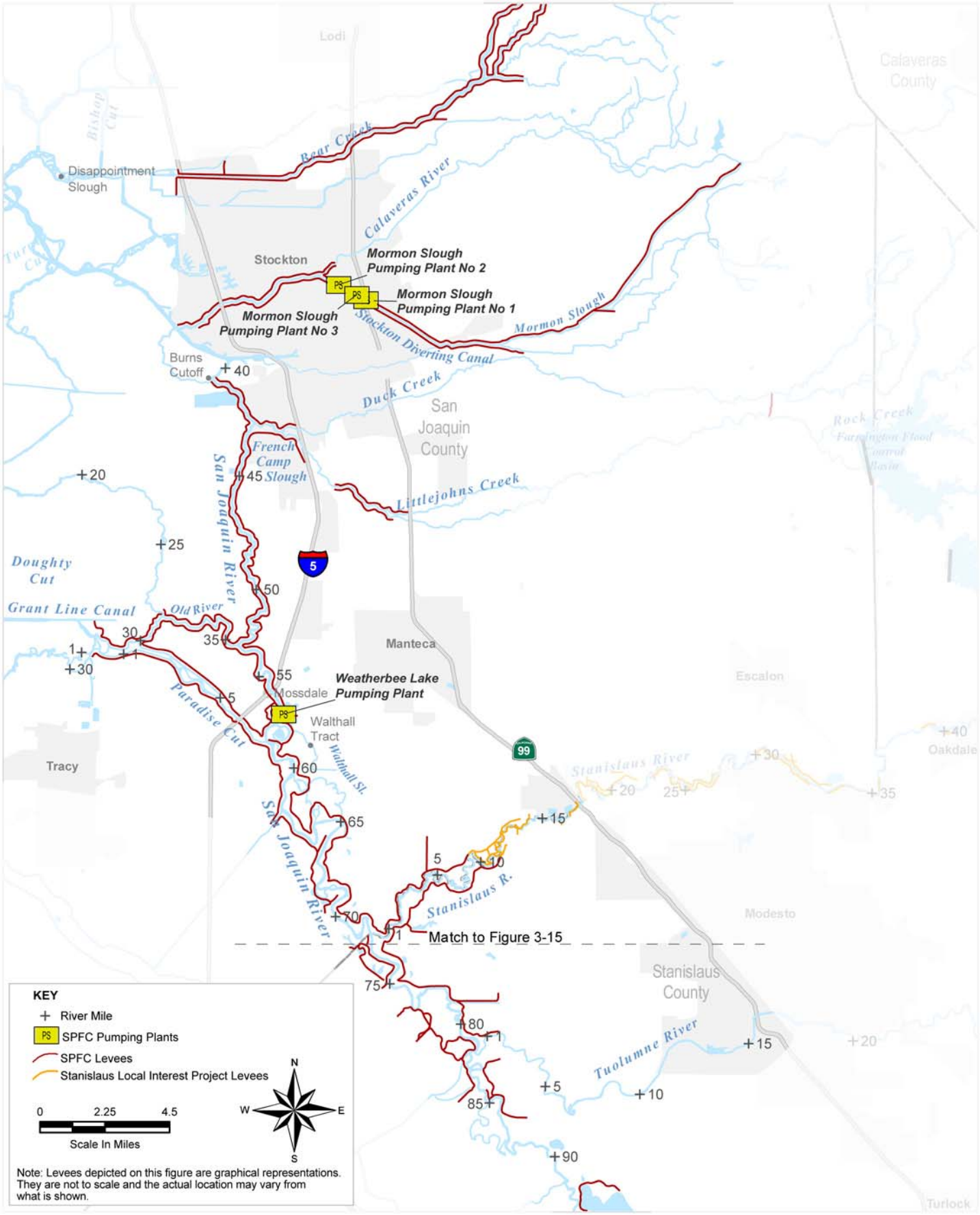

Figure 3-16. San Joaquin River Watershed – State Plan of Flood Control Facilities Along the San Joaquin River and Major Tributaries and Distributaries from Stanislaus River to Disappointment Slough

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. The channel capacity downstream from the control structure is about 2,500 cfs. The Kings River Channel Improvement Project (see O&M Manuals SJR604 and SJR604A) is a non-SPFC project in the Tulare Lake Basin, but federally regulated flows enter the San Joaquin River. During flood release events from Pine Flat Reservoir, the majority of Kings River flows, up to 4,750 cfs, are diverted north into the San Joaquin River through James Bypass and Fresno Slough.

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 (see O&M Manual SJR601). 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 limited channel capacity in the San Joaquin River – the design capacity is 1,500 cfs based on the O&M manual, but vegetation and other channel constrictions have reduced the actual capacity to less than 100 cfs. SPFC facilities are maintained by the Lower San Joaquin Levee District.

San Joaquin River from San Joaquin River Structure to Mariposa Bypass

SPFC facilities (see O&M Manual SJR601) along this reach are levees just upstream from the junction with the Mariposa Bypass. 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.

San Joaquin River from Mariposa Bypass to Eastside Bypass

SPFC facilities (see O&M Manual SJR601) are levees along both sides of the river. The levee design capacity is 10,000 cfs based on the O&M manual. The levees are each about 7 miles long.

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 (see O&M Manual SJR601) along this reach include levees. 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.

San Joaquin River from Merced River to Stanislaus River

The river has discontinuous SPFC levees along both banks of this 44 mile-long reach and one pumping plant. Based on the 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 (see O&M Manuals SJR4, SJR5, and SJR6) consists of three discontinuous segments totaling 20.4 miles. The levees protect agricultural land in RD 2031, RD 2063, RD 2091, and Dos Rios Ranch. About midway between the Merced and Tuolumne rivers, an SPFC pumping plant (see O&M Manual SJR6A) allows discharge of drainage water from the levee-protected area to the San Joaquin River. The pumping plant (capacity of 30,000 gallons per minute) also has provision for gravity flow of drainage water when the flow in the San Joaquin River is low. The left-bank levee (see O&M Manuals SJR12 and SJR13) consists of four discontinuous segments totaling 16.4 miles. The levees protect agricultural land in RD 1602, RD 2099, RD 2100, RD 2101, and RD 2102, and are maintained by those agencies.

Stanislaus River

SPFC facilities on the Stanislaus River include levees on both banks upstream from the San Joaquin River. 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 LIPLs (see Chapter 2) have been identified by USACE as adequate to contain this design capacity. The right-bank levee (see 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 (see O&M Manual SJR4) is 7.2 miles long from high ground to its connection with the San Joaquin River levee. Channel maintenance (see O&M Manual SJR614) is included downstream from Goodwin Dam.

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. The design capacity is 52,000 cfs based on the O&M manuals. The right-bank levee (see O&M Manual SJR3) is 11.3 miles long.

This levee protects agricultural land in RD 2064, RD 2075, and RD 2094, and is maintained by those agencies. The left-bank levee (see O&M Manual SJR11) begins about 2 miles downstream from the Stanislaus River. This levee protects 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.

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. The design channel capacity is 15,000 cfs based on the O&M manuals. The right-bank levee (see O&M Manual SJR9) is 5.9 miles long. This levee protects Stewart Tract and the developing area of Lathrop. The left-bank levee (see O&M Manual SJR10) is 6.2 miles long. The levees are maintained by RD 2058 and RD 2062.

San Joaquin River from Paradise Cut to Old River

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

Old River

SPFC facilities along Old River include levees on both sides of the channel. The right-bank levee (see 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 the right-bank levee 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 (see 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 the left-bank levee is 19,000 cfs. The levee protects Stewart Tract and the urbanizing area of Lathrop. Levees along Old River are maintained by RD 2062, RD 2089, RD 544, and RD 1.

San Joaquin River from Old River to Burns Cutoff

SPFC facilities along this reach of river include levees on both banks. The design capacity is 18,000 cfs based on the O&M manuals. The right-bank levee (see 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 (see O&M Manual SJR7) is about 12.4 miles long and is maintained by RD 544.

French Camp Slough

SPFC facilities within the French Camp Slough drainage include a diversion, channel clearing and excavation, and levees. A dike across Duck Creek and a 5,000-foot-long diversion channel (see 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 reduces flood risk to Stockton and its surrounding urban area.

Both the right (see O&M Manual SJR1) and left (see 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. Levees along French Camp Slough are maintained by RD 17 and RD 404.

Calaveras River and Mormon Slough

The Calaveras River is a tributary to the San Joaquin River. SPFC facilities within the Calaveras River drainage include a diversion from Mormon Slough, pumping plants, and levees and improved channels along Mormon Slough, Porter Creek, and the Calaveras River (see O&M Manual SJR611.1 for channels and levees and O&M Manual SJR611.2 for the pumping plants). There is also a diversion from the Calaveras River to Mormon Slough at Bellota that does not show in the O&M manual as an SPFC facility.

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 Mormon Slough Diversion. Porter Creek has a 0.9-mile-long left-bank levee upstream from its confluence with Mormon Slough. The Stockton Diverting Canal, about 5 miles long, diverts Mormon Slough water to the Calaveras River. Both banks of the diverting canal have levees. Design capacity is 12,500 cfs based on the O&M manuals. Three pumping plants along the right bank of the diverting canal discharge local drainage water into the canal.

The Calaveras River has levees along both banks for a distance of about 6.5 miles upstream from the San Joaquin River. The design capacity of the

river is 13,500 cfs. Facilities are maintained by the San Joaquin County Flood Control and Water Conservation District.

Bear Creek

Bear Creek is a tributary to the San Joaquin River – the creek is not the same as the Bear Creek that is tributary to the Eastside Bypass. SPFC facilities include cleared and excavated the channel and levees on Bear Creek, Paddy Creek, Middle Paddy Creek, and North Paddy Creek. The project includes 14.4 miles of cleared and enlarged channel, 1.3 miles of new channel, and 30.1 miles of levee. O&M Manual SJR612.2 covers the project from high ground to Highway 99. O&M Manual SJR612.1 covers the project from Highway 99 to Disappointment Slough. Facilities are maintained by the San Joaquin County Flood Control District.

3.4 Other Flood Projects with State Assurances

The State has provided the federal government assurances on other flood management projects in California, but these projects do not meet the definition (see Section 1.1) for the SPFC because of their location. The SPFC is limited to projects within the watersheds of the Sacramento and San Joaquin rivers. Examples of other flood projects with State assurances 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 Basin. Since 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 HD 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 (see O&M Manual SAC514) reduces flood risk to the City of Fairfield and Suisun City. The Fairfield Vicinity Streams Project includes improvements along Union Avenue Creek, a small unnamed tributary near Highway 80, 1 mile of Legewood 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 State provided assurances 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.