



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

(old river mileage system); 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 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 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.
- 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

The Butte Basin Overflow Area is an historic overflow area where floodwaters from the Sacramento River spill into the Butte Basin periodically. The importance of this river reach to the functioning of the SRFCP was recognized through the Board's 1986 certification of the EIR 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 the 1986 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

Big Chico Creek/Mud Creek

Big Chico Creek/Mud Creek enters the Sacramento River about 600 feet upstream 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 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.

Ferry gage 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 two 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.

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



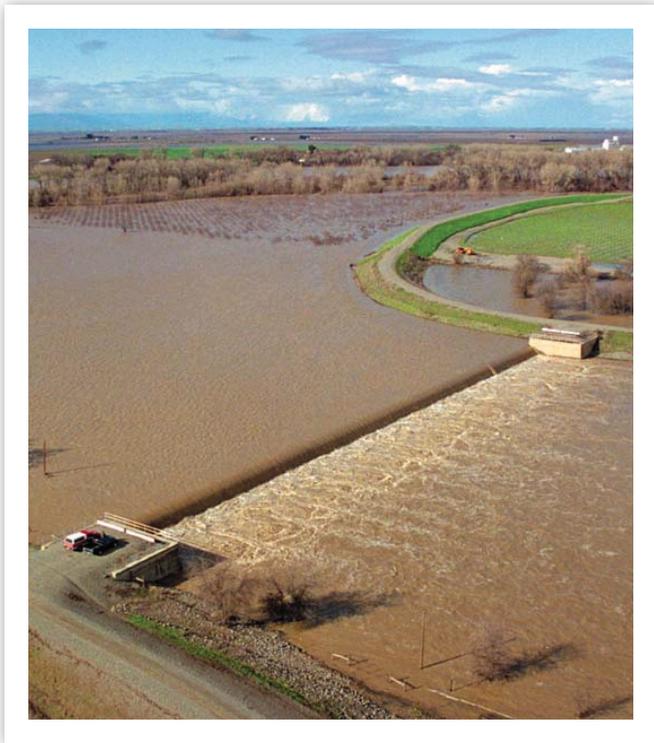
The SPFC relies on the Three B's Natural Overflow Area to protect downstream levees on the Sacramento River

DWR 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 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 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 above) are part of the SPFC.

The State also included regulation of overflow to the Butte Basin in Title 23 CCR (see <http://cvfpub.ca.gov/regulations/CCRTitle23WatersDiv1.pdf>). The standards for the Butte Basin are contained in Section 135, Division 1, 23 CCR. In general, these standards require approval from the Board for any encroachment that could reduce or impede flood flows, or would reclaim any of the floodplain within the Butte Basin. The Board 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 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 gage 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. See the SPFC History Report (under development) for a detailed description and chronology of the Butte Basin Overflow Area.



Moulton Weir spills water into the Butte Basin

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. The right-bank (west) levee (see 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 (see 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 to 1.5 miles apart.

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 through Sutter Maintenance Yard.

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 O&M manuals.

The right-bank levee (see 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 Colusa Weir, its training levees, and sediment basin are SPFC facilities

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

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 so 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 through Sutter Maintenance Yard.

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 O&M manuals. The right-bank levee (see 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 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 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 (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 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 improved by USACE to project standards. The facilities are maintained by DWR through 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 gage exceeds 55.0 feet NGVD 29.



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

Sacramento River from Tisdale Weir to Fremont Weir

SPFC facilities between Tisdale Weir and Fremont Weir include levees and the Knights Landing Outfall



Sacramento River near Knights Landing (photo courtesy of Julia Fredenberg)

Gates. The design capacity of the river downstream from Tisdale Weir is 30,000 cfs, based on O&M manuals.

The right-bank levee (see O&M Manuals SAC127 and SAC130) is about 32 miles long. The levee is intended to reduce flood risk to