Sacramento River Bank Protection Project

2017 ANNUAL EROSION RECONNAISSANCE FIELD REPORT

Sacramento River Bank Protection Project

US Army Corps of Engineers®

2017 ANNUAL EROSION RECONNAISSANCE

FIELD REPORT

SACRAMENTO RIVER BANK PROTECTION PROJECT

SACRAMENTO RIVER AND TRIBUTARIES

September 2018

US Army Corps of Engineers®

SACRAMENTO DISTRICT

Table of Contents

1.0 Authorization

The Sacramento River Bank Protection Project (SRBPP) was authorized for the protection of the existing levees and flood control facilities. It was originally authorized by the 86th Congress under the Flood Control Act of 1960, Public Law 86-645, Title II. It is currently authorized by the Water Resource Development Act of 2007. Under the current authorization (Phase II) there is about 2,280[1] linear feet (LF) available for repairs out of the original 405,000 LF. An additional 80,000 linear feet should be available at the completion of the Post Authorization Change Report. The project area consists of the leveed portion of the Sacramento River and its tributaries and sloughs, as shown in **Figure 1**.

2.0 Purpose

This report summarizes and documents the annual erosion reconnaissance of the Sacramento River Flood Control System (SRFCS). The erosion inventory is conducted every year[2] and consists of a visual inspection of the levees and banks of the Sacramento River Flood Control System by the Engineering Division. Personnel from various sections of the US Army Corps of Engineers collected photos with a GPS camera and data using a Trimble XH with GPS and GIS capabilities. The purpose of the reconnaissance is to maintain and update an inventory of erosion sites, identify new erosion sites, monitor existing erosion sites, and collect data to assist with the site selection process of this project. A site is deemed an erosion site if the erosion is into the projection of the levee slope (section 5.0).

3.0 Project Background

The annual erosion inventory started in 1997, following the large flood event in the winter of 1996 and 1997. This flood event caused a levee breach and numerous flood fighting efforts throughout the SRFCS. The original goal of the inventory was to identify the eroded areas in the levee system and repair them. Since this time, environmental impact concerns resulted in a jeopardy opinion being issued by the resource agencies and have limited the repair work by the SRBPP[3]. Following the jeopardy opinion, repairs were primarily performed under emergency work (PL84-99) or through local maintenance efforts because most of the SRBPP work was found to have potential impacts to critical habitat.

Under the SRBPP, one site on the Sacramento River and five sites on the American River were repaired between 1997 and 2005. In February 2006, after high flows in the rivers of the Sacramento Valley, the Governor of California, Arnold Schwarzenegger, declared a state of emergency for the Central Valley

[1] This is remaining linear feet after the completion of the repair on the Sacramento River at RM 71.3 right bank, which was under construction at the time of the field work, but completed at the time of report completion.

[2] The 2013 Erosion Inventory was only produced in Draft format, but all information gathered during that inventory is contained in this report. Due to funding and personnel constraints, no inventory was conducted in 2014.

[3] A Jeopardy Biological Opinion (BO) was issue by FWS in 2000 related to Splittail and Delta Smelt. A Draft Jeopardy Biological Opinion was issued NMFS in 2001 for WR Chinook, SR Chinook, and Steelhead for most of the project area.

levees. In the following years, all the sites that were defined as "critical" in the 2005 inventory were repaired. Over 100 sites have been repaired since the declaration through the combined efforts of the U.S. Army Corps of Engineers (USACE) and the California Department of Water Resources (DWR). The Local Maintaining Agencies (LMA) who are responsible for maintenance of the levees have also been doing repairs throughout the system.

The rate of repair has dropped since the competition of the emergency work. Since 2010, 9 sites[4] have been repaired by USACE under this program, and 5 sites[5] have been repaired by CA DWR. However the work by the local maintaining agencies has increased, with 9[6] erosion sites repaired[7] in the last 2 years, to the point where they can be removed from the inventory. Due to the limited repairs, the data collected in this report will be used in the Site Selection Process to determine the next sites for repair.

[4] FHR 7.0L, LAR 10.0L, LAR 10.6L, SAC 77.2L, SAC 57.0R, SAC 57.2R, SAC 26.0L, SAC 16.8L, and SAC 71.3R
[5] CHC 3.9L, CHC 4.2L, SAC 46.7L, CHC 2.8L, CHC 3.4L, and FHR 50.9
[6] BER 0.8L, LDS 1.9L, LDS 2.4L, PUC 0.1L, SAC 18.9L, SAC 26.3R, SAC 31.6R, SAC 35.4L, SAC 125.8L
[7] The number of sites repaired by the locals may actually be higher, these are only the ones we could confirm.

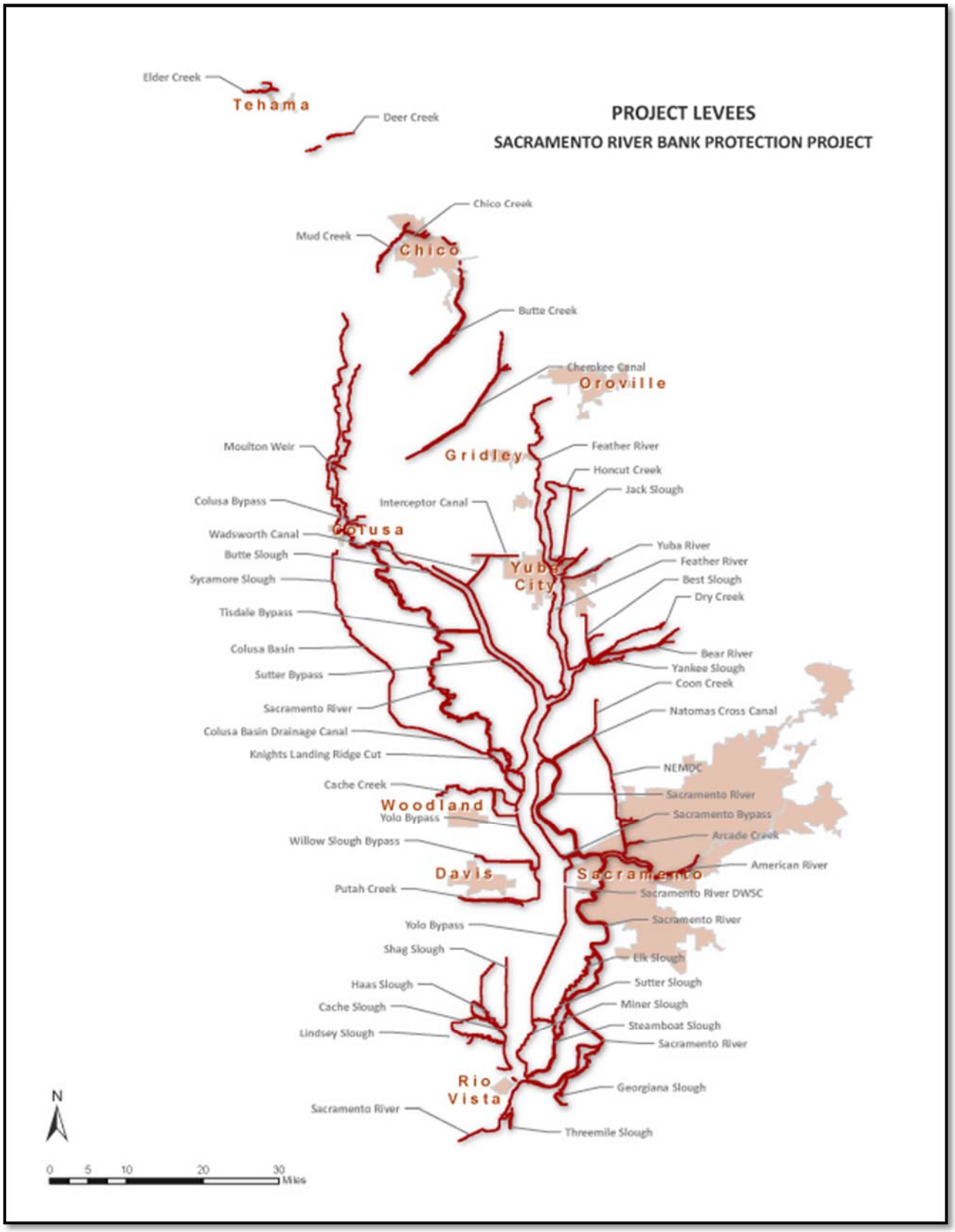

Figure 1. Project Levees of the Sacramento River Flood Control System

4.0 2017 Flood Event

The 2017 water year[8] for the Sacramento River was the wettest winter on record, breaking the previous record set in 1982-83. Prior to this flood season, the State of California was in a drought that lasted roughly six years. Due to the drought, the flood levels in the reservoirs were low, which allowed for more storage capacity and reduced the peak flows of the water sent down the highly regulated Sacramento River system.

Flows throughout the system varied from this flood event, but typically the flows were considered a bankfull event or greater, meaning the majority of the levees in the system were loaded.

- On the upper Sacramento River, just upstream of the leveed section, the Hamilton City gage recorded a peak flow of 132,911 cfs on February 19. This flow represents a 0.15 ACE[9] or roughly once every 7 years.
- On the Sacramento River at Colusa (RM 143.5), the gage recorded a peak flow of 51,100 cfs on February 20th. This flow represents a 0.04 ACE or roughly once every 25 years.
- On the Sacramento River at Verona, RM 79.5, just downstream of the confluence with the Feather River, the gage recorded a peak flow of 80,500 cfs on February 11th. This flow represents a 0.6 ACE or roughly once every two years, commonly referred to as a bankfull event.
- On the Sacramento River at I St, downtown Sacramento, the gage recorded a peak flow of 86,599 cfs on February 9th. This flow represents a 0.25 ACE or roughly once every four years.
- The Feather River gage at Boyd's Landing, just south of Yuba City, had a peak flow of 148,875 cfs on February 11th. This flow represents a 0.02 ACE or roughly once every 50 years.
- The American River had a maximum flow of 70,000 cfs, which represents a 0.2 ACE (once every 5 years) and was the highest since the 1997 event. Much of the floodplain was inundated for four months, which resulted in long term loading on the levees.
- Cache Creek had a maximum flow of 18,800 on both January 9th and February 18th. This represents a 0.3 ACE (roughly once every 3 years), however Cache Creek was only designed for 30,000 cfs, which represents a 0.1 ACE (1 in 10 years).

The levees on the Feather River were subjected to a rapid drawdown condition from the halting of flow releases at Oroville Dam due to the damage to the spillway. Over a period of 12 hours, flows dropped from 100,000 cfs to 0 cfs and water levels dropped 12 feet at the Feather River at Gridley gage, located roughly 20 miles downstream of the Oroville Dam. The rapid drawdown condition resulted in additional stresses to the Feather River levees.

All five of the weirs (Moulton, Colusa, Tisdale, Fremont, and Sacramento) were spilling from the 2017 storm event. The spilling and opening of the weirs resulted in large flows entering the bypass system.

- Moulton Weir started spilling on February 8th and stopped on March 5, with a peak flow of 15,348 cfs (design capacity is 25,000 cfs) entering the Sutter Bypass.

[8] Water Year for 2017 starts in October 2016.
[9] Annual Chance Exceedance

- Colusa Weir was intermittently spilling for a couple of days in December, but started long term spilling on January 9 and stopped on March 11, then spilled a few more times throughout the Spring. The peak flow over the Colusa Weir was 43,300 cfs (design capacity is 70,000 cfs) entering the Sutter Bypass.
- The Tisdale Weir, always the first to send water to the Sutter Bypass, spilled a few times for multiple days starting in December, but long term spilling started on January 9th and stopped on May 2nd. The peak flow over the Tisdale Weir was 35,026 cfs, which is very close to the design capacity of 38,000 cfs.
- The Fremont Weir started spilling on January 9th and stopped on May 3rd. The peak flow over the Fremont Weir was 179,669 cfs (design capacity is 343,000 cfs) into the Yolo Bypass.
- The Sacramento Weir gates were opened for the first time in a decade on January 10th, with DWR opening 7 gates. On February 9th, the number of gates opened increased to 25 gates, flow continued through the weir until March 3rd, when the water levels dropped. The peak flow through the Sacramento Weir was 67,000 cfs (design capacity is 112,000 cfs) send down the Sacramento Bypass and into the Yolo Bypass.

Following the 2017 Storm event, 68 sites in the Sacramento System applied for assistance through the PL84-99 Program. Of these sites, 17 were immediately eliminated due to an inactive status in the program. From the remaining sites, 8 sites received no action (sites were either repaired by the LMA or eliminated because there was no threat to the levee). The remaining sites have either been repaired or are in the process of being repaired.

5.0 Reconnaissance Team and Inventoried Levees

There are two parts to the erosion inventory; these two parts are typically referred to as the “annual erosion inventory” and the “extended erosion inventory”. The annual erosion inventory includes the levees of the SRFCS that are inspected every year. This includes the reaches that convey flow through the SRFCS on an annual basis. The extended inventory is only conducted after high flow events or a minimum of once every five years. The extended erosion inventory includes reaches of the SRFCS that either convey seasonal flow or do not typically convey flow on an annual basis, such as the bypasses. However, any critical site that is in the extended inventory will be checked annually.

The 2017 reconnaissance included the annual inventory and the extended inventory, due to the large storm event which sent water into the bypasses and loaded the majority of the levees in the system. The annual inventory was conducted September 2017 and the extended inventory was conduction over multiple field days in October and November. Field work was done after the storm events passed and when the water levels were at there lowest for optimal viewing of erosion. The inspection was conducted by the USACE Engineering Division, and included team members from Hydraulic Analysis, GIS, Environmental Design, Soil Design, Civil Design, and Levee Safety. Team members from Environmental, Planning, Cultural Resources, and Project Management were also in attendance on many of the sites.

The majority of the annual reconnaissance was conducted by boat for optimal viewing of the channel banks and levees. However, some of the channels did not contain enough flow to navigate by boat, so they were inventoried by vehicle. **Table 1** lists the reaches of the SRFCS, frequency of inspection (annually or extended), and the method of inspection. **Figure 2** shows the levees that are inspected annually and those inspected during the extended inventory.

Table 1. Inspected Reaches of the Sacramento River Flood Control System

SRFCS Reach	River Miles or Length	Inspection Frequency	Inspection Method
American River	RM 0 - 13	Annual	Car[10]
Arcade Creek	2 miles	Extended	Car
Bear River	RM 0 - 14	Annual	Car
Best Slough	2 miles	Extended	Car
Butte Creek	15 miles	Extended	Car
Butte Slough	7 miles	Extended	Car
Cache Creek and Cache Creek Settling Basin	11 miles	Annual	Car
Cache Slough	14 miles	Annual	Boat
Cherokee Canal	20 miles	Extended	Car
Chico/Sycamore Creek	2 miles	Extended	Car
Colusa Basin Drainage Canal and Sycamore Slough	35 miles	Extended	Car
Colusa Weir Bypass	1 mile	Extended	Car
Coon Creek Interceptor	5 miles	Extended	Car
Cottonwood Creek	1 mile	Extended	Car
Deer Creek	5 miles	Extended	Car
Dry Creek (Bear River)	9 miles	Extended	Car

Table 1. cont. Inspected Reaches of the Sacramento River Flood Control System

SRFCS Reach	River Miles or Length	Inspection Frequency	Inspection Method
East Interceptor Canal	3 miles	Extended	Car
Elder Creek	4 miles	Extended	Car
Elk Slough	9 miles	Annual	Boat
Feather River	RM 0 - 34	Annual	Car[11]
Feather River	RM 34 - 60	Extended	Car
Georgiana Slough	12 miles	Annual	Boat
Haas Slough	8 miles	Extended	Car
Honcut Creek	4 miles	Extended	Car
Jack Slough	6 miles	Extended	Car

[10] Due to low water levels, this reach was not accessible by boat.

[11] Due to low water levels, this reach was not accessible by boat.

Knights Landing Ridge Cut	6 miles	Extended	Car
Linda Creek (Dry Creek)	2 miles	Extended	Car
Lindsey Slough	7 miles	Extended	Car
Marysville Ring Levee	7 miles	Extended	Car
Miner Slough	7 miles	Annual	Boat
Moulton Weir Bypass	2 miles	Extended	Car
Mud Creek	7 miles	Extended	Car
Natomas Cross Canal	5 miles	Extended	Car
Natomas East Main Drainage Canal	4 miles	Extended	Car
Pleasant Grove Canal	4 miles	Extended	Car
Putah Creek	9 miles	Extended	Car
Sacramento Bypass	2 miles	Extended	Car
Sacramento Deep Water Ship Channel	18 miles	Extended	Car
Sacramento River	RM 3 - 140	Annual	Boat
Sacramento River	RM 140 - 184	Annual	Car[10]
Steamboat Slough	11 miles	Annual	Boat
Sutter Bypass	34 miles	Extended	Car
Sutter Slough	6 miles	Annual	Boat
Three Mile Slough	3 miles	Annual	Boat
Tisdale Weir Bypass	4 miles	Extended	Car
Ulatis Creek	4 miles	Extended	Car
Wadsworth Canal	5 miles	Extended	Car
West Interceptor Canal	2 miles	Extended	Car
Western Pacific Interceptor Canal	6 miles	Extended	Car
Willow Slough Bypass	8 miles	Extended	Car
Yankee Slough	4 miles	Extended	Car
Yolo Bypass	37 miles	Extended	Car
Yuba River	RM 0 - 5	Extended	Car

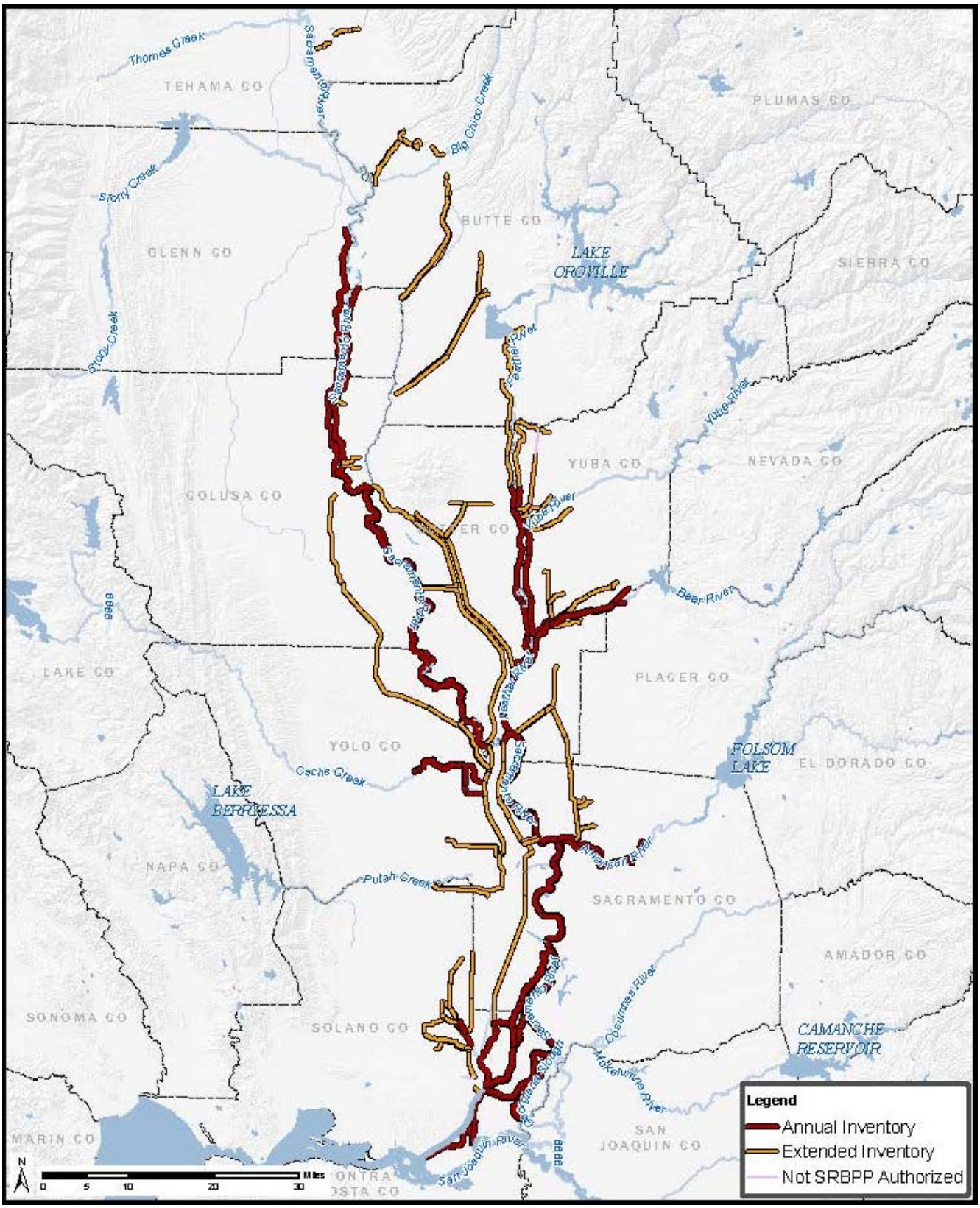

Figure 2. Levees Inspected in Annual and Extended Inventories

6.0 Inventory Criteria and Data Collection

A site meets the criteria to be added to the inventory when the erosion encroaches into the projection of the 3H:1V levee slope, as shown in **Figure 3**. If a berm is present on an eroding bank, the site is typically added if the berm is less than 35 ft (this distance may vary given the levee height). There are areas in the SRFCS where the bank is visibly eroding, but if the erosion does not encroach into the projection of the levee slope, then it does not meet the criteria for an erosion site. A site may be added to the inventory without satisfying these criteria if the Engineering team judges it is an imminent risk for another reason (slump cracking, tree pop-out, etc.) but these additions are rare.

There are six (6) terms used to record the status of the sites as described below:

- Eroding: A site that is susceptible to an erosional breach during flood and/or normal flow conditions.
- New Erosion: A site identified in the current year as susceptible to an erosional breach during flood and/or normal flow conditions.
- Critical: A site that is an imminent threat to the integrity of the SRFCS and of highest priority for repair. More details in Appendix C.
- Repaired: A site that was previously an erosion site that has since been repaired.
- Removed: A site that was previously an erosion site but was taken out of the inventory because it no longer meets the criteria.
- Under Construction: A site in which at the time of inspection was either being repaired or a contract has been awarded and the construction should begin shortly. A site with this designation will likely move to the repaired list in the next year's inventory.

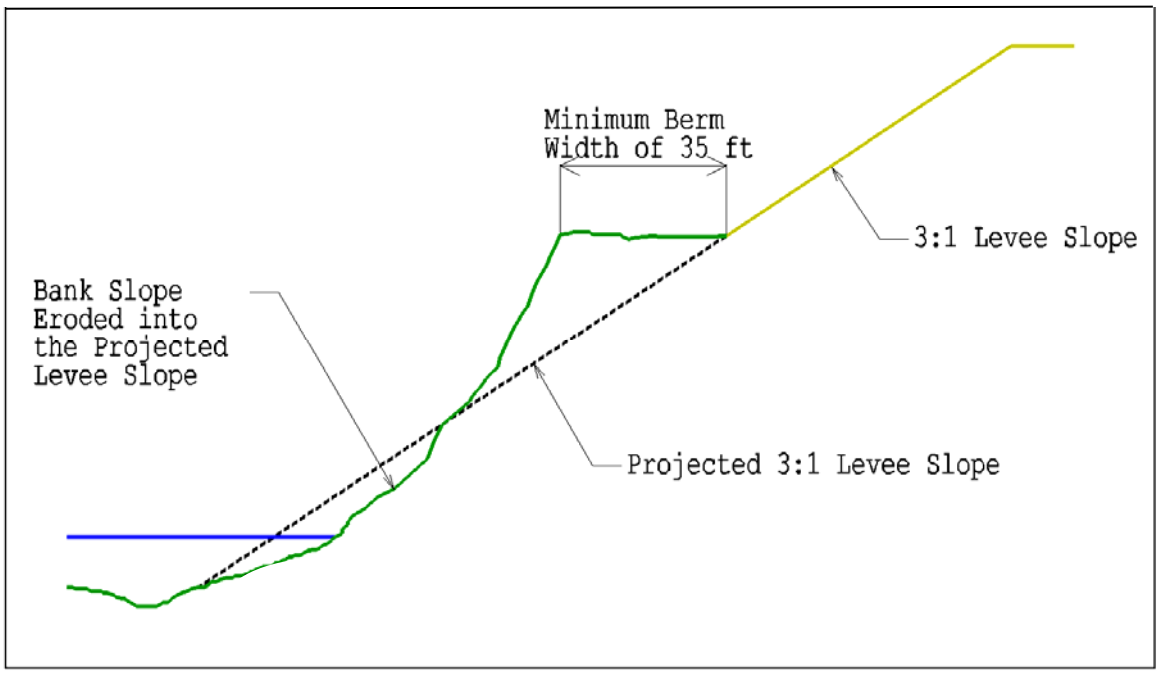

Figure 3. Schematic of Erosion Site Criteria

Each erosion site is identified with a unique name based on the naming scheme described below:

AAA_BB-B_C

Where:

AAA: Three letter river code

BB-B: River or Levee Mile (dash represents the decimal)

C: Bank designation (left or right bank, when looking downstream)

For example, Sacramento River RM 92.8 left bank would be expressed as SAC_92-8_L (All letters are capitalized, no spaces, and no periods)

Three letter river codes:

ACD	-	Arcade Creek	MR1	-	Marysville Unit 1
BER	-	Bear River	MR2	-	Marysville Unit 2
BES	-	Best Slough	MR3	-	Marysville Unit 3
BTC	-	Butte Creek	MIR	-	Miner Slough
BTS	-	Butte Slough	MLW	-	Moulton Weir Bypass
CHC	-	Cache Creek	MUD	-	Mud Creek
CHI	-	Chico Creek	MRS	-	Murphy Slough
CHS	-	Cache Slough	NCC	-	Natomas Cross Canal
CHK	-	Cherokee Canal	PGC	-	Pleasant Grove Canal
CBD	-	Colusa Basin Drainage Canal	PUC	-	Putah Creek
COB	-	Colusa Bypass	SAC	-	Sacramento River
COO	-	Coon Creek	SAP	-	Sacramento Bypass
CWC	-	Cottonwood Creek	SAS	-	Sacramento Slough
DEC	-	Deer Creek	SBP	-	Sutter Bypass
DCN	-	Dry Creek (North, flows to Bear River)	SHG	-	Shag Slough
DCS	-	Dry Creek (South, flows to NEMDC)	STM	-	Steamboat Slough
DWS	-	Deep Water Ship Channel	STR	-	Sutter Slough
EMD	-	East Main Drain (Natomas)	SYC	-	Sycamore Creek
EIC	-	East Interceptor Canal	SYS	-	Sycamore Slough
ELC	-	Elder Creek	TIB	-	Tisdale Bypass
ELK	-	Elk Slough	TMS	-	Three Mile Slough
FHR	-	Feather River	ULB	-	Ulatis Creek Bypass
GEO	-	Georgiana Slough	WAC	-	Wadsworth Canal
HAS	-	Haas Slough	WIC	-	West Interceptor Canal
HNC	-	Honcut Creek	WPC	-	Western Pacific Interceptor Canal
JSK	-	Jack Slough	WSB	-	Willow Slough Bypass
KLR	-	Knights Landing Ridge Cut	YAS	-	Yankee Slough
LAR	-	Lower American River	YOL	-	Yolo Bypass
LDS	-	Lindsey Slough	YUB	-	Yuba River

At the erosion sites, specific data was collected for use in the inventory and the site ranking report, a separate document. This data included: Site Name, Waterway, River or Levee Mile, Bank Designation, Site Status, Length of Erosion, Width of Berm, Erosion Mechanism, Bank Slope, simplified Soil Classification, Issues effecting Stability, Observed Eddies, Wave Action, Bank Protection, Visible Encroachments, and Field Notes.

7.0 Reaches within the Sacramento River Flood Control System

The Sacramento River Flood Control System covers a large area and is made up of many different rivers, creeks, sloughs, and bypasses. Each reach within the system is unique and subject to different erosion processes. Below is a brief description of the different reaches.

Upper Reach of the Sacramento River – Ord Bend to Colusa (RM 185 to 144) – The upper reach of the Sacramento River is unique because the levees are setback and the channel meanders and erodes more naturally than in other reaches. A typical picture of the Upper Sacramento River is shown in **Figure 4**. In general, the river has become somewhat sediment starved due to reservoirs reducing the bedload from upstream. The river is highly erosive and erosion of the outer banks of the meandering bends and the development of sandbars are evident throughout the reach. The natural erosion of the banks is considered good for a healthy river system and environmental factors. However, when the erosion creeps into the projection of the levee slope, it can threaten the integrity of the SRFCS. The 2017 storms cause minor impacts throughout this reach, with the exception of the site at RM 172, which had significant erosion. There are currently 6 erosion sites in this reach, one of which was upgraded to critical. Two (2) sites were removed from the inventory.

Figure 4. Typical View of the Upper Reach of the Sacramento River.

Middle Reach of the Sacramento River – Colusa to Sacramento (RM 144 to RM 61) – The middle reach of the Sacramento River has the levees close to the river and multiple diversion structures to move flow into the bypass system. This reach was intentionally designed with the levees close to the banks to keep velocities higher to help transport some of the bedload and debris that remained from the days of hydraulic mining. An additional aspect for the close levees was that the USACE was responsible for keeping the river navigable up to the city of Colusa. As a result of this design, much of the reach is protected with rock, especially the outsides of bends. The majority of the rock in this reach is cobbles placed prior to the 1960's. Some areas have more recent quarry stone. The cobble sites are reaching the end of their design life and are starting to fail. Roughly one-third of the erosion sites in this reach are from failed cobble. **Figure 5** shows a typical view of the Middle Sacramento River. There are currently 33 erosion sites in this reach, of which two (2) are new and one (1) is under construction. Six (6) sites in this reach were either removed or repaired.

Figure 5. Typical View of the Middle Reach of the Sacramento River.

Sacramento River – Delta Section (RM 61 to RM 15) – The delta reach of the Sacramento River has levees close to the banks and is tidally influenced. The location of the channel has been relatively stable for the past 150 years. A large percentage of this reach is already protected by quarry stone. This area has heavy action from recreational boating, wind wave run-up, and the banks are heavily used by the public. Many of the levees are constructed of deposited dredge tailings from the bottom of the river. **Figure 6** shows a typical view of the Delta section of the Sacramento River. The causes of erosion in this reach are boat wake, wind wave, mass slope failure, fluvial processes, and human usage. The 2017 storm events had a significant impact on erosion in this reach of the river with 6 sites being upgraded to critical. There are currently 29 erosion sites in this reach, of which three (3) are new, and six (6) are critical. Eight (8) sites in this reach have been removed or repaired.

Figure 6. Typical View of the Sacramento River – Delta Section.

Lower Reach of the Sacramento River (RM 15 to RM 3) – The lower reach of the Sacramento River is very wide and the water surface is controlled by the tides. Only the left bank is leveed in this reach; the right bank is considered high ground. There is a narrow highway with no shoulder on top of the levee for half of the reach. Ocean-going cargo ships travel through this reach creating large wakes. The area is also subject to high winds and wind waves. Wind waves and boat wakes are the main cause of erosion in this reach. Bank stability is also an issue; the slopes of the levees are steep and constructed of poor (non-cohesive) soils; however the toe often contains some clay. The 2017 storm event caused increased erosion throughout this reach with one site upgraded to critical, one site added, and increased erosion at the current sites. **Figure 7** shows a typical view of the lower section of the Sacramento River. There are currently nine (9) erosion sites in this reach, of which six (6) are critical, and one (1) is new.

Figure 7. Typical View of the Lower Reach of the Sacramento River.

Steamboat Slough, Miner Slough, Sutter Slough, and Cache Slough – These distributary channels in the Sacramento Delta are predominately backwater channels with low velocities that are controlled by the tides. The erosion mechanism in these sloughs comes from wind wave, boat wake, tidal influences, slumping, human use, and tree pop-outs. The 2017 storm events had minimal impacts on Steamboat, Sutter, and Miner Sloughs, and a more significant impact on Cache Slough, where increased erosion connected 4 sites into one long site. **Figure 8** shows the confluence of Sutter and Miner Sloughs. Steamboat currently has twelve (12) erosion sites, of which four (4) are critical, and two (2) are new. Miner Slough currently does not have any erosion sites and has had no identified erosion sites since the beginning of the inventory. Sutter Slough currently has seven (7) erosion sites, of which one is critical. A portion of Cache Slough is used by cargo ships to enter the Deep Water Ship Channel and therefore is subject to larger boat wakes. Cache Slough currently has three (3) erosion sites, of which one is critical. On Steamboat Slough, two (2) sites were removed, on Sutter Slough two (2) sites were removed, and on Cache Slough, one (1) site was removed.

Figure 8. View of the confluence of Miner and Sutter Sloughs.

Lindsey Slough, Haas Slough, Shag Slough, and Ulatis Creek Bypass – These channels are in the western Delta side of the SRFCS and they all conclude at Cache Slough. Lindsey Slough is a wide shallow channel with the levees set close to the banks. Haas Slough, Shag Slough, and Ulatis Creek Bypass are small channels that primarily carry agricultural runoff. The velocities in these channels are low and tidally influenced. The erosion mechanism in these channels comes from wind wave, tidal influences, and tree pop-outs. Haas Slough also has issues with the banks being trampled by cattle. The 2017 storms had a large impact to Lindsey and Haas Slough with new erosion (720 ft on Lindsey and 1,514 ft on Haas), new slump failures, and sites upgraded to critical. **Figures 9** and **10** show a typical view of Haas Slough and

Lindsey Slough, respectfully. Lindsey Slough has four (4) erosion sites, of which one is critical and one is new. Haas Slough has three (3) erosion sites, of which one is critical and one is new. There are no erosion sites on Shag Slough and Ulatis Creek Bypass.

Figure 9. Typical View of Haas Slough.

Figure 10. Typical View of Lindsey Slough.

Georgiana Slough – Georgiana Slough is unique in that it flows from the Sacramento River System into the San Joaquin River System. The upstream most two miles are regulated as a no wake zone. Georgiana Slough is completely influenced by the tides and subject to severe winds. The majority of the levee and bank slopes are steep with no berm. The banks are composed of poor soils, which do not meet current design standards. The left bank is in worse shape and contains 75% of the sites. Biotechnical repairs in the form of brush boxes have been used to try and protect the banks from wind waves and boat wakes; however, the majority of them have had limited to no success. The primary erosion factors are from wind wave, boat wake, tidal influence, and poor soils. Many of the sites along the left bank have started to merge together and soon the entire bank may be considered an erosion site. **Figure 11** shows a typical view of a Georgiana Slough levee. It is important to note that the local LMA (RD 563) has been working hard to repair the worst erosion pockets, however the levees were hit hard by the 2017 event. The 2017 storm event caused major impacts to the Georgiana Slough levees with significant erosion, slumping, and tree pop-outs. An additional 19,297 ft of erosion was added to the inventory, almost doubling the amount of erosion from the previous year. There are currently twenty-four (24) erosion sites, of which four (4) are critical and nine (9) are new. This reach may benefit from a reach-wide repair.

Figure 11. Typical View of Georgiana Slough.

Elk Slough – Elk Slough was cut off from the Sacramento River on the upstream end by the Sacramento River levee and therefore has no inflow, it is purely a backwater channel with some tidal influence. The channel is shallow, and the banks are full of vegetation and heavily used by humans. The levee slopes are over-steepened and built out of non-cohesive dredge material. The entire levee reach is in poor condition, with slumping, holes, and slope stability problems. **Figure 12** shows a typical view of Elk Slough. With the levees being in such poor shape the entire leveed reach (right bank and left bank) is classified as an erosion site. This reach would benefit from a reach wide repair.

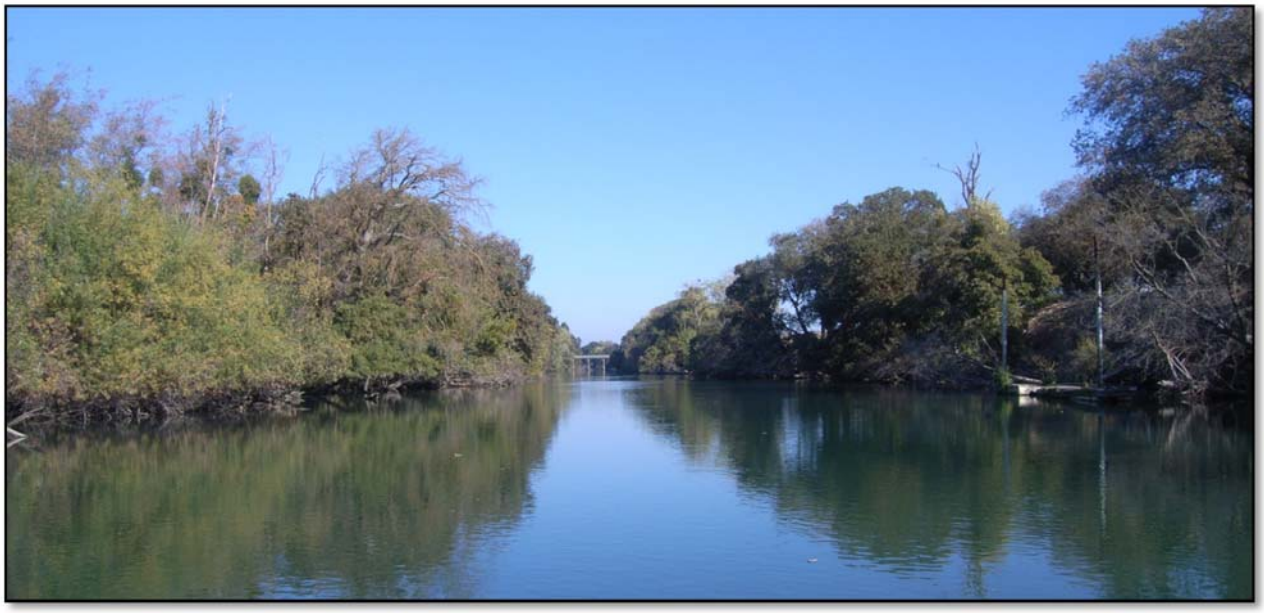

Figure 12. Typical View of Elk Slough.

American River – The American River is fed by Folsom Dam and is therefore generally sediment starved and has been eroding and transporting the fine materials from the channel bed. Once the fines have been removed and the bed armors, the channel is expected to move laterally and erode the banks. The right bank is setback from the channel for the lower 5 miles. Boat wake is not a concern as there is a no wake zone for the entire river. The main causes of erosion are fluvial, tree pop-outs, and public use. This river is generally well maintained and has had many bank repairs in the recent years. The American River levees performed fairly well with the 2017 storm events, with only minimal new erosion. **Figure 13** shows a typical view of the American River. There is currently one erosion site on the American River.

Figure 13. Typical View of the American River.

Feather River, Northern Reach (RM 62 - 46) – The northern portion of the Feather River has a levee only on the right bank. The channel is meandering and the upstream overbanks still show the impacts of past hydraulic mining, with large gravel and dirt mounds visible throughout. The levees are heavily vegetated and there are places where structures (e.g. houses, canals) have been built into the landside of the levee. **Figure 14** shows a typical view of the northern reach of the Feather River. There is one (1) erosion sites in this reach of the Feather River. One site (FHR 50.9 R) was repaired by DWR.

Upper Reach of Feather River, North of Yuba River (RM 46 to RM 28) - The Feather River upstream of the Yuba River is a meandering river with setback levees on both sides. The channel gets close to the levees at a few of the meandering bends, which have been armored from past repairs. The river appears to have pushed the majority of the sediment leftover from hydraulic mining through this reach and with the construction of Oroville Dam, it has started to become sediment starved. Some active erosion was observed, but it was not close to the levees. There are currently no erosion sites in this reach. Although there are no erosion sites in this reach, the area was hit hard by the 2017 Flood event and rapid drawdown conditions. Significant erosion did occur throughout this reach however, the erosion either does not threaten the levee prism or repairs have already taken place.

Figure 14. Typical View of the Northern Reach of the Feather River.

Middle Reach of the Feather River, South of Yuba River (RM 28 to RM 7) – The middle reach of the Feather River is wide and shallow and has a large amount of sand bedload coming from the Yuba River. At RM 24.8, Shanghai Falls, there is a large clay plug that has slowly been moving through the system. This feature acted as a grade control feature in the river and as of early February 2012, this clay plug has been breached. The full impacts of this breach are not yet known, but there will most likely be further erosion to the system. **Figures 15** shows the clay plug in its current state. The levees are setback in this reach and a new setback levee was recently constructed on the left bank from RM 25 to RM 18. The primary causes of erosion in this reach are fluvial and mass failure of eroded banks. The 2017 flood

events did have a significant impact on the banks of the Feather River, two of the existing sites had significant damage and are currently being repaired under the Pl 84-99 program, and one new site was identified. Additional erosion of the banks was observed but it does not yet threaten the levee prism. There are currently four (4) erosion site in this reach of the Feather River, one (1) is new , and two (2) are currently under construction.

Figure 15. View of Clay Plug on the Feather River at RM 24.8 in late 2012.

Lower Feather River (RM7 to RM 0) – The lower reach of the Feather River has a tight levee on the left bank and the Sutter Bypass on the right bank. The river is shallow and wide, with large sandbars throughout the channel. The primary causes of failure in this reach are fluvial and mass failure of eroded banks. **Figure 16** shows a typical view of the lower Feather River. There are currently seven (7) erosion sites in this reach of the river, of which two (2) were upgraded to critical from the damages sustained from the 2017 storm events.

Figure 16. Typical View of lower Feather River.

Yuba River – The Yuba River is a meandering channel and the levees are setback by over a mile from the channel. The Yuba River sustained significant geomorphological changes due to long term gold mining. The south levee was recently constructed and is generally in good condition for most of the reach. Recently, the local RD has constructed improvements to the south levee in order to meet the current USACE levee standards, including adding a slurry wall. There are currently no erosion sites in this river.

Bear River – The Bear River is an incised channel due to the loss of sediments from the Camp Far West Dam and historic sand and gravel mining. The levees are setback a short distance from the slightly meandering channel. **Figure 17** shows a typical view of the Bear River. A setback levee was recently constructed for the first two miles on the right bank. There are currently four (4) erosion sites on this river. One erosion site (BER 0.8 L) was repaired by the local RD after it incurred significant new erosion from the 2017 storm event.

Figure 17. Typical View of Bear River.

Yankee Slough, Dry Creek, Western Pacific Interceptor Canal, and Best Slough – These channels are all tributaries to the Bear River. The leveed portion of Yankee Slough is four miles long and joins the Bear River at RM 3. The levees are set close to the channel and most of the channel is heavily vegetated. Dry Creek (often called North Dry Creek) joins the Bear River at RM 5. The north levee is just over a mile long and the south levee runs for 7 miles. Best Slough and the northern portion of the Western Pacific Interceptor collect the flows from the east and direct it down the southern portion of the Western Pacific Interceptor Canal (WPIC). The floodplain of the WPIC is a mixed use of wetland habitat and agriculture. There is one erosion site on Yankee Slough. At the time of inspection the entire west side of the WPIC was under construction for levee rehabilitation.

Natomas East Main Drainage Canal, Arcade Creek, and Dry Creek – Arcade Creek and Dry Creek (formerly known as Linda Creek, and now more commonly referred to as South Dry Creek) drain water from the Rio Linda, Roseville, Antelope, Citrus Heights, and Carmichael areas. Arcade Creek has the levees relatively close to the channel, however the small floodplain maintains a healthy riparian habitat. Dry Creek has a large floodplain but relatively little riparian habitat, as the floodplains appear to be used for cattle grazing. **Figure 18** shows a typical view of Dry Creek. The Natomas East Main Drainage Canal (NEMDC) directs the flow from Arcade and Dry creeks and sends it south to the American River. NEMDC is a man-made channel that runs north-south and protects the east side of Natomas. There are currently no erosion sites in this section of the system.

Figure 18. Typical View of Dry (Linda) Creek.

Natomas Cross Canal, Pleasant Grove Canal, and Coon Creek Interceptor – Pleasant Grove Canal and Coon Creek Interceptor collect water from the east foothills and communities of Lincoln and Pleasant Grove. These flows are then directed into the Natomas Cross Canal which moves the water down to the Sacramento River. Pleasant Grove Canal and Coon Creek only have levees on the east side. The levees are steep with some grass and shrub vegetation. The Natomas Cross Canal is man-made and the levee on the south side was recently rebuilt. The south levee is mowed and grazed by sheep in the summer while the north levee is tall grasses with shrubs/trees on the lower bank. **Figure 19** shows a typical view of the Natomas Cross Canal. There are three (3) erosion sites on the Natomas Cross Canal, of which two (2) are new.

Figure 19. Typical View of the Natomas Cross Canal.

Cache Creek – The Cache Creek levees start near the town of Yolo and terminate at the Yolo Bypass. Cache Creek is a deeply incised channel with near vertical banks (over 20 ft in height) for the entire leveed reach. The channel is sediment starved from excessive in-stream gravel mining. Some sand and gravel are present in the channel bed, indicating that the channel may be starting to recover and become more stable. **Figure 20** shows a typical view of Cache Creek. The erosional mechanisms in this reach are toe erosion, fluvial and mass failure. The natural banks are too steep and the channel is too narrow for a traditional bank protection repair; setback levees have been the selected option for repair. This creek may benefit from a reach-wide repair. There are currently three (3) erosion sites on Cache Creek, one (1) is considered critical. DWR repaired two (2) of these erosion sites with setback levees in 2016.

Figure 20. Typical View of Cache Creek.

Willow Slough Bypass – The Willow Slough levees start just north of the City of Davis and terminate at the Yolo Bypass. The Willow Slough Bypass directs flow from Willow Slough and agricultural runoff to the Yolo Bypass. Erosion is present along a good portion of the natural bank, but the erosion is not into the projection of the levee slope. The 2017 flood event did have a major impact to this system, there were numerous new erosion pockets observed in the channel bank, however they did not extend into the levee prism. There are currently no erosion sites on Willow Slough Bypass.

Putah Creek – Putah Creek runs from the Coastal Range to the Yolo Bypass. Most of the flow is stopped by the Monticello Dam, however the levees were designed prior to the construction of the Dam. The levees are set a good distance from the creek. There is a riparian corridor on the natural banks of the creek and the floodplains are used for crops and orchards. There is currently one (1) erosion site on Putah Creek. The LMA placed rock on one of the erosion sites (PUC 0.1 L) in 2016 and it is now considered repaired.

Elder Creek – Elder Creek is located in the upper Sacramento Valley, it flows from the east side of the Coastal Mountain range and ends at the Sacramento River near RM 230. Only portions of the creek, near the lower end, are leveed to protect the towns of Gerber and Tehama. Elder Creek is an incised channel with short levees. The channel meanders through a gravel bed and has multiple point bars. The primary mechanisms of erosion are fluvial and whole bank failure. **Figure 21** shows a typical view of Elder Creek channel and eroding bank. There are currently two (2) erosion sites on this creek.

Figure 21. Typical View of the Channel and Eroding Bank of Elder Creek.

Deer Creek – Deer Creek is located in the upper Sacramento Valley, it drains water from Lassen Mountain/Cascade Range and ends at the Sacramento River near RM 220. Only portions of the lower end are leveed and in most of the places where the creek is close to the levee, it is already rocked. Deer Creek is a natural stream with a boulder/cobble bottom and a riparian habitat. **Figure 22** shows a typical view of Deer Creek. The primary mechanisms of erosion are fluvial, whole bank failure, and tree pop-outs. There is currently one (1) erosion sites on this creek. One site (DEC 2.4 L) was removed from the inventory due to cobble deposition in the eroded area and the levee is no longer threatened. The Deer Creek Watershed Conservancy is planning a reach wide repair and restoration to the lower portion of Deer Creek.

Butte Creek – Butte Creek is located in the Upper Sacramento Valley, near the City of Chico, it drains water from the Mount Lassen area into the Butte Sink. Butte Creek has levees close in distance to the natural bank on the upper leveed section and slightly setback levees on the lower portion of the creek. There are multiple grade control structures with fish ladders in the creek. The natural banks are generally made of sandy (non-cohesive) materials. The primary erosion mechanism in this reach is whole bank failure. The 2017 flood event had an impact in this channel, leaving a large scarp along the bank for almost 600 ft. There is currently one (1) erosion sites on this creek and it is new.

Figure 22. Typical View of Deer Creek.

Big Chico Creek, Sycamore Creek, and Mud Creek – These three creeks drain from the Mount Lassen/Cascade Range and terminates at the Sacramento River at RM 196. Only a small portion of Big Chico Creek is leveed to protect the City of Chico. The levee is heavily used for running, biking, and horseback riding. The channel is braided and incised with a sand/gravel/cobble bed and an occasional tree. Sycamore Creek is a straightened channel that becomes more natural as it approaches Mud Creek. Mud Creek is a narrow channel, with incised portions and levees set close to the channel. **Figure 23** shows a typical view of Mud Creek. The 2017 flood event has significant impacts to these channels, with new erosion observed and the addition of three new erosion sites. There is one (1) erosion site on Chico Creek and it is new. There is one (1) erosion site on Sycamore Creek. There are currently three (3) erosion sites on Mud Creek and two (2) of them are new.

Figure 23. Typical View of Mud Creek.

Cherokee Canal and Cottonwood Creek – Cherokee Canal is a man-made canal, roughly 100 to 200ft wide that diverts water from the Lake Oroville area and Cottonwood Creek to the Butte Sink area. Cherokee Canal's floodplain serves multiple uses, it is grazed by cows in the summer, rice is grown, and it has some riparian habitat with many species of birds. There are currently no erosion sites on Cherokee Canal. One site (CHK 11.7 R) was removed from the inventory as the erosion is not into the levee prism and it does not qualify.

Moulton Weir Bypass, Colusa Weir Bypass, Tisdale Weir Bypass, and Sacramento Weir Bypass – These four weirs and bypasses are important features to the flood control project by diverting the high flows from the Sacramento River into either the Sutter Bypass or Yolo Bypass. The Moulton Weir is located on the left bank of the Sacramento River at RM 158 and feeds water into the Butte Sink. It is a non-gated gravity weir, with a design capacity of 25,000 cfs, and it is typically the last of the gravity weirs to start spilling. The Moulton Bypass only has a levee on the south side and there are no erosion sites. The Colusa Weir is located on the left bank of the Sacramento River at RM 145 and feeds water into the Butte Sink, just north of the top of the Sutter Bypass. It is a non-gated gravity weir, with a design capacity of 70,000 cfs, and it is typically the second of the gravity weirs to start spilling. The Colusa Bypass only has two miles of levees on both sides and does not have any erosion sites. The Tisdale Weir is located on the left bank of the Sacramento River at RM 118 and feeds water into the Sutter Bypass. It is a non-gated gravity weir, with a design capacity of 38,000 cfs, and it is typically the first of the gravity weirs to start spilling. The Tisdale Bypass has four miles of levees on both sides and there are no erosion sites. The Sacramento Weir is located on the right bank of the Sacramento River at RM 63 and feeds water into the Yolo Bypass. It is a gated weir, with 48 wood plank gates that are opened manually when the river reaches a specified elevation at the I St Bridge. It has a design capacity of 112,000 cfs. The Sacramento Bypass has two miles of levees on both sides, the face of the south levee was recently relined with concrete. There is currently one (1) erosion site on the Sacramento Bypass.

Sacramento Deep Water Ship Channel – The Sacramento Deep Water Ship Channel runs from the Port of Sacramento (located in West Sacramento) to Cache Slough at RM 18. This man-made dredged channel was completed in 1963 and the navigable section is 30 ft deep and roughly 200 to 400 ft wide. The channel provides access for large ocean-going cargo ships to the Sacramento region. There is no inflow to the channel and it is tidally influenced for the entire length. While there are levees on both sides of the channel, only the east levee is considered a federal levee. The west side of the channel is the Yolo Bypass. The channel has wide berms on both sides, ranging from 300 to 700 ft. There are no erosion sites in this channel.

Yolo Bypass – The Yolo Bypass runs from the Fremont Weir to the Sacramento River at RM 15 and carries the high flows from the Sacramento River, Feather River, and Sutter Bypass to the Delta. The bypass is several miles wide in sections. The land is used for agriculture, primarily rice, in the summers. Portions of the east levee (near West Sacramento) are heavily rocked (typically with quarry stone). Upstream of Cache Creek and downstream of Willow Slough Bypass, the lower half of the west levee is rocked to protect against wave wash. The primary erosion mechanism in this reach is wind wave. The Yolo Bypass levees were loaded for an extended period of time from the 2017 storm event and subsequently suffered from wave wash and erosion. Much of the erosion that occurred has already

been repaired under the PL 84-99 project. There are currently seven (7) erosion sites on the Yolo Bypass levees, of which two (2) are new. Two sites were removed from the inventory as we did not observe any erosion.

Sutter Bypass – The Sutter Bypass starts at the bottom of the Sutter Buttes, joins the Feather River at RM 7, and runs parallel to the Feather River until it joins the Sacramento River between RM 84 and 80. During high flows when the Sutter Bypass is running, the flow bisects the Sacramento River and continues over the Fremont Weir into the Yolo Bypass. It gets progressively larger and carries progressively more flow, with the capacity around 400,000 cfs at the confluence with the Sacramento River. The upper part of the floodplain is National Wildlife Refuge and the lower part is primarily agricultural use. The primary erosion mechanism is from wind waves. The erosion site on the Sutter Bypass (SBP 11.1 L) was removed as the site no longer meets the site definition.

Colusa Basin Drainage Canal and Sycamore Slough – The Colusa Basin Drainage Canal runs along the west side of RD 108 and is often referred to as the Back Levee. The upper portion of this Back Levee is Sycamore Slough. It protects the area from the runoff of the east side of the Coastal Mountain Range. It ends at the Knights Landing Ridge Cut and there is also a connection to the Sacramento River, however the flow is controlled by a gated structure. There are three (3) erosion sites on the Colusa Basin Drainage Canal.

Knights Landing Ridge Cut – The Knights Landing Ridge Cut runs from the Colusa Basin Drainage Canal to the Yolo Bypass. The levees are in poor condition with steep slopes and slumping of the toe throughout most of the system. There are cracks along the middle of the left levee crest that may indicate potential mass movement and further slumping. **Figure 24** shows a typical view of the Knights Landing Ridge Cut. Access issue prevented the team from viewing a portion of these levees. There are seven (7) erosion sites in this reach.

Wadsworth Canal, East and West Interceptor Canals – The East and West Interceptor Canals collect runoff from the Sutter Buttes and directs it into the Wadsworth Canal. The canals are man-made and the levees are short, steep and vegetated with thick grasses. Wadsworth Canal is man-made with the purpose of directing flow into the Sutter Bypass. The levees have poor soils, over-steepened slopes, and active erosion throughout most of the channel. The primary mechanism of failure is whole bank failure. The 2017 storm events caused significant new erosion throughout much of the channel reach. There are currently six (6) erosion sites on Wadsworth, of which, one is new.

Figure 24. Typical View of the Knights Landing Ridge Cut.

8.0 Summary of the 2017 Erosion Reconnaissance

The 2017 inventoried erosion sites are tabulated in **Appendix A** and are shown graphically in **Appendix B - 2017 Sacramento River Erosion Reconnaissance Atlas**. Within Appendix A, Table A-1 lists all the erosion sites, Table A-2 lists the critical erosion sites, Table A-3 lists the new erosion sites, Table A-4 lists the erosion sites under construction, Table A-5 lists the removed and repaired sites, and Table A-6 lists the geographic coordinates for the erosion sites.

8.1 Erosion Sites

Based on the field investigation, the total number of erosion sites within the Sacramento River Flood Control System is 192 sites, of which 29 are critical, 33 are new (5 new in 2016 and 28 new in 2017), 4 are under construction, 14 were repaired, and 22 were removed. A detailed list of the sites per river/channel is provided in **Table 2**. This table includes the number of sites/channel for the 2015 erosion sites (last published report), the 2017 erosion sites, the new sites in 2016 and 2017, and the repaired/removed sites in 2016/2017.

Table 3 breaks the sites down into linear feet to demonstrate the overall linear footage that still needs repair. The actual repair length may vary, depending on the design. Table 3 shows the amount of linear feet from the last published document (2015), the linear feet added in 2016 and 2017, the amount of linear feet removed or repaired, and the current linear feet following the 2017 field inspection. In 2015, there were 262,610 linear feet of erosion within the SRFCS. In 2017, there was a total of 355,993 linear feet of erosion in the SRFCS. The number of linear feet added accounts for new sites and additional length added to existing sites. This is an addition of around 100,000 linear feet and a 30% increase in the amount of erosion throughout the system.

8.2 Critical Erosion Sites

Based on the field investigation, the total number of critical sites is 29. One of these sites is on Cache Creek and accounts for 218 linear feet. One site is on Cache Slough (and overlaps to Haas Slough) and accounts for 21,499 linear feet. Two sites are on the Feather River and account for 2,123 linear feet. Four of these sites are on Georgiana Slough and account for 12,989 linear feet (over 2 miles). One site is on Haas Slough and accounts for 1,595 linear feet. One site is on Lindsey Slough and accounts for 280 linear feet. One site is on the Sacramento Bypass and accounts for 841 ft, however this site will likely be removed with the expansion of the Sacramento Weir. Thirteen (13) of these sites are on the Sacramento River and account for 12,020 linear feet (over 2 miles). Three (3) of these sites are on Steamboat Slough and accounts for 1,592 linear feet. One critical site is on Sutter Slough and accounts for 2,180 linear feet. Additional information about these critical sites is discussed in Appendix C.

8.3 New Erosion Sites

Based on the field investigation, 33 erosion sites were added to the inventory (5 in 2016 and 28 in 2017). This is a very large number of new sites and can be attributed to the large storm events of 2017 that saw larger flows in the majority of the channels. The total linear feet added in 2016 and 2017 is 104,447 ft, which includes 87,613 ft from new sites and 16,834 ft from extending existing erosion sites.

8.4 Erosion Sites Under Construction

Of all the sites in the erosion inventory, four were under construction for repair at the time of the inspection. The erosion sites under repair within the system are Feather River RM 12.3R (177 ft), Feather River RM 12.8R (293), Sacramento River RM 71.3R (522 ft), and the entire right levee of the Western Pacific Interceptor Canal (31,652 ft). The two sites on the Feather River are being repaired by the PL 84-99 program and the repair should be complete at the time of the next inspection. The site on the Sacramento River is being repaired by the Sacramento Bank Protection Project and construction was finished in early 2018. The Western Pacific Interceptor Canal is being repaired by the LMA and it should be removed from the inventory in the next year.

8.5 Repaired and Removed Sites

Based on the field investigation and knowledge of construction activities, 14 sites were repaired and 21 sites were removed. The total linear feet repaired was 6,481 ft, with nine (9) repairs being completed by the local maintaining agency, three repairs being completed by DWR, and 2 repairs completed by the US Army Corps of Engineers. The total linear feet removed was 11,275 ft and these sites were removed since they no longer qualify as erosion sites or we could not verify the official repair.

Table 2. Summary of 2017 Erosion Sites by Channel

Waterway	2015 Erosion Sites	2016 New Erosion Sites	2017 New Erosion Sites	2017 Repaired/ Removed Erosion Sites	2017 Erosion Sites	2017 Critical Erosion Sites
American River	1	0	0	0	1	0
Arcade Creek	0	0	0	0	0	0
Bear River	5	0	0	1	4	0
Best Slough	0	0	0	0	0	0
Butte Creek	0	0	1	0	1	0
Butte Slough	0	0	1	0	1	0
Cache Creek	5	0	0	2	3	1
Cache Slough	8	0	1	2	3	1
Cherokee Canal	1	0	0	1	0	0
Chico/Sycamore Creek	1	0	1	0	2	0
Colusa Basin Drainage Canal	3	0	0	0	3	0
Colusa Weir Bypass	0	0	0	0	0	0
Coon Creek Interceptor	0	0	0	0	0	0
Cottonwood Creek	0	0	0	0	0	0
Deer Creek	2	0	0	1	1	0
Dry Creek (North)	0	0	0	0	0	0
Dry Creek (South)	0	0	0	0	0	0
East Interceptor Canal	0	0	0	0	0	0
Elder Creek	2	0	0	0	2	0
Elk Slough	2	0	0	0	2	0
Feather River	12	0	1	1	12	2
Georgiana Slough	15	0	9	0	24	4
Hass Slough	2	0	1	0	3	1
Honcut Creek	0	0	0	0	0	0
Jack Slough	0	0	0	0	0	0
Knights Landing Ridge Cut	7	0	0	0	7	0
Lindsey Slough	5	0	1	2	4	1
Marysville Ring Levee	0	0	0	0	0	0
Miner Slough	0	0	0	0	0	0
Moulton Weir Bypass	0	0	0	0	0	0
Mud Creek	1	0	2	0	3	0
Natomas Cross Canal	1	1	1	0	3	0
Natomas East Main Drainage Canal	0	0	0	0	0	0
Pleasant Grove Canal	0	0	0	0	0	0
Putah Creek	2	0	0	1	1	0
Sacramento Bypass	0	0	1	0	1	1
Sacramento Deep Water Ship Channel	1	0	0	1	0	0
Sacramento River	88	1	5	16	77	13
Steamboat Slough	13	2	0	2	12	4
Sutter Bypass	1	0	0	1	0	0

Table 2 cont. Summary of 2017 Erosion Sites by Channel

Waterway	2015 Erosion Sites	2016 New Erosion Sites	2017 New Erosion Sites	2017 Repaired / Removed Erosion Sites	2017 Erosion Sites	2017 Critical Erosion Sites
Sutter Slough	9	0	0	2	7	1
Sycamore Slough	0	0	0	0	0	0
Three Mile Slough	0	0	0	0	0	0
Tisdale Weir Bypass	0	0	0	0	0	0
Ulatis Creek	0	0	0	0	0	0
Wadsworth Canal	5	0	1	0	6	0
West Interceptor Canal	0	0	0	0	0	0
Western Pacific Interceptor Canal	0	0	1	0	1	0
Willow Slough Bypass	0	0	0	0	0	0
Yankee Slough	1	0	0	0	1	0
Yolo Bypass	7	1	1	2	7	0
Yuba River	0	0	0	0	0	0
Total	**200**	**5**	**28**	**35**	**192**	**29**

* Notes - Five sites on Cache Slough were combined into one site, which accounts for the discrepancy in site numbers.
Two sites on the Sacramento River were combined into one site, which accounts for the discrepancy in site numbers.
Two sites on the Steamboat Slough were combined into one site, which accounts for the discrepancy in site numbers.

Table 3. Summary of 2017 Linear Footage of Erosion by Channel

Waterway	2015 Linear Feet	2016 New Linear Feet	2017 New Linear Feet	Repaired/ Removed Linear Feet	2017 Linear Feet
American River	190	0	676	0	866
Arcade Creek	0	0	0	0	0
Bear River	1,643	0	0	452	1,191
Best Slough	0	0	0	0	0
Butte Creek	0	0	558	0	558
Butte Slough	0	0	409	0	409
Cache Creek	1,561	0	0	696	865
Cache Slough	5,141	0	22,595	1,526	26,210
Cherokee Canal	34	0	0	34	0
Chico/Sycamore Creek	98	0	207	0	305
Colusa Basin Drainage Canal	1,976	0	0	0	1,976
Colusa Weir Bypass	0	0	0	0	0
Coon Creek Interceptor	0	0	0	0	0
Cottonwood Creek	0	0	0	0	0
Deer Creek	363	0	0	97	265

Table 3 cont. Summary of 2017 Linear Footage of Erosion by Channel

Waterway	2015 Linear Feet	2016 New Linear Feet	2017 New Linear Feet	Repaired/ Removed Linear Feet	2017 Linear Feet
Dry Creek (North)	0	0	0	0	0
Dry Creek (South - Linda)	0	0	0	0	0
East Interceptor Canal	0	0	0	0	0
Elder Creek	460	0	0	0	460
Elk Slough	99,615	0	0	0	99,615
Feather River	11,482	0	309	371	11,421
Georgiana Slough	21,140	0	19,297	0	40,437
Hass Slough	3,745	0	1,514	0	5,259
Honcut Creek	0	0	0	0	0
Jack Slough	0	0	0	0	0
Knights Landing Ridge Cut	7,484	0	0	0	7,484
Lindsey Slough	2,484	0	720	497	2,707
Marysville Ring Levee	0	0	0	0	0
Miner Slough	0	0	0	0	0
Moulton Weir Bypass	0	0	0	0	0
Mud Creek	300	0	1,223	0	1,523
Natomas Cross Canal	191	2,377	743	0	3,311
Natomas East Main Drainage Canal	0	0	0	0	0
Pleasant Grove Canal	0	0	0	0	0
Putah Creek	728	0	0	423	305
Sacramento Bypass	0	0	841	0	841
Sacramento Deep Water Ship Channel	81	0	0	81	0
Sacramento River	67,970	1,399	9,637	10,909	68,097
Steamboat Slough	5,093	697	688	689	5,789
Sutter Bypass	162	0	0	162	0
Sutter Slough	6,686	0	410	562	6,534
Sycamore Slough	0	0	0	0	0
Three Mile Slough	0	0	0	0	0
Tisdale Weir Bypass	0	0	0	0	0
Ulatis Creek	0	0	0	0	0
Wadsworth Canal	16,124	0	6,776	0	29,589
West Interceptor Canal	0	0	0	0	0
Western Pacific Interceptor Canal	0	0	31,652	0	31,652
Willow Slough Bypass	0	0	0	0	0
Yankee Slough	147	0	0	0	147
Yolo Bypass	7,712	1,517	202	1,254	8,177
Yuba River	0	0	0	0	0
Total	**262,610**	**5,990**	**98,457**	**17,753**	**355,993**

9.0 Conclusions

Following the 2017 annual erosion inventory we offer the following conclusions:

- There are currently 192 erosion sites in the inventory, or approximately 355,993 linear feet of eroding sites within the system.
- There are 33 new erosion sites (5 from 2016 and 28 from 2017) and 104,447 linear feet of eroding bank were added in 2016 and 2017.
- There are 29 critical erosion sites: one on Cache Creek, one on Cache Slough, 2 on Feather River, 4 on Georgiana Slough, one on Haas Slough, one on Lindsey Slough, one on the Sacramento Bypass, 13 on the Sacramento River, 4 on Steamboat Slough, and one on Sutter Slough. Twenty (20) of these erosion sites were upgraded to critical in 2017.
- All identified erosion sites need to be repaired. Critical erosion sites are the highest priority for repair.
- Given the large backlog of erosion sites that need to be repaired, the repair rate, and the significant damages from the previous flood season, the risk that one of these sites will have an imminent failure or breach in the coming years has increased.
- Repairs of the eroding banks and levees needs to be completed to maintain the integrity of the Sacramento River Flood Control System and continue to provide flood damage risk reduction to the people of the Sacramento Valley.

10.0 References

- Northwest Hydraulics Consultants Inc. and Mobile Boundary Hydraulics. Sacramento River Sediment Study, Phase II – Sediment Transport Modeling and Channel Shift Analysis - Draft. Prepared for the US Army Corps of Engineers. August 2011.

- US Army Corps of Engineers, Sacramento District. "Levee System Inspection Status" Periodic Inspections, updated July 3, 2014 http://www.spk.usace.army.mil/Missions/CivilWorks/LeveeSafetyProgram/LeveeSystemsInspectionStatus.aspx

- US Army Corps of Engineers. 2011 Annual Erosion Reconnaissance Report, Sacramento River and Tributaries. February 2012.

- US Army Corps of Engineers. 2012 Annual Erosion Reconnaissance Engineering Report, Sacramento River and Tributaries. February 2013.

- US Army Corps of Engineers. ETL 1110-2-571, Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures. Washington DC, April 10, 2009.

- US Department of Agriculture, Watershed Physical Processes Research Unit. National Sedimentation Laboratory Technical Report Number 71: Sediment Loading from Streambanks and Levees along the Sacramento River ad Selected Tributaries - Draft. Prepared for the US Army Corps of Engineers by Natasha Bankhead, Andrew Simon, Tobert Thomas, Lauren Klimetz, and Danny Klimetz. December 2010.

2017 ANNUAL EROSION RECONNAISSANCE

FIELD REPORT

APPENDIX A – EROSION TABLES

SACRAMENTO RIVER BANK PROTECTION PROJECT

SACRAMENTO RIVER AND TRIBUTARIES

September 2018

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
BER 1.9 L	Bear River	1.9	0	L	RD 1001 - Nicolaus	Rio Oso	Eroding	2011	432	5	Erosion Pockets, Fluvial	Scattered Quarry Stone in Poor condition	Likely	None	2011 - Large slumped sections of bank. 2012 - Slopes slightly steeper.	Minor new erosion observed.
BER 2.5 L	Bear River	2.5	0	L	RD 1001 - Nicolaus	Rio Oso	Eroding	2011	222	25	Erosion Pockets, Whole Bank Failure	None	Likely	None	2011 - Large section of bank has slumped off. RD has flagged and appears to be watching. 2012 - Slopes slightly steeper. 2013 - Minor new erosion observed.	Erosion pockets have expanded
BER 4.9 R	Bear River	4.9	0	R	RD 784 - Plumas Lake	Johnson Ranch	Eroding	2009	64	10	Fluvial	None	Likely	None	2009 - Small site which could be repaired with maintenance. Erosion into the levee toe, rock has started to fail.	Access Issues - Could not observe
BER 5.7 L	Bear River	5.7	0	L	RD 1001 - Nicolaus	Bear	Eroding	2008	474	10	Fluvial, Erosion Pokets	None	Likely	None	2008 - Sandy/silty banks with rotational slab failures creating near vertical bank with pop-outs due to tree failures. Narrow berm.	Minor new erosion observed.
BTC 1.8 L	Butte Creek	0	1.8	L	Maintenance Area 5	Unassigned	Eroding New	2017	558	20	Fluvial, Whole Bank Failure	None	Unsure	None		Long vertical scarp on toe.
BTS 0.8 R	Butte Slough	0.8	0	R	RD 070 - Meridian Farms	North Sutter	Eroding New	2017	409	0	Erosion Pockets, Whole Bank Failure	None	Likely	Overhead power lines and power poles		Erosion along lower bank, one section has slumped off. Large cracks observed, and expecting additional slumping failures.
CBD 0.5 L	Colusa Basin Drainage Canal	0	0.5	L	RD 787 -Fair Ranch	RD 787	Eroding	2011	611	5	Fluvial, Tree Pop-outs	None	Likely	None	2011 - Large scallops throughout the entire reach. Toe scour due to tree pop-outs, resulting in a steepening slope. The reduced resistive forces plus clay levee may increase the loading. Additional erosion due to human use.	Wide levee section, roughly 40 ft.
CBD 0.9 L	Colusa Basin Drainage Canal	0	0.9	L	RD 787 -Fair Ranch	RD 787	Eroding	2011	968	0	Tree Pop-Outs, Fluvial	None	Likely	Overhead utility poles and pipe	2011 - Large scallops throughout the entire reach. Toe scour due to tree pop-outs, resulting in a steepening slope. The reduced resistive forces plus clay levee may increase the loading.	Oversized embankment.
CBD 19.2 L	Colusa Basin Drainage Canal	0	19.2	L	RD 108 - River Farms	Grimes	Eroding	2011	397	0	Fluvial, Toe Scour	None	Unsure	None	2011 - Toe scour at the bottom of a steep bank, large sections of the toe are sliding down. Erosion may be due to the upstream bend.	Access Issues - Could not observe
CHC 2.4 L	Cache Creek	0	2.4	L	DWR Sacramento Maintenance Yard	Yolo	Critical	2002	218	15	Fluvial	None	Likely	Pipe through levee with flapgate, overhead powerline crossing and power pole	Site identified as CRITICAL in 2002. 2006 - Currently constructing a setback levee. New failures present and extensive. Downstream end of the setback levee did not extend far enough. Upstream end was repaired. 2007 - DWR repaired with a setback levee, but the levee did not go far enough downstream. 2012 - New cracks observed. 2013 - Fresh erosion on upper bank.	No observed change.
CHC 3.5 R	Cache Creek	0	3.5	R	DWR Sacramento Maintenance Yard	Woodland	Eroding	2010	450	25	Fluvial	None	Likely	None	2010 - Large slump on the upper berm, a tree has recently slid down the slope. 2011 - Large slump and new erosion. 2012 - Slightly steeper slopes and cracks observed.	Significant amount of debris along bank.
CHC 5.4 L	Cache Creek	0	5.4	L	DWR Sacramento Maintenance Yard	Yolo	Eroding	2009	198	10	Fluvial	None	Likely	None	2009 - Erosion into the levee slope. 2010 - Minor new erosion. 2011 - New erosion and a freshly fallen tree. 2012 - New animal holes and slightly steeper slopes. 2013 - New tree popout and 2 feet of erosion along the top bank.	Site continues to erode due to recent high storm events.
CHI 2.7 L	Chico Creek	0	2.7	L	Butte County	Unassigned	Eroding New	2017	207	15	Fluvial, Whole Bank Failure	None	Unlikely	None		No trees on bank or levee. Large erosion scarp along lower bank.
CHS 1.8 L	Cache Slough	0	1.8	L	RD 2104 - Perters Pocket Tract	Peters Pocket	Critical	2017	21,499	0	Slump Cracking	None	Likely	Pump and pipes		Deep cracking aobserved along the ENTIRE LEVEE; risk of total levee failure; vertical cracking is on both the waterside and landside, eminent slump failure expected.
CHS 21.1 R	Cache Slough	21.1	0	R	RD 2060 - Hastings Tract	Hasting Tract	Eroding	2011	1,625	0	Toe Scour, Wave Wash	Scattered Quarry Stone in Fair Condition	Unsure	None	2011 - Several pockets of erosion from rotational failure and slumping toe. 2013 - Site extended downstream to include new erosion pockets. 2016 - New rock in one of the erosion spots.	Significant toe erosion within last year.
CHS 22.9 R	Cache Slough	22.9	0	R	RD 2060 - Hastings Tract	Hasting Tract	Eroding	2007	3,086	0	Erosion Pockets	Quarry Stone in Good Condition	Unsure	None	2007 - Geotechnical failure of midside slope and wave wash/scalloping in toe area. Stone revetment upstream and downstream of site. Similar sites are present all along the right bank downstream of this site, most could be repaired with some maintenance. 2008 - Small scour pockets and mid-slope wave wash. 2010 - Minor new erosion. 2011 - Site extended downstream and new erosion. 2013 - Pockets of erosion behind willows and extending into the levee toe. 2015 - Erosion pockets have increased in size. 2016 - Rock has been placed in some of the pockets.	Sites 22.6, 22.8, 22.9, and 23.0 were combined into one long erosion site due to due erosion.
DEC 0.9 R	Deer Creek	0	0.9	R	Tehama County	Unassigned	Eroding	2006	265	10	Fluvial	Quarry Stone in fair condition	Likely	None	2006 - Banks are composed of lithified cobble alluvial soils (relict alluvial fan deposits). Slow erosion of lithified lower bank materials with faster erosion of overlying less cohesive soils resulting in channel "skating" across lithified horizon. 2011 - The Deer Creek Watershed Conservation Group is planning a reach-wide repair for Deer Creek.	No observed change.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
ELC 1.4 L	Elder Creek	0	1.4	L	Tehama County	Unassigned	Eroding	2006	331	20	Fluvial	Quarry Stone in good condition	Unlikely	None	2006 - High vertical bank due to mass failures. Thalweg meandering and erosion of bank. Banks are cohesive with non cohesive gravel horizons. 2011 - Foundation is silty-sand with gravel. New slumping at the toe, mass failure continues.	A large quarry stone placed since last inspection.
ELC 3.0 R	Elder Creek	0	3	R	Tehama County	Unassigned	Eroding	2006	129	20	Fluvial	None	Likely	None	2006 - Mass failure of this bank due to being along the outside of a bend where erosion and undercutting are the greatest. Low flow is being forced into the toe of this bank by point bar on the opposite side of the creek. 2011 - Toe of the bank continues to be undercut.	Does not appear to have new erosion , channel was being dredged during inspection.
ELK 0.2 L	Elk Slough	0.2	0	L	RD 150 - Merritt Island	Merritt Island	Eroding	1997	49,631	0	Whole Bank Failure, Tree Pop-outs	Scattered Quarry Stone in fair condition	Likely	Multiple pipes through the levee, boat docks, and a bridge	1997 - Most of lower Elk Slough contains high near vertical banks, with erosion into the levee slope. Channel almost appears incised. 2002 - Sites where the levee slope is near vertical and severely eroding. It could fail catastrophically. 2004 - Looks bad in terms of vertical slopes and fallen trees. 2005 - Banks are still over steepened in most places and potentially susceptible to geotechnical failures. 2006 - Both banks are still over steepened in most places and potentially susceptible to geotechnical failures. 2010 - The entire reach is in poor condition, with severely eroding near vertical slopes, needs a regional repair. 2011 - Channel banks are still oversteepened with erosion continuing. 2012 - New cracks and animal holes observed.	Fresh erosion; site continues to worsen.
ELK 0.2 R	Elk Slough	0.2	0	R	RD 999 - Netherlands	Clarksburg	Eroding	1997	49,983	0	Whole Bank Failure, Tree Pop-outs	Scattered Quarry Stone in fair condition	Likely	Multiple pipes through the levee, boat docks, and a bridge	1997 - Most of lower Elk Slough contains high near vertical banks, with erosion into the levee slope. Channel almost appears incised. 2002 - Sites where the levee slope is near vertical and severely eroding. It could fail catastrophically. 2004 - Looks bad in terms of vertical slopes and fallen trees. 2005 - Banks are still over steepened in most places and potentially susceptible to geotechnical failures. 2006 - Both banks are still over steepened in most places and potentially susceptible to geotechnical failures. 2010 - The entire reach is in poor condition, with severely eroding near vertical slopes, needs a regional repair. 2011 - Channel banks are still oversteepened with erosion continuing. 2012 - New cracks and animal holes observed. 2013 - Fresh erosion around pump structure.	Fresh erosion; site continues to worsen.
FHR 0.6 L	Feather River	0.6	0	L	RD 1001 - Nicolaus	Rio Oso	Eroding	1997	901	5	Fluvial, Toe Scour	None	Likely	None	1997- Deposits over top of cobble on the upper slope. 2000 - Old cobble site in poor shape; some toe retreat, but little change; steep bank. 2010 - Site extended upstream due to new toe erosion. 2012 - Minor new erosion at toe, new slumping, animals holes and cracks observed.	Further toe erosion, with sections of sand deposition.
FHR 1.0 L	Feather River	1	0	L	RD 1001 - Nicolaus	Rio Oso	Eroding	2000	1,054	20	Fluvial, Whole Bank Failure	None	Unsure	Pump structure, pile wall and power pole	2000 - Site is relatively stable except for some toe erosion at the upstream end, recommend monitoring the upstream end. 2004 - Some new block failures (10ft deep) at the toe of the upstream end. 2007 - Some minor new slumping at the waterline. 2013 - Minor new erosion along the bank toe.	Significant new erosion along lower bank.
FHR 3.8 L	Feather River	3.8	0	L	RD 1001 - Nicolaus	Rio Oso	Eroding	2006	2,094	15	Fluvial, Toe Scour	None	Likely	Pump structure near downstream end	2006 - Sandy, silty bank with intermittent pockets of erosion. Rotational failure and tree pop outs are most of the problem. Some upper slope fluvial erosion. 2010 - Site extended upstream. The lower Feather may benefit from a regional repair. 2011 - Site combined with 3.6. Minimal new erosion. 2013 - New erosion observed at bank toe. Trees on site now have exposed roots.	New erosion along lower slope
FHR 5.0 L	Feather River	5	0	L	RD 1001 - Nicolaus	Rio Oso	Critical	2000	1,666	15	Whole Bank Failure, Fluvial	None	Unsure	None	2000 - Steep bank off berm with some slumps and fallen trees, continued erosion. 2002 - Site lengthened upstream and downstream due to vertical bank along most of the reach. 2010 - Site extended upstream. 2011 - Minimal new erosion. 2012 - Site extended on the upstream end, new tree pop-out, and bank erosion continues to worsen. 2013 - Minor new erosion at the toe and top of bank.	Upgraded to critical, significant new erosion, entire bank slope is vertical with non cohesive soils.
FHR 5.8 L	Feather River	5.8	0	L	RD 1001 - Nicolaus	Rio Oso	Eroding	2011	1,030	5	Whole Bank Failure, Fluvial	Scattered Cobbles in poor condition	Unsure	Pipe through levee and pump structure at downstream end	2011 - Large slumped sections on the lower bank. 2012 - New cracks observed.	slope is not stable enough to maintain vegetation growth, new erosion
FHR 6.0 L	Feather River	6	0	L	RD 1001 - Nicolaus	Rio Oso	Critical	2011	487	10	Whole Bank Failure, Fluvial	None	Likely	Pipe	2011 - Tall slumping sections. Scour around trees has exposed most of the roots. 2016 - Recent large slope failure observed.	Upgraded to critical, entire bank slope is slumping, with near vertical face

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
FHR 6.6 L	Feather River	6.6	0	L	RD 1001 - Nicolaus	Rio Oso	Eroding	2011	710	5	Fluvial, Toe Scour	None	Likely	Pipe through levee, pump at upstream end, and power pole	2011 - Erosion pockets from tree popouts. Sections of the lower bank have slumped off. 2013 - Scallops from tree popouts no longer visible on site. Minor new erosion at the middle of the bank. 2015 - Fres erosion from human usage.	Sandy bank slope is unraveling.
FHR 7.7 L	Feather River	7.7	0	L	RD 1001 - Nicolaus	Rio Oso	Eroding New	2017	309	0	Fluvial, Tree Pop-outs	Cobbles in Fair Condition	Unsure	None		Erosion along bank appears to be due to rapid drawdown condition. Lower bank cobbles are unraveling. Tree popout at upstream end.
FHR 12.3 R	Feather River	12.3	0	R	Maintenance Area 3	Yuba City	Under Construction	2015	177	15	Toe Scour	None	Likely	None	2013 - Minor toe scour causing gradual erosion of bank slope. Site is within ecological reserve.	Under construction. work in progress.
FHR 12.8 R	Feather River	12.8	0	R	Maintenance Area 3	Yuba City	Under Construction	2015	293	15	Toe Scour	None	Likely	None	2013 - Minor toe scour causing gradual erosion into the bank slope.	Under construction. work in progress.
FHR 17.8 L	Feather River	17.8	0	L	RD 784 - Plumas Lake	Arboga	Eroding	2003	1,858	50	Fluvial, Tree Pop-outs	None	Unlikely	Pump structure and pipes through levee	2003 - Bank is near vertical. Identified as a Potentially Critical site. 2004 - Eddy flow off downstream end of Modesto formation eroding the fluvial sediments. 2005 - Some new slumping. Actively eroding but berm width is greater than 50 ft. 2006 - Downgraded to regular erosion site. Still actively eroding. Large old rotational failures in high bank on the downstream end. 2008 - Removed from inventory due to wide berm width does not meet criteria for an erosion site. 2010 - Added back to the inventory after 10 ft of bank erosion in the winter 2009 storm. Steep vertical face. 2011 - Bank has retreated an additional 2.5 ft from last year. New tree popouts and erosion throughout the site. 2012 - Site continues to worsen with new tree popouts and many sections of new erosion.	Large sandbar on opposite bank, thalweg moving closer to levee.
FHR 47.5 R	Feather River	47.5	0	R	Maintenance Area 7	Live Oak	Eroding	2011	842	30	Fluvial, Eddy Scour	None	Unsure	Pipes through levee and canal on landside slope	2011 - The toe of the levee has been excavated by the land owner. Small holes throughout the site have been filled with a plaster like substance. Large canal on landside slope and over the levee toe.	Vertical face into the levee prism, huge eddy.
GEO 0.3 L	Georgiana Slough	0.3	0	L	RD 563 - Tyler Island	Tyler Island	Eroding	1997	523	0	Erosion Pockets, Fluvial	Quarry Stone in good condition	Likely	None	1997 - Erosion pockets into the levee toe. 1999 - Some small pockets fixed with rock riprap. 2002 - New "brush boxes" along the bank toe. 2005 - Brush boxes are empty. Some pockets are filled with new stone. 2006 - Some new rock at the downstream end (~100 ft long). Several small pockets of new rock in scallops. Brush boxes in poor to fair condition. 2010 - Site looks a little worse, some toe rock but still has erosion scars at lower to mid slope. 2011 - Site upgraded to CRITICAL. Significant new erosion. Erosion scallops are vertical and almost the height of the levee. 2012 - Rock has been placed in some of the erosion scallops and therefore the site is no longer critical. 2013 - Site shortened site. The downstream half of site was repaired by RD. Pipe no longer in site limits.	Site shortened. New rock placed on levee slope in erosion pockets.
GEO 1.7 L	Georgiana Slough	1.7	0	L	RD 563 - Tyler Island	Tyler Island	Eroding	1997	1,528	5	Erosion Pockets, Wave Wash	Quarry Stone in good condition	Likely	None	1997 - Old damaged rock riprap along the toe. 1999 - Downstream end (400 ft) repaired with rock. 2002 - New rock/concrete rubble section on the downstream end. 2004 - Small pocket repairs at the downstream end. 2005 - Some new bundles in the brush boxes. 2012 - Some rock has been placed in last year.	New rock placed in erosion pockets , site has improved wih work done by RD, but still some erosion pockets and toe erosion. Slump failure with headscarp at downstream end.
GEO 2.0 L	Georgiana Slough	2	0	L	RD 563 - Tyler Island	Tyler Island	Eroding	2009	652	0	Whole Bank Failure	Quarry Stone in good condition	Likely	None	1997 - Erosion pockets into the toe of the levee. 2001 - Staked low fascine walls at the bankline. 2004 - Numerous "Brush Boxes." 2005 - Some new bundles in the brush boxes. 2012 - Site extended downstream to account for new bank sloughing. 2013 - Some rock added to the upstream end by the local RD. 2016 - Quarry stone is starting to fail.	Rock placed on levee for most of site in last years, but it is already failing, almost vertical bank.
GEO 2.5 L	Georgiana Slough	2.5	0	L	RD 563 - Tyler Island	Tyler Island	Eroding	1997	992	0	Whole Bank Failure, Wind Wave	None	Likely	None	1997 - Erosion pockets into the toe of the levee. 2001 - Staked low fascine walls at the bankline. 2004 - Numerous "Brush Boxes." 2005 - Some new bundles in the brush boxes. 2012 - Site extended downstream to account for new bank sloughing. 2013 - Some rock added to the upstream end by the local RD.	Head scarp observed.
GEO 3.8 L	Georgiana Slough	3.8	0	L	RD 563 - Tyler Island	Tyler Island	Eroding	1997	2,589	0	Wave Wash, Toe Scour	Quarry Stone in fair condition	Likely	Pump, Pipe, utility	1997 - Pockets of erosion into the levee at the water line. Alders are being undercut and rotating out into the channel. Damaged rock at upstream end. 2000 - New minor erosion. 2001 - Staked low fascine walls at bankline. 2002 - New "Brush Boxes" along the bank toe. 2003 - New erosion pockets in the middle of the site. 2005 - Some new bundles in the brush boxes. 2011 - Site upgraded to CRITICAL. Significant new erosion. Sites 3.6, 3.7, 3.71, and 4.0 were combined. 2012 - Rock has been placed in some of the erosion pockets since last year, however site remains critical. 2013 - Site no longer critical. The worst pockets were filled with rock by the local RD.	Fresh toe erosion, significant undercutting and slumping.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
GEO 4.3 L	Georgiana Slough	4.3	0	L	RD 563 - Tyler Island	Tyler Island	Eroding	1997	1,052	0	Fluvial, Wave Wash	Quarry Stone in good condition	Likely	PG&E pipeline crossing	1997 - Pockets of erosion into the levee toe. 1999 - Minor rock riprap and willow bundles place in a couple of spots. 2001 - Staked, low fascine walls at bankline. 2003 - Small unprotected pockets still eroding. 2004 - Numerous brush boxes, some falling apart, some with new bundles. 2005 - Some new brush boxes installed; some boxes are empty. Levee slope and banks still look bad with pocket scallops into the levee slopes. 2011 - Erosion continues and the number of pockets is increasing. 2013 - Some of the downstream end was repaired by the RD. 2016 - Fresh erosion observed.	The worst sections have been filled with quarry stone , but still areas of concern.
GEO 4.5 L	Georgiana Slough	4.5	0	L	RD 563 - Tyler Island	Tyler Island	Critical	1997	1,396	0	Whole Bank Failure, Wave Wash	Quarry Stone in fair condition	Likely	Bridge, underground telephone crossing, and pipe	1997 - Pocket erosion at upstream end and into the levee toe under the Alder trees. 2003 - New brush boxes with wattles on bank. 2004 - No brush boxes. 2005 - Site extended from the downstream side of the bridge. Whole bank is vertical. 2010 - Some minor new erosion. 2011 - Site upgraded to CRITICAL. New erosion pockets throughout the site. Sites 4.5, and 4.6 were combined. 2016 - Fresh erosion observed.	Numerous areas of bank erosion, with vertical sections up to the levee hinge.
GEO 5.3 L	Georgiana Slough	5.3	0	L	RD 563 - Tyler Island	Tyler Island	Eroding	1997	3,538	0	Whole Bank Failure, Wave Wash	Quarry Stone in good condition	Likely	Pipes	1997 - Pocket erosion into the toe of the levee. 2000 - Scallops in banks with small colored flags, biotech rolls present. 2001 - Staked, low fascine walls at bankline. 2003 - Still have visibly bad spots, especially at the upstream end. 2005 - Some new brush bundles in the brush boxes; some with missing bundles. Some boxes too low relative to high tide. 2010 - Site extended upstream. 2011 - Minor new erosion. 2016 - Fresh erosion observed.	Site extended upstream, increased toe erosion from boat wake/tide action, RD has placed rock on levee slope in places.
GEO 5.5 R	Georgiana Slough	5.5	0	R	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Eroding New	2017	86	0	Whole Bank Failure, Anthropogenic Erosion	Scattered Quarry Stone in poor condition	Unlikely	Pump and pipe through levee		Failed rock section, slump failure of bank to subvertical face.
GEO 6.3 L	Georgiana Slough	6.3	0	L	RD 563 - Tyler Island	Tyler Island	Critical	1997	5,951	0	Erosion Pockets, Wave Wash	Quarry Stone in fair condition	Unsure	Pipes and PG&E crossing	1997 - Deep pockets of erosion and narrow berm. Reach is characterized by lots of pockets into the existing berm and/or levee slope. 1999 - Some pockets filled with rock riprap. 2000 - Exposed fabric. 2001 - Staked, low fascine walls at bankline. 2002 - New spot of rock at upstream end. Some new brush boxes. 2005 - Some stone sliding off the underlying geotextile fabric. Some new brush bundles in the brush boxes; some with missing bundles. Some boxes too low relative to high tide. 2009 - Minimal new erosion, site length extended. 2010 New erosion on downstream end, site extended downstream. 2011 - Sites 6.1. 6.4 and 6.6 were combined. New erosion pockets, site extended to include the erosion in between the old sites. 2012 - Rock has been placed in portions of the bank since last year. 2016 - Site 5.8 was merged with this site due to new erosion connecting the sites.	Upgraded to CRITICAL. Combined with 6.8. Vertical sections from mid slope to toe, vertical face from levee hinge at some locations. Wave/tide erosion at toe, evidence of beavers.
GEO 7.0 R	Georgiana Slough	7	0	R	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	1997	1,137	5	Toe Scour, Wave Wash	Scattered Quarry Stone in poor condition	Likely	Pipe and boat dock permited	1997 - Toe damaged rock. 1999 - One pocket filled with gravel. 2000 - Eroding beach with some biotech rolls and stakes; some gravel on slope. 2001 - Staked, low fascine walls at bankline. 2005 - Stone revetment in between pockets. 2006 - New rock on upper slope behind brush boxes at the upstream end, Stone is sliding off the hard toe. 2016 - Fresh erosion observed.	Site extended downstream. Large erosion pockets and significant toe erosion.
GEO 7.2 L	Georgiana Slough	7.2	0	L	RD 563 - Tyler Island	Tyler Island	Eroding	2009	332	0	Wave Wash, Toe Scour	Scattered Quarry Stone in Poor condition	Likely	None	2009 - Small scallops of erosion into the levee toe behind brush boxes. 2011 - Minor new erosion. 2012 - Site extended upstream to account for addition erosion pockets. 2016 - Fresh erosion observed.	New erosion at toe.
GEO 8.3 L	Georgiana Slough	8.3	0	L	RD 563 - Tyler Island	Tyler Island	Eroding	1997	3,110	0	Wind Wave, Whole Bank Fialure	Quarry Stone in good condition	Likely	Pump and house on landside slope	1997 - Narrow eroding berm upstream of existing rock. 2001 - Staked, low fascine walls at bankline. 2011 - Minor new erosion. Site extended downstream. 2012 - Rock repair failing in one erosion pocket. 2016 - Fresh erosion observed.	New rock on levee in sections, failure of old rock in other sections, site extended upstream to account for new erosion pocket.
GEO 9.0 R	Georgiana Slough	9	0	R	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	2017	1,678	0	Whole Bank Failure, Toe Scour	Quarry Stone in fair condition	Likely	Pipe and ramps		Toe erosion and failed revetment.
GEO 9.2 R	Georgiana Slough	9.2	0	R	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	2017	707	0	Whole Bank Failure, Toe Scour	Quarry Stone in fair condition	Likely	Pump and pipe		Toe erosion.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
GEO 9.3 L	Georgiana Slough	9.3	0	L	RD 563 - Tyler Island	Tyler Island	Critical	1997	4,304	0	Toe Scour, Wave Wash	Scattered Quarry Stone in poor condition	Likely	Pump, Pipes, Ramp, and power poles	1997 - Loss of rock at toe; pockets of upper berm erosion; very narrow berm width; toe rock problem; erosion pockets in rock. 2002 - New brush boxes at toe of the worst spots. 2005 Upstream 200 ft removed because of the wide berm. 2006 - Some rock repair pockets behind the brush boxes at the upstream end. 2010 - Some new erosion. 2013 - New rock placed on the levee slope. 2016 - Fresh erosion along the toe.	Upgraded to critical. Pockets of erosion - subvertical. Areas of failed revetment, old rock is unraveling, and eminent tree popout outs expected.
GEO 9.8 L	Georgiana Slough	9.8	0	L	RD 563 - Tyler Island	Tyler Island	Eroding New	2017	280	0	Whole Bank Failure, Wave Wash	None	Likely	None		Whole bank failure , eroded to subvertical face, and giant animal holes.
GEO 10.0 L	Georgiana Slough	10	0	L	RD 563 - Tyler Island	Tyler Island	Eroding New	2017	1,282	0	Wave Wash, Whole Bank Failure	Quarry Stone in poor condition	Unsure	Pipes		Revetment failure , toe erosion moving landward.
GEO 10.2 L	Georgiana Slough	10.2	0	L	RD 563 - Tyler Island	Tyler Island	Eroding New	2017	3,906	0	Whole Bank Failure, Wave Wash	None	Likely	Pump, pipes, and boat dock permitted		Evidence of meander process, eroding to short vertical face
GEO 10.9 R	Georgiana Slough	10.9	0	R	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	2017	1,703	5	Toe Scour, Whole Bank Failure	Concrete Rubble in poor condition	Likely	Pipeline		Significant toe erosion and whole bank failure in sections, large pockets from tree popouts.
GEO 11.0 L	Georgiana Slough	11	0	L	RD 563 - Tyler Island	Tyler Island	Eroding	2011	990	0	Wave Wash, Whole Bank Failure	Quarry Stone in poor condition	Likely	None	2011 - Short sections of eroding bank at the waterline and holes in toe of levee. 2012 - Site extended upstream. 2013 - Erosion pockets filled with an insufficient amounts of revetment. 2016 - Fresh erosion observed.	Increased toe erosion, slumping, boat wake erosion, and revetment failure near downstream end. Site extended upstream.
GEO 11.4 L	Georgiana Slough	11.4	0	L	RD 563 - Tyler Island	Tyler Island	Critical	2017	1,338	0	Whole Bank Failure, Toe Scour	Quarry Stone in poor condition	Likely	None		New erosion site, upgraded to critical. Subvertical face from levee hinge, large erosion pockets, and toe erosion throughout.
GEO 11.8 R	Georgiana Slough	11.8	0	R	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	2017	1,007	5	Toe Scour, Whole Bank Failure	Concrete Rubble in poor condition	Likely	Pipe		Tree popout popouts eminent , significant toe erosion and whole bank failure in sections
GEO 12.0 L	Georgiana Slough	12	0	L	RD 563 - Tyler Island	Tyler Island	Eroding New	2017	356	0	Toe Scour	None	Likely	Pipe and ramp		Toe erosion throughout site, slumping, subvertical levee slope in sections.
HAS 7.9 L	Haas Slough	0	7.9	L	RD 2098 - Cache-Haas Area	Moore Tract	Eroding	2011	2,150	0	Erosion Pockets, Toe Scour	None	Likely	Pipes	2011 - Large vertical erosion pockets and bank slumping.	POSSIBLY BEING FIXED BY RD; deep cracks along bank and toe, intermittent slump.
HAS 8.4 L	Haas Slough	0	8.4	L	RD 2098 - Cache-Haas Area	Moore Tract	Eroding New	2017	1,514	0	Toe Scour, Tree Pop-outs	Scattered Quarry Stone in poor condition	Likely	Overhead powerpole		Horizontal cracks; scour along toe; poorly constructed levee susceptible to erosion.
HAS 9.7 L	Haas Slough	0	9.7	L	RD 2098 - Cache-Haas Area	Moore Tract	Critical	2011	1,595	0	Slump Failures, Erosion Pockets, Bovine Erosion	None	Unlikely	In-channel structure at upstream end	2011 - Several scallops of erosion. Erosion primarily due to the weight of cattle on the slope. 2016 - Two new large scallop pockets in the middle of the site.	Upgraded to CRITICAL. Multiple slump on top of old slumping ; slump is into levee prisim.
KLR 3.0 L	Knights Landing Ridge Cut	0	3.0	L	Knights Landing Ridge Drainage District	Knights Landing	Eroding	2006	1,113	0	Wave wash	None	Unsure	None	2006 - The whole levee toe area is slowly slumping into the channel (creep) due to dewatering and poor slope soils. Occasional piping in the levee slope evident as well. Pistol-butted trees at the levee toe indicate slow retreat. 2011 - Multiple scallops throughout the site and slumping of the toe.	Access Issues - Could not observe
KLR 3.1 L	Knights Landing Ridge Cut	0	3.1	L	Knights Landing Ridge Drainage District	Knights Landing	Eroding	2006	658	0	Fluvial	None	Unsure	None	2006 - The whole levee toe area is slowly slumping into the channel (creep) due to dewatering and poor slope soils. Occasional piping in the levee slope evident as well. Pistol-butted trees at the levee toe indicate slow retreat. 2011 - Slumping of the levee toe.	Access Issues - Could not observe
KLR 3.5 R	Knights Landing Ridge Cut	0	3.5	R	Knights Landing Ridge Drainage District	Yolo	Eroding	2011	418	0	Toe Scout	None	Unsure	Pipe through levee	2011 - Toe scour and bank slumping.	Access Issues - Could not observe
KLR 3.7 L	Knights Landing Ridge Cut	0	3.7	L	Knights Landing Ridge Drainage District	Knights Landing	Eroding	2011	678	0	Tree Pop-outs and whole bank failure	None	Unsure	Abandoned pipe and concrete box	2011 - The toe has eroded away and there are a few scallops from bank slumping.	Access Issues - Could not observe
KLR 3.9 R	Knights Landing Ridge Cut	0	3.9	R	Knights Landing Ridge Drainage District	Yolo	Eroding	2011	366	0	tree Pop-outs	None	Unsure	None	2011 - Toe erosion and erosion pockets from tree popouts. More tree popouts are expected due to the eroding toe.	Access Issues - Could not observe
KLR 4.7 L	Knights Landing Ridge Cut	0	4.7	L	Knights Landing Ridge Drainage District	Knights Landing	Eroding	2011	1,266	0	Fluvial	None	Unsure	None	2011 - This site is the downstream section of the old KLR 5.3L site. Levee toe is slowly retreating. Cracking on top of the levee may indicate potential mass movement.	Access Issues - Could not observe
KLR 5.8 L	Knights Landing Ridge Cut	0	5.8	L	Knights Landing Ridge Drainage District	Knights Landing	Eroding	2011	2,986	0	Fluvial	None	Likely	Pipes and concrete structure	2011 - This site is the upstream section of the old KLR 5.3L site. Levee toe is slowly retreating. Cracking on top of the levee may indicate potential mass movement.	Hummocky levee, with multiple slump failures and tree popouts.
LAR 1.8 L	Lower American River	1.8	0	L	American River Flood Control District	Sacramento	Eroding	2012	866	10	Fluvial, Anthropogenic	None	Likely	None	2012 - Located just downstream of older repair. Failing rock at the upstream end. Erosion of the bank has exposed large tree roots.	Site littered with homeless camps. Hard to survey. Site extended downstream.
LDS 0.6 R	Lindsey Slough	0	0.6	R	RD 536 - Egbert Tract	Lindsey	Eroding	2011	1,620	0	Erosion Pockets, Bovine Erosion	Scattered Quarry Stone in fair condition	Unlikely	None	2011 - Multiple sections of slumping bank. 2016 - Bank continues to erode.	Appears to be cow paths along slope causing erosion.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
LDS 0.7 R	Lindsey Slough	0.7	0	R	RD 536 - Egbert Tract	Lindsey	Critical	2011	280	0	Erosion Pockets, Wave Wash	None	Likely	None	2011 - Levee toe is unraveling with large slumping sections. This site is downstream of old bank rock. 2012 - Erosion pocket has increased in size. 2016 - Site continues to erode.	Upgraded to CRITICAL. Erosion pocket has increased significantly in the last year.
LDS 0.8 R	Lindsey Slough	0.8	0	R	RD 536 - Egbert Tract	Lindsey	Eroding	2011	86	0	Wave Wash, Toe Scour	Scattered Quarry Stone in poor condition	Likely	Pipe through levee and pump structure	2011 - Multiple erosion pockets from tree popouts. A smaller erosion pocket in the middle of a failing bank repair. Pump structure at the downstream end may be contributing to the erosion.	additional erosion at toe.
LDS 1.7 L	Lindsey Slough	0	1.7	L	RD 2060 - Hastings Tract	Hasting Tract	Eroding New	2017	720	0	Erosion Pockets	None	Likely	None		Soil is boulders and sand. Multiple slumping sections.
MUD 3.3 L	Mud Creek	0	3.3	L	Butte County	Unassigned	Eroding New	2017	457	10	Whole Bank Failure, Fluvial	None	Unsure	None		Large mass failure of lower bank slope.
MUD 2.8 L	Mud Creek	0	2.8	L	Butte County	Unassigned	Eroding New	2017	766	15	Fluvial, Whole Bank Failure	None	Unsure	None		Large erosion scarp along lower toe.
MUD 4.4 R	Mud Creek	0	4.4	R	Butte County	Unassigned	Eroding	2011	300	20	Whole Bank Failure, Fluvial	None	Unsure	None	2011 - Two large erosion scallops at the toe from a rotational failure. Deep cracks along the slope indicate the potential for further failures.	Erosion scarps have increased since last inspection in 2011.
NCC 1.9 L	Natomas Cross Canal	0	1.9	R	RD 1001 - Nicolaus	Rio Oso	Eroding New	2017	408	0	Fluvial	None	Unsure	None		Erosion along mid bank and sections of slumped bank.
NCC 2.4 R	Natomas Cross Canal	0	2.4	R	RD 1001 - Nicolaus	Rio Oso	Eroding	2006	526	30	Erosion Pockets	None	Unlikely	None	2006 - Noted old saturation slumping of upper levee slope that is into the levee core (near high water line). 2011 - Erosion is into the top of the levee. This site is actually located at LM 2.4. 2016 - Site extended downstream. Slumping of entire meiddle levee section.	Site renamed, previously mislabeled as NCC 3.0. Erosion along mid bank slope.
NCC 2.9 R	Natomas Cross Canal	2.9	2.9	R	RD 1001 - Nicolaus	Rio Oso	Eroding New	2016	2,377	0	Erosion Pockets	None	Unlikely	None	2016 - Slumping of upper bank slope.	Hummocky levee face, slumping upper bank.
PUC 7.2 L	Putah Creek	0	7.2	L	DWR Sacramento Maintenance Yard	Davis	Eroding	2011	305	0	Toe Scour, Fluvial	None	Likely	Storm drain through levee	2011 - The toe to mid-bank is slumping. Large tree pop-outs have furthered the erosion. Slope is slightly steeper than 1:1.	New erosion along lower bank.
SAP 1.4 R	Sacramento Bypass	0	1.4	R	RD 785 - Driver District	Elkhorn	Critical	2017	841	0	Slump Cracking, Erosion Pockets	None	Unlikely	None		New site, immediately upgraded to critical. Start of slump failure, deep cracks along levee crest, concern that a large slump failure will occur from the next heavy rain.
SAC 7.3 L	Sacramento River	7.3	0	L	RD 341 - Sherman Island	Sherman Island	Critical	2011	619	0	Surface Runoff Erosion, Whole Bank Failure	Concrete Rubble in poor condition	Likely	Fish release system, pipes, pilings, conduit, netting, and power poles	2011 - Large slump at downstream end. Gully formed from surface runoff from the road. Shallow slumping throughout site. 2012 - The gully at upstream end has increased in size and site continues to worsen.	No observed change..
SAC 7.5 L	Sacramento River	7.5	5.5	L	RD 341 - Sherman Island	Sherman Island	Eroding New	2017	580	0	Whole Bank Failure, Anthropogenic Erosion	Concrete Rubble in poor condition	Likely	Ramp, pipe, poles		Erosion along levee slope, erosion appears to mainly be human caused, but it is threatening the integrity of the Hwy on top of the levee.
SAC 7.9 L	Sacramento River	7.9	0	L	RD 341 - Sherman Island	Sherman Island	Critical	2011	1,276	0	Whole Bank Failure, Wind Wave	Concrete Rubble in fair condition	Likely	Pipe	2011 - Large slump section. 2012 - Site extended downstream, upgraded to critical, severe windwave. Slope is very steep and may be effecting the highway on top of the levee.	Road base exposed in multiple locations. New tree popout observed.
SAC 8.0 L	Sacramento River	8	0	L	RD 341 - Sherman Island	Sherman Island	Critical	1999	1,200	0	Wave Wash, Whole Bank Failure	Concrete Rubble in poor condition	Likely	None	1999 - New small slump in eroded bank. 2005 - Reach extended because of vertical bank along the roadway upstream. 2011 - More slumping since last year. 2012 - Site upgraded to critical. Very steep slope which may be effecting the highway on top of the levee. 2015 - New erosion towards the downstream end of site.	Site extended downstream
SAC 8.2 L	Sacramento River	8.2	0	L	RD 341 - Sherman Island	Sherman Island	Eroding	2011	1,023	0	Wind Wave, Whole Bank Fialure	Quarry Stone in poor condition	Unsure	Pipe through levee	2011 - Large new erosion pocket probably hidden by vegetation in the past.	Minor new erosion.
SAC 10.8 L	Sacramento River	10.8	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Eroding	2004	820	0	Wave Wash	Quarry Stone in good condition	Likely	Pipe	2004 - Wave wash pockets approximately 100 ft long with new full bank rock between the pockets. 2005 - Spot repairs, but toe is still eroding in several places. 2006 - Low vertical bank along roadway. 2007 - A PL 84-99 repair was constructed, it cover the majority of the site with the exception of the upstream 150 to 200 ft and the downstream 250 ft, therefore it is being kept in the inventory. 2009 - Minimal new erosion. 2010 - Outboard berm looks good, but the banks are still very steep. 2011 - While the outboard berm is protecting against wave wash, bank still has slumping issues.	Lots of new woody debris recruitment.
SAC 11.2 L	Sacramento River	11.2	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	2008	1,971	0	Whole Bank Failure, Wave Wash	Quarry Stone in fair condition	Likely	Pipe	2008 - Erosion causing vertical bank at the highway on top of levee. The whole bank along the highway should be repaired. 2009 - Minimal new erosion. 2011 - Bank continues to slowly erode. 2012 - Upgrade to critical, new erosion since lat year and steeper slopes in sections. 2015 - Road foundation and cables exposed. Extremely large tree with exposed roots looks likely to fail and take out a significant portion of the levee. 2016 - Site continues to erode.	New slump section. Erosion under the road has enlarged.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
SAC 12.1 L	Sacramento River	12.1	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	2010	1,165	0	Whole Bank Failure	Concrete Rubble in poor condition	Likely	Pipe, gas line, ramp, dock, boat launch, and utility poles	2010 - Small inlet area behind a man-built spit. Bank is slumping and could possibly be fixed with maintenance. 2011 Site continues to worsen. 2015 - Upgraded to CRITICAL. 2016 - Site continues to get worse.	Continues to worsen and threaten the road.
SAC 13.6 L	Sacramento River	13.6	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	2011	303	0	Whole Bank Failure	None	Likely	Marina at upstream end	2011 - Large section of bank slumped off.	Upgraded to critical. Nearly vertical face from levee hinge. Trees with large root balls likely to fail.
SAC 18.1 L	Sacramento River	18.1	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	2009	267	0	Fluvial, Wave Wash	Quarry Stone in fair condition	Likely	None	2009 - Short reach of vertical bank at the toe. 2010 - Large tree is getting ready to fall in. 2015 - Freshly exposed tree roots.	Upgraded to critical. Vertical slope face behind a tree that is likely to pop-out soon.
SAC 21.9 L	Sacramento River	21.9	0	L	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	2013	237	5	Wave Wash, Fluvial	None	Likely	None	2013 - Erosion pockets encroaching on levee foundation.	No observed change..
SAC 22.5 L	Sacramento River	22.5	0	L	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	1997	900	10	Eddy Scour, Fluvial	Quarry Stone in good condition	Likely	Pipe and pump structure	2002 - Spot rock along berm, but not in the erosion pockets. 2005 - Some new minor stone revetment at the upstream end. Brush boxes present. 2006 - Currently installing new brush in downstream brush boxes. 2007 - Rock in middle portion for about 150 ft. 2010 - Some attempt at repairs but still has pockets of erosion. 2012 - More erosion along the toe.	New lower bank erosion at the upstream end. Locals placed rock in some erosion pockets.
SAC 22.7 L	Sacramento River	22.7	0	L	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	1997	311	0	Fluvial, Wave Wash	None	Likely	Pipe	1997 - Scallops into berm and very close to levee toe. 2005 - Brush boxes present. 2011 - New toe scour and freshly fallen tree. 2012 - New tree popout has taken significant portion of soil out of the levee.	Minor new erosion at toe.
SAC 23.2 L	Sacramento River	23.2	0	L	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	1997	589	0	Fluvial, Wave Wash	None	Likely	None	2000 - Recently fallen cottonwood at the downstream end. 2005 - Empty brush boxes. 2011 - A few trees have fallen since last year. 2012 - Potential new tree popout since last year. 2013 - New erosion at downstream end of site and a recent tree pop-out observed. 2016 - New erosion at the toe.	New erosion along lower bank.
SAC 24.8 L	Sacramento River	24.8	0	L	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	1997	783	5	Fluvial, Wave Wash	None	Likely	None	1997 - Slow erosion of the berm at the waterline; bench below water. 2005 - Brush boxes present. 2010 - Minor new erosion. 2013 - There is little to no berm remaining at downstream end of this site. 2016 - New erosion on levee slope.	Significant lower bank erosion.
SAC 25.2 L	Sacramento River	25.2	0	L	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	1997	619	5	Fluvial, Wave Wash	Quarry Stone in good condition	Likely	None	1997 - Rock is in poor condition and has failed in many places. Scallops in berm with remnants of old rock in the toe area. 2005 - Brush boxes present. 2013 - Site extended upstream approximately 300 ft to include new erosion pockets. 2015 - Minor new erosion at toe.	Minor new erosion observed.
SAC 27.0 L	Sacramento River	27.0	0	L	RD 554 - Walnut Grove	Tyler Island	Eroding	2009	504	0	Whole Bank Failure	Quarry Stone in fair condition	Likely	Pipe	2009 - Tension cracks on road on top of levee. Erosion into the levee slope and mass failure. 2013 - Short vertical sections at bank toe.	Minor new erosion at toe.
SAC 33.9 R	Sacramento River	33.9	0	R	RD 349 - Sutter Island	Sutter Island	Critical	2015	457	10	Toe Scour, Wave Wash	Concrete Rubble in poor condition	Likely	House on waterside slope	2015 - Erosion observed at the toe.	New erosion pocket. Tree roots propped up with junk. Tree likely to fall and house to come tumbling after. Upgraded to critical.
SAC 38.5 R	Sacramento River	38.5	0	R	RD 150 - Merritt Island	Merritt Island	Critical	1997	364	0	Fluvial, Whole Bank Failure	Quarry Stone in fair condition	Likely	None	1999 - Downstream end (300 ft) repaired with rock. 2010 - Toe erosion, some vertical slopes lower down. 2011 - Failing rock repair. Slumping of the lower bank. Minor new erosion. 2013 - Tree at upstream end has exposed roots. Some new erosion.	New erosion pocket. Vertical section along lower bank, and cracking. Upgraded to critical.
SAC 38.8 L	Sacramento River	38.8	0	L	Maintenance Area 9	Beach Stone Lake	Eroding New	2017	549	0	Toe Scour, Wave Wash	Quarry Stone in fair condition	Likely	None		Toe erosion along entire site. Heavily used by people for fishing and campfires. Large tree at downstream end.
SAC 40.4 L	Sacramento River	40.4	0	L	Maintenance Area 9	Beach Stone Lake	Eroding New	2017	108	0	Fluvial, Toe Scour	Quarry Stone in fair condition	Likely	None		Erosion along lower slope. Large erosion pocket at downstream end.
SAC 41.9 R	Sacramento River	41.9	0	R	RD 999 - Netherlands	Clarksburg	Critical	1997	1,360	0	Toe Scour, Whole Bank Failure	None	Likely	Gas pipeline at downstream end and power poles	1997 - Structural problem rather than erosional, failed cobble at downstream end. 2005 - New brush boxes at waterline for several hundred feet downstream, No toe or bank protection present. 2006 - Some minor new erosion. Brush boxes not working well; most of the brush has floated out. 2007 - Brush boxes have recently been repaired. 2016 - Minor new slumping.	Fresh erosion on entire bank. Upgraded to critical.
SAC 43.1R	Sacramento River	43.1	0	R	RD 307 - Lisbon Island	Borges	Eroding	2011	646	0	Tree Pop-Outs, Whole Bank Failure	Cobbles in poor condition	Likely	Large discharge pipes	2011 - Erosion pockets likely from tree popouts. This site has been in the inventory before and been fixed with emergency bank rock but continues to fail.	Fresh erosion observed along toe and slope.
SAC 43.2 R	Sacramento River	43.2	0	R	RD 307 - Lisbon Island	Borges	Eroding	2008	992	0	Tree Pop-Outs, Whole Bank Failure	Quarry Stone in fair condition	Likely	Pipe	2008 - Large rotational failure in bank and well into the levee slope. Could be a significant problem in the next high flow event. 2009 - Minimal new erosion, site extended upstream. 2010 - Minor new erosion. 2011 - Tree popout has left a large hole. Large slump area. Rock on the bank is failing in some locations. 2012 - The toe appears to be scouring out. 2016 - Some rock placed in the last year	New erosion pockets and new toe erosion.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
SAC 48.4 L	Sacramento River	48.4	0	L	Maintenance Area 9	Sacramento	Eroding New	2016	1,399	0	Toe Scour, Wave Wash	None	Unsure	None	2016 - Extensive toe erosion. Erosion around roots of multiple trees.	New erosion along toe. Possibly part of pl 84-99 site
SAC 48.6 R	Sacramento River	48.6	0	R	RD 307 - Lisbon Island	Borges	Eroding	2012	471	0	Fluvial	Quarry Stone in fair condition	Likely	None	2012 - Bank is slowly eroding, old rock protection starting to unravel. 2016 - Anthropogenic erosion observed.	Site lengthened upstream and shortened downstream.
SAC 50.3 L	Sacramento River	50.3	0	L	Maintenance Area 9	Sacramento	Eroding	2011	89	0	Tree Pop-Outs	Quarry Stone in fair condition	Likely	None	2011 - Tree popout at the toe has taken out the rock toe protection. 2016 - Sand deposition has filled in some of the hole.	Vegetation has grown in the tree hole.
SAC 52.4 L	Sacramento River	52.4	0	L	Maintenance Area 9	Sacramento	Critical	2010	260	0	Tree Pop-Outs, Toe Scour	Concrete Rubble in fair condition	Likely	Pipe, Wooden steps	2004 - A large tree cave was identified. 2005 - Site repaired. 2010 - At the downstream end of the repair at 52.5, bad transition is inducing further erosion. 2011 - Minor new erosion on bank. 2016 - Erosion continues under the tree.	Huge tree with scoured roots, likely to fall soon and take huge chunk of levee with it. Upgraded to critical.
SAC 52.7 L	Sacramento River	52.7	0	L	Maintenance Area 9	Sacramento	Eroding	2010	158	0	Fluvial, Tree Pop-outs	Cobbles in poor condition	Likely	None	2010 - Small section of slumping, can be fixed with maintenance. 2011 - Freshly fallen tree and minor new toe erosion.	Minor new toe erosion. Observed bricks mixed with soil.
SAC 53.8 L	Sacramento River	53.8	0	L	Maintenance Area 9	Sacramento	Eroding	2011	155	15	Tree Pop-Outs, Fluvial	None	Likely	Caltrans Pipeline, pump, house built into ladside slope	2010 - Small section of slumping, can be fixed with maintenance. 2011 - Freshly fallen tree and minor new toe erosion. 2016 - Erosion continues due to anthropogenic usage.	Minor new erosion at toe.
SAC 54.8 L	Sacramento River	54.8	0	L	Maintenance Area 9	Sacramento	Eroding	2011	325	0	Toe Scour	None	Likely	Pipes, dock	2011 - A large tree has fallen behind a larger tree, putting stress on an already compromised tree. Toe erosion due to wave wash. 2013 - Site extended upstream due to steep bank. 2015 - Site extened upstream due to steep bank.	No observed change..
SAC 55.2 L	Sacramento River	55.2	0	L	Maintenance Area 9	Sacramento	Eroding	2003	1,075	5	Fluvial, Toe Scour	Quarry Stone in poor condition	Likely	Pump, pipes, boat docks, and fences	Site previously named 55.1. 2003 - Pockets of toe erosion at low flow waterline. 2005 - Site renamed 55.2. Still have pockets of erosion but rock bench at waterline is still present. 2010 - Site extended upstream due to new erosion. 2011 - Some of the toe rock has failed. The upper levee slope seems to be slumping. 2012 - Minor new slumping. 2016 - New erosion observed under a tree at the upstream end.	No observed change.
SAC 55.5 L	Sacramento River	55.5	0	L	Maintenance Area 9	Sacramento	Eroding	1997	384	15	Toe Scour	Quarry Stone in poor condition	Likely	Large marina and parking lot on waterside berm	1997 - Large cottonwoods on slope. 2003 - Some minor sloughing. 2004 - New sediment deposition on the downstream end. 2007 - New dock was installed without notification to USACE and halted the planned repair due to ROW issues. 2015 - Minor new erosion at the toe.	No observed change.
SAC 55.7 R	Sacramento River	55.7	0	R	RD 900 - West Sacramento	Southport	Critical	2008	1,150	0	Fluvial, Whole Bank Failure	Quarry Stone in good condition	Likely	Boat dock, pipes, power poles, and dolphins	2008 - Erosion into levee toe. Over steepened levee slope, worst at the upstream end. 2009 - Near vertical banks from rotational slumping, hidden by vegetation. 2010 - Boat sinking more, may be causing eddy scour around it. Difficult to see the vertical slumps due to dense vegetation. 2011 - Minor new erosion at the toe. The paddleboat that was sitting at this site for years has been removed. 2012 - Site extended upstream due to additional erosion. 2016 - New rock on slope at upstream end.	Fresh toe erosion. Site upgraded to critical. A setback levee is under construction behind this site.
SAC 56.5 R	Sacramento River	56.5	0	R	RD 900 - West Sacramento	Southport	Eroding	1997	465	10	Fluvial, Wave Wash	None	Unsure	Pump and pipeline	1997 - Low berm is contributing to erosion. Old timber pile dikes above water parallel to bank. The upstream mitigation low berm causes a flow separation at the site. 1999 - Some new localized erosion with less thank one foot of bank retreat. 2000 - Some new erosion at the upstream end. Fat toe deposits at toe. 2003 - Some new erosion upstream, but have a wide berm. 2011 - Minor new erosion at toe.	Fresh toe erosion.
SAC 56.6 L	Sacramento River	56.6	0	L	City of Sacramento	Sacramento	Eroding	1997	70	0	Fluvial, Toe Scour	Quarry Stone in fair condition	Likely	SMUD structure and pipe	1997 - Erosion at pump station, concrete debris and plastic showing. 2000 - Separation scour of bank due to poor transition. 2004 - New large tree pop out; city dumped fill dirt/rock into hole. 2006 - Minor new erosion at top of bank. 2010 - Some new rock placed in tree pop-out. 2011 - A large tree has fallen and flood fighting was performed by the city on the upper levee slope. 2012 - Small rock placed in hole from tree popout.	Upstream portion repaired by locals.
SAC 56.7 R	Sacramento River	56.7	0	R	RD 900 - West Sacramento	Southport	Eroding	2007	662	10	Fluvial, Wave Wash	Quarry Stone in fair condition	Likely	Power Poles	2007 - Have good berm width with minor toe erosion. Close to the levee toe protection, but levee slope is steep. 2011 - New large erosion pocket. 2012 - Minor new erosion at the toe.	Fresh toe erosion. New rock placed.
SAC 58.5 L	Sacramento River	58.5	0	L	City of Sacramento	Sacramento	Eroding	2008	445	0	Fluvial	Quarry Stone in fair condition	Likely	Pipe through levee, railroad and bikepath on top of levee, and monitoring wells	2008 - Oversized levee, should be repaired under maintenance. 2009 - Shallow slumps at the mid bank. 2010 - Some minor erosion at the toe, likely from wave wash. Some new shallow slumps. 2011 - One new tree has fallen. 2013 - Erosion continues on the slope surface, site extended upstream.	Slump sections along mid bank. City requested PL 84-99 assistance.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
SAC 62.9 R	Sacramento River	62.9	0	R	RD 537 - Lovdal District	West Sacramento	Eroding	1997	1,059	10	Erosion Pockets, Wave Wash	Concrete Rubble in poor condition	Likely	Ramp and structure on top of levee	1997 - This may have been a cobble rehabilitation site to the 1957 cobble that was place all the way to the I-80 Bridge. 2000 - Local damage induced by human use. 2003 - Site is still very close to the levee and into the levee toe. 2011 - One new tree has fallen. 2015 - Sites 62.9 and 63 were combined into one site.	Fresh erosion pocket near downstream end.
SAC 71.3 R	Sacramento River	71.3	0	R	RD 1600 - Mull District	Elkhorn	Under Construction	1997	522	25	Toe Scour, Fluvial	None	Likely	None	2000 - Very cohesive vertical bank. 2003 - Some minor new erosion. 2006 - Some minor erosion in old pockets. 2009 - Minimal new erosion. 2011 - Multiple new erosion pockets and a few new tree popouts.	New erosion pocket and fresh toe erosion. Site is currently under construction.
SAC 74.0 R	Sacramento River	74	0	R	RD 1600 - Mull District	Elkhorn	Eroding New	2017	2,049	30	Toe Scour, Whole Bank Failure, Tree Pop-outs	None	Likely	None		Significant toe erosion. Erosion along entire bank. Tree popouts observed.
SAC 74.4 R	Sacramento River	74.4	0	R	RD 1600 - Mull District	Elkhorn	Eroding	1997	1,343	25	Toe Scour, Fluvial	None	Likely	None	1997 - Steep high bank. 2005 - Some small pockets in the low toe near the waterline. 2006 - Minor slope clearing. 2010 - Minor new erosion. 2011 - Multiple trees have fallen since last year. Some other trees look ready to fall. Significant new erosion since last year. 2012 - Minor new erosion. 2013 - Minor new erosion. 2015 - Minor new toe erosion.	Significant erosion at toe in the past year. Fresh tree popout.
SAC 75.3 R	Sacramento River	75.3	0	R	RD 1600 - Mull District	Elkhorn	Eroding	1997	2,753	30	Toe Scour, Fluvial	None	Likely	Pump and pipe through levee	1997 - Very steep bank. 2005 - Lots of small trees down along the bank at the upstream end. 2006 - Minor new erosion, but slow. 2010 - Almost all of the roots are exposed on the trees, appears ready to fall. 2011 - New erosion and tree popouts. 2012 - Site has become overgrown with vegetation, making it hard to observe. 2015 - Dense vegetation made the site difficult to observe.	Fresh erosion along lower bank in sections.
SAC 77.7 R	Sacramento River	77.7	0	R	RD 1600 - Mull District	Elkhorn	Eroding	2006	156	10	Eddy Scour, Tree Pop-outs	None	Likely	USACE wing dam	2006 - Eddy scour off end of rock causing erosion and scour hole near levee. Sandy silt bank with rock on upstream end. 2010 - Trees are leaning more, minor new erosion. 2011 - Many of the tree roots have scoured out and trees look ready to fall.	Minor new erosion.
SAC 83.9 R	Sacramento River	83.9	0	R	Yolo County Service Area 6	Knights Landing	Eroding	2006	988	35	Fluvial, Whole Bank Failure	None	Likely	Gage station	2006 - Approximately 18 to 20 ft of bank near levee at the corner of the levee and the Freemont Weir. Vertical bank with undercutting/mass failure. 2007 - Staked at top of bank for monitoring. 2011 - Site has become significantly worse with more of the toe and lower bank eroded. Many trees have fallen since last year. 2012 - Site looks worse with more ersion around trees. 2013 - Additional erosion into the toe. 2015 - Site extended upstream about 500 ft to account for eroding bank. 2016 - Site continues to erode. Multiple trees appear ready to fall into the river.	Fresh erosion on lower bank.
SAC 86.3 L	Sacramento River	86.3	0	L	RD 1500 - Sutter Basin	South Sutter	Eroding	2006	3,035	30	Fluvial, Whole Bank Failure	Cobbles in poor condition	Unsure	Pipe and electric conduit through levee	2006 - New erosion upstream, new bank failures near levee but still fairly wide berm in most places. 2008 - Large berm, questionable as to if it should remain in the inventory. 2010 - Minor new erosion, old cobble starting to fail. 2011 - Cobble continues to unravel and additional slumping. 2012 - Minor new erosion at bank mid point. 2013 - Minor new erosion. 2016 - Toe relatively stable. Upper slope is over steepened.	No observed change..
SAC 86.9 R	Sacramento River	86.9	0	R	Yolo County Service Area 6	Knights Landing	Eroding	2006	517	25	Toe Scour, Wave Wash	None	Likely	Pump and conduit through levee	2006 - Short section is into the levee toe, rest is near the levee toe. Mass failure and fluvial erosion of depositional material. Rock at the upstream and downstream ends. 2011 - Minor new erosion. 2012 - Slope continues to steepen, tree roots have become exposed, and new eddy formed.	No observed change..
SAC 87.1 L	Sacramento River	87.1	0	L	RD 1500 - Sutter Basin	South Sutter	Eroding	2010	1,239	40	Fluvial, Toe Scour	None	Likely	Pipe and PG&E pipeline	2010 - The upstream end of the repair site at 87.0. Repair did not extend far enough upstream. 2011 - New erosion pockets. 2012 - Minor new erosion at toe. 2013 - Minor new erosion. 2015 - Significant new toe erosion. 2016 - Fresh erosion on riverbank.	Large whole bank failure section in middle of site.
SAC 95.8 L	Sacramento River	95.8	0	L	RD 1500 - Sutter Basin	South Sutter	Eroding	1997	2,458	15	Fluvial	Concrete Rubble in poor condition	Unlikely	Well, trailer pad, spetic tank, leach field, pipes, fish screen, ramp, structure, and overhead utility	1997 - No toe on the large upstream rubble (mix of broken concrete, bricks, rock, and steal) - should be replaced. Oversized bank. 2001 - New slump at the downstream end. 2003 - Some minor bank retreat at the downstream end. 2004 - Some new retreat at the downstream end. 2006 - Some new erosion, mainly on the steep slope and scarps. (Pumping station is not part of the erosion site.) 2010 - Minor new erosion. 2011 - Minor new erosion at the toe. 2015 - Fresh slumping	Sites 95.8 and 96.2 combined.
SAC 99.0 L	Sacramento River	99	0	L	RD 1500 - Sutter Basin	South Sutter	Eroding	1997	1,745	10	Fluvial	Quarry Stone in fair condition	Unlikely	Pipe and Pump structure	1997 - Intermittent toe failure of the hand placed riprap; failure of toe materials.	Rock continues to unravel.
SAC 101.3 R	Sacramento River	101.3	0	R	RD 108 - River Farms	Grimes	Eroding	1997	188	25	Toe Scour, Fluvial	Cobbles in poor condition	Likely	None	1997 - Toe damage and loss of cobble revetment and small patch of local damage to the cobble revetment. 2000 - Cohesive vertical toe; revegetation site.	No observed change..

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
SAC 104.0 L	Sacramento River	104	0	L	RD 1500 - Sutter Basin	South Sutter	Eroding	1997	3,443	40	Fluvial	Cobbles in Fair Condition	Unlikely	Pumping plant and discharge pipe	1997 - Pocket failures of cobble revetment toe; scallops of rock loss along the bank; irregular bankline developing. 2001 Small scallops in the toe of the berm. 2005 - Still multiple erosion pockets in the toe. 2006 - Two new small slumps. 2011 - Old cobble continue to fail causing minor slumping. 2012 - Portions of site appears to be stabilizing. 2016- Cobble revetment continues to fail.	Bank slope is relatively stable.
SAC 104.5 L	Sacramento River	104.5	0	L	RD 1500 - Sutter Basin	South Sutter	Eroding	1997	1,424	25	Fluvial	Cobbles in poor condition	Unlikely	Pump and pipes through levee	1997 - Cobbles eroded off the clay materials; not much evidence of erosion on the toe; cobble loss on the toe. 2011 - Some minor new erosion.	Site appears stable.
SAC 111.0 R	Sacramento River	111	0	R	RD 108 - River Farms	Grimes	Eroding	2009	110	20	Toe Scour, Whole Bank Failure	Cobbles in poor condition	Likely	Pipes through levee	2009 - Minor erosion, should be repaired under maintenance. 2011 - Some new minor erosion at the toe.	No observed change.
SAC 115.9 R	Sacramento River	115.9	0	R	RD 108 - River Farms	Grimes	Eroding	2008	540	30	Fluvial, Toe Scour	Cobbles in poor condition	Unsure	None	2008 - Slippage of cobbles off hard underlying toe material. 2011 - Minor slumping site. 2012 - Failing cobble site, site extended upstream. 2016 - New erosion pockets.	No observed change.
SAC 116.0 L	Sacramento River	116	0	L	RD 1500 - Sutter Basin	South Sutter	Eroding	2000	831	30	Fluvial	Concrete Rubble in poor condition	Unlikely	Pipe through levee	2000 - Eroding, vertical berm slope over a vertical cohesive toe; slow erosion but getting close to the toe. 2002 - Erosion is getting close to the levee, still eroding with some new small slumps. 2004 - Some minor new erosion. 2006 - Some new erosion, cleaned off older scars and slump faces. 2008 - New, small, partial rotational failure. 2011 - Some new minor erosion. 2016 - Fresh erosion on lower bank.	Minor new erosion throughout the site.
SAC 116.5 L	Sacramento River	116.5	0	L	RD 1500 - Sutter Basin	South Sutter	Eroding	1997	3,393	30	Fluvial, Whole Bank Failure	None	Unlikely	Pipe through levee and pump	2003 - New sedimentation and some new small toe scallops at the upstream end; downstream end has some new erosion. 2004 - Some new erosion at the toe and upper bank and some small new rotational failures (mainly minor, except at the downstream end). 2007 - Some new slumps. 2009 - Some new scallops and site was extended upstream. 2010 - New deposition along upstream end of site, however there is also new erosion throughout the site. Site seems to be worsening, and eroding fast. Large habitat for bank swallows. 2011 - Some new minor erosion. 2012 - Minor new erosion. 2016 - Fresh erosion on lower bank.	Site has been stable for a few years.
SAC 118.0 R	Sacramento River	118	0	R	RD 108 - River Farms	Grimes	Eroding	2008	837	10	Whole Bank Failure, Fluvial	None	Likely	None	2008 - Whole bank is eroding, nearly vertical slope with cohesive toe. Bed is very deep along the toe (greater than 30 ft deep at 20 ft from the shore). 2011 - Some new minor erosion. 2016 - Minor new erosion.	No observed change.
SAC 120.6 L	Sacramento River	120.6	0	L	RD 1660 - Tisdale	North Sutter	Eroding	2011	190	20	Eddy Scour, Fluvial	None	Likely	Pipe	2009 - Erosion on levee toe where an old cobble site is failing. 2011 - Some new minor erosion. 2012 - Site extended downstream, bank is being impacted from the weight of the trees. 2013 - Minor new erosion at the toe. 2015 - Minor new erosion at toe.	No observed change.
SAC 122.0 R	Sacramento River	122	0	R	Sacramento River West Side Levee District	Grimes	Eroding	1997	311	40	Fluvial, Whole Bank Failure	None	Unsure	None	1997 - Mass failure of the lower cohesive bank and toe. 2000 - Still eroding, steeply dipping foresets in the toe are falling off. 2010 - Some new erosion and some new deposition. Eddy current off the upstream rock. 2011 - Still plenty of berm left. 2016 - Minor new erosion.	Minor new erosion at toe.
SAC 122.3 R	Sacramento River	122.3	0	R	Sacramento River West Side Levee District	Grimes	Eroding	2002	855	40	Fluvial	None	Unsure	Pipe	2002 - Upstream end has recent slope failure and exposure of tree roots. 2003 - Some new minor slope erosion with new snags on the bank. 2004 - Appears a little worse. 2005 - Scallop in bank at the upstream end looks worse. 2009 - Minimal new erosion, Berm width is still large, but one large event or one fallen tree and it could go fast. 2010 - New erosion, bank is nearly all vertical from slumping. Site looks bad. 2011 - Site continues to look bad. 2012 - Minor new erosion. 2015 - Undermining of toe rock. 2016 - Site extended upstream, new erosion and exposed tree roots.	Fresh slumping erosion at toe.
SAC 123.3 L	Sacramento River	123.3	0	L	RD 070 - Meridian Farms	North Sutter	Eroding	2006	679	30	Fluvial, Tree Pop-outs	None	Likely	None	2006 - Erosion into the levee toe. Rock at upstream end has poor transition causing eddy scour. 2010 - Minor new erosion. 2011 - Some fresh erosion. 2012 - Additional slumping on the previously slumped bank, site extended downstream.	minor new erosion. additional tree popout.
SAC 123.7 R	Sacramento River	123.7	0	R	Sacramento River West Side Levee District	Grimes	Eroding	1997	122	15	Fluvial	Concrete Rubble in fair condition	Likely	Pumphouse and pipe through levee	1997 - Erosion into the levee section; old concrete rubble loss at toe; transition between the rock upstream and the cobble downstream. 2000 - Cohesive bench with concrete slabs on top; 25 ft deep scour hole on the downstream end.	No observed change.
SAC 125.6 R	Sacramento River	125.6	0	R	Sacramento River West Side Levee District	Grimes	Eroding	2008	415	15	Fluvial, Anthropogenic Erosion	None	Likely	None	2008 - Slow erosion of the hard toe. 2010 - Cobble rubble is failing, erosion is into the toe of the levee, with vertical slumping. 2012 - Site appears to be relatively stable. 2013 - New animal holes.	No observed change.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
SAC 127.9 R	Sacramento River	127.9	0	R	Sacramento River West Side Levee District	Grimes	Eroding	1997	562	30	Eddy Scour, Whole Bank Failure	None	Unsure	None	1997 - Major scour off the downstream end of existing rock, creating a scour pocket where the levee starts diverging from the bankline. 2000 - Some minor erosion, 20 ft deep hole at downstream end. 2004 - Small amount of new erosion. 2010 - Bad transition off downstream end of rock revetment, some new erosion. 2012 - Site extended downstream, minor new erosion. 2013- Minor new erosion. 2016 - Fresh erosion at toe.	fresh erosion at lower slope.
SAC 131.8 L	Sacramento River	131.8	0	L	RD 070 - Meridian Farms	North Sutter	Eroding	2005	665	25	Toe Scour, Fluvial	None	Likely	Pipe	2005 - (known as 132) On inside of bend. Erosion of berm toe. Levee slope is steep. Erosion probably due to eddy scour off upstream cobble. 2009 - Groins may be a good option for repair. 2010 - Scour off the upstream rock, some new erosion. 2011 - Site extended downstream. 2012 - Minor new erosion since last year and new animal holes. 2012 - Minor new erosion since last year and new animal holes. 2013 - New tree popout.	Difficult to observe with excessive vegetation growth.
SAC 136.6 R	Sacramento River	136.6	0	R	Sacramento River West Side Levee District	Grimes	Eroding	2010	1,013	30	Toe Scour, Fluvial	None	Unsure	None	2010 - Lower portion of 136.7 that did not extend far enough. Abrupt transition from upstream site. 2012 - Site extended upstream, minor new erosion. 2013 - Minor new erosion at the toe. New tree popout. Downstream limit extended. 2016 - Site continues to worsen, fresh erosion at toe.	New erosion observed along the entire bank slope.
SAC 138.1 L	Sacramento River	138.1	0	L	RD 070 - Meridian Farms	North Sutter	Eroding	1997	1,308	10	Toe Scour, Fluvial	Cobbles in Fair Condition	Likely	Pipe	1997 - Loss of cobble revetment in levee section. 2004 - New fresh erosion in a short section of the downstream end. 2010 New deposition on cobbles. 2016 - Site appears to be stabilizing.	No observed change.
SAC 141.5 R	Sacramento River	141.5	0	R	Sacramento River West Side Levee District	Colusa Basin	Eroding	2010	696	30	Fluvial, Tree Pop-outs	Cobbles in Fair Condition	Unsure	Power pole	2010 - Old cobble site starting to unravel at toe. 2011 - Cobbles continue to unravel. 2013 - Site extended downstream to revetment.	No observed change.
SAC 141.9 R	Sacramento River	141.9	0	R	Sacramento River West Side Levee District	Colusa Basin	Eroding New	2017	1,018	20	Whole Bank Failure, Tree Pop-outs	Scattered Quarry Stone in poor condition	Unsure	Pump, pipes, pole		Erosion along entire bank slope. Bank heavily vegetated. Tree popout that has removed a large of bank.
SAC 143.5 R	Sacramento River	143.5	0	R	Sacramento River West Side Levee District	Colusa Basin	Eroding	2011	602	10	Fluvial, Tree Pop-outs	Cobbles in Fair Condition	Likely	None	2011 - Multiple scallops, one tree pop out. Old cobble site starting to unravel at midbank. 2012 - Mid bank slumping continues to worsen but cobble at the toe appears stable.	New erosion along lower slope.
SAC 152.6 L	Sacramento River	152.6	0	L	Maintence Area 1	Butte Basin	Eroding	2008	1,555	0	Whole Bank Failure, Fluvial	None	Unsure	Overhead utility	2008 - Large rotational/mass failure in the bank with tree slump. 2009 - Minimal new erosion, the tree is leaning further into the river. 2011 - Site extended downstream. 2012 - Minor new erosion and tree roots are further exposed.	Access Issues - Could not observe
SAC 152.8 L	Sacramento River	152.8	0	L	Maintence Area 1	Butte Basin	Eroding	2006	299	10	Fluvial, Tree Pop-outs	None	Likely	Utility pole, pipes, and pump	2006 - Large rotational/mass failure in the bank with tree slump. Tough clayey toe material. 2007 - Site is between stone revetments with a pump station at the downstream end. 2010 - Erosion is into the levee toe. 2011 - Minor new erosion. 2012 - Minor new erosion.	Minor new erosion observed.
SAC 157.7 R	Sacramento River	157.7	0	R	Maintence Area 1	Colusa Basin	Eroding	2004	484	15	Whole Bank Failure, Fluvial	None	Likely	pipelines	2004 - Slowly eroding but near vertical with no vegetation to hold it. 2005 - Erosion is close to levee toe but not into the levee section yet. 2010 - Some new toe scour.	Vertical face of clay sand bank, new tree popout. Bank continues to erode.
SAC 164.3 R	Sacramento River	164.3	0	R	Maintence Area 1	Colusa Basin	Eroding	2009	1,200	20	Whole Bank Failure, Fluvial	None	Likely	PG&E gas line through levee	Erosion site added in 1997 and removed in 2005. 2009 - Site added back in, hard toe with slow moving erosion. Potential geotechnical failure. 2011 - Site extended downstream.	New erosion along entire site.
SAC 164.7 R	Sacramento River	164.7	0	R	Maintence Area 1	Colusa Basin	Eroding	2009	1,117	5	Fluvial, Whole Bank Failure	None	Likely	overhead poles	2009 - Very slow retreat, hard toe, encroaching into the levee projection. 2010 - Slowly eroding. 2011 - Site extended downstream.	New erosion along entire site.
SAC 172.0 L	Sacramento River	172	0	L	LD 3 Glenn County	Butte Basin	Critical	2007	1,628	0	Fluvial, Whole Bank Failure	None	Unsure	None	2007 - Getting close to the levee. Bank is clayey silt with clayey/silty toe. 2008 - Looks a little worse at the upstream end. 2009 - Some new erosion and slumping. 2010 - Some new erosion upstream of site, actively eroding at low flow. New bank swallow colony noted. 2011 - Significant erosion since last year, with an estimated 10 to 15 feet of berm lost. Large sections of the bank have slumped off. 2012 - Part of the site appears to be stabilizing, but still minor slumping in other locations. 2013 - Minor new erosion at toe.	Significant erosion in last year. Erosion is entering levee prism, at current erosion rate, one more large storm and the levee will be comprised. Upgraded to critical.
STM 15.5 L	Steamboat Slough	15.5	0	L	RD 003 - Grand Island	Grand Island	Eroding	2016	379	0	Wave Wash, Whole Bank Failure	Quarry Stone in fair condition	Likely	None	2016 - Large erosion pockets observed.	No observed change.
STM 15.7 R	Steamboat Slough	15.7	0	R	RD 501 -Ryer Island	Ryer Island	Eroding	2008	338	0	Whole Bank Failure	Concrete Rubble in poor condition	Likely	None	2008 - Overstepped levee section with multiple small pockets of erosion 10 - 20 ft wide. 2013 - Site has fresh erosion and taller vertical sections.	No observed change.
STM 21.2 R	Steamboat Slough	21.2	0	R	RD 501 -Ryer Island	Ryer Island	Eroding New	2016	318	0	Fluvial	Quarry Stone in good condition	Likely	None	2016 - Large slump section.	Difficult to observe due to high vegetation.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
STM 22.8 R	Steamboat Slough	22.8	0	R	RD 349 - Sutter Island	Sutter Island	Eroding	2010	643	0	Fluvial, Wave Wash	None	Likely	None	2010 - Slumping sections on the lower bank, appears to be scouring around the trees. 2011 - Soil beach at toe.	No observed change.
STM 23.6 R	Steamboat Slough	23.6	0	R	RD 349 - Sutter Island	Sutter Island	Eroding	2011	768	0	Whole Bank Failure, Wave Wash	None	Likely	None	2011 - Toe scour at the tidal zone. 2015 - New tree pop-out and minor new erosion. 2016 - New erosion at upstream end.	Previously observed quarry stone at the downstream end is now gone. Significant erosion at upstream end. Fresh sedimentation on the downstream end.
STM 23.9 R	Steamboat Slough	23.9	5	R	RD 349 - Sutter Island	Sutter Island	Eroding	1997	168	0	Fluvial	None	Likely	Pipe and pump house	1997 - Top right bank has retreated into the levee. Site is between two rock sites. 1999 - Downstream half of the reach repaired with rock. 2000 - Trees leaning into the water. 2010 Site appears worse. 2011 - New erosion at the toe. 2013 - Short vertical sections observed at upstream end. 2015 - Minor new erosion.	No observed change.
STM 24.1 R	Steamboat Slough	24.1	0	R	RD 349 - Sutter Island	Sutter Island	Eroding	2011	55	0	Erosion Pockets	None	Likely	None	2011 - Small scallop caused by erosion and wave wash.	No observed change.
STM 24.7 R	Steamboat Slough	24.7	0	R	RD 349 - Sutter Island	Sutter Island	Critical	1997	949	0	Wave Wash, Whole Bank Failure	Scattered Quarry Stone in poor condition	Likely	Pump and Pipe	1997 - Erosion of very sandy levee behind large stand of riparian vegetation on top right bank. Dry ravel of sand. 1999 - Quarry waste rock was dumped down the levee slope; poor repair job; still eroding in places. Eroding at midslope off fabric. 2005 - Length revised, only the middle 150 - 200 ft are eroding. 2006 - Some rock/small material dumped down the bank but it is slowly unraveling. Upstream end is unraveling faster. Steep slope with poor gradation so fines are washing out. 2010 - Lots of overhanging trees and erosion pockets. 2011 - This site is upgraded to CRITICAL. Near vertical bank at the downstream end. New erosion at various locations throughout the site.	No observed change.
STM 25.0 L	Steamboat Slough	25	0	L	RD 003 - Grand Island	Grand Island	Critical	1997	1,037	0	Whole Bank Failure, Eddy Scour	None	Likely	Pipes	1997 - Erosion of sandy levee on top left bank. Site is downstream of a rock section. Large riparian trees on the bank. 1999 - Upstream half of the reach repaired with rock, except for a 30 ft reach at the upstream end. 2001 - Rock repair on the upstream and downstream ends; no revetment at the trees. 2002 - Rock repair is starting to slide off the geotextile at the upstream end. 2005 - One new small tree has fallen. 2006 - 50 ft pocket at the downstream end and at the upstream end with new rock in between. 2007 - Upstream end has been repaired. 2008 - Area closed sign on bank. Newly fallen trees at both ends and pop outs along the bank. 2010 - Site extended downstream. 2011 - New erosion at the toe. More trees popouts. 2013 - Short vertical sections observed at the downstream end. 2015 - Significant new erosion, large oak tree on verge of popping out. 2016 - Sites 24.8 and 25 were combined.	Upgraded to critical. Site has eroded to near vertical at upstream end.
STM 25.5 R	Steamboat Slough	25.5	0	R	RD 349 - Sutter Island	Sutter Island	Eroding	2010	580	0	Wave Wash, Tree Pop-outs	None	Likely	None	2010 - Small maintenance, erosion into the toe. 2011 - Minor new erosion at toe. 2015 - Minor new erosion at toe, new tree pop-out. 2016 - Fresh scarp at downstream end.	No observed change.
STM 25.8 R	Steamboat Slough	25.8	0	R	RD 349 - Sutter Island	Sutter Island	Critical	2007	243	0	Whole Bank Failure, Wave Wash	Quarry Stone in fair condition	Likely	None	2007 - Slow erosion, probably due to wave wash and fluvial erosion. Site has likely been here for awhile but was unseen due to boats parked in front. 2015 - Large tree popout. Erosion scarp now reaches the crown of the levee.	Upgraded to critical. Significant bank erosion.
STM 26.0 L	Steamboat Slough	26	0	L	RD 003 - Grand Island	Grand Island	Critical	1997	312	8	Whole Bank Failure, Wave Wash	None	Likely	None	1997 - Mass failure of berm slope and wave wash erosion. Large trees on top of berm, some failed trees. New area of low rock to on the upstream end. 2000 - Some minor erosion near the downstream end. 2005 - One new small tree has fallen. 2009 - Minimal new erosion. 2010 - Minor new erosion. 2013 - Observed new animal holes and vertical sections at middle of site. 2015 - Minor new erosion.	Upgraded to critical. Significant bank failure on upstream end.
STR 24.7 R	Sutter Slough	24.7	0	R	RD 999 - Netherlands	Clarksburg	Critical	1997	2,180	0	Whole Bank Failure, Toe Scour	Quarry Stone in fair condition	Likely	Pipe	1997 - Intermittent over-steepened sections. Large riparian vegetation along the length of the entire reach. Attempts to repair with rock on bank have failed. 1999 - New rock repair at the downstream end. 2002 - Some minor spot repairs. 2009 - Minimal new erosion. 2010 - Appears that fresh rock placed on downstream portion of site. Toe scour and overhanging trees with some overturned. 2012 - Minor new erosion at the toe. 2013 - Site upgraded to CRITICAL. Severe slumping into levee at downstream end of site. Fresh erosion into bank toe. 2015 - New slumping, tall vertical sections. 2016 - Upper slumped section continues to worsen.	Locals have placed rock in worst sections. Fresh erosion at toe. New tall vertical sections observed.
STR 25.2 R	Sutter Slough	25.2	0	R	RD 999 - Netherlands	Clarksburg	Eroding	2008	694	0	Wave Wash, Erosion Pockets	None	Likely	Pipe	2008 - Over steepened levee section. 2009 - Significant new erosion. 2010 - Minor new erosion.	Minor new erosion at toe.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
STR 25.7 R	Sutter Slough	25.7	0	R	RD 999 - Netherlands	Clarksburg	Eroding	2011	709	5	Toe Scour, Whole Bank Failure	None	Likely	None	2011 - Toe scour along length of site and erosion pockets. 2012 - Site extended slighty upstream due to new erosion pocket. 2013 - Tall vertical sections at upstream end of site.	Large erosion scarp near downstream end.
STR 26.1 R	Sutter Slough	26.1	0	R	RD 999 - Netherlands	Clarksburg	Eroding	2015	253	0	Toe Scour, Wave Wash	None	Likely	None	2015 - Tall vertical sections into the levee slope and erosion along the toe. 2016 - New tree pop-out observed.	No observed change.
STR 26.5 L	Sutter Slough	26.5	0	L	RD 349 - Sutter Island	Sutter Island	Eroding	2002	621	0	Toe Scour, Erosion Pockets	Quarry Stone in poor condition	Likely	None	2002 - Original rock over geotextile is sliding off and the end is coming unraveled. 2003 - Some minor new erosion on the downstream end. 2004 - Site has gotten worse. Underlined geofabric is exposed. 2005 - Still looks bad with exposed geotextile fabric. 2006 - Still have some new unraveling and exposed fabric. Site lengthened upstream. 2009 - Minimal new erosion. 2010 - geotextile fabric placed since last year, possible flood fight. 2012 - Exposed geotech style fabric, assume rock on top slid off. 2015 - Erosion pockets covered with plastic.	There appears soil under geotech fabric that appears to be failing but hard to tell.
STR 26.9 R	Sutter Slough	26.9	0	L	RD 349 - Sutter Island	Sutter Island	Eroding	2015	636	20	Toe Scour, Wave Wash	None	Likely	Pipe	2015 - Large Tree popout and tall vertical sections into the levee slope.	new erosion at toe. new erosion pocket at upstream end.
STR 27.3 R	Sutter Slough	27.3	0	R	RD 999 - Netherlands	Clarksburg	Eroding	2011	1,440	0	Wave Wash, Whole Bank Failure	None	Likely	Pump and pipes	2011 - Multiple erosion pockets. Some likely from tree popouts. 2013 - Tall vertical sections. 2015 - New tree pop-out and significant new erosion. 2016 - New erosion at toe.	site extended downstream. section of lower bank has slumped off. fresh toe erosion. pipe encroachment. fresh tree popout
SYC 9.3 L	Sycamore Creek	0	9.3	L	Maintenance Area 12	Grimes	eroding	2011	98	0			Unlikely	culvert	2011 - Erosion occurring upstream and downstream of an irrigation diversion structure.	Access Issues - Could not observe
WAC 2.1 L	Wadsworth Canal	0	2.1	L	DWR Sutter Maintenance Yard	Yuba City	Eroding	2011	3,422	5	Fluvial	None	Likely	Pipes and utility pole	2011 - Whole bank is starting to unravel, with failure from poor soils.	Minor new erosion observed.
WAC 2.1 R	Wadsworth Canal	0	2.1	R	DWR Sutter Maintenance Yard	Sutter Town	Eroding	2011	3,376	5	Fluvial	None	Likely	Pipes and utility pole	2011 - Whole bank is starting to unravel, with failure from poor soils.	Minor new erosion observed.
WAC 2.4 L	Wadsworth Canal	0	2.4	L	DWR Sutter Maintenance Yard	Yuba City	Eroding	2010	4,603	5	Fluvial	None	Likely	PG&E gas line, bridge, and power poles	2010 - Over steepened levees, some slumping, reach-wide problem. 2011 - Still a reach-wide problem.	Significant new erosion along lower bank.
WAC 2.4 R	Wadsworth Canal	0	2.4	R	DWR Sutter Maintenance Yard	Sutter Town	Eroding	2010	4,617	5	Fluvial	None	Likely	Pipe, bridge, and power poles	2010 - Over steepened levees, some slumping, reach-wide problem. 2011 - Still a reach-wide problem.	Significant new erosion along lower bank.
WAC 4.3 R	Wadsworth Canal	0	4.3	R	DWR Sutter Maintenance Yard	Sutter Town	Eroding	2011	6,795	0	Whole Bank Failure, Fluvial	None	Unlikely	Pipes, overhead utility, bridges	2011 - Small erosion pocket.	Site extended downstream. Significant lower bank erosion.
WAC 4.4 L	Wadsworth Canal	0	4.4	L	DWR Sutter Maintenance Yard	Yuba City	Eroding New	2017	6,776	5	Whole Bank Failure, Fluvial	None	Unlikely	Pipes, overhead utility, bridges		Significant lower bank erosion and overall slumping.
WPC 0.1 R	Western Pacific Interceptor Canal	1.6	0	R	RD 784 - Plumas Lake	Arboga	Under Construction	2017	31,652	0			Unlikely	Pipe		Entire levee was under construction.
YAS 1.7 L	Yankee Slough	0	1.7	L	RD 1001 - Nicolaus	Rio Oso	Eroding	2011	147	0	Fluvial	None	Likely	Pipe	2011 - New erosion site. Steep eroding slope. Fairly old scarp with vegetation growth.	No observed change.
YOL 1.2 R	Yolo Bypass	0	1.2	R	RD 2035 - Conaway Tract	Woodland	Eroding	2011	215	0	Toe Scour	None	Unlikely	AT&T fiberoptic cable under levee	2011 - Small sections of slumping, likely from wind wave.	Small amount of toe erosion.
YOL 2.0 R	Yolo Bypass	0	2	R	RD 2035 - Conaway Tract	Woodland	Eroding	2006	267	0	Toe Scour, Wind Wave	None	Unlikely	Poles	2006 - Wave wash erosion and some saturation slumping occurring. Tension/separation cracks evident in fine grained levee slope materials. 2011 - Small sections of slumping lower bank, just downstream of bank rock. 2016 - New cracks observed a the mid-slope.	Toe continues to erode.
YOL 2.2 R	Yolo Bypass	0	2.2	R	RD 2098 - Cache-Haas Area	Moore Tract	Eroding New	2017	202	0	Whole Bank Failure, Erosion Pockets	Scattered Quarry Stone in poor condition	Unsure	None		POTENTIALLY UNDER REPAIR; full landslide from levee crown down, revetment failure , additional slumping ds and slump cracks observed.
YOL 2.3 R	Yolo Bypass	0	2.3	R	RD 2035 - Conaway Tract	Woodland	Eroding	2011	1,822	0	Wind Wave	None	Unlikely	Wells	2011 - Erosion from wind waves along entire length of the levee toe. Several sections of slumping bank along the toe. 2016 - Fresh cracks observed.	Minor new toe erosion.
YOL 2.8 R	Yolo Bypass	0	2.8	R	RD 2035 - Conaway Tract	Woodland	Eroding	2011	2,502	0	Wind Wave, Toe Scour	None	Unlikely	Pipe and wells	2011 - Wave wash erosion and several sections of slumming bank along the toe.	Erosion creeps further into levee toe.
YOL 3.5 R	Yolo Bypass	0	3.5	R	RD 2035 - Conaway Tract	Woodland	Eroding New	2016	1,517	0			Unsure	None	2016 - Erosion observed at levee toe.	Unable to view due to access issues.
YOL 4.2 R	Yolo Bypass	0	4.2	R	RD 2035 - Conaway Tract	Woodland	Eroding	2006	1,652	0			Unsure	None	2006 - Wave wash erosion and some saturation slumping occurring. Several small scallops present in lower levee slope/toe due to saturation slumping. Tension/separation cracks evident in fine-grained levee slope materials. 2011 - Small pockets of erosion throughout the site. Site formerly called 3.8.	Unable to view due to access issues
									355,992							

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
CHC 2.4 L	Cache Creek	0	2.4	L	DWR Sacramento Maintenance Yard	Yolo	Critical	2002	218	15	Fluvial	None	Likely	Pipe through levee with flapgate, overhead powerline crossing and power pole	Site identified as CRITICAL in 2002. 2006 - Currently constructing a setback levee. New failures present and extensive. Downstream end of the setback levee did not extend far enough. Upstream end was repaired. 2007 - DWR repaired with a setback levee, but the levee did not go far enough downstream. 2012 - New cracks observed. 2013 - Fresh erosion on upper bank.	No observed change.
CHS 1.8 L	Cache Slough	0	1.8	L	RD 2104 - Perters Pocket Tract	Peters Pocket	Critical	2017	21,499	0	Slump Cracking	None	Likely	Pump and pipes		Deep cracking aobserved along the ENTIRE LEVEE; risk of total levee failure; vertical cracking is on both the waterside and landside, eminent slump failure expected.
FHR 5.0 L	Feather River	5	0	L	RD 1001 - Nicolaus	Rio Oso	Critical	2000	1,666	15	Whole Bank Failure, Fluvial	None	Unsure	None	2000 - Steep bank off berm with some slumps and fallen trees, continued erosion. 2002 - Site lengthened upstream and downstream due to vertical bank along most of the reach. 2010 - Site extended upstream. 2011 - Minimal new erosion. 2012 - Site extended on the upstream end, new tree pop-out, and bank erosion continues to worsen. 2013 - Minor new erosion at the toe and top of bank.	Upgraded to critical, significant new erosion, entire bank slope is vertical with non cohesive soils.
FHR 6.0 L	Feather River	6	0	L	RD 1001 - Nicolaus	Rio Oso	Critical	2011	487	10	Whole Bank Failure, Fluvial	None	Likely	Pipe	2011 - Tall slumping sections. Scour around trees has exposed most of the roots. 2016 - Recent large slope failure observed.	Upgraded to critical, entire bank slope is slumping, with near vertical face
GEO 4.5 L	Georgiana Slough	4.5	0	L	RD 563 - Tyler Island	Tyler Island	Critical	1997	1,396	0	Whole Bank Failure, Wave Wash	Quarry Stone in fair condition	Likely	Bridge, underground telephone crossing, and pipe	1997 - Pocket erosion at upstream end and into the levee toe under the Alder trees. 2003 - New brush boxes with wattles on bank. 2004 - No brush boxes. 2005 - Site extended from the downstream side of the bridge. Whole bank is vertical. 2010 - Some minor new erosion. 2011 - Site upgraded to CRITICAL. New erosion pockets throughout the site. Sites 4.5, and 4.6 were combined. 2016 - Fresh erosion observed.	Numerous areas of bank erosion, with vertical sections up to the levee hinge.
GEO 6.3 L	Georgiana Slough	6.3	0	L	RD 563 - Tyler Island	Tyler Island	Critical	1997	5,951	0	Erosion Pockets, Wave Wash	Quarry Stone in fair condition	Unsure	Pipes and PG&E crossing	1997 - Deep pockets of erosion and narrow berm. Reach is characterized by lots of pockets into the existing berm and/or levee slope. 1999 - Some pockets filled with rock riprap. 2000 - Exposed fabric. 2001 - Staked, low fascine walls at bankline. 2002 - New spot of rock at upstream end. Some new brush boxes. 2005 - Some stone sliding off the underlying geotextile fabric. Some new brush bundles in the brush boxes; some with missing bundles. Some boxes too low relative to high tide. 2009 - Minimal new erosion, site length extended. 2010 - New erosion on downstream end, site extended downstream. 2011 - Sites 6.1. 6.4 and 6.6 were combined. New erosion pockets, site extended to include the erosion in between the old sites. 2012 - Rock has been placed in portions of the bank since last year. 2016 - Site 5.8 was merged with this site due to new erosion connecting the sites.	Upgraded to CRITICAL. Combined with 6.8. Vertical sections from mid slope to toe, vertical face from levee hinge at some locations. Wave/tide erosion at toe, evidence of beavers.
GEO 9.3 L	Georgiana Slough	9.3	0	L	RD 563 - Tyler Island	Tyler Island	Critical	1997	4,304	0	Toe Scour, Wave Wash	Scattered Quarry Stone in poor condition	Likely	Pump, Pipes, Ramp, and power poles	1997 - Loss of rock at toe; pockets of upper berm erosion; very narrow berm width; toe rock problem; erosion pockets in rock. 2002 - New brush boxes at toe of the worst spots. 2005 - Upstream 200 ft removed because of the wide berm. 2006 - Some rock repair pockets behind the brush boxes at the upstream end. 2010 - Some new erosion. 2013 - New rock placed on the levee slope. 2016 - Fresh erosion along the toe.	Upgraded to critical. Pockets of erosion - subvertical. Areas of failed revetment, old rock is unraveling, and eminent tree popout outs expected.
GEO 11.4 L	Georgiana Slough	11.4	0	L	RD 563 - Tyler Island	Tyler Island	Critical	2017	1,338	0	Whole Bank Failure, Toe Scour	Quarry Stone in poor condition	Likely	None		New erosion site, upgraded to critical. Subvertical face from levee hinge, large erosion pockets, and toe erosion throughout.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
HAS 9.7 L	Haas Slough	0	9.7	L	RD 2098 - Cache-Haas Area	Moore Tract	Critical	2011	1,595	0	Slump Failures, Erosion Pockets, Bovine Erosion	None	Unlikely	In-channel structure at upstream end	2011 - Several scallops of erosion. Erosion primarily due to the weight of cattle on the slope. 2016 - Two new large scallop pockets in the middle of the site.	Upgraded to CRITICAL. Multiple slump on top of old slumping ; slump is into levee prisim.
LDS 0.7 R	Lindsey Slough	0.7	0	R	RD 536 - Egbert Tract	Lindsey	Critical	2011	280	0	Erosion Pockets, Wave Wash	None	Likely	None	2011 - Levee toe is unraveling with large slumping sections. This site is downstream of old bank rock. 2012 - Erosion pocket has increased in size. 2016 - Site continues to erode.	Upgraded to CRITICAL. Erosion pocket has increased significantly in the last year.
SAP 1.4 R	Sacramento Bypass	0	1.4	R	RD 785 - Driver District	Elkhorn	Critical	2017	841	0	Slump Cracking, Erosion Pockets	None	Unlikely	None		New site, immediately upgraded to critical. Start of slump failure, deep cracks along levee crest, concern that a large slump failure will occur from the next heavy rain.
SAC 7.3 L	Sacramento River	7.3	0	L	RD 341 - Sherman Island	Sherman Island	Critical	2011	619	0	Surface Runoff Erosion, Whole Bank Failure	Concrete Rubble in poor condition	Likely	Fish release system, pipes, pilings, conduit, netting, and power poles	2011 - Large slump at downstream end. Gully formed from surface runoff from the road. Shallow slumping throughout site. 2012 - The gully at upstream end has increased in size and site continues to worsen.	No observed change..
SAC 7.9 L	Sacramento River	7.9	0	L	RD 341 - Sherman Island	Sherman Island	Critical	2011	1,276	0	Whole Bank Failure, Wind Wave	Concrete Rubble in fair condition	Likely	Pipe	2011 - Large slump section. 2012 - Site extended downstream, upgraded to critical, severe windwave. Slope is very steep and may be effecting the highway on top of the levee.	Road base exposed in multiple locations. New tree popout observed.
SAC 8.0 L	Sacramento River	8	0	L	RD 341 - Sherman Island	Sherman Island	Critical	1999	1,200	0	Wave Wash, Whole Bank Failure	Concrete Rubble in poor condition	Likely	None	1999 - New small slump in eroded bank. 2005 - Reach extended because of vertical bank along the roadway upstream. 2011 - More slumping since last year. 2012 - Site upgraded to critical. Very steep slope which may be effecting the highway on top of the levee. 2015 - New erosion towards the downstream end of site.	Site extended downstream
SAC 11.2 L	Sacramento River	11.2	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	2008	1,971	0	Whole Bank Failure, Wave Wash	Quarry Stone in fair condition	Likely	Pipe	2008 - Erosion causing vertical bank at the highway on top of levee. The whole bank along the highway should be repaired. 2009 - Minimal new erosion. 2011 - Bank continues to slowly erode. 2012 - Upgrade to critical, new erosion since lat year and steeper slopes in sections. 2015 - Road foundation and cables exposed. Extremely large tree with exposed roots looks likely to fail and take out a significant portion of the levee. 2016 - Site continues to erode.	New slump section. Erosion under the road has enlarged.
SAC 12.1 L	Sacramento River	12.1	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	2010	1,165	0	Whole Bank Failure	Concrete Rubble in poor condition	Likely	Pipe, gas line, ramp, dock, boat launch, and utility poles	2010 - Small inlet area behind a man-built spit. Bank is slumping and could possibly be fixed with maintenance. 2011 - Site continues to worsen. 2015 - Upgraded to CRITICAL. 2016 - Site continues to get worse.	Continues to worsen and threaten the road.
SAC 13.6 L	Sacramento River	13.6	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	2011	303	0	Whole Bank Failure	None	Likely	Marina at upstream end	2011 - Large section of bank slumped off.	upgraded to critical. nearly vertical face from levee hinge. trees with large root balls likely to fail.
SAC 18.1 L	Sacramento River	18.1	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	2009	267	0	Fluvial, Wave Wash	Quarry Stone in fair condition	Likely	None	2009 - Short reach of vertical bank at the toe. 2010 - Large tree is getting ready to fall in. 2015 - Freshly exposed tree roots.	Upgraded to critical. Vertical slope face behind a tree that is likely to pop-out soon.
SAC 33.9 R	Sacramento River	33.9	0	R	RD 349 - Sutter Island	Sutter Island	Critical	2015	457	10	Toe Scour, Wave Wash	Concrete Rubble in poor condition	Likely	House on waterside slope	2015 - Erosion observed at the toe.	New erosion pocket. Tree roots propped up with junk. Tree likely to fall and house to come tumbling after. Upgraded to critical.
SAC 38.5 R	Sacramento River	38.5	0	R	RD 150 - Merritt Island	Merritt Island	Critical	1997	364	0	Fluvial, Whole Bank Failure	Quarry Stone in fair condition	Likely	None	1999 - Downstream end (300 ft) repaired with rock. 2010 - Toe erosion, some vertical slopes lower down. 2011 - Failing rock repair. Slumping of the lower bank. Minor new erosion. 2013 - Tree at upstream end has exposed roots. Some new erosion.	New erosion pocket. Vertical section along lower bank, and cracking. Upgraded to critical.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
SAC 41.9 R	Sacramento River	41.9	0	R	RD 999 - Netherlands	Clarksburg	Critical	1997	1,360	0	Toe Scour, Whole Bank Failure	None	Likely	Gas pipeline at downstream end and power poles	1997 - Structural problem rather than erosional, failed cobble at downstream end. 2005 - New brush boxes at waterline for several hundred feet downstream, No toe or bank protection present. 2006 - Some minor new erosion. Brush boxes not working well; most of the brush has floated out. 2007 - Brush boxes have recently been repaired. 2016 - Minor new slumping.	Fresh erosion on entire bank. Upgraded to critical.
SAC 52.4 L	Sacramento River	52.4	0	L	Maintenance Area 9	Sacramento	Critical	2010	260	0	Tree Pop-Outs, Toe Scour	Concrete Rubble in fair condition	Likely	Pipe, Wooden steps	2004 - A large tree cave was identified. 2005 - Site repaired. 2010 - At the downstream end of the repair at 52.5, bad transition is inducing further erosion. 2011 - Minor new erosion on bank. 2016 - Erosion continues under the tree.	Huge tree with scoured roots, likely to fall soon and take huge chunk of levee with it. Upgraded to critical.
SAC 55.7 R	Sacramento River	55.7	0	R	RD 900 - West Sacramento	Southport	Critical	2008	1,150	0	Fluvial, Whole Bank Failure	Quarry Stone in good condition	Likely	Boat dock, pipes, power poles, and dolphins	2008 - Erosion into levee toe. Over steepened levee slope, worst at the upstream end. 2009 - Near vertical banks from rotational slumping, hidden by vegetation. 2010 - Boat sinking more, may be causing eddy scour around it. Difficult to see the vertical slumps due to dense vegetation. 2011 - Minor new erosion at the toe. The paddleboat that was sitting at this site for years has been removed. 2012 - Site extended upstream due to additional erosion. 2016 - New rock on slope at upstream end.	Fresh toe erosion. Site upgraded to critical. A setback levee is under construction behind this site.
SAC 172.0 L	Sacramento River	172	0	L	LD 3 Glenn County	Butte Basin	Critical	2007	1,628	0	Fluvial, Whole Bank Failure	None	Unsure	None	2007 - Getting close to the levee. Bank is clayey silt with clayey/silty toe. 2008 - Looks a little worse at the upstream end. 2009 - Some new erosion and slumping. 2010 - Some new erosion upstream of site, actively eroding at low flow. New bank swallow colony noted. 2011 - Significant erosion since last year, with an estimated 10 to 15 feet of berm lost. Large sections of the bank have slumped off. 2012 - Part of the site appears to be stabilizing, but still minor slumping in other locations. 2013 - Minor new erosion at toe.	Significant erosion in last year. Erosion is entering levee prism, at current erosion rate, one more large storm and the levee will be comprised. Upgraded to critical.
STM 24.7 R	Steamboat Slough	24.7	0	R	RD 349 - Sutter Island	Sutter Island	Critical	1997	949	0	Wave Wash, Whole Bank Failure	Scattered Quarry Stone in poor condition	Likely	Pump and Pipe	1997 - Erosion of very sandy levee behind large stand of riparian vegetation on top right bank. Dry ravel of sand. 1999 - Quarry waste rock was dumped down the levee slope; poor repair job; still eroding in places. Eroding at midslope off fabric. 2005 - Length revised, only the middle 150 - 200 ft are eroding. 2006 - Some rock/small material dumped down the bank but it is slowly unraveling. Upstream end is unraveling faster. Steep slope with poor gradation so fines are washing out. 2010 - Lots of overhanging trees and erosion pockets. 2011 - This site is upgraded to CRITICAL. Near vertical bank at the downstream end. New erosion at various locations throughout the site.	No observed change.
STM 25.0 L	Steamboat Slough	25	0	L	RD 003 - Grand Island	Grand Island	Critical	1997	1,037	0	Whole Bank Failure, Eddy Scour	None	Likely	Pipes	1997 - Erosion of sandy levee on top left bank. Site is downstream of a rock section. Large riparian trees on the bank. 1999 - Upstream half of the reach repaired with rock, except for a 30 ft reach at the upstream end. 2001 - Rock repair on the upstream and downstream ends; no revetment at the trees. 2002 - Rock repair is starting to slide off the geotextile at the upstream end. 2005 - One new small tree has fallen. 2006 - 50 ft pocket at the downstream end and at the upstream end with new rock in between. 2007 - Upstream end has been repaired. 2008 - Area closed sign on bank. Newly fallen trees at both ends and pop outs along the bank. 2010 - Site extended downstream. 2011 - New erosion at the toe. More trees popouts. 2013 - Short vertical sections observed at the downstream end. 2015 - Significant new erosion, large oak tree on verge of popping out. 2016 - Sites 24.8 and 25 were combined.	Upgraded to critical. Site has eroded to near vertical at upstream end.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
STM 25.8 R	Steamboat Slough	25.8	0	R	RD 349 - Sutter Island	Sutter Island	Critical	2007	243	0	Whole Bank Failure, Wave Wash	Quarry Stone in fair condition	Likely	None	2007 - Slow erosion, probably due to wave wash and fluvial erosion. Site has likely been here for awhile but was unseen due to boats parked in front. 2015 - Large tree popout. Erosion scarp now reaches the crown of the levee.	Upgraded to critical. Significant bank erosion.
STM 26.0 L	Steamboat Slough	26	0	L	RD 003 - Grand Island	Grand Island	Critical	1997	312	8	Whole Bank Failure, Wave Wash	None	Likely	None	1997 - Mass failure of berm slope and wave wash erosion. Large trees on top of berm, some failed trees. New area of low rock to on the upstream end. 2000 - Some minor erosion near the downstream end. 2005 - One new small tree has fallen. 2009 - Minimal new erosion. 2010 - Minor new erosion. 2013 - Observed new animal holes and vertical sections at middle of site. 2015 - Minor new erosion.	Upgraded to critical. Significant bank failure on upstream end.
STR 24.7 R	Sutter Slough	24.7	0	R	RD 999 - Netherlands	Clarksburg	Critical	1997	2,180	0	Whole Bank Failure, Toe Scour	Quarry Stone in fair condition	Likely	Pipe	1997 - Intermittent over-steepened sections. Large riparian vegetation along the length of the entire reach. Attempts to repair with rock on bank have failed. 1999 - New rock repair at the downstream end. 2002 - Some minor spot repairs. 2009 - Minimal new erosion. 2010 - Appears that fresh rock placed on downstream portion of site. Toe scour and overhanging trees with some overturned. 2012 - Minor new erosion at the toe. 2013 - Site upgraded to CRITICAL. Severe slumping into levee at downstream end of site. Fresh erosion into bank toe. 2015 - New slumping, tall vertical sections. 2016 - Upper slumped section continues to worsen.	Locals have placed rock in worst sections. Fresh erosion at toe. New tall vertical sections observed.
									56,315							

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
BTC 1.8 L	Butte Creek	0	1.8	L	Maintenance Area 5	Unassigned	Eroding New	2017	558	20	Fluvial, Whole Bank Failure	None	Unsure	None		Long vertical scarp on toe.
BTS 0.8 R	Butte Slough	0.8	0	R	RD 070 - Meridian Farms	North Sutter	Eroding New	2017	409	0	Erosion Pockets, Whole Bank Failure	None	Likely	Overhead power lines and power poles		Erosion along lower bank, one section has slumped off. Large cracks observed, and expecting additional slumping failures.
CHS 1.8 L	Cache Slough	0	1.8	L	RD 2104 - Perters Pocket Tract	Peters Pocket	Critical	2017	21,499	0	Slump Cracking	None	Likely	Pump and pipes		Deep cracking abobserved along the ENTIRE LEVEE; risk of total levee failure; vertical cracking is on both the waterside and landside, eminent slump failure expected.
CHI 2.7 L	Chico Creek	0	2.7	L	Butte County	Unassigned	Eroding New	2017	207	15	Fluvial, Whole Bank Failure	None	Unlikely	None		No trees on bank or levee. Large erosion scarp along lower bank.
FHR 7.7 L	Feather River	7.7	0	L	RD 1001 - Nicolaus	Rio Oso	Eroding New	2017	309	0	Fluvial, Tree Pop-outs	Cobbles in Fair Condition	Unsure	None		Erosion along bank appears to be due to rapid drawdown condition. Lower bank cobbles are unraveling. Tree popout at upstream end.
GEO 5.5 R	Georgiana Slough	5.5	0	R	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Eroding New	2017	86	0	Whole Bank Failure, Anthropogenic Erosion	Scattered Quarry Stone in poor condition	Unlikely	Pump and pipe through levee		Failed rock section, slump failure of bank to subvertical face.
GEO 9.0 R	Georgiana Slough	9	0	R	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	2017	1,678	0	Whole Bank Failure, Toe Scour	Quarry Stone in fair condition	Likely	Pipe and ramps		Toe erosion and failed revetment.
GEO 9.2 R	Georgiana Slough	9.2	0	R	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	2017	707	0	Whole Bank Failure, Toe Scour	Quarry Stone in fair condition	Likely	Pump and pipe		Toe erosion.
GEO 9.8 L	Georgiana Slough	9.8	0	L	RD 563 - Tyler Island	Tyler Island	Eroding New	2017	280	0	Whole Bank Failure, Wave Wash	None	Likely	None		Whole bank failure , eroded to subvertical face, and giant animal holes.
GEO 10.0 L	Georgiana Slough	10	0	L	RD 563 - Tyler Island	Tyler Island	Eroding New	2017	1,282	0	Wave Wash, Whole Bank Failure	Quarry Stone in poor condition	Unsure	Pipes		Revetment failure , toe erosion moving landward.
GEO 10.2 L	Georgiana Slough	10.2	0	L	RD 563 - Tyler Island	Tyler Island	Eroding New	2017	3,906	0	Whole Bank Failure, Wave Wash	None	Likely	Pump, pipes, and boat dock permitted		Evidence of meander process, eroding to short vertical face
GEO 10.9 R	Georgiana Slough	10.9	0	R	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	2017	1,703	5	Toe Scour, Whole Bank Failure	Concrete Rubble in poor condition	Likely	Pipeline		Significant toe erosion and whole bank failure in sections, large pockets from tree popouts.
GEO 11.8 R	Georgiana Slough	11.8	0	R	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	2017	1,007	5	Toe Scour, Whole Bank Failure	Concrete Rubble in poor condition	Likely	Pipe		Tree popout popouts eminent , significant toe erosion and whole bank failure in sections
GEO 12.0 L	Georgiana Slough	12	0	L	RD 563 - Tyler Island	Tyler Island	Eroding New	2017	356	0	Toe Scour	None	Likely	Pipe and ramp		Toe erosion throughout site, slumping, subvertical levee slope in sections.
HAS 8.4 L	Haas Slough	0	8.4	L	RD 2098 - Cache-Haas Area	Moore Tract	Eroding New	2017	1,514	0	Toe Scour, Tree Pop-outs	Scattered Quarry Stone in poor condition	Likely	Overhead powerpole		Horizontal cracks; scour along toe; poorly constructed levee susceptible to erosion.
LDS 1.7 L	Lindsey Slough	0	1.7	L	RD 2060 - Hastings Tract	Hasting Tract	Eroding New	2017	720	0	Erosion Pockets	None	Likely	None		Soil is boulders and sand. Multiple slumping sections.
MUD 3.3 L	Mud Creek	0	3.3	L	Butte County	Unassigned	Eroding New	2017	457	10	Whole Bank Failure, Fluvial	None	Unsure	None		Large mass failure of lower bank slope.
MUD 2.8 L	Mud Creek	0	2.8	L	Butte County	Unassigned	Eroding New	2017	766	15	Fluvial, Whole Bank Failure	None	Unsure	None		Large erosion scarp along lower toe.
NCC 1.9 L	Natomas Cross Canal	0	1.9	R	RD 1001 - Nicolaus	Rio Oso	Eroding New	2017	408	0	Fluvial	None	Unsure	None		Erosion along mid bank and sections of slumped bank.
NCC 2.9 R	Natomas Cross Canal	2.9	2.9	R	RD 1001 - Nicolaus	Rio Oso	Eroding New	2016	2,377	0	Erosion Pockets	None	Unlikely	None	2016 - Slumping of upper bank slope.	Hummocky levee face, slumping upper bank.
SAP+B12:T12 1.4 R	Sacramento Bypass	0	1.4	R	RD 785 - Driver District	Elkhorn	Critical	2017	841	0	Slump Cracking, Erosion Pockets	None	Unlikely	None		New site, immediately upgraded to critical. Start of slump failure, deep cracks along levee crest, concern that a large slump failure will occur from the next heavy rain.
SAC 7.5 L	Sacramento River	7.5	5.5	L	RD 341 - Sherman Island	Sherman Island	Eroding New	2017	580	0	Whole Bank Failure, Anthropogenic Erosion	Concrete Rubble in poor condition	Likely	Ramp, pipe, poles		Erosion along levee slope, erosion appears to mainly be human caused, but it is threatening the integrity of the Hwy on top of the levee.
SAC 38.8 L	Sacramento River	38.8	0	L	Maintenance Area 9	Beach Stone Lake	Eroding New	2017	549	0	Toe Scour, Wave Wash	Quarry Stone in fair condition	Likely	None		Toe erosion along entire site. Heavily used by people for fishing and campfires. Large tree at downstream end.
SAC 40.4 L	Sacramento River	40.4	0	L	Maintenance Area 9	Beach Stone Lake	Eroding New	2017	108	0	Fluvial, Toe Scour	Quarry Stone in fair condition	Likely	None		Erosion along lower slope. Large erosion pocket at downstream end.
SAC 48.4 L	Sacramento River	48.4	0	L	Maintenance Area 9	Sacramento	Eroding New	2016	1,399	0	Toe Scour, Wave Wash	None	Unsure	None	2016 - Extensive toe erosion. Erosion around roots of multiple trees.	New erosion along toe. Possibly part of pl 84-99 site

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
SAC 74.0 R	Sacramento River	74	0	R	RD 1600 - Mull District	Elkhorn	Eroding New	2017	2,049	30	Toe Scour, Whole Bank Failure, Tree Pop-outs	None	Likely	None		Significant toe erosion. Erosion along entire bank. Tree popouts observed.
SAC 141.9 R	Sacramento River	141.9	0	R	Sacramento River West Side Levee District	Colusa Basin	Eroding New	2017	1,018	20	Whole Bank Failure, Tree Pop-outs	Scattered Quarry Stone in poor condition	Unsure	Pump, pipes, pole		Erosion along entire bank slope. Bank heavily vegetated. Tree popout that has removed a large of bank.
STM 15.5 L	Steamboat Slough	15.5	0	L	RD 003 - Grand Island	Grand Island	Eroding	2016	379	0	Wave Wash, Whole Bank Failure	Quarry Stone in fair condition	Likely	None	2016 - Large erosion pockets observed.	No observed change.
STM 21.2 R	Steamboat Slough	21.2	0	R	RD 501 -Ryer Island	Ryer Island	Eroding New	2016	318	0	Fluvial	Quarry Stone in good condition	Likely	None	2016 - Large slump section.	Difficult to observe due to high vegetation.
WAC 4.4 L	Wadsworth Canal	0	4.4	L	DWR Sutter Maintenance Yard	Yuba City	Eroding New	2017	6,776	5	Whole Bank Failure, Fluvial	None	Unlikely	Pipes, overhead utility, bridges		Significant lower bank erosion and overall slumping.
WPC 0.1 R	Western Pacific Interceptor Canal	1.6	0	R	RD 784 - Plumas Lake	Arboga	Under Construction	2017	31,652	0			Unlikely	Pipe		Entire levee was under construction.
YOL 2.2 R	Yolo Bypass	0	2.2	R	RD 2098 - Cache-Haas Area	Moore Tract	Eroding New	2017	202	0	Whole Bank Failure, Erosion Pockets	Scattered Quarry Stone in poor condition	Unsure	None		POTENTIALLY UNDER REPAIR; full landslide from levee crown down, revetment failure , additional slumping ds and slump cracks observed.
YOL 3.5 R	Yolo Bypass	0	3.5	R	RD 2035 - Conaway Tract	Woodland	Eroding New	2016	1,517	0			Unsure	None	2016 - Erosion observed at levee toe.	Unable to view due to access issues.
									87,613							

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
FHR 12.3 R	Feather River	12.3	0	R	Maintenance Area 3	Yuba City	Under Construction	2015	177	15	Toe Scour	None	Likely	None	2013 - Minor toe scour causing gradual erosion of bank slope. Site is within ecological reserve.	Under construction. work in progress.
FHR 12.8 R	Feather River	12.8	0	R	Maintenance Area 3	Yuba City	Under Construction	2015	293	15	Toe Scour	None	Likely	None	2013 - Minor toe scour causing gradual erosion into the bank slope.	Under construction. work in progress.
SAC 71.3 R	Sacramento River	71.3	0	R	RD 1600 - Mull District	Elkhorn	Under Construction	1997	522	25	Toe Scour, Fluvial	None	Likely	None	2000 - Very cohesive vertical bank. 2003 - Some minor new erosion. 2006 - Some minor erosion in old pockets. 2009 - Minimal new erosion. 2011 - Multiple new erosion pockets and a few new tree popouts.	New erosion pocket and fresh toe erosion. Site is currently under construction.
WPC 0.1 R	Western Pacific Interceptor Canal	1.6	0	R	RD 784 - Plumas Lake	Arboga	Under Construction	2017	31,652	0			Unlikely	Pipe		Entire levee was under construction.
									32,644							

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
BER 0.8 L	Bear River	0.8	0	L	RD 1001 - Nicolaus	Rio Oso	Repaired	2006	452	5	Fluvial	Quarry Stone in good condition	Likely	None	2006 - Multiple rotational failures in the berm. Erosion is into the levee toe and lower slope. Tension cracks extensive at top of bank. Cohesive toe creates a bench on which failures occur. 2007 - Still steep bank with some berm with pistol-butted reeds. 2012 - Site extended upstream due to additional slumping. Slopes slightly steeper.	The 2017 floods caused additional damage to the site, however the site was repaired by locals, with a very steep rock riprap slope. The rock slope appears to be less than 1:1, some rock already appears to be failing .
CHC 2.8 L	Cache Creek	0	2.4	L	DWR Sacramento Maintenance Yard	Yolo	Repaired	2002	209	20	Toe Scour, Whole Bank Failure	None	Unsure	None	2006 - Large new failure. 2008 - Plans for repair currently in the design phase. 2010 - Planned setback levee by CA DWR, 60% design complete, construction planned for 2012. 2011 - Construction delayed to 2013 - 2014. 2016 - Site repaired with a setback levee by CA DWR.	
CHC 3.4 L	Cache Creek	0	3.4	L	DWR Sacramento Maintenance Yard	Yolo	Repaired	2002	487	15	Toe Scour, Whole Bank Failure	None	Unsure	None	2006 - Some significant new erosion, especially fresh upper bank slumping. Still substantial berm. 2010 - Site extended downstream, some new erosion, heavily vegetated and hard to see. Planned setback levee by CA DWR, 60% design complete, construction planned for 2012. 2011 - Construction delayed to 2013 - 2014. 2016 - Site repaired with a setback levee by CA DWR.	
CHK 11.7 R	Cherokee Canal	0	11.7	R	Maintenance Area 13	Unassigned	Removed	2011	34	0	Eddy Scour	None	Unsure	Weir and headwall	2011 - Small erosion pocket likely caused by irrigation diversion structure.	Does not qualify, no erosion in the levee prism.
CHS 15.9 L	Cache Slough	0	15.9	L	RD 501 -Ryer Island	Ryer Island	Removed	2005	377	3	Wave Wash	Quarry stone on part of bank in fair condition	Unlikely	Pipe	2016 - Fresh rock placed on levee slope, site is in good order and removed from inventory.	
CHS 23.6 R	Cache Slough	0	23.6	R	RD 2060 - Hastings Tract	Hasting Tract	Removed	2005	1,149	0	Fluvial	Quarry stone at toe in fair condition	Unlikely	PG&E overhead transmission line	Site added in 1997 and removed in 2003. 2005 - Put back in the inventory. 2006 - Stone repair at the middle of the site. 2011 - Some rock placed at toe in the past year. 2013 - Site extended both upstream and downstream to include new erosion pockets. 2016 - Removed due to maintenance work.	
DEC 2.4 L	Deer Creek	0	2.4	L	Tehama County	Unassigned	Removed	2006	97	20	Fluvial	Cobbles in Fair Condition	Likely	None	2006 - Erosion along outer bank of a meandering bend that is getting close to the projection of the levee toe. Trees are leaning out into the channel and ready to fall. Whole bank in reach is actively eroding. 2011 - New erosion pocket caused by an eddy. The Deer Creek Watershed Conservation Group is planning a reach-wide repair for Deer Creek.	Cobbles have deposited in the eroded section and with the amount berm, the levee is no longer threatened.
DWS 5.0 L	Deep Water Ship Channel	0	5	L	RD 999 - Netherlands	Clarksburg	removed	2006	81	200	Erosion Pocket	None	Unlikely	None	2006 - Slump failure of lower slope. Longitudinal cracks present along the levee slope. 2011 - Difficult to see due to overgrown vegetation. A small section of the levee has slumped. Sties DWS 5.0 and DWS 5.01 were combined.	No erosion evident, removed from inventory.
FHR 50.9 R	Feather River	50.9	0	R	Maintenance Area 7	Live Oak	Repaired	2012	371	15	Whole Bank Failure	Quarry Stone in fair condition	Unsure	Old bridge piers and canal on landside slope	2012 - Oversteepened slope with failing rock (from repair completed in 1954). Likely slope stability issues.	Repaired by state, large quarry stone along entire bank.
LDS 1.9 L	Lindsey Slough	0	1.9	L	RD 2060 - Hastings Tract	Hasting Tract	Repaired	2011	358	0	Wave Wash, Fluvial	Quarry Stone in good condition	Unsure	None	2011 - Multiple erosion pockets. Deep cracks throughout site could lead to further bank failure. 2016 - Site has been repaired by locals.	
LDS 2.4 L	Lindsey Slough	0	2.4	L	RD 2060 - Hastings Tract	Hasting Tract	Repaired	2011	139	0	Wave Wash, Fluvial	None	Unsure	None	2011 - Two erosion pockets from rotational failures. Very soft soil. 2016 - Repaired by locals.	
PUC 0.1 L	Putah Creek	0	0.1	L	DWR Sacramento Maintenance Yard	Davis	Repaired	2011	423	0	Wave wash	Cobbles at toe in fair condition	Unlikely	PG&E utility poles	2011 - Old cobble site is unraveling, likely causing the toe of the bank to become unstable. 2016 - Rock placed in eroding sections by locals.	
SAC 16.8 L	Sacramento River	16.8	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Repaired	2008	591	0			Likely	Pump	2008 - Overstepped levee section with pocket erosion. Plans for repair currently in the design phase. 2010 - Very steep slope with slumps, longitudinal cracking, and overturned trees. 2011 - Upgraded to CRITICAL. Sections of vertical slope with highway on top. Heavy vegetation in front of most of the erosion pockets. 2015 - New rock placed on the levee slope for most of the downstream end, but bad spots still remain. 2016 - Under construction.	Repaired by USACE in 2016.
SAC 18.0 L	Sacramento River	18	0	L	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Repaired	2009	444	0			Likely	None	2009 - Large scallop from rotational failure. One fallen tree and one large tree with half of its root structure exposed. 2015 - Large tree expected to pop out within next couple of years, will take very large chunk of levee out.	Repaired by locals with quarry stone.
SAC 21.5 L	Sacramento River	21.5	0	L	RD 556 - Upper Andrus Island	Brannan Andrus Island	Removed	1997	548	5		Quarry Stone in good condition	Likely	Pipe	1999 - Downstream 140 ft repaired with rock. 2010 - Lots of woody debris, but no changes to site. 2015 - Site extended upstream due to erosion pockets.	Site removed, levee is not threatened.
SAC 23.3 L	Sacramento River	23.3	0	L	RD 556 - Upper Andrus Island	Brannan Andrus Island	Removed	1997	584	30	Fluvial, Wave Wash		Likely	None	1997 - Few scallops in berm, some getting close to levee toe. 2005 - Brush boxes present. 2012 - More erosion of the toe since last year.	Erosion is not in levee prism.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
SAC 26.0L	Sacramento River	26	0	L	RD 556 - Upper Andrus Island	Brannan Andrus Island	Repaired	1997	1,547	0	Fluvial, Wave Wash	Small section of quarry stone in good condition	Likely	Pump and USGS gage station	2002 - Two rocked sections (150 ft long) at the downstream end. 2005 - Lots of old brush boxes, some with established vegetation in the area behind the boxes. 2006 - Some small spots fixed with stone. 2009 - Minimal new erosion, rock in the middle of the reach may be new. 2011 - Minor new erosion at the toe. 2013 - Minor new erosion. 2015 - Site under construction. 2016 - Site repaired by USACE.	Site repaired by USACE in 2016
SAC 26.3 R	Sacramento River	26.3	0	R	RD 003 - Grand Island	Grand Island	Repaired	2008	418	0			Likely	Boat dock	2009 - Hole left in levee toe from a fallen tree. Could be repaired under maintenance. 2010 - Minor new erosion. 2015 - Minor new erosion at toe.	Repaired by locals.
SAC 31.6R	Sacramento River	31.6	0	R	RD 003 - Grand Island	Grand Island	Repaired	1997	442	0	Fluvial	Quarry Stone in good condition	Likely	Pipes and Pumphouse	1997 - Erosion of supper sandy levee material above the water line, straight reach. 1999 - Small pocket repaired with rock. 2005 - Downstream 400 ft have been repaired. 2011 - Site is overgrown with vegetation. 2015 - Site appears stable, may consider for removal if not change after the next large storm event. 2016 - Repairs made to the worst section, remain site appears stable.	Site repaired by locals in 2016
SAC 35.4 L	Sacramento River	35.4	0	L	RD 755 - Randall Island	Courtland	Repaired	2003	484	5	Wave Wash and Tree Pop-Outs	Quarry Stone in good condition	Likely	None	2003 - Toe and lower slope eroding, rock in water and a few pieces on the slope; rock at upstream and downstream ends. 2005 - Looks a little worse. Two major holes with vertical banks and smaller intermittent pockets in between. Stone is present upstream, downstream, and at toe. 2008 - Repaired at both ends (50 ft of new stone) but middle remains unrepaired. 2011 - Site extended downstream to include new scour. 2013 - At the downstream end, behind tree, there is a new animal burrow. Tree has exposed roots. 2015 - New rock placed at toe in middle of the site, but a hole remains behind the tree. 2016 - Repaired by locals.	Repaired by locals.
SAC 78.3 L	Sacramento River	78.3	0	L	RD 1000 - Natomas	Natomas	Removed	1997	654	15	Fluvial, Wave Wash	None	Likely	Pipes, Power Poles	1997 - Very cohesive toe. 2005 - Site was staked and rock was stockpiled along the top of the bank. 2010 - New adjacent levee under construction. 2011 - New animal burrow.	Site removed. New adjacent levee and the erosion is not longer in the levee prism.
SAC 85.4 R	Sacramento River	85.4	0	R	Yolo County Service Area 6	Knights Landing	Removed	2009	1,025	5	Fluvial	Cobbles in fair condition	Likely	Pipe	2009 - Erosion into the levee toe. Some cobbles have been dumped into the erosion pockets. 2010 - Old cobble site starting to unravel. 2012 - Slope continues to steepen and new animal holes. 2013 - Downstream cobble is unraveling. 2016 - Site removed, bank has stabilized.	
SAC 92.8 L	Sacramento River	92.8	0	L	RD 1500 - Sutter Basin	South Sutter	Removed	1997	834	0	Fluvial, Toe Scour	Cobble at toe in good condition	Unsure	Pipe	1997 - Damage to cobble revetment on top left bank and toe damage. 2004 - Site is pretty minor. 2010 - Cobbles continue to deteriorate. 2011 - Minor new erosion at the toe. 2013 - Might be able to shorten due to deposition. 2015 - Site shortened, downstream end has plenty of berm and deposited material, well vegetated.	Site has remained stable for a few years, levee is no longer being threatened.
SAC 125.8 L	Sacramento River	125.8	0	L	RD 070 - Meridian Farms	North Sutter	Repaired	2008	115	5	Fluvial	Quarry Stone in good condition	Likely	Pipe	2005 - Site was repaired. 2009 - Site is at upstream end of the repair site. 2011 - Still minor erosion. 2012 - Site shortened to remove non-erosding section, minor erosion with failing cobbles. 2016 - Locals dumped rock and bank appears stable. Site removed.	
SAC 130.0 L	Sacramento River	130	0	L	RD 070 - Meridian Farms	North Sutter	Removed	1997	712	0			Unsure	Pump and PG&E power pole	1997 - Critical Site - Erosion of cobble site on outside of a bend. Failure caused by erosion of a material from behind the cobbles and cobbles rolling down the slope. Failure is just above the toe levee. Some repairs had been done at the upstream end. 2004 - Some minor new erosion at the top of the berm. 2005 - Trees look okay and the downstream end has some new rock repair. Site is no longer critical. 2006 - No longer critical, some repairs.	Significant deposition from 2017 storm. Erosion has moved downstream and the levee is no longer threatened.
SAC 136.6 L	Sacramento River	136.6	0	L	RD 070 - Meridian Farms	North Sutter	Removed	1997	616	15	Toe Scour	Cobbles in fair condition	Unlikely	Pump and Pipe	1997 - Toe erosion on a cobble revetment on the outside of a low receding bend. 2012 - Toe appears pretty stable with old cobbles. 2016 - Site is stable and would not benefit from repair. Site removed.	
SAC 151.0 R	Sacramento River	151	0	R	Maintence Area 1	Colusa Basin	Removed	2009	1,748	15		None	Likely	Pipes through levee	2009 - Slump in the middle of the section has left a vertical section on the bank. 2010 - Old cobble site unraveling, site extended downstream.	No longer qualities as a site, removed.

Site Name	Waterway	River Mile	Levee Mile	Bank	Levee Maintaining Agency	Economic Impact Area	Erosion Status	Year Added	Site Length (ft)	Berm Width (ft)	Erosion Mechanism(s)	Revetment Details	Veg Variance Required?	Encroachment Details	Site History	2017 Field Notes
SAC 168.3 L	Sacramento River	168.3	0	L	LD 3 Glenn County	Butte Basin	Removed	1997	149	0			Unsure	None	1997 - Erosion of top left bank; eroding downstream of rock section where levee is closest to the bank, approximately 40 to 50 ft of bank retreat, some berm left. 1999 - Some new beach sedimentation at toe. 2000 - Snags in eddy area could induce bank erosion at higher flows. 2002 - Small bar is gone. 2003 - Bar is present and higher. 2004 - Some new deposition on the bank at the upstream end. 2006 - New sand on bar and bank. 2007 - New sand deposition with vegetation colonizing bars between dikes. 2008 - More eddy sedimentation and vegetation on bar along bank. Bank is healing due to retreat of right bank. 2009 - Additional bar sedimentation. 2010 - some deposition at toe, new erosion on opposite bank. Site continues to heal. 2012 - Majority of site healed but upstream end still needs toe rock.	New deposition on site, river has shifted to opposite bank and levee is no longer threatened.
STM 18.8 R	Steamboat Slough	18.8	0	R	RD 501 -Ryer Island	Ryer Island	Removed	1999	359	0	Fluvial, Wave Wash	None	Likely	Pipe	2000 - Slow erosion of lower and mid-slope with rock bench at the low water line. 2016 - Site removed, stable for years.	
STM 18.9 R	Steamboat Slough	18.9	0	R	RD 501 -Ryer Island	Ryer Island	Removed	2009	330	0	Fluvial, Wave Wash	Quarry stone at toe in fair condition	Likely	Pipe	2009 - Rock is starting to unravel, probably from a tree pop-out, hard toe. 2016 - Site removed, bench has been stable for years.	
SBP 11.1 L	Sutter Bypass	0	11.1	L	DWR Sutter Maintenance Yard	Yuba City	Removed	2011	162	15			Unsure	None	2011 - Small section of the mid levee slope has eroded from wind wave.	Remove, no longer qualities.
STR 27.1 R	Sutter Slough	27.1	0	R	RD 999 - Netherlands	Clarksburg	Removed	2012	255	0			Likely	None	2012 - Slumping of upper levee slope.	Removed, no erosion observed.
STR 28.4 R	Sutter Slough	28.4	0	R	RD 150 - Merritt Island	Merritt Island	Removed	2013	307	0			Likely	Bridge	2013 - Old toe repair unraveling. Bridge at upstream end of site.	Removed, no threat to the levee.
YOL 0.1 R	Yolo Bypass	0	0.1	R	RD 2035 - Conaway Tract	Woodland	Removed	2006	427	0	Fluvial, Wave Wash	None	Unlikely	None	2006 - Wave wash erosion and some saturation slumping occurring. Tension/separation cracks evident in fine grained levee slope materials. 2011 - Slumping of the lower toe. New slumped section on downstream end. 2016 - Site removed, no erosion evident, possibly repaired.	
YOL 2.6 R	Yolo Bypass	0	2.6	R	Knights Landing Ridge Drainage District	Knights Landing	Removed	2006	827	0			Unsure	None	2006 - Slow wave wash and general fluvial erosion of the toe area under river cobbles. Erosion is creating a scarp and cobble covered wave-cut bench. 2011 - Site appears better than it looked in 2006, but still eroding.	No erosion apparent , possibly fixed by locals, site removed.
									17,756							

Site Name	Site Length (ft)	LMA	Damage Basin	Erosion Status	Midpoint Latitude	Midpoint Longitude	Start Latitude	Start Longitude	End Latitude	End Longitude
BER 0.8 L	452	RD 1001 - Nicolaus	Rio Oso	Repaired	38.947034	-121.563742	38.947591	-121.56339	38.946477	-121.564094
BER 1.9 L	432	RD 1001 - Nicolaus	Rio Oso	Eroding	38.954675	-121.550081	38.95507	-121.549528	38.954227	-121.550592
BER 2.5 L	222	RD 1001 - Nicolaus	Rio Oso	Eroding	38.964302	-121.545109	38.964583	-121.544967	38.96401	-121.545228
BER 4.9 R	64	RD 784 - Plumas Lake	Johnson Ranch	Eroding	38.981335	-121.515924	38.9814	-121.515848	38.981271	-121.515999
BER 5.7 L	474	RD 1001 - Nicolaus	Bear	Eroding	38.982655	-121.501971	38.982737	-121.501144	38.982572	-121.502797
BTC 1.8 L	558	Maintenance Area 5	Unassigned	Eroding New	39.675914	-121.778466	39.676588	-121.777977	39.67528	-121.779005
BTS 0.8 R	409	RD 070 - Meridian Farms	North Sutter	Eroding New	39.145043	-121.842538	39.145602	-121.842573	39.144486	-121.842547
CBD 0.5 L	611	RD 787 -Fair Ranch	RD 787	Eroding	38.795502	-121.731568	38.795268	-121.732566	38.795931	-121.730627
CBD 0.9 L	968	RD 787 -Fair Ranch	RD 787	Eroding	38.795807	-121.737284	38.796225	-121.738902	38.795486	-121.735647
CBD 19.2 L	397	RD 108 - River Farms	Grimes	Eroding	39.017122	-121.985893	39.017516	-121.986374	39.016727	-121.985411
CHC 2.4 L	218	DWR Sacramento Maintenance Yard	Yolo	Critical	38.73276	-121.797524	38.732836	-121.797893	38.732685	-121.797154
CHC 3.5 R	450	DWR Sacramento Maintenance Yard	Woodland	Eroding	38.722752	-121.75986	38.722138	-121.759736	38.723294	-121.759588
CHC 5.4 L	198	DWR Sacramento Maintenance Yard	Yolo	Eroding	38.7232	-121.760499	38.722933	-121.760561	38.723467	-121.760436
CHI 2.7 L	207	Butte County	Unassigned	Eroding New	39.781441	-121.85049	39.781508	-121.850137	39.781327	-121.850828
CHK 11.7 R	34	Maintenance Area 13	Unassigned	Removed	39.44278	-121.75988	39.442821	-121.759851	39.442738	-121.759908
CHS 1.8 L	21499	RD 2104 - Perters Pocket Tract	Peters Pocket	Critical	38.30714	-121.733528	38.293779	-121.739262	38.324495	-121.758096
CHS 21.1 R	1625	RD 2060 - Hastings Tract	Hasting Tract	Eroding	38.262464	-121.697829	38.264585	-121.698868	38.260593	-121.696403
CHS_22-5_L	123	RD 2098 - Cache-Haas Area	Moore Tract	Removed	38.28286	-121.710938	38.282948	-121.711121	38.282772	-121.710756
CHS 22.9 R	3086	RD 2060 - Hastings Tract	Hasting Tract	Eroding	38.280709	-121.715395	38.28412	-121.718577	38.277633	-121.711912
DEC 0.9 R	265	Tehama County	Unassigned	Eroding	39.967965	-122.024224	39.968165	-122.023828	39.967766	-122.02462
DEC 2.4 L	97	Tehama County	Unassigned	Removed	39.962817	-122.031545	39.96291	-122.031421	39.962724	-122.03167
DWS 5.0 L	81	RD 999 - Netherlands	Clarksburg	Removed	38.437401	-121.597755	38.437506	-121.597707	38.437296	-121.597803
ELC 1.4 L	331	Tehama County	Unassigned	Eroding	40.051787	-122.163643	40.051596	-122.164179	40.051979	-122.163106
ELC 3.0 R	129	Tehama County	Unassigned	Eroding	40.05485	-122.140408	40.05473	-122.140578	40.05497	-122.140238
ELK 0.2 L	49631	RD 150 - Merritt Island	Merritt Island	Eroding	38.376185	-121.543483	38.413893	-121.522896	38.332735	-121.583625
ELK 0.2 R	49983	RD 999 - Netherlands	Clarksburg	Eroding	38.376409	-121.544224	38.414157	-121.523156	38.332643	-121.584449
FHR 0.6 L	901	RD 1001 - Nicolaus	Rio Oso	Eroding	38.794424	-121.62903	38.795455	-121.629903	38.793394	-121.628156
FHR 1.0 L	1054	RD 1001 - Nicolaus	Rio Oso	Eroding	38.799508	-121.632582	38.80092	-121.63305	38.798165	-121.631939
FHR 3.8 L	2094	RD 1001 - Nicolaus	Rio Oso	Eroding	38.834184	-121.635127	38.836966	-121.634128	38.831498	-121.636371
FHR 5.0 L	1666	RD 1001 - Nicolaus	Rio Oso	Critical	38.850199	-121.630052	38.852394	-121.629231	38.848004	-121.630873
FHR 5.8 L	1030	RD 1001 - Nicolaus	Rio Oso	Eroding	38.862701	-121.622288	38.863946	-121.621388	38.861558	-121.623316
FHR 6.0 L	487	RD 1001 - Nicolaus	Rio Oso	Critical	38.865276	-121.620378	38.865875	-121.619983	38.864706	-121.620813
FHR 6.6 L	710	RD 1001 - Nicolaus	Rio Oso	Eroding	38.873248	-121.615949	38.874113	-121.61538	38.872373	-121.616504
FHR 7.7 L	309	RD 1001 - Nicolaus	Rio Oso	Eroding New	38.88886	-121.607283	38.889127	-121.606858	38.888603	-121.607713
FHR 12.3 R	177	Maintenance Area 3	Yuba City	Under Construction	38.937694	-121.588491	38.937451	-121.588512	38.937937	-121.588471
FHR 12.8 R	293	Maintenance Area 3	Yuba City	Under Construction	38.945578	-121.586233	38.945188	-121.586096	38.945958	-121.586394
FHR 17.8 L	1858	RD 784 - Plumas Lake	Arboga	Eroding	39.007065	-121.578636	39.009366	-121.579766	39.004549	-121.579143
FHR 47.5 R	842	Maintenance Area 7	Live Oak	Eroding	39.33312	-121.633543	39.33424	-121.633908	39.332	-121.633178
FHR 50.9 R	371	Maintenance Area 7	Live Oak	Repaired	39.367128	-121.647593	39.367606	-121.647866	39.366726	-121.647217
GEO 0.3 L	523	RD 563 - Tyler Island	Tyler Island	Eroding	38.130141	-121.586839	38.130544	-121.587607	38.129968	-121.585981
GEO 1.7 L	1528	RD 563 - Tyler Island	Tyler Island	Eroding	38.14182	-121.59819	38.143519	-121.599677	38.139918	-121.596986
GEO 2.0 L	652	RD 563 - Tyler Island	Tyler Island	Eroding	38.146765	-121.600007	38.147537	-121.599433	38.145994	-121.600581
GEO 2.5 L	992	RD 563 - Tyler Island	Tyler Island	Eroding	38.151173	-121.595269	38.15082	-121.59365	38.150647	-121.596858
GEO 3.8 L	2589	RD 563 - Tyler Island	Tyler Island	Eroding	38.156642	-121.591276	38.156987	-121.587427	38.152919	-121.591129
GEO 4.3 L	1052	RD 563 - Tyler Island	Tyler Island	Eroding	38.158911	-121.585743	38.160261	-121.585056	38.157625	-121.586543
GEO 4.5 L	1396	RD 563 - Tyler Island	Tyler Island	Eroding	38.162658	-121.583909	38.164462	-121.583092	38.160888	-121.584807
GEO 5.3 L	3538	RD 563 - Tyler Island	Tyler Island	Eroding	38.172492	-121.579776	38.177202	-121.579439	38.167959	-121.581616

Site Name	Site Length (ft)	LMA	Damage Basin	Erosion Status	Midpoint Latitude	Midpoint Longitude	Start Latitude	Start Longitude	End Latitude	End Longitude
GEO 5.5 R	86	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Eroding New	38.173295	-121.580648	38.17341	-121.580683	38.173178	-121.580622
GEO 6.3 L	5951	RD 563 - Tyler Island	Tyler Island	Critical	38.181952	-121.570457	38.186013	-121.561512	38.185968	-121.561667
GEO 7.0 R	1137	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	38.188597	-121.55901	38.189775	-121.557729	38.187369	-121.560247
GEO 7.2 L	332	RD 563 - Tyler Island	Tyler Island	Eroding	38.189798	-121.556767	38.190073	-121.556307	38.189524	-121.557227
GEO 8.3 L	3110	RD 563 - Tyler Island	Tyler Island	Eroding	38.201825	-121.539983	38.206346	-121.540819	38.199925	-121.544249
GEO 9.0 R	1678	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	38.209265	-121.540841	38.210674	-121.538854	38.206919	-121.541559
GEO 9.2 R	707	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	38.213357	-121.537972	38.214144	-121.538692	38.212577	-121.537244
GEO 9.3 L	4304	RD 563 - Tyler Island	Tyler Island	Critical	38.210886	-121.53518	38.208046	-121.540759	38.215405	-121.539764
GEO 9.8 L	280	RD 563 - Tyler Island	Tyler Island	Eroding New	38.217325	-121.542562	38.21768	-121.542761	38.217003	-121.542309
GEO 10.0 L	1282	RD 563 - Tyler Island	Tyler Island	Eroding New	38.219728	-121.543019	38.221405	-121.543627	38.217972	-121.542861
GEO 10.2 L	3906	RD 563 - Tyler Island	Tyler Island	Eroding New	38.223551	-121.537554	38.226635	-121.532167	38.222157	-121.543591
GEO 10.9 R	1703	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	38.227284	-121.532466	38.227615	-121.529894	38.225374	-121.534406
GEO 11.0 L	990	RD 563 - Tyler Island	Tyler Island	Eroding	38.226409	-121.528994	38.22566	-121.527556	38.227157	-121.530432
GEO 11.4 L	1338	RD 563 - Tyler Island	Tyler Island	Critical	38.228919	-121.524418	38.227692	-121.526096	38.230326	-121.522886
GEO 11.8 R	1007	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding New	38.232976	-121.520927	38.234038	-121.519817	38.231879	-121.522003
GEO 12.0 L	356	RD 563 - Tyler Island	Tyler Island	Eroding New	38.234497	-121.518346	38.234861	-121.517934	38.234133	-121.518758
HAS 7.9 L	2150	RD 2098 - Cache-Haas Area	Moore Tract	Eroding	38.296887	-121.727896	38.299606	-121.728621	38.294858	-121.725433
HAS 8.4 L	1514	RD 2098 - Cache-Haas Area	Moore Tract	Eroding New	38.305643	-121.72983	38.306705	-121.732014	38.304278	-121.72796
HAS 9.7 L	1595	RD 2098 - Cache-Haas Area	Moore Tract	Critical	38.322389	-121.74031	38.324587	-121.740254	38.32024	-121.740183
KLR 3.0 L	1113	Knights Landing Ridge Drainage District	Knights Landing	Eroding	38.756433	-121.692734	38.757925	-121.693048	38.754899	-121.692653
KLR 3.1 L	658	Knights Landing Ridge Drainage District	Knights Landing	Eroding	38.759385	-121.693949	38.760053	-121.694686	38.758587	-121.693359
KLR 3.5 R	418	Knights Landing Ridge Drainage District	Yolo	Eroding	38.758906	-121.695586	38.759332	-121.696063	38.758432	-121.695158
KLR 3.7 L	678	Knights Landing Ridge Drainage District	Knights Landing	Eroding	38.766393	-121.700967	38.767336	-121.701023	38.765522	-121.700608
KLR 3.9 R	366	Knights Landing Ridge Drainage District	Yolo	Eroding	38.764448	-121.701786	38.764905	-121.702074	38.764037	-121.701434
KLR 4.7 L	1266	Knights Landing Ridge Drainage District	Knights Landing	Eroding	38.776789	-121.704822	38.778115	-121.706195	38.775271	-121.703685
KLR 5.8 L	2986	Knights Landing Ridge Drainage District	Knights Landing	Eroding	38.789481	-121.720408	38.792395	-121.724091	38.786566	-121.716724
LAR 1.8 L	866	American River Flood Control District	Sacramento	Eroding	38.599367	-121.481124	38.598791	-121.479799	38.599878	-121.482483
LDS 0.6 R	1620	RD 536 - Egbert Tract	Lindsey	Eroding	38.251666	-121.759072	38.249615	-121.760165	38.253717	-121.757979
LDS 1.7 L	720	RD 2060 - Hastings Tract	Hasting Tract	Eroding New	38.252125	-121.721815	38.252605	-121.722924	38.25191	-121.72062
LDS 0.7 R	280	RD 536 - Egbert Tract	Lindsey	Critical	38.246153	-121.707173	38.245981	-121.707609	38.246326	-121.706737
LDS 0.8 R	86	RD 536 - Egbert Tract	Lindsey	Eroding	38.245624	-121.708466	38.245581	-121.708605	38.245667	-121.708327
MUD 2.8 L	766	Butte County	Unassigned	Eroding New	39.770465	-121.900013	39.771186	-121.89906	39.769616	-121.900854
MUD 3.3 L	457	Butte County	Unassigned	Eroding New	39.765201	-121.90605	39.765543	-121.905367	39.764869	-121.906737
MUD 4.4 R	300	Butte County	Unassigned	Eroding	39.773613	-121.895348	39.773969	-121.895078	39.773257	-121.895618
NCC 1.9 L	408	RD 1001 - Nicolaus	Rio Oso	Eroding New	38.799389	-121.582148	38.799733	-121.581585	38.799037	-121.582706
NCC 2.4 R	526	RD 1001 - Nicolaus	Rio Oso	Eroding	38.803767	-121.575261	38.804206	-121.574529	38.803327	-121.575993
NCC_2-9_R	2377	RD 1001 - Nicolaus	Rio Oso	Eroding	38.809151	-121.566198	38.80718	-121.569523	38.811122	-121.562873
PUC 7.2 L	305	DWR Sacramento Maintenance Yard	Davis	Eroding	38.517397	-121.752296	38.517355	-121.752824	38.517362	-121.751778
SAC 7.3 L	619	RD 341 - Sherman Island	Sherman Island	Critical	38.080448	-121.729412	38.08037	-121.728341	38.080526	-121.730483
SAC 7.5 L	580	RD 341 - Sherman Island	Sherman Island	Eroding New	38.081441	-121.718828	38.081801	-121.717915	38.081584	-121.719794
SAC 7.9 L	1276	RD 341 - Sherman Island	Sherman Island	Critical	38.085072	-121.708988	38.086603	-121.707786	38.083954	-121.710589
SAC 8.0 L	1200	RD 341 - Sherman Island	Sherman Island	Critical	38.088994	-121.707049	38.09062	-121.706684	38.087425	-121.707639
SAC 8.2 L	1023	RD 341 - Sherman Island	Sherman Island	Eroding	38.095994	-121.706357	38.097398	-121.706321	38.09459	-121.706393
SAC 10.8 L	820	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Eroding	38.128697	-121.688058	38.129722	-121.687468	38.127672	-121.688646
SAC 11.2 L	1971	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	38.138813	-121.686354	38.141399	-121.685346	38.136227	-121.687361
SAC 12.1 L	1165	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	38.150311	-121.682603	38.151867	-121.682201	38.148711	-121.68279
SAC 13.6 L	303	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	38.166188	-121.670849	38.166583	-121.670684	38.165794	-121.671014

Site Name	Site Length (ft)	LMA	Damage Basin	Erosion Status	Midpoint Latitude	Midpoint Longitude	Start Latitude	Start Longitude	End Latitude	End Longitude
SAC 16.8 L	591	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Repaired	38.163093	-121.618329	38.162959	-121.617323	38.163334	-121.619312
SAC 18.0 L	444	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Repaired	38.164993	-121.601141	38.165303	-121.600477	38.164682	-121.601804
SAC 18.1 L	267	Brannan-Andrus Levee Maintenance District	Brannan Andrus Island	Critical	38.165722	-121.599713	38.165945	-121.599345	38.165498	-121.60008
SAC 21.5 L	548	RD 556 - Upper Andrus Island	Brannan Andrus Island	Removed	38.200956	-121.557527	38.201687	-121.557305	38.200225	-121.557749
SAC 21.9 L	237	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	38.206051	-121.557163	38.206377	-121.557184	38.205729	-121.557108
SAC 22.5 L	900	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	38.212347	-121.557119	38.213581	-121.557197	38.211112	-121.557042
SAC 22.7 L	311	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	38.218528	-121.556754	38.218951	-121.556689	38.218104	-121.556819
SAC 23.2 L	589	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	38.224042	-121.555664	38.22485	-121.555641	38.223233	-121.555687
SAC 23.3 L	584	RD 556 - Upper Andrus Island	Brannan Andrus Island	Removed	38.227402	-121.555568	38.228202	-121.555502	38.226601	-121.555605
SAC 24.8 L	783	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	38.240586	-121.545449	38.240401	-121.544106	38.240772	-121.546791
SAC 25.2 L	619	RD 556 - Upper Andrus Island	Brannan Andrus Island	Eroding	38.239031	-121.537816	38.238772	-121.536788	38.239265	-121.538845
SAC 26.3 R	418	RD 003 - Grand Island	Grand Island	Repaired	38.239922	-121.520265	38.239992	-121.519542	38.23987	-121.520989
SAC 27.0 L	504	RD 554 - Walnut Grove	Tyler Island	Eroding	38.245619	-121.511309	38.246222	-121.510878	38.245017	-121.51174
SAC 33.9 R	457	RD 349 - Sutter Island	Sutter Island	Critical	38.326397	-121.576792	38.325798	-121.577027	38.326996	-121.576557
SAC 38.5 R	364	RD 150 - Merritt Island	Merritt Island	Critical	38.371418	-121.523192	38.371909	-121.523316	38.370928	-121.523069
SAC 38.8 L	549	Maintenance Area 9	Beach Stone Lake	Eroding New	38.376273	-121.523663	38.377013	-121.523877	38.375565	-121.52336
SAC 40.4 L	108	Maintenance Area 9	Beach Stone Lake	Eroding New	38.39493	-121.512214	38.395077	-121.512195	38.394783	-121.512234
SAC 41.9 R	1360	RD 999 - Netherlands	Clarksburg	Critical	38.416039	-121.523977	38.417692	-121.525083	38.414387	-121.522871
SAC 43.1R	646	RD 307 - Lisbon Island	Borges	Eroding	38.430842	-121.533117	38.431726	-121.5332	38.429957	-121.533035
SAC 43.2 R	992	RD 307 - Lisbon Island	Borges	Eroding	38.433566	-121.53225	38.43456	-121.531159	38.432287	-121.532978
SAC_48-4_L	1399	Maintenance Area 9	Sacramento	Eroding	38.474654	-121.530662	38.474575	-121.533104	38.474733	-121.528221
SAC 48.6 R	471	RD 307 - Lisbon Island	Borges	Eroding	38.473132	-121.530652	38.473161	-121.531474	38.473103	-121.529831
SAC 50.3 L	89	Maintenance Area 9	Sacramento	Eroding	38.490989	-121.553446	38.491086	-121.55354	38.490892	-121.553352
SAC 52.4 L	260	Maintenance Area 9	Sacramento	Critical	38.515193	-121.543188	38.5153	-121.542755	38.515085	-121.543621
SAC 52.7 L	158	Maintenance Area 9	Sacramento	Eroding	38.515841	-121.540443	38.515887	-121.540174	38.515794	-121.540713
SAC 53.8 L	155	Maintenance Area 9	Sacramento	Eroding	38.52078	-121.523127	38.520996	-121.523072	38.520606	-121.523261
SAC 54.8 L	325	Maintenance Area 9	Sacramento	Eroding	38.531611	-121.527077	38.531806	-121.526566	38.531417	-121.527589
SAC 55.2 L	1075	Maintenance Area 9	Sacramento	Eroding	38.533769	-121.521313	38.534423	-121.519626	38.533143	-121.52301
SAC 55.5 L	384	Maintenance Area 9	Sacramento	Eroding	38.536396	-121.516597	38.536756	-121.516107	38.536036	-121.517087
SAC 55.7 R	1150	RD 900 - West Sacramento	Southport	Critical	38.539968	-121.514739	38.541246	-121.513561	38.538689	-121.515916
SAC 56.5 R	465	RD 900 - West Sacramento	Southport	Eroding	38.550705	-121.514203	38.551319	-121.514423	38.55009	-121.513983
SAC 56.6 L	70	City of Sacramento	Sacramento	Eroding	38.551671	-121.512366	38.551764	-121.512395	38.551578	-121.512336
SAC 56.7 R	662	RD 900 - West Sacramento	Southport	Eroding	38.553391	-121.515008	38.554277	-121.515263	38.552504	-121.514752
SAC 58.5 L	445	City of Sacramento	Sacramento	Eroding	38.572723	-121.512531	38.573169	-121.511998	38.572277	-121.513063
SAC 62.9 R	1059	RD 537 - Lovdal District	West Sacramento	Eroding	38.601747	-121.553634	38.601718	-121.553629	38.602874	-121.55462
SAC 71.3 R	522	RD 1600 - Mull District	Elkhorn	Eroding	38.683407	-121.634025	38.684106	-121.634219	38.682707	-121.63383
SAC 74.0 R	2049	RD 1600 - Mull District	Elkhorn	Eroding New	38.712907	-121.611812	38.715134	-121.609566	38.710874	-121.614239
SAC 74.4 R	1343	RD 1600 - Mull District	Elkhorn	Eroding	38.719514	-121.606737	38.721351	-121.606414	38.71777	-121.607423
SAC 75.3 R	2753	RD 1600 - Mull District	Elkhorn	Eroding	38.732441	-121.605185	38.73611	-121.604153	38.728684	-121.605844
SAC 77.7 R	156	RD 1600 - Mull District	Elkhorn	Eroding	38.76501	-121.594987	38.765219	-121.595049	38.764801	-121.594926
SAC 83.9 R	988	Yolo County Service Area 6	Knights Landing	Eroding	38.7589	-121.669119	38.759	-121.670759	38.75939	-121.6675
SAC 86.3 L	3035	RD 1500 - Sutter Basin	South Sutter	Eroding	38.773074	-121.686931	38.777282	-121.685841	38.77039	-121.690553
SAC 86.9 R	517	Yolo County Service Area 6	Knights Landing	Eroding	38.779772	-121.687835	38.780407	-121.688238	38.779137	-121.687432
SAC 87.1 L	1239	RD 1500 - Sutter Basin	South Sutter	Eroding	38.783481	-121.688966	38.784936	-121.690033	38.781962	-121.688033
SAC 92.8 L	834	RD 1500 - Sutter Basin	South Sutter	Removed	38.840011	-121.728243	38.840347	-121.726857	38.839546	-121.729591
SAC 95.8 L	2458	RD 1500 - Sutter Basin	South Sutter	Eroding	38.870157	-121.753121	38.869139	-121.757108	38.871848	-121.749349
SAC 99.0 L	1745	RD 1500 - Sutter Basin	South Sutter	Eroding	38.85956	-121.783523	38.861899	-121.784057	38.857239	-121.783771

Site Name	Site Length (ft)	LMA	Damage Basin	Erosion Status	Midpoint Latitude	Midpoint Longitude	Start Latitude	Start Longitude	End Latitude	End Longitude
SAC 101.3 R	188	RD 108 - River Farms	Grimes	Eroding	38.874981	-121.813305	38.875109	-121.813592	38.874854	-121.813018
SAC 104.0 L	3443	RD 1500 - Sutter Basin	South Sutter	Eroding	38.900239	-121.795518	38.902721	-121.790677	38.901337	-121.801175
SAC 104.5 L	1424	RD 1500 - Sutter Basin	South Sutter	Eroding	38.90605	-121.790957	38.906697	-121.792796	38.904041	-121.790298
SAC 111.0 R	110	RD 108 - River Farms	Grimes	Eroding	38.954186	-121.840667	38.954312	-121.840774	38.95406	-121.84056
SAC 115.9 R	540	RD 108 - River Farms	Grimes	Eroding	38.998016	-121.798441	38.998336	-121.799298	38.997696	-121.797584
SAC 116.0 L	831	RD 1500 - Sutter Basin	South Sutter	Eroding	39.000588	-121.801886	39.001413	-121.802889	38.999745	-121.800898
SAC 116.5 L	3393	RD 1500 - Sutter Basin	South Sutter	Eroding	39.005501	-121.810297	39.006072	-121.815926	39.003301	-121.805024
SAC 118.0 R	837	RD 108 - River Farms	Grimes	Eroding	39.01545	-121.825055	39.016401	-121.82423	39.014499	-121.82588
SAC 120.6 L	190	RD 1660 - Tisdale	North Sutter	Eroding	39.044138	-121.837479	39.044361	-121.837654	39.043916	-121.837305
SAC 122.0 R	311	Sacramento River West Side Levee District	Grimes	Eroding	39.06362	-121.839095	39.063997	-121.839335	39.063209	-121.838927
SAC 122.3 R	855	Sacramento River West Side Levee District	Grimes	Eroding	39.066636	-121.844108	39.067386	-121.845266	39.065886	-121.84295
SAC 123.3 L	679	RD 070 - Meridian Farms	North Sutter	Eroding	39.069636	-121.856962	39.069166	-121.857995	39.070105	-121.855929
SAC 123.7 R	122	Sacramento River West Side Levee District	Grimes	Eroding	39.066952	-121.867117	39.066901	-121.867322	39.067004	-121.866913
SAC 125.6 R	415	Sacramento River West Side Levee District	Grimes	Eroding	39.078816	-121.895029	39.079351	-121.895317	39.07834	-121.894656
SAC 127.9 R	562	Sacramento River West Side Levee District	Grimes	Eroding	39.100097	-121.903981	39.100836	-121.90432	39.099482	-121.90343
SAC 130.0 L	712	RD 070 - Meridian Farms	North Sutter	Removed	39.121651	-121.909498	39.122459	-121.910121	39.120684	-121.909152
SAC 131.8 L	665	RD 070 - Meridian Farms	North Sutter	Eroding	39.13147	-121.935606	39.13204	-121.936521	39.1309	-121.93469
SAC 136.6 R	1013	Sacramento River West Side Levee District	Grimes	Eroding	39.173778	-121.939818	39.174949	-121.940737	39.172501	-121.939053
SAC 138.1 L	1308	RD 070 - Meridian Farms	North Sutter	Eroding	39.191876	-121.934463	39.193219	-121.935783	39.190038	-121.934199
SAC 141.5 R	696	Sacramento River West Side Levee District	Colusa Basin	Eroding	39.194667	-121.988301	39.195595	-121.988621	39.193769	-121.987901
SAC 141.9 R	1018	Sacramento River West Side Levee District	Colusa Basin	Eroding New	39.199452	-121.987509	39.200685	-121.986717	39.198117	-121.988106
SAC 143.5 R	602	Sacramento River West Side Levee District	Colusa Basin	Eroding	39.213739	-121.998592	39.213869	-121.999641	39.213608	-121.997543
SAC 151.0 R	1748	Maintence Area 1	Colusa Basin	Removed	39.265345	-122.017854	39.266315	-122.020682	39.26573	-122.014925
SAC 152.6 L	1555	Maintence Area 1	Butte Basin	Eroding	39.281889	-122.01718	39.283853	-122.016113	39.27991	-122.018221
SAC 152.8 L	299	Maintence Area 1	Butte Basin	Eroding	39.284933	-122.015449	39.285298	-122.015208	39.284568	-122.01569
SAC 157.7 R	484	Maintence Area 1	Colusa Basin	Eroding	39.332082	-122.029696	39.332716	-122.029953	39.331447	-122.02944
SAC 164.3 R	1200	Maintence Area 1	Colusa Basin	Eroding	39.409474	-122.009001	39.411111	-122.009238	39.407837	-122.008763
SAC 164.7 R	1117	Maintence Area 1	Colusa Basin	Eroding	39.416169	-122.010111	39.417689	-122.010369	39.414649	-122.009853
SAC 168.3 L	149	LD 3 Glenn County	Butte Basin	Removed	39.454896	-121.994162	39.455096	-121.994217	39.454696	-121.994107
SAC 172.0 L	1628	LD 3 Glenn County	Butte Basin	Critical	39.506322	-121.984944	39.508117	-121.986562	39.504388	-121.985301
SAP 1.4 R	841	RD 785 - Driver District	Elkhorn	Critical	38.600064	-121.58627	38.600456	-121.584883	38.599713	-121.587668
SBP 11.1 L	162	DWR Sutter Maintenance Yard	Yuba City	Removed	39.024617	-121.726869	39.024835	-121.726929	39.024399	-121.726808
STM_15-5_L	379	RD 003 - Grand Island	Grand Island	Eroding	38.184064	-121.648668	38.183798	-121.649246	38.18418	-121.648055
STM 15.7 R	338	RD 501 -Ryer Island	Ryer Island	Eroding	38.189716	-121.643593	38.190001	-121.64316	38.189311	-121.643917
STM_21-2_R	318	RD 501 -Ryer Island	Ryer Island	Eroding	38.24759	-121.602715	38.247156	-121.602669	38.248025	-121.602761
STM 22.8 R	643	RD 349 - Sutter Island	Sutter Island	Eroding	38.262409	-121.590583	38.26251	-121.589481	38.262533	-121.59169
STM 23.6 R	768	RD 349 - Sutter Island	Sutter Island	Eroding	38.272901	-121.588756	38.273854	-121.588745	38.271998	-121.589424
STM 23.9 R	168	RD 349 - Sutter Island	Sutter Island	Eroding	38.278807	-121.589734	38.279017	-121.589615	38.278597	-121.589854
STM 24.1 R	55	RD 349 - Sutter Island	Sutter Island	Eroding	38.279994	-121.58944	38.280069	-121.589443	38.279919	-121.589438
STM 24.7 R	949	RD 349 - Sutter Island	Sutter Island	Critical	38.28736	-121.583977	38.288727	-121.583823	38.286475	-121.585026
STM 25.0 L	264	RD 003 - Grand Island	Grand Island	Critical	38.293031	-121.582647	38.293386	-121.582554	38.292675	-121.582741
STM 25.5 R	580	RD 349 - Sutter Island	Sutter Island	Eroding	38.298165	-121.581932	38.298897	-121.581571	38.297384	-121.582176
STM 25.8 R	243	RD 349 - Sutter Island	Sutter Island	Critical	38.302094	-121.579944	38.302358	-121.579707	38.301772	-121.580093
STM 26.0 L	312	RD 003 - Grand Island	Grand Island	Critical	38.302762	-121.577784	38.303035	-121.577357	38.302544	-121.578241
STR 24.7 R	2180	RD 999 - Netherlands	Clarksburg	Critical	38.292627	-121.604732	38.295505	-121.605648	38.289634	-121.604343
STR 25.2 R	694	RD 999 - Netherlands	Clarksburg	Eroding	38.299949	-121.602073	38.300542	-121.601118	38.299402	-121.603056
STR 25.7 R	709	RD 999 - Netherlands	Clarksburg	Eroding	38.305948	-121.5991	38.306667	-121.598266	38.305229	-121.599933

Site Name	Site Length (ft)	LMA	Damage Basin	Erosion Status	Midpoint Latitude	Midpoint Longitude	Start Latitude	Start Longitude	End Latitude	End Longitude
STR 26.1 R	253	RD 999 - Netherlands	Clarksburg	Eroding	38.311177	-121.597363	38.311013	-121.597751	38.311342	-121.596976
STR 26.5 L	621	RD 349 - Sutter Island	Sutter Island	Eroding	38.314596	-121.591793	38.315407	-121.591433	38.313836	-121.592259
STR 26.9 R	636	RD 349 - Sutter Island	Sutter Island	Eroding	38.321354	-121.590102	38.3205	-121.589882	38.322216	-121.590101
STR 27.1 R	255	RD 999 - Netherlands	Clarksburg	Removed	38.322766	-121.590472	38.323042	-121.590209	38.322457	-121.590693
STR 27.3 R	1440	RD 999 - Netherlands	Clarksburg	Eroding	38.323868	-121.58739	38.325592	-121.585925	38.323419	-121.589645
STR 28.4 R	307	RD 150 - Merritt Island	Merritt Island	Removed	38.328305	-121.577087	38.328071	-121.576652	38.328599	-121.577483
SYC 9.3 L	98	Maintenance Area 12	Grimes	Eroding	39.158091	-122.02195	39.158226	-122.02195	39.157957	-122.02195
WAC 4.4 L	6776	DWR Sutter Maintenance Yard	Yuba City	Eroding New	39.162135	-121.730578	39.170973	-121.726852	39.153296	-121.734304
WAD 2.1 L	3422	DWR Sutter Maintenance Yard	Yuba City	Eroding	39.137789	-121.746195	39.141757	-121.742939	39.133887	-121.749526
WAD 2.1 R	3376	DWR Sutter Maintenance Yard	Sutter Town	Eroding	39.137906	-121.746483	39.141814	-121.74326	39.134064	-121.749781
WAD 2.4 L	4603	DWR Sutter Maintenance Yard	Yuba City	Eroding	39.147509	-121.738266	39.153095	-121.73439	39.142235	-121.742609
WAD 2.4 R	4617	DWR Sutter Maintenance Yard	Sutter Town	Eroding	39.147532	-121.738478	39.15315	-121.734611	39.142254	-121.742847
WAD 4.3 R	6795	DWR Sutter Maintenance Yard	Sutter Town	Eroding	39.162171	-121.730794	39.171031	-121.72704	39.15332	-121.734573
WPC 0.1 R	31652	RD 784 - Plumas Lake	Arboga	Under Construction	39.014608	-121.541772	38.974837	-121.538075	39.058518	-121.542532
YAS 1.7 L	147	RD 1001 - Nicolaus	Rio Oso	Eroding	38.96969	-121.494578	38.96974	-121.494327	38.96964	-121.494829
YOL 1.2 R	215	RD 2035 - Conaway Tract	Woodland	Eroding	38.659758	-121.668984	38.66005	-121.669028	38.659465	-121.66894
YOL 2.0 R	267	RD 2035 - Conaway Tract	Woodland	Eroding	38.64853	-121.666519	38.648881	-121.666653	38.648178	-121.666385
YOL 2.2 R	202	RD 2098 - Cache-Haas Area	Moore Tract	Eroding New	38.296956	-121.693231	38.297232	-121.6932	38.296678	-121.693223
YOL 2.3 R	1822	RD 2035 - Conaway Tract	Woodland	Eroding	38.643158	-121.663483	38.645319	-121.665089	38.640997	-121.661878
YOL 2.6 R	827	Knights Landing Ridge Drainage District	Knights Landing	Removed	38.724945	-121.663303	38.725505	-121.662041	38.724385	-121.664564
YOL 2.8 R	2502	RD 2035 - Conaway Tract	Woodland	Eroding	38.635757	-121.658056	38.638731	-121.660247	38.632783	-121.655864
YOL_3-5_R	1517	RD 2035 - Conaway Tract	Woodland	Eroding	38.625339	-121.650498	38.623533	-121.649176	38.627145	-121.65182
YOL 4.2 R	1652	RD 2035 - Conaway Tract	Woodland	Eroding	38.620263	-121.646748	38.622224	-121.648201	38.618302	-121.645296

2017 ANNUAL EROSION RECONNAISSANCE

FIELD REPORT

APPENDIX B – EROSION ATLAS

(Separate Document)

SACRAMENTO RIVER BANK PROTECTION PROJECT

SACRAMENTO RIVER AND TRIBUTARIES

September 2018

2017 ANNUAL EROSION RECONNAISSANCE

FIELD REPORT

APPENDIX C – CRITICAL EROSION SITES

SACRAMENTO RIVER BANK PROTECTION PROJECT

SACRAMENTO RIVER AND TRIBUTARIES

September 2018

Memorandum for Record **CESPK-ED-HA**

Sacramento River Bank Protection Project - Critical Sites Memorandum

May 14, 2018

This Memorandum for Record is a summary of the Critical Bank Erosion Sites identified during the Sacramento River Bank Protection Project (SRBPP) 2017 Erosion Inventory field work. The erosion inventory field work is conducted every year to keep track of erosion threatening the levees of the Sacramento Flood Control Project (SRFCP). This memorandum does not discuss all of the erosion sites identified, only those that were deemed critical. A critical erosion site is defined as a site where there is a potential for a levee breach or serious levee issues (an issue which at the minimum would require flood fighting) during the next large storm event. This memorandum is to illustrate the details of the critical sites and the immediate need to repair.

The 2017 Erosion Inventory took place from September 18th to December 1st of 2017. **Figures 1 and 2** show the extent of the levees inspected and label the locations of all the critical erosion sites. Field personnel identified 192 erosion sites. Of these sites, 29 sites were labeled as critical. Three (3) of the critical sites (CHS 1.8L, GEO 11.4L, and SAP 1.4R) are also new sites added to the erosion inventory this year (2017). **Table 1** summarizes the number of critical sites and the linear feet per waterway.

Table 1. Summary of Critical Sites by Waterway

Waterway	Number of Critical Sites	Linear Feet of Critical Sites
Cache Creek (CHC)	1	218 ft
Cache Slough (CHS)	1	21,498 ft
Feather River (FHR)	2	2,152 ft
Georgiana Slough (GEO)	4	11,738 ft
Haas Slough (HAS)	1	1,595 ft
Lindsey Slough (LDS)	1	280 ft
Sacramento River (SAC)	13	12,020 ft
Sacramento Bypass (SAP)	1	841 ft
Steamboat Slough (STM)	4	1,768 ft
Sutter Slough (STR)	1	2,180 ft
Total	**29**	**54,292 ft**

Table 2 summarizes all of the critical erosion sites. Of these sites, 9 have been critical for multiple years and 20 have been added or upgraded to critical in the past year (2017). In 2015, there was 11,838 linear ft of critical erosion and following the 2017 inventory, there was a substantial increase to 54,292 linear ft of critical erosion. This increase is likely due to the channels experiencing the largest flows in the winter of 2017 since the 1997 flood season, one of the largest storm event since the construction of the upstream dams.

Additionally, in Table 2, sites highlighted green are in economically feasible basins and those highlighted red are in non-economically justified basins. These economically justified basins are based on site conditions prior to the 2017 flood event. During the 2017 flood event, conditions may have changed and the economics was not updated or re-evaluated to reflect this change. Basins not highlighted have not been analyzed for economic justification. The USACE Economics section has divided the areas

surrounding the levees into economic impact areas, meaning basins where economic damages would be expected if a levee breach occurred. While the economic basins do not determine whether a site is critical, it may be used for the benefit cost ratio and that is why this piece of information is being included.

Table 2. Summary of Critical Erosion Sites

Site ID	Site Name	Year Added to Inventory	Year Upgraded to Critical	Economic Impact Area	Site Length (linear ft)
CHC 2.4 L	Cache Creek LM 2.4 L	2002	2002	Yolo	218
CHS 1.8 L	Cache Slough LM 1.8 L	2017	2017	Peters Pocket	21499
FHR 5.0 L	Feather River RM 5.0 L	2000	2017	Rio Oso	1666
FHR 6.0 L	Feather River RM 6.0 L	2011	2017	Rio Oso	487
GEO 4.5L	Georgiana Slough RM 4.5 L	1997	2011	Tyler Island	1396
GEO 6.3 L	Georgiana Slough RM 6.3 L	1997	2017	Tyler Island	4700
GEO 9.3 L	Georgiana Slough RM 9.3 L	1997	2017	Tyler Island	4304
GEO 11.4 L	Georgiana Slough RM 11.4 L	2017	2017	Tyler Island	1338
HAS 9.7 L	Haas Slough LM 9.7 L	2011	2017	Moore Tract	1595
LDS 0.7 R	Lindsey Slough RM 0.7 R	2011	2017	Lindsey	280
SAC 7.3 L	Sacramento River RM 7.3 L	2011	2011	Sherman Island	619
SAC 7.9 L	Sacramento River RM 7.9 L	2011	2012	Sherman Island	1276
SAC 8.0 L	Sacramento River RM 8.0 L	1999	2012	Sherman Island	1200
SAC 11.2 L	Sacramento River RM 11.2 L	2008	2012	Brannan Andrus Island	1971
SAC 12.1 L	Sacramento River RM 12.1 L	2010	2015	Brannan Andrus Island	1165
SAC 13.6 L	Sacramento River RM 13.6 L	2011	2017	Brannan Andrus Island	303
SAC 18.1 L	Sacramento River RM 18.1 L	2009	2017	Brannan Andrus Island	267
SAC 33.9 R	Sacramento River RM 33.9 R	2015	2017	Sutter Island	457
SAC 38.5 R	Sacramento River RM 38.5 R	1997	2017	Merritt Island	364
SAC 41.9 R	Sacramento River RM 41.9 R	1997	2017	Clarksburg	1360
SAC 52.4 L	Sacramento River RM 52.4 L**	2010	2017	Sacramento	260
SAC 55.7 R	Sacramento River RM 55.7 R*	2008	2017	Southport	1150
SAC 172.0 L	Sacramento River RM 172.0 L	2007	2017	Butte Basin	1628
SAP 1.4 R	Sacramento Bypass LM 1.4 R**	2017	2017	Elkhorn	841
STM 24.7 R	Steamboat Slough RM 24.7 R	1997	2011	Sutter Island	949
STM 25.0 L	Steamboat Slough RM 25.0 L	1997	2017	Grand Island	264
STM 25.8 R	Steamboat Slough RM 25.8 R	2007	2017	Sutter Island	243
STM 26.0 L	Steamboat Slough RM 26.0 L	1997	2017	Grand Island	312
STR 24.7 R	Sutter Slough RM 24.7 R	1997	2013	Clarksburg	2180

Notes:

* This site will be fixed by the Southport Setback Levee, already under construction.
**This site is expected to be repaired by the WRDA 2016 project.

Economically Justified Basin

Non-Economically Justified Basin

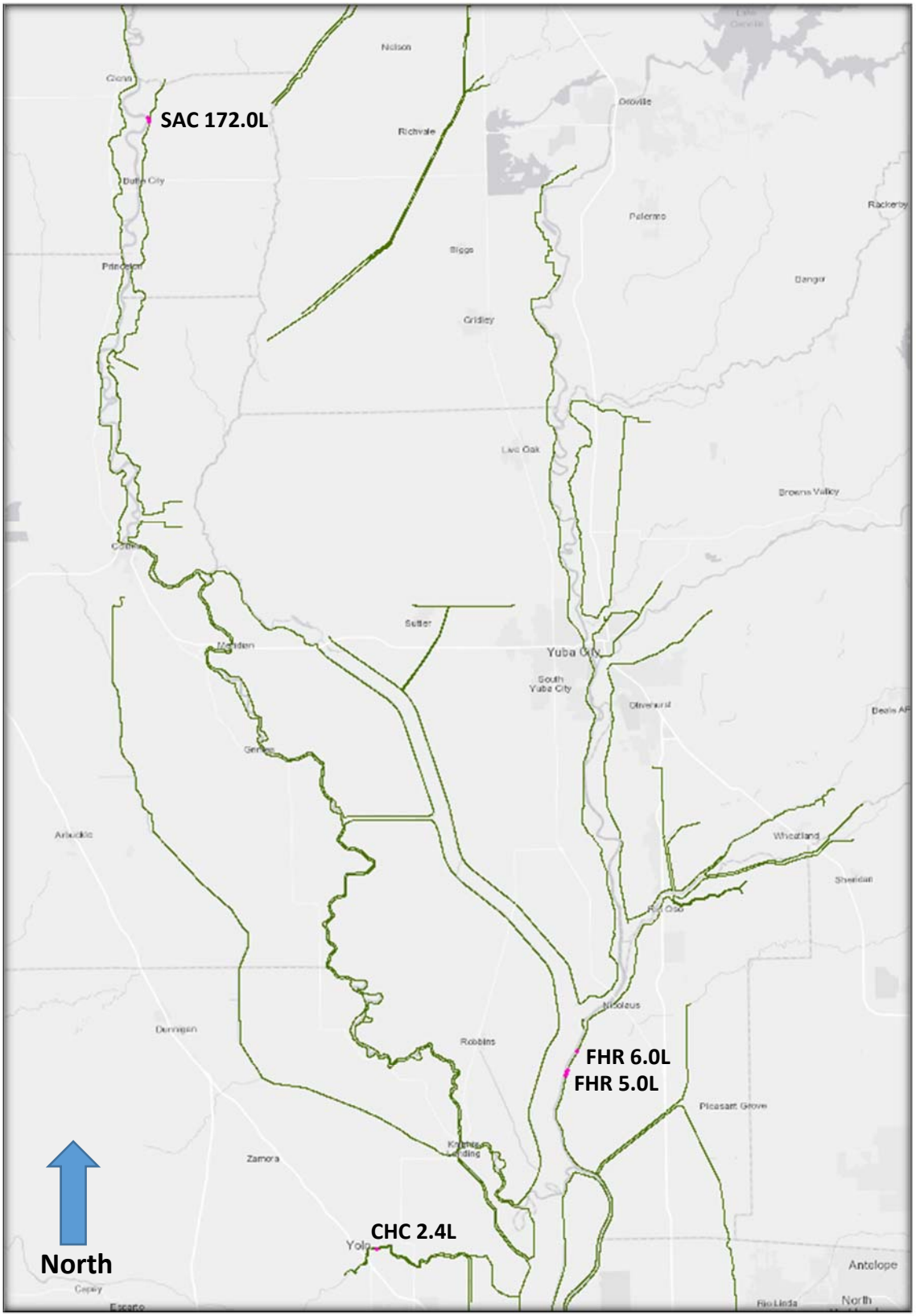

Figure 1- Critical Erosion Sites – Northern Section

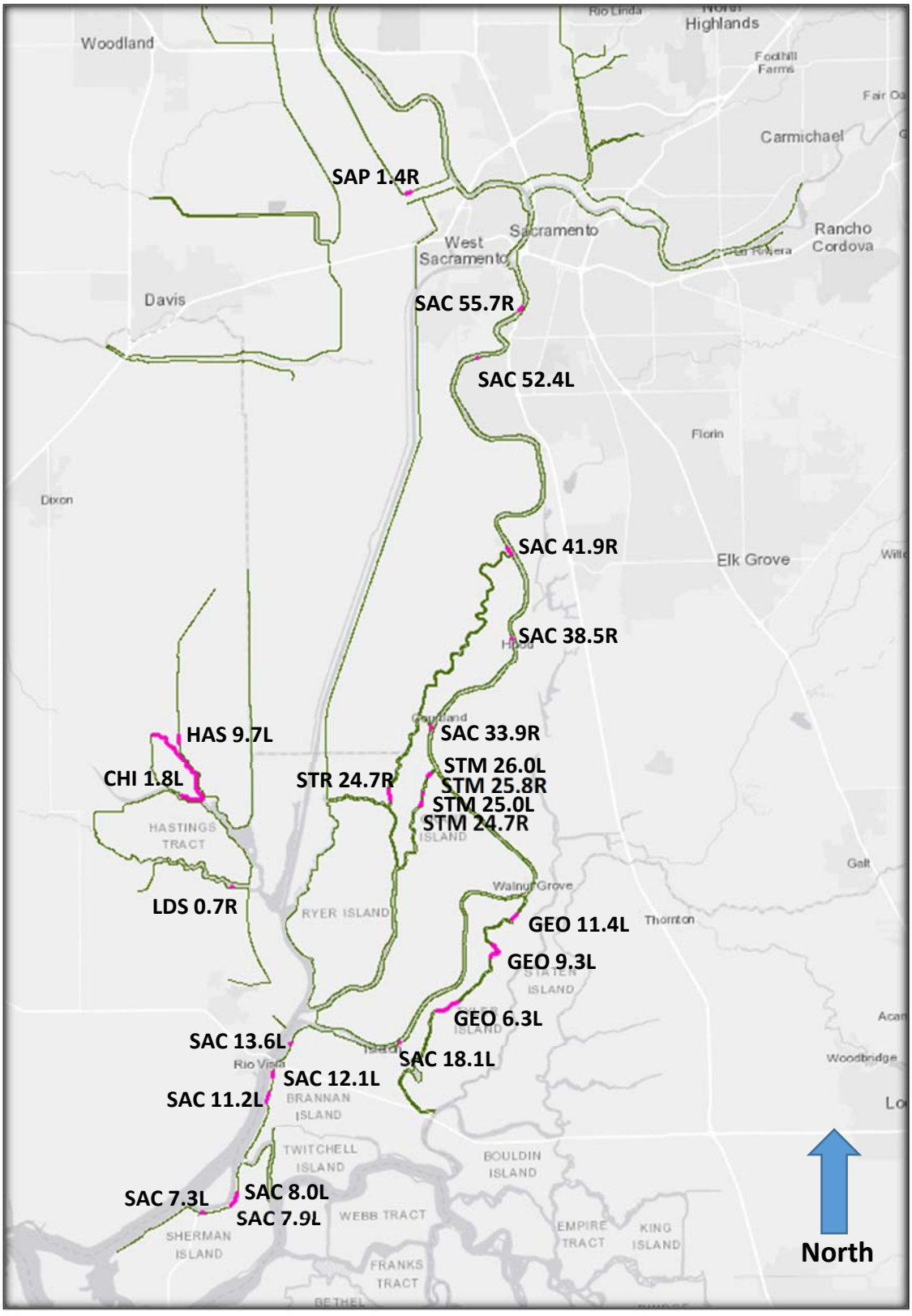

Figure 2- Critical Erosion Sites – Southern Section

Below is a detailed summary of each critical erosion site.

Cache Creek LM 2.4 Left Bank (CHC 2.4L)

This critical erosion site is located along the left bank of Cache Creek at levee mile 2.4. CHC 2.4L is located in Yolo County, near the town of Yolo, and just north of Woodland. The Levee Maintaining Agency is the CA Department of Water Resources (DWR) – Sacramento Maintenance Yard. It is located in the Yolo Economic Impact Area. The site was added to the erosion inventory in 2002 and immediately designated as critical in 2002. A portion of this site was repaired in 2007 by DWR under the SRBPP authority, however the repair did not go far enough downstream due to logistic issues. The site is 218 ft long and has about 15 ft of berm between the natural bank and the levee toe.

The main cause of erosion along CHC 2.4L is fluvial action of the river; a combination of high velocities, over-steepened slopes, and poor soils have led to significant erosion. Additional issues at this site are vertical banks, animal holes, cracks, and slumping[1]. Fresh erosion was observed in 2013 and 2017. Seepage is a known issue along this levee reach.

Due to how narrow the channel width is and how deep the channel is, a setback levee is the only type of repair that is likely acceptable at this site. However, adjacent to this levee (on the landside) is a house (with multiple smaller structures) which will require real estate acquisition for any repair work, DWR is currently working to find a long term solution. Photos depicting this site are shown in **Figures 3 and 4**.

Figure 3. Looking Downstream along Cache Creek LM 2.4L

[1] Slumping is a form of mass wasting that occurs when the soil moves a short distance down the slope.

Figure 4. View of Cache Creek LM 2.4L from Opposite Bank

Cache Slough LM 1.8 Left Bank (CHI 1.8L)

This critical site is located along the left bank of Cache Slough and the right bank of Haas Slough, surrounding the area known as Peters Pocket. CHI 1.8L is located in Solano County, east of Travis Air Force Base, and north of Rio Vista. The Levee Maintaining Agency is RD 2104 Peters Pocket Tract. It is located in the Peters Pocket Economic Impact Area. The site was added to the erosion inventory in 2017 and immediately designated as critical in 2017. The site is 21,499 ft long (or 4 miles) and has no berm between the natural bank and the levee toe.

The main cause of concern along CHI 1.8L is slump cracking; the entire levee is at risk of eminent slump failure from deep cracks that run almost the length of the levee on both the waterside and landside. While the site does not currently have active erosion, the potential for slump is very high and eminent, which will result in an erosion issue. This site will need an erosion repair if immediate action is not taken to repair the slump cracks. An additional issue at this site are large trees on the levee slope. Seepage is a known issue along this levee reach.

Due to the poor soils and deep cracks, this levee would not benefit from the traditional SRBPP rock repair. It would require either a reconstruction of the levee or a policy decision to decommission the levee. Photos depicting this site are shown in **Figures 5 and 6**.

Figure 5. Slump Crack showing width of the crack (with boot for scale) at Cache Slough, RM 1.8L.

Figure 6. Slump Cracks observed on both the landside and waterside of Peters Pocket at Cache Slough, RM 1.8L.

Feather River RM 5.0 Left Bank (FHR 5.0L)

This critical erosion site is located along the left bank of the Feather River at river mile 5.0. FHR 5.0L is located in Sutter County, near the town of Nicolaus, and north of Sacramento. The Levee Maintaining Agency is RD 1001, Nicolaus. It is located in the Rio Oso Economic Impact Area. The site was added to the erosion inventory in 2000 and upgraded to critical in 2017. The site is 1,666 ft long and has about 15 ft of berm between the natural bank and the levee toe.

The main cause of erosion along FHR 5.0L is from the fluvial action of the river and whole bank failure[2]; a combination of over-steepened slopes along with non-cohesive soils have led to significant erosion. Additional issues at this site are vertical banks, trees with exposed roots that are leaning over, animal holes, and slumping. Significant new erosion was observed following the 2017 flood season and the site has a history of tree pop-outs[3]. Seepage is a known issue along this levee reach. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. Photo depicting this site is shown in **Figure 7**.

Figure 7. Erosion Site at Feather River, RM 5.0 Left Bank.

Feather River RM 6.0 Left Bank (FHR 6.0L)

This critical erosion site is located along the left bank of the Feather River at river mile 6.0. FHR 6.0L is located in Sutter County, near the town of Nicolaus, and north of Sacramento. The Levee Maintaining Agency is RD 1001, Nicolaus. It is located in the Rio Oso Economic Impact Area. The site was added to

[2] Whole bank failure is defined as oversteepening of the bank slopes (due to a combination of hydraulic forces and geotechnically unstable bank) and subsequent slip plane failures and mass wasting which leaves a visible eroded slope face.

[3] A tree pop-out is when the tree can no longer be supported in the bank slope and the weight causes it to overturn into the river, leaving an alcove shaped cavity in the bank.

the erosion inventory in 2011 and upgraded to critical in 2017. The site is 487 ft long and has about 10 ft of berm between the natural bank and the levee toe.

The main cause of erosion along FHR 6.0L is from the fluvial action of the river and whole bank failure; a combination of over-steepened slopes along with non-cohesive soils have led to significant erosion. The entire bank slope is slumping. Additional issues at this site are bank slopes at less than 1:1, trees with exposed roots that are leaning over, animal holes, and slumping. Significant new erosion was observed from the 2017 flood season. Seepage is a known issue along this levee reach. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. Photo depicting this site is shown in **Figure 8**.

Figure 8. Erosion Site along the Feather River at RM 6.0, Left Bank.

Georgiana Slough RM 4.5 Left Bank (GEO 4.5L)

This critical erosion site is located along the left bank of Georgiana Slough at river mile 4.5. GEO 4.5L is located in Sacramento County, near the town of Walnut Grove. The Levee Maintaining Agency is RD 563, Tyler Island. It is located in the Tyler Island Economic Impact Area. The site was added to the erosion inventory in 1997 and upgraded to critical in 2011. The site is 1,396ft long (0.3 miles) and has no berm between the natural bank and the levee toe.

The main cause of erosion along GEO 6.3L is from whole bank failure and wave wash; a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to failure of the entire bank slope. Additional issues at this site are tall vertical sections, animal holes, slumping, and large trees with exposed roots. Fresh erosion was observed following the 2017 flood season. The vertical sections typically extend from the mid-slope to the toe, however in some sections there is a vertical face from the levee hinge to the toe. Seepage is a known issue along this levee reach. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. There are encroachments throughout this site, including a bridge, pipes and a telephone crossing. A Photo depicting this site is shown in **Figure 9**.

Figure 9. Erosion Pocket along the Georgiana Slough RM 4.5, Left Bank.

Georgiana Slough RM 6.3 Left Bank (GEO 6.3L)

This critical erosion site is located along the left bank of Georgiana Slough at river mile 6.3. GEO 6.3L is located in Sacramento County, near the town of Walnut Grove. The Levee Maintaining Agency is RD 563, Tyler Island. It is located in the Tyler Island Economic Impact Area. The site was added to the erosion inventory in 1997 and upgraded to critical in 2017. The site is 4,700 ft long (0.9 miles) and has no berm between the natural bank and the levee toe.

The main cause of erosion along GEO 6.3L is from wave wash and erosion pockets[4]; a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to significant toe erosion and pockets of failed bank slope. Additional issues at this site are tall vertical sections, animal holes, and slumping. Fresh erosion was observed following the 2017 flood season, along with evidence of beaver activity. The vertical sections typically extend from the mid-slope to the toe, however in some sections there is a vertical face from the levee hinge to the toe. Seepage is a known issue along this levee reach. Although the locals have been placing rock in many of the erosion pockets, the site continues to deteriorate. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. There are encroachments throughout this site, including pipes and a PG&E crossing. Photos depicting this site are shown in **Figures 10 and 11**.

Figure 10. Toe Erosion along the Georgiana Slough RM 6.3, Left Bank.

[4] This term refers to alcove section of eroded bank.

Figure 11. Erosion Pocket showing whole bank failure along the Georgiana Slough RM 6.3, Left Bank.

Georgiana Slough RM 9.3 Left Bank (GEO 9.3L)

This critical erosion site is located along the left bank of Georgiana Slough at river mile 9.3. GEO 9.3L is located in Sacramento County, near the town of Walnut Grove. The Levee Maintaining Agency is RD 563, Tyler Island. It is located in the Tyler Island Economic Impact Area. The site was added to the erosion inventory in 1997 and upgraded to critical in 2017. The site is 4,305 ft long (0.8 miles) and has no berm between the natural bank and the levee toe.

The main causes of erosion along GEO 11.4 are wave wash and toe scour; a combination of wind waves, boat wakes, and being in the tidal zone along have led to significant toe erosion and failed bank revetment. Additional issues at this site include short sections of vertical bank, animal holes, tree pop-outs, and slumping. This site increased in length by more than 3,000 ft since the last inspection (2015) due to new erosion from the 2017 flood season. The bank has some sub-vertical sections, areas of failed revetment, and eminent tree pop-outs are expected. Seepage is a known issue along this levee reach. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. There are encroachments along this site, including a pump. A photo depicting this site are shown in **Figures 12 and 13**.

Figure 12. Typical toe erosion along the left bank of Georgiana Slough at river mile 9.3

Figure 13. Photo depicting failing revetment and eminent tree pop-out at Georgiana Slough, RM 9.3L.

Georgiana Slough RM 11.4 Left Bank (GEO 11.4L)

This critical erosion site is located along the left bank of Georgiana Slough at river mile 11.4. GEO 11.4L is located in Sacramento County, near the town of Walnut Grove. The Levee Maintaining Agency is RD 563, Tyler Island. It is located in the Tyler Island Economic Impact Area. The site was added to the erosion inventory in 2017 and immediately classified as critical in 2017. The site is 1,338 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along GEO 11.4 is toe scour and whole bank failure; a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to significant toe erosion and failed bank slope. Additional issues at this site are vertical bank slopes, animal holes, trees with exposed roots, and slumping. The new erosion at this site occurred from the 2017 flood season. The bank has a sub-vertical face from the levee hinge to the toe. Seepage is a known issue along this levee reach. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 14**.

Figure 14. Erosion along the left bank of Georgiana Slough at RM 11.4.

Haas Slough LM 9.7 Left Bank (HAS 9.7L)

This critical erosion site is located along the left bank of Haas Slough at levee mile 9.7. HAS 9.7L is located in Solano County, north of Rio Vista and east of Travis Air Force Base. The Levee Maintaining Agency is RD 2098, Cache-Haas Area. It is located in the Moore Tract Economic Impact Area. The site

was added to the erosion inventory in 2011 and upgraded to critical in 2017. The site is 1,595 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along LDS 0.7R is wave wash and erosion pockets; a combination of wind waves, and being in the tidal zone along have led to significant pockets of eroded bank. Additional issues at this site are over steepened slopes, excessive loading from cattle, short vertical sections of bank, eddy[5] currents, and shallow cracks. Seepage is a known issue along this levee reach. Some concrete rubble in poor condition is located in sections along this site. A vegetation variance or vegetation removal does not appear to be required at this site. Photos depicting this site are shown in **Figures 15 and 16**.

Figure 15. Erosion Pockets along the Left Bank of Haas Slough at LM 9.7.

[5] An eddy is a swirling of water in the reverse current to the river's flow direction and could potentially cause bank erosion.

Figure 16. Slumps at Haas Slough LM 9.7 L.

Lindsey Slough RM 0.7 Right Bank (LDS 0.7R)

This critical erosion site is located along the right bank of Lindsey Slough at river mile 0.7. LDS 0.7R is located in Solano County, north of Rio Vista and east of Travis Air Force Base. The Levee Maintaining Agency is RD 536, Egbert Tract. It is located in the Lindsey Economic Impact Area. The site was added to the erosion inventory in 2011 and upgraded to critical in 2017. The site is 280 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along LDS 0.7R is wave wash and erosion pockets; a combination of wind waves, and being in the tidal zone along have led to significant pockets of eroded bank. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 17**.

Figure 17. Erosion Pocket along the right bank of Lindsey Slough at river mile 0.7.

Sacramento River, RM 7.3 Left Bank (SAC 7.3L)

This critical erosion site is located along the left bank of the Sacramento River at river mile 7.3. SAC 7.3L is located in Sacramento County, south of Isleton, and north of Antioch. The Levee Maintaining Agency is RD 341, Sherman Island. It is located in the Sherman Island Economic Impact Area. The site was added to the erosion inventory in 2011 and immediately classified as critical in 2011. The site is 619 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 7.3L is surface runoff and whole bank failure; a combination of surface runoff, bank slumping of poor soils along with wind waves, and being in the tidal zone have led to significant slumping, the formation of a gully[6], and failed bank slope. Additional issues at this site are short vertical[7] sections of eroding bank, animal holes, shallow cracks, eddy formations, and slumping. Seepage is a known issue along this levee reach. Some concrete rubble in poor condition is located in sections along this site. There are encroachments at this site, including pipes fish release system, pilings,

[6] A gully is a landform created by running water, eroding sharply into the soil of the levee slope.
[7] Vertical sections are considered short if they are less than half the bank height and tall if they are greater than half the bank height.

conduit, netting, and power poles. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. Photos depicting this site are shown in **Figures 18 and 19**.

Figure 18. Surface Runoff Issue on the left bank of the Sacramento River at RM 7.3.

Figure 19. Encroachments and Slumping along the left bank of the Sacramento River at RM 7.3.

Sacramento River, RM 7.9 Left Bank (SAC 7.9L)

This critical erosion site is located along the left bank of the Sacramento River at river mile 7.9. SAC 7.9L is located in Sacramento County, south of Rio Vista. The Levee Maintaining Agency is RD 341, Sherman Island. It is located in the Sherman Island Economic Impact Area. The site was added to the erosion

inventory in 2011 and upgraded to critical in 2012. The site is 1,276 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 7.9L is wave wash and whole bank failure; a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to significant toe erosion and pockets of failed bank slope. Some surface runoff from the Highway is also causing erosion along the bank and road base is now exposed. This site was extended by 800 ft due to new erosion from the 2017 flood event. Trees with exposed roots along the levee slope are a significant issue, one tree popped out during or following the 2017 flood season, and more trees are likely to go in the future. Additional issues at this site are tall vertical sections of eroding bank, deep cracks, animal holes, and slumping. Seepage is a known issue along this levee reach. Some concrete rubble in poor condition is located in sections along this site. A vegetation variance or removal of vegetation encroachments may be required at this site. Photos depicting this site are shown in **Figures 20 and 21**.

Figure 20. Erosion from Surface Runoff along the left bank of the Sacramento River at RM 7.9.

Figure 21 – Eroded levee slope and trees with exposed roots along the left bank of the Sacramento River at RM 7.9.

Sacramento River, RM 8.0 Left Bank (SAC 8.0L)

This critical erosion site is located along the left bank of the Sacramento River at river mile 8.0. SAC 8.0L is located in Sacramento County, south of Rio Vista. The Levee Maintaining Agency is RD 341, Sherman Island. It is located in the Sherman Island Economic Impact Area. The site was added to the erosion inventory in 1999 and upgraded to critical in 2012. The site is 758 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 8.0L is wave wash and whole bank failure; a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to significant toe erosion and pockets of failed bank slope. Some surface runoff from the Highway is also causing erosion along the bank. This site was extended by 400 ft due to new erosion from the 2017 flood event. Additional issues at this site are tall vertical sections of eroding bank, shallow cracks, eddy formations, and slumping. Seepage is a known issue along this levee reach. Some concrete rubble in poor condition is located in sections along this site. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. Photos depicting this site are shown in **Figures 22 and 23**.

Figure 22. Bank erosion along the left levee slop of the Sacramento River at RM 8.0.

Figure 23. Erosion from surface runoff along the left bank of the Sacramento River at RM 8.0.

Sacramento River, RM 11.2 Left Bank (SAC 11.2L)

This critical erosion site is located along the left bank of the Sacramento River at river mile 11.2. SAC 11.2L is located in Sacramento County, south of Isleton, and east of Rio Vista. The Levee Maintaining Agency is the Brannan-Andrus Levee Maintaining District. It is located in the Brannan Andrus Island Economic Impact Area. The site was added to the erosion inventory in 2008 and upgraded to critical in 2012. The site is 1,971 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 11.2L is wave wash and whole bank failure; a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to significant toe erosion and pockets of failed bank slope. The eroded levee slope has scoured out a section under the Highway 160 road base material. This site was extended by 700 ft due to new erosion from the 2017 flood event. Additional issues at this site are large trees with exposed roots, tall vertical sections of eroding bank, animal holes, deep cracks, eddy formations, and slumping. Seepage is a known issue along this levee reach. Some quarry stone in fair condition is located in sections along this site. There are encroachments at this site, including a pipe through the levee. A vegetation variance or removal of vegetation encroachments may be required at this site. Photos depicting this site are shown in **Figures 24 and 25**.

Figure 24 – Section of levee that has eroded under the highway along the left bank of the Sacramento River at RM 11.2.

Figure 25. Eroded bank and large trees with exposed roots along the left levee slope of the Sacramento River at RM 11.2.

Sacramento River, RM 12.1 Left Bank (SAC 12.1L)

This critical erosion site is located along the left bank of the Sacramento River at river mile 12.1. SAC 12.1L is located in Sacramento County, south of Isleton, and east of Rio Vista. The Levee Maintaining Agency is the Brannan-Andrus Levee Maintaining District. It is located in the Brannan Andrus Island Economic Impact Area. The site was added to the erosion inventory in 2010 and upgraded to critical in 2015. The site is 1,165 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 12.1L is whole bank failure; a combination of wind waves, cargo boat wakes, and being in the tidal zone along with poor soils have led to significant erosion and failure of the entire bank slope. Additional issues at this site are large trees with exposed roots, tall vertical sections of eroding bank, animal holes, shallow cracks, eddy formations, and slumping. Seepage is a known issue along this levee reach. Some concrete rubble in poor condition is located in sections along this site. There are encroachments at this site, including a pipe through the levee, gas line, ramp, dock, boat launch, and utility poles. A vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figures 26**.

Figure 26. Eroded bank with large trees in the slope along the left bank of the Sacramento River at RM 12.1.

Sacramento River, RM 13.6 Left Bank (SAC 13.6L)

This critical erosion site is located along the left bank of the Sacramento River at river mile 13.6. SAC 13.6L is located in Sacramento County, south of Isleton, and east of Rio Vista. The Levee Maintaining Agency is the Brannan-Andrus Levee Maintaining District. It is located in the Brannan Andrus Island Economic Impact Area. The site was added to the erosion inventory in 2011 and upgraded to critical in 2017. The site is 303 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 13.6L is whole bank failure; a combination of wind waves, cargo boat wakes, and being in the tidal zone along with poor soils have led to significant erosion and failure of the entire bank slope. There is a nearly vertical face of eroding slope from the levee hinge to the water line. Trees with exposed roots along the levee slope are a significant issue, with tree pop-outs expected in the coming years. Additional issues at this site are animal holes, shallow cracks, and eddy formations. There are encroachments at this site, including a marina at the upstream end. A vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figures 27**.

Figure 27. Whole bank failure and large trees with exposed roots along the left bank of the Sacramento River at RM 13.6.

Sacramento River, RM 18.1 Left Bank (SAC 18.1L)

This critical erosion site is located along the left bank of the Sacramento River at river mile 18.1. SAC 18.1L is located in Sacramento County, just north of Isleton. The Levee Maintaining Agency is the Brannan-Andrus Levee Maintaining District. It is located in the Brannan Andrus Island Economic Impact Area. The site was added to the erosion inventory in 2009 and upgraded to critical in 2017. The site is 267 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 7.3L is wave wash and fluvial action of the river; a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to significant bank erosion. The eroded levee slope has scoured behind a large tree, leaving a vertical face on the levee and exposed roots of the tree, with a potential tree pop-out eminent. Additional issues at this site are eddy formations, and slumping. Quarry stone in fair condition is located along the toe of this site and minimally helping with wave wash. A vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 28**.

Figure 28. Eroded bank slope along the left bank of the Sacramento River at RM 18.1.

Sacramento River, RM 33.9 Right Bank (SAC 33.9R)

This critical erosion site is located along the right bank of the Sacramento River at river mile 33.9. SAC 33.9R is located in Sacramento County, south of Courtland. The Levee Maintaining Agency is RD 349, Sutter Island. It is located in the Sutter Island Economic Impact Area. The site was added to the erosion inventory in 2015 and upgraded to critical in 2017. The site is 457 ft long and has 10 ft of berm between the natural bank and the levee toe.

The main cause of erosion along SAC 33.9R is toe scour and wave wash; a combination of boat wakes and wind waves, along with poor soils have led to significant toe erosion. Significant scour has undermined a tree on the levee slope, there is nothing structurally underneath the majority of the root structure (with the exception of a chair and ice chest) and a tree pop-out seems eminent. The 2017 flood season has resulted in new erosion along this site. Additional issues at this site are short vertical sections of eroded bank, eddy formations, and slumping. Some concrete rubble in poor condition is located in sections along this site. A vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 29**.

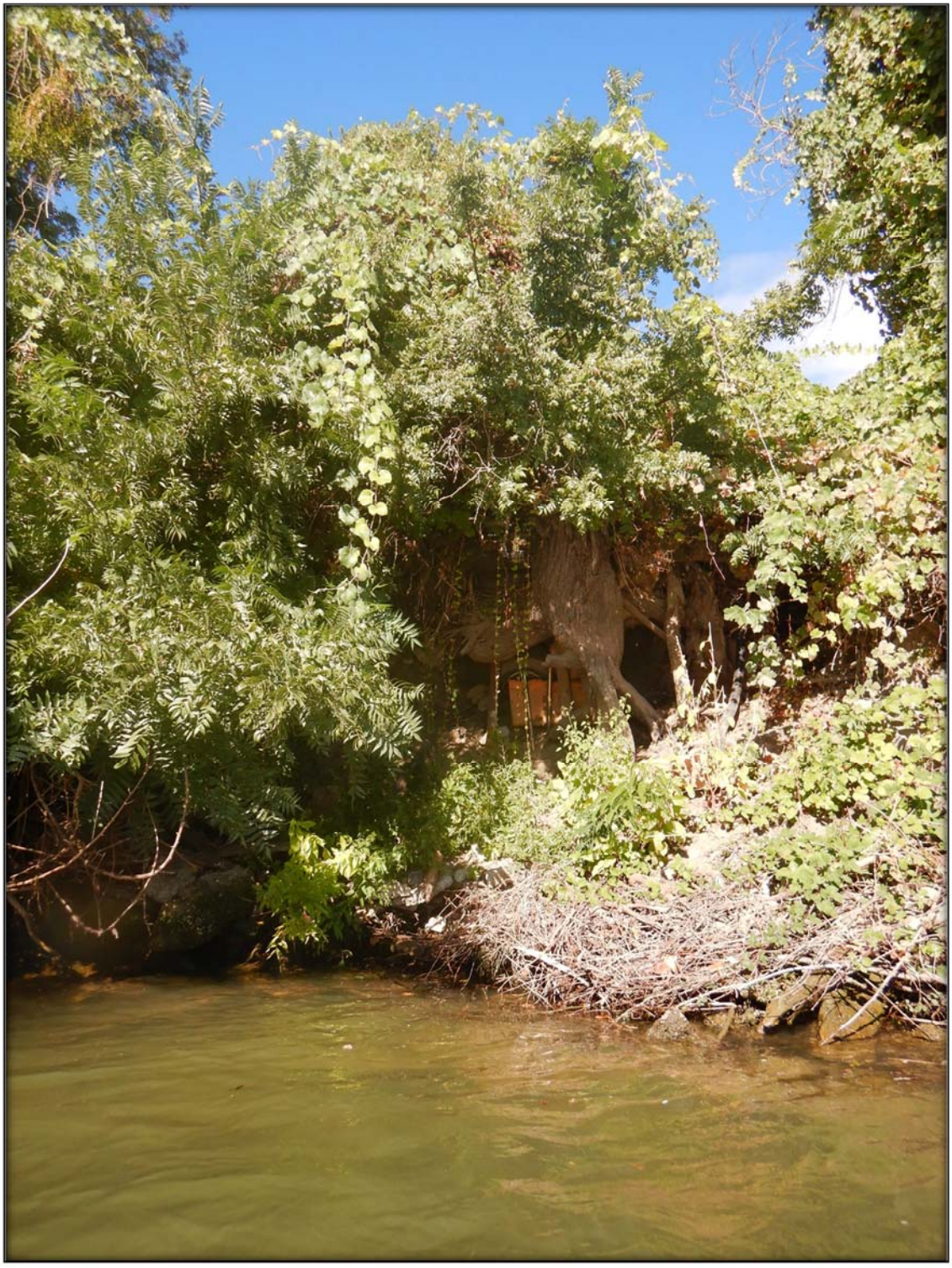

Figure 29. Scour underneath tree roots along the right bank of the Sacramento River at RM 33.9.

Sacramento River, RM 38.5 Right Bank (SAC 38.5R)

This critical erosion site is located along the right bank of the Sacramento River at river mile 38.5. SAC 38.5R is located in Yolo County, south of Clarksburg, and west of Hood. The Levee Maintaining Agency is RD 150, Merritt Island. It is located in the Merritt Island Economic Impact Area. The site was added to the erosion inventory in 1997 and upgraded to critical in 2017. The site is 364 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 38.5R is the fluvial action of the river and whole bank failure; a combination of high velocities, over-steepened slopes, and poor soils have led to significant erosion. Significant scour has undermined a tree on the levee slope, there is nothing structurally underneath the majority of the root structure and a tree pop-out seems eminent. Additional issues at this site are short vertical sections of eroded bank, animal holes, shallow cracks, boat wakes, eddy formations, and slumping. Some quarry stone in fair condition is located in sections along this site. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 30**.

Figure 30. Scoured section of levee that has undermined a tree along the right bank of the Sacramento River at RM 38.5.

Sacramento River, RM 41.9 Right Bank (SAC 41.9R)

This critical erosion site is located along the right bank of the Sacramento River at river mile 41.9. SAC 41.9R is located in Yolo County, at the town of Clarksburg, and south of West Sacramento. The Levee Maintaining Agency is RD 999, Netherlands. It is located in the Clarksburg Economic Impact Area. The site was added to the erosion inventory in 1997 and upgraded to critical in 2017. The site is 1,360 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 38.5R is toe scour and whole bank failure; a combination of high velocities, over-steepened slopes, and boat wakes have led to significant erosion of the toe. Additional issues at this site are tall vertical sections of eroded bank, large trees with exposed roots that are leaning over, animal holes, eddy formations, and slumping. When the site was first added, there was some failed cobbles, and only a minimal amount of revetment remains today. Brush boxes were attempted at this site to slow the effects of wave wash, but they were not maintained so they did not help reduce toe scour. The 2017 flood season resulted in fresh erosion throughout the site. The erosion under the tree roots is especially concerning as the lack of structure underneath the large trees will likely cause tree pop-outs and leave a large hole in the bank. There are encroachments at this site, including a gas pipeline and power poles. A vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 31**.

Figure 31. Toe scour and erosion of the levee slope along the right bank of the Sacramento River at RM 41.9. Empty brush boxes and leaning trees are also seen.

Sacramento River, RM 52.4 Left Bank (SAC 52.4L)

This critical erosion site is located along the left bank of the Sacramento River at river mile 52.4. SAC 52.4R is located in Sacramento County, adjacent to the Pocket Area of the City of Sacramento. The Levee Maintaining Agency is Maintenance Area 9, part of DWR Sacramento Maintenance Yard. It is located in the Sacramento Economic Impact Area. The site was added to the erosion inventory in 2010 and upgraded to critical in 2017. The site is 260 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 52.4R is tree pop-outs and toe scour; a combination of high velocities and over-steepened slopes have resulted in a tree popping out of the levee slope, leaving a large hole and this has led to erosion of the toe. A second tree with scoured roots is expected to pop-out soon, taking a large chunk of the levee with it. Additional issues at this site are short vertical sections of eroded bank, animal holes, boat wakes, eddy formations, and slumping. There is some concrete rubble in fair condition along the slope. A vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 32**.

This site is in the WRDA 2016 repair area and they are planning to repair the banks in this vicinity. Once the WRDA 2016 repairs are complete, we expect to remove the site from the erosion inventory.

Figure 32. Scoured out tree roots along the left bank of the Sacramento River at RM 52.4.

Sacramento River, RM 55.7 Right Bank (SAC 55.7R)

This critical erosion site is located along the right bank of the Sacramento River at river mile 55.7. SAC 55.7R is located in Yolo County, adjacent to the City of West Sacramento. The Levee Maintaining Agency is RD 900, West Sacramento. It is located in the Southport Economic Impact Area. The site was added to the erosion inventory in 2008 and upgraded to critical in 2017. The site is 1,150 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along SAC 38.5R is the fluvial action of the river and whole bank failure; a combination of high velocities, over-steepened slopes, boat wakes, and poor soils have led to significant erosion of the toe. Additional issues at this site are tall vertical sections of eroded bank, large trees with exposed roots that are leaning over, animal holes, eddy formations, and slumping. The 2017 flood season resulted in fresh erosion throughout the site. There are encroachments at this site, including a boat dock, pipes, power poles, and dolphins. Seepage is a known issue along this levee reach. There is quarry stone in good condition along the slope, however the revetment is not enough to help all the issues at this site. A vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 33**.

Although this site is critical, with significant levee failure issues, and adjacent to a large metropolitan area, no fix is recommended for this site under the SRBPP. There is currently a setback levee being constructed in the vicinity that will address this site and once it is completed, we expect to remove the site from the inventory.

Figure 33. Eroded and over-steepened slope of the right bank of the Sacramento River at RM 55.7.

Sacramento River, RM 172.0 Left Bank (SAC 172.0L)

This critical erosion site is located along the left bank of the Sacramento River at river mile 172.0. SAC 172.0L is located in Glenn County, north of Butte City. The Levee Maintaining Agency is Levee District 3, Glenn County, with assistance from the CA DWR Sutter Maintenance Yard. It is located in the Butte Basin Economic Impact Area. The site was added to the erosion inventory in 2007 and upgraded to critical in 2017. The site is 1,628 ft long and has about 20 ft of berm between the natural bank and the levee toe.

The main cause of erosion along SAC 172.0L is the fluvial action of the river and whole bank failure related to growth of a meander bend. Bank retreat at this site has been quick, with the channel migrating over 500 ft east in the last 20 years, and greater than 100 ft of bank erosion towards the levee (at the most critical point) since its inclusion in the erosion inventory. Although this site still has some berm between the natural bank and the levee toe, the erosion is entering the levee prism. The rate of erosion is of concern and a large storm event has the potential to cause significantly more bank erosion, possibly breaching the levee toe.

Additional issues at this site are vertical banks, animal holes, and slumping. Although further analysis is needed, it is likely that a vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 34**.

Figure 34. Bank Erosion into the levee prism along the left bank of the Sacramento River at RM 172.0.

Sacramento Bypass LM 1.4 Right Bank (SAP 1.4R)

This critical erosion site is located along the right bank of the Sacramento Bypass. SAP 1.4R is located in Yolo County, north of the City of West Sacramento. The Levee Maintaining Agency is RD 785, Driver District. It is located in the Elkhorn Economic Impact Area. The site was added to the erosion inventory in 2017 and immediately designated as critical in 2017. The site is 841 ft long and has no berm between the natural bank and the levee toe.

The main cause of concern along SAP 1.4R is a slump crack; a slump failure is forming, with deep cracks along the levee crest that may results in a large slump failure during the next heavy rain event. A photo depicting this site is shown in **Figure 35**.

Although this site is critical, and a failure could impact the levee bypass system, no fix is recommended for this site under the SRBPP. This site is in the WRDA 2016 repair area and they are planning to setback the Elkhorn levee on the west side which would likely eliminate this site. Once the WRDA 2016 repairs are complete, this site should be removed from the inventory.

Figure 35. Slump Crack along the right bank of the Sacramento Bypass at LM 1.4.

Steamboat Slough, RM 24.7 Right Bank (STM 24.7R)

This critical erosion site is located along the right bank of Steamboat Slough at river mile 24.7. STM 24.7R is located in Sacramento County, south of Courtland and northwest of Walnut Grove. The Levee Maintaining Agency is RD 349, Sutter Island. It is located in the Sutter Island Economic Impact Area. The site was added to the erosion inventory in 1997 and upgraded to critical in 2011. The site is 949 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along STM 24.7R is wave wash and fluvial action of the river and whole bank failure; a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to significant bank erosion. There are near vertical banks at the downstream end and new erosion was observed throughout the site. Additional issues at this site are large trees on the slope, eddy formations, and slumping. Seepage is a known issue along this levee reach. Quarry stone in poor condition is scattered throughout this site, but not helping with bank stability. A vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 36**.

Figure 36. Erosion along the right bank of Steamboat Slough at RM 24.7.

Steamboat Slough, RM 25.0 Left Bank (STM 25.0L)

This critical erosion site is located along the left bank of Steamboat Slough at river mile 25.0. STM 25.0L is located in Sacramento County, south of Courtland and northwest of Walnut Grove. The Levee Maintaining Agency is RD 003, Grand Island. It is located in the Grand Island Economic Impact Area. The site was added to the erosion inventory in 1997 and upgraded to critical in 2017. The site is 264 ft long and has no berm between the natural bank and the levee toe.

The main causes of erosion along STM 25.0L are eddy scour, fluvial action of the river, and whole bank failure; in addition to a large eddy at this site, a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to significant bank erosion. Significant new erosion was observed throughout the site from the 2017 flood season, and at the upstream end the banks are near vertical to the top of the levee. Additional issues at this site are tree with exposed roots, tall vertical sections of eroding bank, animal holes, and slumping. Seepage is a known issue along this levee reach. A vegetation variance or removal of vegetation encroachments may be required at this site. Photos depicting this site are shown in **Figures 37 and 38**.

Figure 37. Typical exposed roots along the eroded left bank of Steamboat Slough at RM 25.0.

Figure 38. Eroded bank from eddy formation off adjacent rock protection along the left bank of Steamboat Slough at RM 25.0.

Steamboat Slough, RM 25.8 Right Bank (STM 25.8R)

This critical erosion site is located along the right bank of Steamboat Slough at river mile 25.8. STM 25.8R is located in Sacramento County, south of Courtland and northwest of Walnut Grove. The Levee Maintaining Agency is RD 349, Sutter Island. It is located in the Sutter Island Economic Impact Area. The site was added to the erosion inventory in 2007 and upgraded to critical in 2017. The site is 243 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along STM 25.8R is wave wash and fluvial action of the river and whole bank failure; a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to significant bank erosion. There was significant new erosion was observed throughout the site from the 2017 flood season. Additional issues at this site are tree pop-outs, tall vertical sections of eroding bank, animal holes, eddy formations, and slumping. Seepage is a known issue along this levee reach. Quarry stone in fair condition is scattered in sections at this site, but not helping with bank stability. A vegetation variance or removal of vegetation encroachments may be required at this site. A photo depicting this site is shown in **Figure 39**.

Figure 39. Eroding bank along the right bank of Steamboat Slough at RM 25.8.

Steamboat Slough, RM 26.0 Left Bank (STM 26.0L)

This critical erosion site is located along the left bank of Steamboat Slough at river mile 26.0. STM 26.0L is located in Sacramento County, south of Courtland and northwest of Walnut Grove. The Levee Maintaining Agency is RD 003, Grand Island. It is located in the Grand Island Economic Impact Area. The site was added to the erosion inventory in 1997 and upgraded to critical in 2017. The site is 312 ft long and has about 8 ft of berm between the natural bank and the levee toe.

The main cause of erosion along STM 26.0L is wave wash; a combination of wind waves, boat wakes, and being in the tidal zone along with poor soils have led to significant bank erosion. There was significant new erosion from the 2017 flood season, and mass failure of the berm slope on the upstream end. Additional issues at this site are tree with exposed roots, tall vertical sections of eroding bank, animal holes, eddy formations, and slumping. Seepage is a known issue along this levee reach. A vegetation variance or removal of vegetation encroachments may be required at this site. A Photo depicting this site is shown in **Figure 40**.

Figure 40. Erosion along the left bank of Steamboat Slough at RM 26.0.

Sutter Slough, RM 24.7 Right Bank (STR 24.7R)

This critical erosion site is located along the right bank of the Sutter Slough at river mile 24.7. STR 24.7R is located in Yolo County, south of the town of Courtland. The Levee Maintaining Agency is RD 999, Netherlands. It is located in the Clarksburg Economic Impact Area. The site was added to the erosion inventory in 1997 and upgraded to critical in 2013. The site is 2,180 ft long and has no berm between the natural bank and the levee toe.

The main cause of erosion along STR 24.7R is toe scour and whole bank failure; a combination of high velocities, over-steepened slopes, and boat wakes have led to significant erosion of the toe. In 2013, a severe slump of the upper levee slope occurred at this site. The 2017 flood season resulted in fresh erosion at the toe and new vertical sections throughout the site. Additional issues at this site are large trees with exposed roots that are leaning over, animal holes, shallow cracks, eddy formations, and slumping. There is quarry stone in fair condition in places along this site, and the locals have place more in the worst areas, but the bank continues to erode. Seepage is a known issue along this levee reach. A vegetation variance or removal of vegetation encroachments may be required at this site. Photos depicting this site are shown in **Figures 41 and 42**.

Figure 41. Large slump on the upper levee slope that occurred in 2013 along the right bank of Sutter Slough at RM 24.7.

Figure 42. Vertical Bank (covered with vines) of the right bank of Sutter Slough at RM 24.7.