Institutional Barriers and Process Improvements White Paper

Upper San Joaquin River

Regional Flood Management Planning

February 2024

Upper San Joaquin River Regional Flood Management Plan

San Joaquin River Flood Control Project Agency

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Acronyms and Abbreviations

CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	*Code of Federal Regulations*
CPA	Conservation Planning Area
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CWA	Clean Water Act
CWC	California Water Code
DAC	disadvantaged community
Delta	Sacramento–San Joaquin Delta
DWR	California Department of Water Resources
EcoFIP	Ecological Floodplain Inundation Potential
FCWCA	Flood Control and Water Conservation Agency
IRWM	integrated regional water management
LMA	local maintaining agency
MOOM	multiple-objective operations and maintenance

MOU	memorandum of understanding
MSG	Merced Streams Group
NEPA	National Environmental Policy Act
NMFS	US Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWP	Nationwide Permit
NWR	National Wildlife Refuge
O&M	operations and maintenance
OMRR&R	operation, maintenance, repair, rehabilitation, and replacement
PL	Public Law
Reclamation	US Department of the Interior Bureau of Reclamation
RFMP	Regional Flood Management Plan
RGP	Regional General Permit
Settlement	San Joaquin River Restoration Settlement
SGMA	Sustainable Groundwater Management Act
SHPO	State Historic Preservation Office
SJRFCPA	San Joaquin River Flood Control Project Agency
SJRRP	San Joaquin River Restoration Program
SPFC	State Plan of Flood Control
USACE	US Army Corps of Engineers
USC	*United States Code*
USFWS	US Fish and Wildlife Service
USJR	Upper San Joaquin River
WDR	waste discharge requirement
WRP	Water Resilience Portfolio

CHAPTER 1

Introduction

The San Joaquin River Flood Control Project Agency (SJRFCPA) is continuing to develop and advance the Upper San Joaquin River (USJR) Regional Flood Management Plan (RFMP) in support of the Central Valley Flood Protection Plan (CVFPP) effort. The SJRFCPA is a joint powers authority created to coordinate the efforts of the RFMP process and to represent local agency and landowner interests. The SJRFCPA consists of the Lower San Joaquin Levee District (LSJLD) and San Joaquin River Exchange Contractors Water Authority.

As part of the USJR RFMP effort, the SJRFCPA has developed this white paper to identify, assess, and address institutional barriers that hinder both ongoing flood risk management efforts and future implementation of flood risk reduction actions. This white paper also identifies challenges associated with multi-benefit project implementation, and system operations and maintenance (O&M), and recommends ways to address these challenges through strategic and tactical action. These recommendations both build on and advance the 2015 *Final Upper San Joaquin River Regional Flood Management Plan* (SJRFCPA 2015) and more recent planning efforts such as the Draft *Regional Priorities White Paper* (SJRFCPA 2021) and a suite of other white papers on related topics such as financial planning and funding support (SJRFCPA 2023b), multi-benefit opportunities (SJRFCPA 2023c), climate resiliency (SJRFCPA 2023a), and regional governance frameworks (SJRFCPA 2023d). Taken together, these white papers provide additional strategic planning support, and help the SJRFCPA to provide improved flood management in the region.

This white paper is organized to cover two topics:

- **Institutional Barriers—**This section highlights institutional barriers related to alignment with State of California (State) and federal flood policy, O&M, revenue and funding, and regulatory compliance.
- **Process Improvements and Opportunities—**This section outlines improvements and opportunities related to multi-benefit projects, collaboration, funding, and regulatory compliance.

Regional Context

The San Joaquin River watershed is located south of the Sacramento River watershed and north of the Tulare Lake watershed. It is bordered on the east by the Sierra Nevada mountains and on the west by the coastal mountains of the Diablo Range. The drainage area extends south from

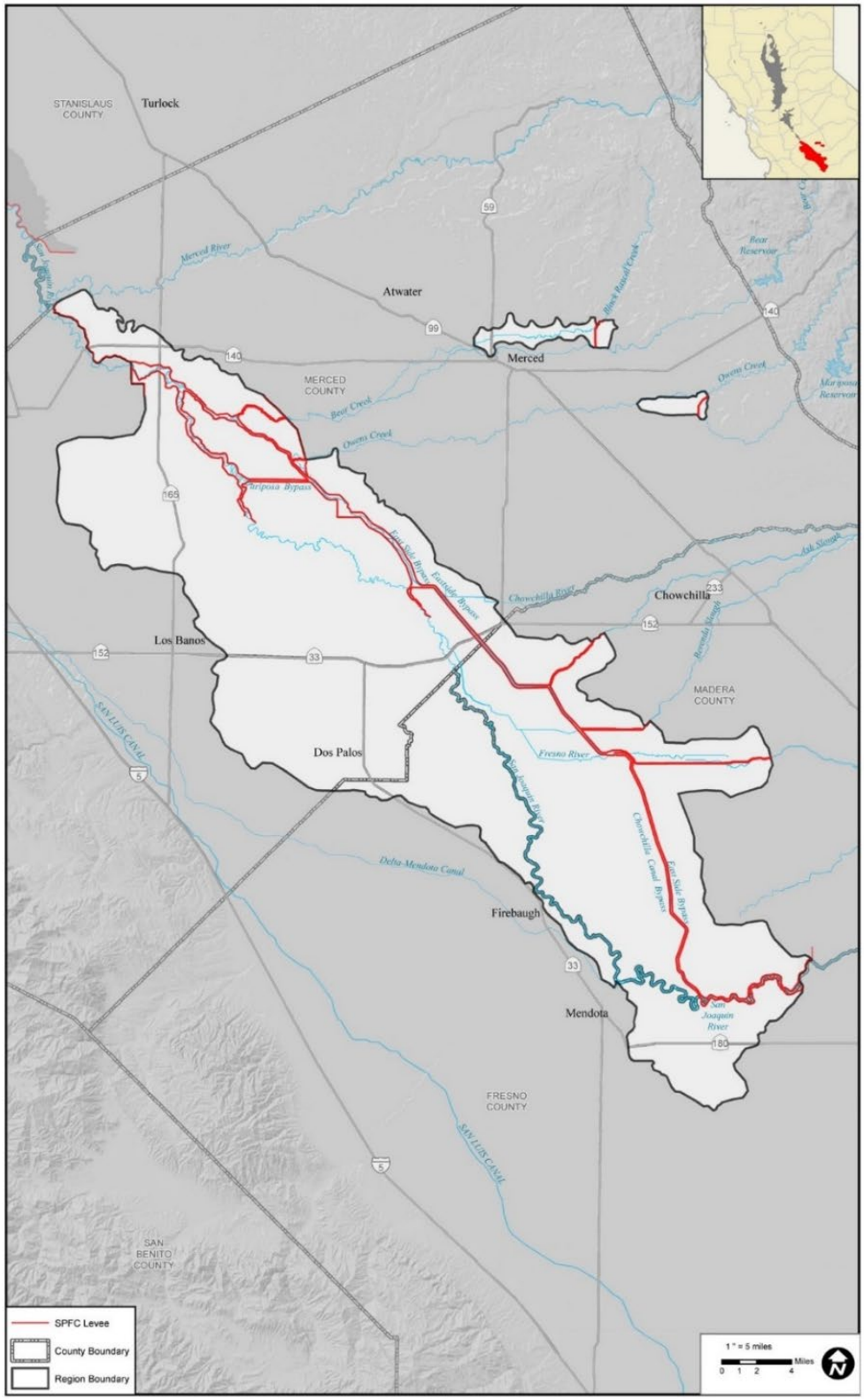
the southern boundaries of the Sacramento–San Joaquin Delta (Delta) to include the headwaters of the San Joaquin River in Madera County and its southern drainage in Fresno County. The region is hydrologically separated from the Tulare Lake watershed by a low broad ridge that extends across the San Joaquin Valley between the San Joaquin and Kings rivers. The San Joaquin River has a historical average annual unimpaired runoff of approximately 3.2 million acre-feet, and it drains about 32,000 square miles of watershed. Major tributaries include the Calaveras, Stanislaus, Tuolumne, and Merced rivers.

At approximately 300 miles long, the San Joaquin River is one of California's longest rivers. The headwaters of the San Joaquin River begin near the 14,000-foot crest of the Sierra Nevada and turns northwestward on the valley floor toward the Delta, where it meets the Sacramento River.

The USJR region (Figure 1) covers approximately 660 square miles of the San Joaquin Valley. The region is home to some of the most productive agricultural land in California and accounts for a large portion of the state's economy. The local economy depends on maintaining the quality and productivity of the region's agriculture. The USJR region also includes a variety of habitats supporting fish and wildlife species, and it includes large areas of managed wildlife refuges. Just over one-third of the region (145,000 acres) is native vegetation or riparian habitat with contiguous wetland complexes that support more than 550 identified species of birds, animals, and plants. The USJR region has promoted the recognition and consideration of natural environment and agriculture benefits when evaluating potential improvements to the flood management system (SJRFCPA 2015).

The region includes a diverse set of stakeholder groups that includes counties, cities, small communities, local maintaining agencies (LMAs), nongovernmental entities, landowners, wildlife refuges, and State and federal agencies. Almost all the communities (more than 10) in the region are considered disadvantaged communities (DACs) based on income level, and require significant financial support. Major cities in the region include the Firebaugh, Mendota, Dos Palos, Merced, and Los Banos. The City of Merced, with a population of 83,000, is the only urban area in the region. No known tribal lands are located in the region (SJRFCPA 2015). As such, the USJR region experiences several complexities related to regulatory requirements, competing interests, natural resource management, and flood protection.

Figure 1. Upper San Joaquin River Regional Flood Management Planning Area



Source: San Joaquin River Flood Control Project Agency 2015

Regional Flood Management Plan Priorities and Opportunities

The following priorities for the USJR region were identified in the *Regional Priorities White Paper* (SJRFCPA 2021):

- Restore federal authorization for the SJRFCPA.
- Improve O&M and ability to obtain permits.
- Restore the flood system to the original design capacity or increase capacity where it is feasible and reasonable to do so.
- Provide 200-year flood protection per Senate Bill (SB) 5 for urban areas (Merced).
- Provide 100-year flood protection per SB 5 for small communities of Franklin-Beachwood, Firebaugh, and Dos Palos.
- Facilitate the modification or removal of levees from the State Plan of Flood Control (SPFC).
- Preserve the unique and historical agricultural community.
- Expedite the permitting and construction of infrastructure improvements.

CHAPTER 2

Institutional Context

The USJR region's flood management system experiences a number of challenges including subsidence, insufficient or aging infrastructure, seepage, loss of hydraulic capacity due to sedimentation and vegetation encroachment, and complex system operations. Alignment with State and federal flood policy, complex regulatory and compliance issues, and lack of adequate funding make implementation of flood management actions and routine operation and maintenance difficult. Together, these institutional barriers render the USJR region increasingly susceptible to flood-related impacts, particularly in the DACs in the region. The following sections highlight institutional barriers related to alignment with State and federal flood policy, O&M, revenue and funding, and regulatory compliance.

Alignment with State and Federal Flood Policy

In some cases, aligning with State and federal flood policy can create challenges when implementing flood risk reduction actions and when maintaining the USJR flood control system. Key examples are highlighted here.

Public Law 84-99 and Federal Deauthorization

Public Law (PL) 84-99 describes the discretionary authority given to US Army Corps of Engineers (USACE) to repair and/or rehabilitate eligible flood control projects (that is, levees) that are damaged during flood events. Under PL 84-99, USACE will help to rehabilitate flood damage reduction projects (such as levees) only under the following conditions:

- When the federally authorized project is in "active" status in the USACE Rehabilitation and Inspection Program.
- When the damage has been caused by a recent high-water event.
- When repairs are clearly beyond the normal, physical, and financial capabilities of the project sponsor (SJRFCPA 2015).

In the Central Valley, complying with the conditions of "active" status has been difficult because of funding constraints, a project's alignment with national levee standards, passing USACE inspections, and other regulatory requirements (California Department of Water Resources [DWR] 2022a). There are not currently any systems in the USJR region that have "active" status in the USACE Rehabilitation and Inspection Program.

In July 2015, USACE submitted a letter to the Central Valley Flood Protection Board (CVFPB) that deauthorized the San Joaquin River Flood Control Project. This resulted in 192 miles of levees in the USJR region becoming ineligible for assistance under PL 84-99. The State (that is, DWR and CVFPB) has only recently responded to the 2015 letter from USACE, leaving the LSJLD without PL 84-99 funding. Restoring federal authorization of the San Joaquin River Flood Control Project is a priority for the USJR region so it can receive critically needed federal emergency funding for levee repair and rehabilitation in areas that are increasingly under the threat of flood events. If restoring federal PL 84-99 eligibility is not an option, an agreement with the state will need to be developed to ensure future funding for post event rehabilitation.

The San Joaquin River Restoration Program (SJRRP) is operated by US Department of the Interior Bureau of Reclamation (Reclamation). The SJRRP is the result of an 18-year lawsuit and the resulting San Joaquin River Restoration Settlement (Settlement). SJRRP goals are:

- Restore and maintain fish populations in good condition on the main channel of the San Joaquin River from downstream of Friant Dam to the confluence with Merced River.
- Reduce or avoid adverse water supply impacts to the Friant Dam long-term contractors as a result of implementation of the Settlement.

The Settlement sets forth agreed-upon restoration releases from Friant Dam. The maximum SJRRP flows are 4,000 cubic feet per second (cfs) for approximately 2 weeks in wet and normal wet years (with an estimated probability of 50% of years). Fall SJRRP releases are 400 to 700 cfs for 10 days, and spring releases are 500 to 2,000 for 8 to 16 weeks in all but the driest years and varying by water year. As a result of the SJRRP, more flows are being conveyed through the USJR region downstream of Friant Dam. The purchase of easements and installation of levee drains has resulted in increased O&M costs for the region due to additional seepage, sedimentation, and vegetation that must be managed under wet conditions.

San Luis National Wildlife Refuge Complex

The San Luis National Wildlife Refuge (NWR) Complex is composed of the San Luis NWR, Merced NWR, Grasslands Wildlife Management Area, and San Joaquin NWR. Each of these areas, with the exception of the San Joaquin NWR, have some overlap with the USJR region. In total, several tens of thousands of acres of wetland, riparian woodlands, native grasslands, and vernal pools encompass the San Luis NWR Complex (USFWS 2023). While these areas are key to preserving native habitats and species, many of the flood management agencies in the region rely on benefit assessments as a source of revenue. However, NWRs and other protected lands are exempt from these property assessments. As these areas expand, the amount of land available for assessments decreases, leading to a loss of much-needed revenue for these agencies.

Central Valley Flood Protection Plan

The CVFPP describes a programmatic vision for improving flood risk management throughout the Central Valley and guides the State's participation in managing flood risk in areas protected

by the SPFC. DWR prepares the CVFPP in accordance with the Central Valley Flood Protection Act of 2008 and is updated every 5 years.

The initial CVFPP was adopted by the CVFPB in 2012 and outlined the following primary goals:

- **Improve flood risk management**—Reduce the chance of flooding, and damages once flooding occurs, and improve public safety, preparedness, and emergency response through the following:
  - Identifying, recommending, and implementing structural and nonstructural projects and actions that benefit lands currently receiving protection from facilities of the SPFC.
  - Formulating standards, criteria, and guidelines to facilitate implementation of structural and nonstructural actions for protecting urban areas and other lands of the Sacramento and San Joaquin rivers' basins and the Delta.

The CVFPP also includes four supporting goals:

- **Improve O&M**—Reduce systemwide maintenance and repair requirements by modifying the flood management systems in ways that are compatible with natural processes, and adjust, coordinate, and streamline regulatory and institutional standards, funding, and practices for O&M, including significant repairs.
- **Promote ecosystem functions**—Integrate the recovery and restoration of key physical processes, self-sustaining ecological functions, native habitats, and species into flood management system improvements.
- **Improve institutional support**—Develop stable institutional structures, coordination protocols, and financial frameworks that enable effective and adaptive integrated flood management (designs, O&M, permitting, preparedness, response, recovery, and land use and development planning).
- **Promote multi-benefit projects**—Describe flood management projects and actions that also contribute to broader integrated water management objectives identified through other programs (DWR 2017a).

Implementation of the CVFPP provided that DWR fund six RFMPs that would describe the local vision for flood risk reduction and to outline region-specific strategies to enhance flood safety. As one of the RFMP regions, the USJR submits a list of planned and in-progress flood management actions with each update of the CVFPP. These actions are reviewed for consistency with the CVFPP goals described above and are ultimately used for a high-level estimate of regional investment needs across the SPFC over a 30-year planning horizon. A given action may be excluded from this estimate if it does not contribute to the goals of the CVFPP, increases State liability, is geographically irrelevant to the SPFC, or is inconsistent with State policy. While the CVFPP is not a funding program and does not direct funding to submitted regional actions, it provides an avenue for regional entities to coordinate directly with the State and describes flood management challenges, priorities, and improvement needs. The State uses and considers this information when structuring various grant programs.

The USJR region faces several challenges related to grant funding and regulatory requirements that make implementation of flood risk reduction actions in alignment with the goals of the CVFPP difficult. Agencies in the USJR region often lack adequate staff and funding to plan, formalize, and implement projects and to apply for grants. Furthermore, local cost-share requirements for grants are frequently beyond the capacity of these agencies. While alignment with the primary CVFPP goal is typically included in flood-related projects, incorporating the supporting goals of the CVFPP can create additional challenges. For example, restoring the capacity of the flood management system and meeting level of protection guidelines for urban and small communities are of high priority in the USJR region. However, integrating ecosystem functions and other multi-benefit components into these flood protection actions can be costly and funding opportunities are often predicated on incorporating multi-benefit components. These challenges create barriers to flood risk reduction in the USJR region and limit opportunities to improve the flood management system.

Central Valley Flood Protection Plan Conservation Strategy

A key element of the CVFPP is the Conservation Strategy (DWR 2022b). The Conservation Strategy describes how ecological components can be integrated into flood management projects and O&M. The Conservation Strategy provides four goals for improving ecosystem functions and values that are associated with implementation of the CVFPP:

- **Improve Ecosystem Processes—**Improve dynamic hydrologic (flow) and geomorphic processes in the SPFC. These ecosystem processes are critical for maintaining riverine and floodplain habitats and species. They include a diversity of flows, suitable sources of sediment, floodplain inundation, and a sufficiently broad river corridor to allow channel meander; critical factors in sustaining fisheries and riverine habitat.
- **Increase Habitats—**Increase and improve the quantity, diversity, and connectivity of riverine and floodplain habitats. These habitats include aquatic, riparian, wetland, shaded riverine aquatic cover, and other floodplain habitats, as well as agricultural lands that can provide important wildlife values.
- **Help Species—**Contribute to the recovery and sustainability of native species populations and overall biotic community diversity. The native species addressed by the Conservation Strategy include species associated primarily with riverine and floodplain habitats that are at risk of extirpation or extinction. Although the preceding goals are the foundation for species conservation, this goal emphasizes the need to not only avoid, minimize, and mitigate adverse effects on sensitive species, as well as the need to contribute to their recovery.
- **Reduce Stressors—**Reduce stressors related to development and operation of the SPFC that negatively affect at-risk species. These stressors include invasive plant species, constraints on sediment sources and channel meander migration, isolation of floodplains from rivers by levees, and fish passage barriers, all of which contribute to loss and degradation of ecosystem functions and habitat.

The Conservation Strategy provides recommendations organized by Conservation Planning Area for specific types of ecosystem improvements. It also establishes long-term objectives for the number of improvements that would result from multi-benefit flood projects and O&M in the Central Valley. In the context of the CVFPP, "multi-benefit projects" refers to projects that are designed to reduce flood risk and increase fish and wildlife habitat that may also provide other public benefits.

Ecological processes and habitat conditions in the USJR region have been impacted by several key events, including:

- **Historical Mining—**Historical hydraulic mining sediments have created deep legacy gravel pits.
- **Levee Construction—**Construction of levees, cutoff channels, and revetments have cut off or destroyed floodplain habitat in the San Joaquin River and its tributaries.
- **Disconnection from Flood Plain—**Channel incision has separated channels from their relict floodplains under most hydraulic conditions.
- **Degraded Vegetation Communities—**Vegetation communities such as wetlands and riparian cover have been substantially degraded or removed (DWR 2016).
- **Groundwater Pumping—**Substantial groundwater pumping has depleted surface flows, particularly during dry conditions.

For the SJRFCPA, the Conservation Strategy and 2022 CVFPP Update cumulatively identify 14 target species and a suite of objectives/metrics to contribute to recovery. The 14 species are:

- Delta button-celery (*Eryngium racemosum*)
- Slough thistle (*Cirsium crassicaule*)
- Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
- Monarch butterfly (*Danaus plexippus*)
- California Central Valley steelhead (*Oncorhynchus mykiss*)
- Fall/late-fall-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Spring-run Chinook salmon
- Giant garter snake (*Thamnophis gigas*)
- Greater sandhill crane (*Grus canadensis*)
- Least Bell's vireo (*Vireo bellii pusillus*)
- Swainson's hawk (*Buteo swainsoni*)
- Western yellow-billed cuckoo (*Coccyzus americanus*)
- Tricolored blackbird (*Agelaius tricolor*)

- Yellow-breasted chat (*Icteria virens*)

Climate Adaptation

A primary theme of the Conservation Strategy and 2022 CVFPP Update is the impact of climate change on the physical processes that influence the timing, duration, and magnitude of flow events in the Sacramento and San Joaquin River watersheds, and the resulting implications for flood risks and ecological conditions in the Central Valley. As described in Appendix H to the *2022 Conservation Strategy Update* (DWR 2022b), changes in temperature, precipitation, and hydrology are likely to result in watershed-scale changes, including a greater percentage of precipitation occurring as rain and less as snow, shifts in precipitation seasonality, increased prevalence of atmospheric river conditions, and increases in extreme precipitation intensity. Changes in temperature include warmer average air temperatures, more frequent and intense extreme heat events, higher water temperatures in surficial water bodies (in lakes and rivers especially), and an increase in potential evapotranspiration. The San Joaquin River watershed responses to these changes will include the following:

- A reduction in spring snowpack and snowmelt volume.
- Earlier, more rapid snowmelt and lower-magnitude spring and summer flows.
- Increased winter runoff volumes and higher peak-winter runoff rates.
- More frequent and intense droughts.
- Increased evapotranspiration.
- More frequent and intense wildfires.

At a location on the San Joaquin River near Gravelly Ford, modeled projections of changes in 100-year regulated (that is, controlled by structure operations) hydrology under a medium climate change scenario show roughly a 378% increase in the flow and 12-foot increase in stage by 2072, as presented in Table 1 (DWR 2021).

Table 1. Modeled Projections of Future Hydrology for 100-Year Regulated Hydrology in the USJR Region under Medium Climate Conditions

Metric	2022 Condition	2072 Condition	Change from 2022 to 2072
Flow (cfs)	26,500	126,800	379%
Stage (feet)	215	227	12 feet

Source: Modified from DWR 2021

The ecological implications of these changes are potentially severe. Modifications to the timing, duration and frequency of more frequent, ecologically relevant flow events, as well as changes to patterns precipitation and overall increases in temperature have deep ramifications for the regional ecological processes and habitats that native species depend on (DWR 2021).

Other State and Local Entities

San Joaquin River Conservancy

The San Joaquin River Conservancy, a regionally governed agency, was created to develop, operate, and manage the planned San Joaquin River Parkway, a natural floodplain recreational area along the 22 river miles extending from Friant Dam to Highway 99. The Conservancy's mission includes purchasing roughly 5,900 acres from willing sellers in areas upstream of Gravelly Ford; providing public access and recreation; and protecting, enhancing, and restoring natural riparian and floodplain habitat in the region (San Joaquin River Conservancy 2023).

San Joaquin River Exchange Contractors Water Authority

The San Joaquin River Exchange Contractors Water Authority was established in 1939 and hold some of the oldest water rights in California. The SJRECWA services approximately 240,000 acres of prime agricultural land along the San Joaquin River and is made up of the following San Joaquin River Water Exchange Contractors: Central California Irrigation District, San Luis Canal Company, Firebaugh Canal Water District, and Columbia Canal Company. The SJRECWA plays a critical role in San Joaquin River flood operations, water supply management, and addressing groundwater and subsidence issues.

Counties

The USJR region occupies portions of three counties in the San Joaquin Valley: Merced County, Madera County, and Fresno County (Figure 1). Merced County covers roughly 50 percent of the region and includes the City of Merced, Black Rascal Creek, Owens Creek, and the Mariposa Bypass. Madera County covers the southeastern area of the USJR region and includes the Fresno River, Ash Slough, Berenda Slough, and the Chowchilla Canal Bypass. Fresno County overlaps with a small area in the southern extent of the region and includes the City of Firebaugh and Fresno Slough.

The City of Firebaugh

The City of Firebaugh, located in Fresno County in the Central San Joaquin Valley, is about 35 miles west of the City of Fresno. Firebaugh sits on the west side of the San Joaquin River. Firebaugh is a DAC with high flood vulnerability. The City of Firebaugh is within the 100-year floodplain. Historically, flood fighting in the City of Firebaugh has been undertaken by DWR because the City does not have adequate resources. The State's and the LSJLD's responsibility for O&M in the Region includes the channel bottom of the San Joaquin River adjacent to the City of Firebaugh but does not include the non-project levees adjacent to the City of Firebaugh on the San Joaquin River.

Operations and Maintenance

Proper O&M of the USJR region's flood management system is necessary to ensure the safety and wellbeing of people and property in the USJR region. Institutional barriers related to O&M

can be particularly detrimental to proper and routine upkeep of the flood system. When O&M is not sufficient, implementation of capital improvements is hampered.

Federal law requires that all federal flood control facilities (that is, project levees) are operated and maintained in accordance with USACE's O&M manuals. USACE's O&M manuals incorporate federal flood control regulations codified at 33 *Code of Federal Regulations* Section 208.10. While these regulations do not necessarily apply to non-project or deauthorized systems, some level of O&M is needed (or may be desired) to appropriately protect people and property adjacent to levees. O&M activities are those that comprise routine, predictable, and necessary to upkeep of flood system infrastructure. These activities are guided in part by USACE's O&M manuals and hydraulic design criteria, which were originally developed in the 1950s.

An expanded definition of operation, maintenance, repair, rehabilitation, and replacement (OMRR&R) is used to describe and include a more comprehensive set of exceptional and non-routine activities that are needed to ensure an effective flood management system. Non-routine activities can also include deferred maintenance.

Deferred maintenance is needed maintenance that is delayed or that does not occur due to a variety of reasons including insufficient funding, high permit costs, or delays in securing required permits. As applied to flood management, flood protection facilities require routine maintenance and repair to keep them in acceptable condition and to preserve and extend their useful service lives. When maintenance is delayed or does not occur, it is referred to as deferred maintenance. Without sufficient funding and resources to maintain the flood protection system as intended, a deferred maintenance list will grow long. Preventive maintenance such as addressing deficiencies when impact is minimal is more efficient and less costly than deferred maintenance or more costly repairs. However, deferred maintenance is difficult to prioritize over more critical repair needs.

Central Valley Flood System Maintenance

Flood system facility management in the California Central Valley has evolved over the past two centuries. Levees and other flood control facilities (for example, channels and structures such as weirs, pumping plants, and outfall gates) have been constructed over time to meet specific needs based on evolving design standards and construction techniques (DWR 2012). While management and maintenance of flood control facilities has been ongoing, management standards have been more consistently implemented in the past 50 to 75 years (DWR 2012).

Over time, levees may deteriorate due to natural and human-caused factors including erosion induced by high flows, rodent burrowing activity, encroachments, vandalism, and other factors. Flood channels may lose conveyance capacity through sedimentation, encroachment of vegetation, encroachments, and unauthorized dumping of debris. Structures may also become damaged or go into a state of disrepair as a result of corrosion, inadvertent damage by human activities, and other circumstances (DWR 2017b). Further, with the onset of more frequent extreme weather events, channel and floodplain capacity may not contain increasing amounts of flow. This deterioration is exacerbated by warming temperatures that result in less

precipitation held as snow and earlier melting of snowpack in the Sierra (DWR 2022a). Descriptions of various maintenance activities and challenges in the USJR region and Central Valley as a whole are outlined in the 2015 RFMP (SJRFCPA 2015) and the 2017 and 2022 CVFPP updates and supporting documents (DWR 2017a; DWR 2022a).

Management of the USJR Flood System

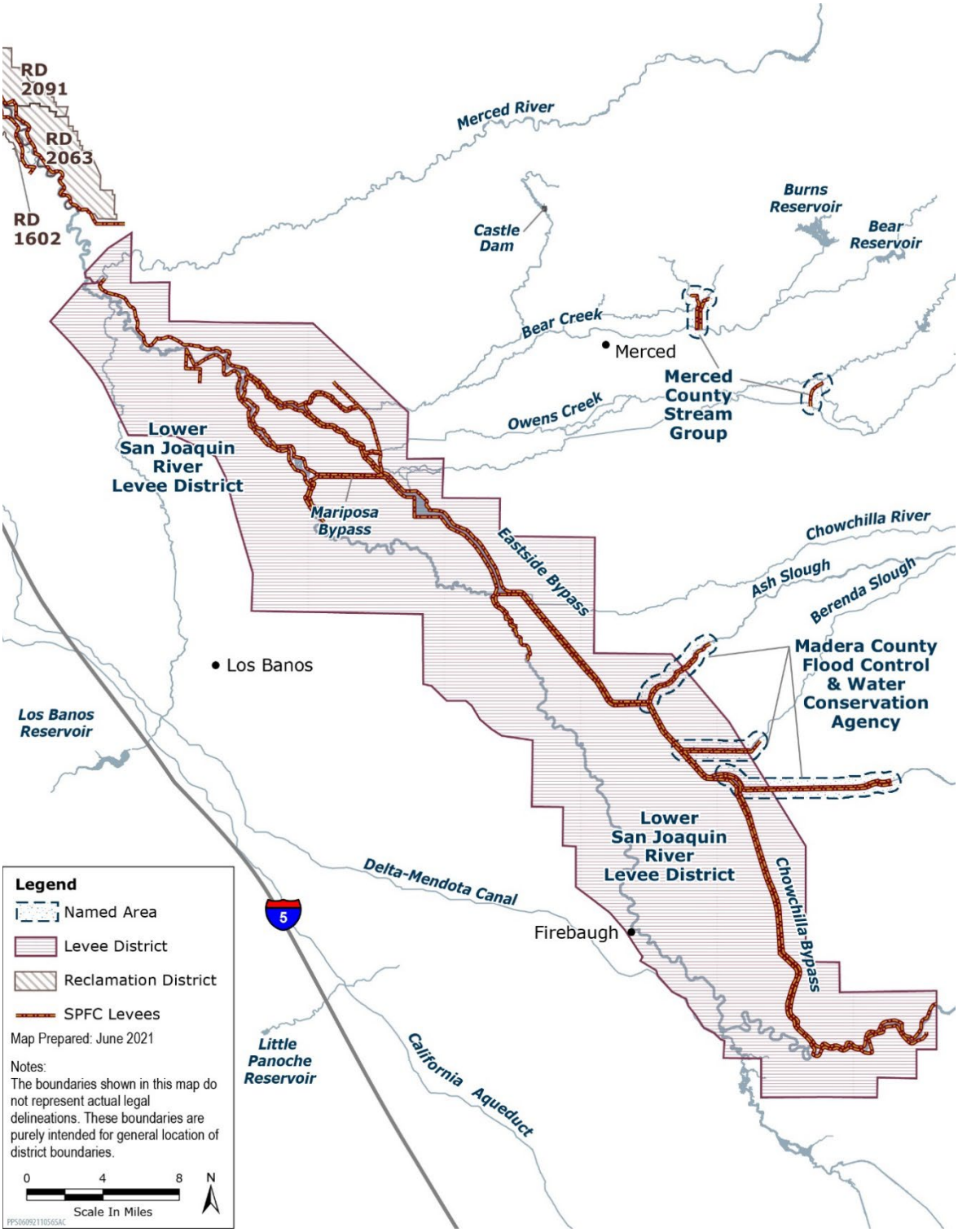
The USJR region's flood system is divided into three LMAs that perform O&M on project levees in the region:

- LSJLD.
- Merced Streams Group (MSG).
- Madera County Flood Control and Water Conservation Agency (FCWCA).

These LMA areas are shown on Figure 2. Table 2 lists relevant SPFC facilities for these LMAs. Some areas of the USJR region also have non-project levees, including much of the levee system along the San Joaquin River from the Bifurcation Structure east of Mendota to roughly 2 miles south of the Mariposa Bypass Channel. Maintenance of these facilities is often limited and is not regularly conducted. Other agencies including the Kings River Conservation District, Chowchilla Water District, and Madera Irrigation District, are responsible for O&M of flood facilities that are outside of the regional planning area but release flow into project facilities (SJRFCPA 2015).

The San Joaquin River Flood Control Project and much of the flood system in the USJR region were constructed—not engineered—in the mid-1900s using native material and were intended to protect against a 50-year flood event. Since then, substantial sediment accumulation, vegetation encroachment, unaddressed levee deficiencies, and subsidence have severely reduced the ability for the existing system to convey flood flows. Many of these areas already struggle or fail to convey existing flood flows for less than 50-year events. Further, the majority of damage caused by these flood events isn't necessarily the flood flows themselves, but the duration that the flood water is present, contributing to additional erosion of these already compromised levees.

Figure 2. Overview of LMAs in the USJR Region



Source: DWR 2022c

Table 2. USJR Maintaining Agencies by SPFC Facility

Maintaining Agency	Responsible SPFC Facilities
LSJLD	• Chowchilla Bypass right- and left-bank levees, Chowchilla Canal Bypass Control Structure and Debris Settling Basin, San Joaquin River Control Structure. • Berenda Slough right- and left-bank levees from levee mile 0 to levee mile 2.03. • Ash Slough right- and left-bank levees from levee mile 0 to levee mile 1.28, Ash Slough Drop Structures 1 through 4. • Eastside Bypass right- and left-bank levees, Eastside Bypass Control Structure, Eastside Bypass Drop Structures 1 and 2. • Mariposa Bypass right- and left-bank levees, Mariposa Bypass Control Structure. • San Joaquin River right- and left-bank levees in LSJLD, Sand Slough Control Structure, San Joaquin River Structure.
Madera County FCWCA	• Fresno River right- and left-bank levees.[1] • Berenda Slough right- and left-bank levees in Madera County FCWCA.[1] • Ash Slough right- and left-bank levees in Madera County FCWCA.[1]
Merced County (part of MSG)	• Owens Creek Diversion Channel right- and left-bank levees. • Black Rascal Diversion Channel. • Castle Dam. • MSG Project channels: – Black Rascal Creek. – Bear Creek Burns Creek. – Mariposa Creek and Duck Slough. – Miles Creek. – Owens Creek.

Note:

1. Only a small portion of the Fresno River, Berenda Slough, and Ash Slough lies within the State Plan of Flood Control. This creates additional challenges for Madera County as grants will often only pay for these areas and not the regions upstream. Furthermore, levees along these areas are not recognized as project facilities for the upstream reservoirs, but the channels themselves are.

Source: Adapted from DWR 2022c

Local Maintaining Agency Reporting

With the passing of Assembly Bill (AB) 156 in 2007, *California Water Code* (CWC) Sections 9140 and 9141 were added, requiring LMAs to submit annual reports regarding O&M of their project (and non-project levees in some cases) to DWR by September 30. DWR compiles submitted

information, in addition to annual inspection findings, into an annual report that is released to the public each year. Under CWC Section 9140, the following information is required:

- Information known to the local agency that is relevant to the condition or performance of the project levee.
- Information identifying known conditions that might impair or compromise the level of flood protection provided by the project levee.
- A summary of the maintenance performed by the local agency during the previous fiscal year.
- A statement of work and estimated cost for operation and maintenance of the project levee for the current fiscal year, as approved by the local agency.
- Any other readily available information contained in the records of the local agency relevant to the condition or performance of the project levee, as determined by the board or the department.

Preparing reports to fulfill AB 156 requirements can be a cumbersome process for LMAs and diverts a portion of the limited budget these agencies have. Additionally, while these annual reports include findings for areas with existing seepage, erosion, and other deficiencies, limited support, if any, is provided to LMAs to address these concerns. LMAs in the USJR region are challenged to perform much-needed maintenance due to additional regulatory restrictions, higher costs associated with OMRR&R activities, and a lack of sustainable funding. This ultimately expands the backlog of deferred maintenance and increases the need for additional funding to return the USJR flood system to the proper standard.

Lower San Joaquin Levee District

LSJLD has operated and maintained the San Joaquin River Flood Control Project, including all levees, channels, and control structures, since its completion in 1966. The LSJLD service area is substantially larger than that of other LMAs in the region, and a small staff of employees inspects, maintains, and patrols its facilities. Benefit assessments on lands within the LSJLD boundary are the only source of revenue for general operating expenses. However, lands in its jurisdiction that are acquired by State and federal agencies for wildlife refuges and other purposes are exempt from property assessments. Operating expenses are increasing at typical inflation rates while revenue sources continue to decrease. At present, LSJLD's limited staffing and financial support are not sufficient to reliably meet its statutory obligations to the State (SJRFCPA 2015). Furthermore, without USACE authorization of the San Joaquin River Flood Control Project, emergency funding support is not available for LSJLD to repair or rehabilitate any damages incurred during flood events.

LSJLD faces several challenges related to conducting OMRR&R. Numerous levee sections in the LSJLD need repair, but funding constraints are a challenge when addressing these concerns. Additionally, many levee landside slopes lack stabilizing vegetation, promoting erosion. Recent regulations limiting spraying herbicides in wet environments result in limited vegetation control, and alternative approaches such as employing a permanent herbicide consultant to

complete the necessary permitting paperwork, are costly to implement. Sediment is periodically removed from the channels, but much more is needed to restore the system to original design capacity. Furthermore, dredged material has limited market value for alternative purposes. As a result, LSJLD typically bears the cost of excavating, hauling, and disposing dredged material (SJRFCPA 2015).

Merced Streams Group

MSG facilities are maintained by Merced County, the City of Merced, and Merced Irrigation District. The cost of O&M is shared among these three agencies, and their pooled resources are typically sufficient to conduct routine maintenance. A written, formal agreement between these agencies does not exist, but formation of a joint powers authority is being considered (SJRFCPA 2015).

A major O&M limitation for the MSG is its inability to effectively manage vegetation in floodways while maintaining compliance with its 2007 programmatic permitting agreement with the California Department of Fish and Wildlife (CDFW). Sediment, trash removal, and rodent control activities are permitted in the dry season, but vegetation removal can only be conducted during specific periods when runoff is often occupying channels. Other regulatory requirements as stated in the 2015 RFMP (SJRFCPA 2015) include:

- Removing downed trees only in the dry season.
- Replacing any removed trees larger than 3 inches in diameter with replanted saplings at a ratio of 10 saplings to 1 removed tree.
- Clearing only one bank of a given channel during a maintenance cycle.

These requirements conflict with the MSG O&M manual; however, the MSG complies with the CDFW programmatic permitting agreement under threat of possible fines or prosecution for noncompliance. Streamlining or rectifying these conflicts would enhance MSG's O&M capabilities (SJRFCPA 2015). Some MSG members have determined that the programmatic permitting agreement's requirements are so onerous and limiting they have pursued separate CDFW permits rather than perform maintenance work under the agreement. Further examples of these conflicting priorities are listed below:

- Irrigation ditches and canals need to be maintained to reduce the risk of flooding, but onerous permitting processes are needed to conduct this maintenance.
- Concerns related to the preservation of native plants and sensitive habitats and species also slow down the ability to conduct needed maintenance.

Madera County Flood Control and Water Conservation Agency

Madera County FCWCA is a special district but has limited staff and funding for flood maintenance actions. The operating budget, which relies entirely upon property assessments, is limited for the number of facilities in the County's jurisdiction (SJRFCPA 2015). The County tried

to pursue the Proposition 218 process but received public response that was not in favor of assessment.

The 2015 USACE deauthorization of the San Joaquin River Flood Control Project does not impact Madera County FCWCA. However, Madera County FCWCA received a 2007 deauthorization letter regarding waterways into bypass for Madera County. USACE is still performing inspections and Madera County FCWCA is currently preparing systemwide improvement frameworks to regain eligibility for the USACE PL 84-99 Rehabilitation and Inspection Program.

Madera County FCWCA has an outdated governance structure and agreements. Additionally, there is unclear guidance, responsibility, and jurisdiction of waterways. The County finds it challenging that the channels they maintain provide benefits to irrigation districts and water districts, but neither of these users provide support for maintenance costs. A memorandum of understanding or a joint powers authority that includes participating agencies could help to alleviate some of this burden. The County has expressed that it is unreasonable to use public funds on privately used channels and waterways. Yet, the County is responsible for waterway maintenance even though they do not own any waterways and do not convey any water.

The biggest maintenance challenges for Madera County FCWCA are vegetation management, sediment removal, and ground squirrel holes. Mitigating subsidence impacts is also an issue that the County faces but is of lesser priority compared to the others. County projects (as opposed to mainstem San Joaquin River) are primarily focused on invasive vegetation management (mainly giant reed, Himalayan blackberry, and Chinese sumac), but this continuous O&M need requires continuous funding. Madera County landscape maintenance staff assisted with vegetation management in the past but restructuring in 2011 has resulted in minimal maintenance in following years (SJRFCPA 2015). O&M funding has been challenging to obtain as grants are typically focused more on capital projects. Madera County FCWCA has recently had their Letter of Intent (LOI) accepted by DWR and is currently drafting their System-Wide Improvement Framework (SWIF). However, because grants often only cover the portion of levees within the SPFC and there is no community support for a Proposition 218 effort (or any fee for service), more is needed from the State to fully address the issues the County faces. Additionally, as described above for MSG, the County has similar permitting restrictions for vegetation removal. Areas outside of the SPFC area require substantial preliminary monitoring and are therefore not being maintained (SJRFCPA 2015).

Non-project Levees

The condition of non-project levees on private lands along the San Joaquin River are uncertain because there are no public agencies that are responsible for their O&M. In some cases, local irrigation districts may perform as needed maintenance activities. For example, non-project levees in Fresno County north of Mendota Pool are sometimes repaired by Firebaugh Canal Water District and Central California Irrigation District. Improving the O&M of non-project levees that are in poor condition and implementing regular inspections may require incorporating these levees into the jurisdiction of other public agencies. However, as stated in

the 2015 RFMP, “This would be a costly endeavor in terms of acquiring easements, environmental permitting, and the construction necessary to bring the levees into conformance with acceptable minimum standards” (SJRFCPA 2015).

Revenue and Funding

Funding challenges in the USJR region due to the limited tax base, the rising costs of O&M, labor, new permitting requirements, and other institutional barriers limit the ability of local agencies to address critical flood management issues. Aging infrastructure, reduced flood bypass conveyance capacity due to extreme subsidence and sedimentation, and deferred maintenance impacts the ability of flood management facilities to function as intended, and all require significant additional investment. As flood risk increases with increasing storm severity, underinvestment in flood management makes the system vulnerable to failure at the cost of human life, homes and business, and other valuable community resources.

Local flood management funding is raised largely through property tax assessments, but because of the composition of the USJR region, the tax base is limited. Any additional tax assessments that require voter approval are likely not feasible or affordable considering the prominence of local DACs. Furthermore, as detailed previously, lands acquired by the San Luis NWR Complex are no longer eligible for tax assessments, further limiting potential tax revenue to the region. The lack of sufficient local funding can also be a hurdle to accessing State and federal funding sources, many of which require a local cost share.

O&M

New permitting requirements have played a major role in increasing O&M costs, and contributed to significant delays in maintenance activities, creating a backlog of deferred maintenance. Additionally, LMAs do not have the funding or staff resources to address the maintenance backlog on top of current maintenance needs. This maintenance backlog has become a liability issue, as recent flooding events have resulted in lawsuits for flood damages and considerable expense to responsible LMAs. The increased costs of carrying out maintenance activities under wet conditions due to the SJRRP flow regimes has also impacted the LSJLD. To address these concerns, the LSJLD has needed to hire outside contractors to support vegetation removal at significant expense. Local agencies are already constrained in their ability to fund flood management infrastructure and have limited O&M budgets to maintain existing facilities. Additionally, USACE deauthorization of levees could leave the region financially vulnerable if failure occurs.

State Funding Programs

Targeted State funding programs are critical to the USJR region. These programs address some of the specific challenges faced by local agencies, such as funding infrastructure repairs and routine maintenance through the Flood System Repair Project and Flood Maintenance Assistance Program, and supporting small communities and DACs through the Small Communities Flood Risk Reduction Program.

However, these programs have areas where improvement is needed. Meeting local cost-share requirements can be a challenge, particularly in DACs. Some of these programs, like the Flood System Repair Project, provide local agencies favorable State cost shares of up to 95%, but even small local cost shares can present a hurdle to small DACs. Rate specifications for in-kind services to meet the cost-share requirement are not always clear to program participants.

Another limitation of these programs is that they apply only to SPFC facilities, meaning that these programs only cover a portion of the region's total flood management facilities, and many are bond-funded, meaning that funding is periodic and can run out after several years. Continued, stable funding for these programs at the State level is necessary to meet the investment need in the USJR region.

Local agencies in the region have experienced other challenges with these programs that can be improved in future rounds of funding. Past challenges have included requirement to hire DWR-approved vendors, unclear program requirements that vary from year to year (for example, unclear eligibility for particular expense categories such as equipment), and funding expiring before necessary permits could be secured. Continued engagement in regional and State planning efforts can help identify remaining critical funding gaps, such as those for non-SPFC facilities, and areas for needed improvement.

Regulatory Compliance

As previously discussed, regulatory compliance is challenging for both capital improvement projects and for O&M. The permitting process can be onerous when working in environmentally sensitive, fragmented areas such as riparian corridors. Because relatively little of this valuable habitat remains, permits to alter existing conditions require meeting stringent conditions (particularly related to State and federally listed species). These conditions apply even when the benefits of the project are an overall improvement, such as when implementing multi-benefit projects.

The permitting process can also be time-consuming and iterative for project proponents as well as for local, state, and federal agencies. Depending on permitting requirements, it is not uncommon for the process to take more than 2 years from the time the permit applications are submitted to having all permits issued. Project proponents as well as permitting agency staff manage multiple projects with the same or similar deadlines to meet the requirements for all projects planned for the construction season. It's also not uncommon to have permitting agencies deem an application incomplete when the complete and correct information was included in the original application submittal. This can further delay permit issuance. Addressing agency comments can result in additional comments on original applications rather than the revised application materials that were requested. Changing policies, conflicting regulatory requirements and high turnover in agency staff can prove problematic and require more effort and time to secure permits. Securing mitigation credits to meet permit requirements prior to project implementation may be difficult depending on project location, agency requirements, number of credits and availability based on species and habitat needs.

These issues can significantly delay project implementation of the flood protection projects and increase the cost.

As an example, a multi-benefit project within the region secured funding from multiple sources in 2019. Engineered designs were prepared, a clear regulatory strategy was developed, and agency pre-consultations were initiated in early 2020 with project implementation scheduled for summer of 2022. The project designs were provided to local, state, and federal permitting agencies and preliminary consultations with those agencies were conducted in 2020-2021. By the end of 2021, all required permit applications were submitted and both the budget and schedule were on track allowing more than 18 months to address agency questions and concerns, secure project permissions, and meet regulatory requirements. Over the next 18 months, a series of challenges as described above caused significant project delays and a cost overrun of nearly 160% of the original environmental compliance/permitting budget. As a result, the project schedule was pushed back and additional funds had to be secured. Currently, several permitting agencies are still requesting additional information and new supplemental studies/documentation prior to issuing permissions for project implementation. Once identified available mitigation credits are sold out with limited alternative sources of mitigation credits for specific species/habitat/location, secured grant funds slated for implementation are close to expiration, and secured funds required to meet regulatory requirements are nearly exhausted. The combination of circumstances and regulatory barriers have greatly impacted both the schedule and budget for this project having the potential to prevent successful completion of a valuable multi-benefit project.

In addition to funding and leadership needs, regulatory compliance can impede the implementation of multi-benefit projects. Regulatory barriers identified through outreach efforts conducted during the development of the CVFPP Conservation Strategy 2022 Update are as follows:

- Policies, funding sources, and regulatory requirements often do not align well between and within different State and federal agencies.
- Existing engagement with regulatory agencies is not sufficient to support successful implementation of projects.
- Funding requirements are too costly to adequately conduct O&M of the flood system, and regulatory challenges further constrain these efforts (DWR 2022b).

Addressing mitigation needs when converting habitat types (for example, from foraging to nesting) may also require compensatory mitigation that can be costly. Leveraging credits to mitigate impacts onsite may also result in permitting obstacles involving long-term legal protection and funding. Table 3 summarizes the typical potential permits needed for capital improvement projects.

Table 3. Typical Authorizations Required for Capital Improvements

Agency	Agency—Statute	Authorization or Approval Action
Federal	Lead federal agency—NEPA	• Record of decision

Agency	Agency—Statute	Authorization or Approval Action
	USACE—Section 404 of the CWA	• Individual (standard) permit • Letter of permission • General permit (nationwide, regional, or programmatic basis)
	USACE—Section 9 of the Rivers and Harbors Act of 1899	• Individual (standard) permit • General permit (nationwide, regional, or programmatic basis)
	USACE—Section 10 of the Rivers and Harbors Act of 1899	• Individual (standard) permit • Letter of permission • General permit (nationwide, regional, or programmatic basis)
	USACE—Section 14 of the Rivers and Harbors Act of 1899 (33 USC 408)	• Letter of permission
	USFWS/NMFS—ESA, Section 7	• Biological opinion • Incidental take statement
	USFWS/NMFS—ESA, Section 10	• Incidental take permit • Enhancement of survival permit • Recovery and interstate commerce permit
	National Marine Fisheries Service—Magnuson-Stevens Fishery Conservation and Management Act [a]	• Consultation
State	Lead State or local agency—CEQA	• Notice of determination
	CDFW—Section 1600 of the California Fish and Game Code	• Lake and streambed alteration agreement • Master agreement • Routine maintenance agreement
	CDFW—CESA	• Section 2081(a) MOU • Section 2081(b) incidental take permit • Section 2080.1 consistency determination • Natural community conservation plan • Safe harbor agreement • Voluntary local program
	State Water Resources Control Board—Sections 1200 and 1201 of the California Water Code	• Water right permit
	Central Valley Regional Water Quality Control Board—Porter-Cologne Water Quality Control Act	• WDR

Agency	Agency—Statute	Authorization or Approval Action
	Central Valley Regional Water Quality Control Board—CWA (Section 401)	• Water quality certification
	Central Valley Regional Water Quality Control Board—CWA Section 402	• NPDES permit and WDR
	California Office of Historic Preservation—Section 106 of the National Historic Preservation Act	• Consultation with the SHPO
	Central Valley Flood Protection Board—CWC Section 8608	• Encroachment permit
	California State Lands Commission—Public Resources Code Section 6009	• Lease
	Delta Stewardship Council—Sacramento–San Joaquin Delta Reform Act of 2009	• Certification of consistency [b]

Source: DWR 2022b

[a] Consultations on actions that may adversely affect essential fish habitat (required by the Magnuson-Stevens Fishery Conservation and Management Act) may be conducted in conjunction with NEPA compliance, ESA compliance, USACE permitting, or as a separate consultation.

[b] Filed by the lead State or local agency.

CDFW = California Department of Fish and Wildlife
CEQA = California Environmental Quality Act
CESA = California Endangered Species Act
CWA = Clean Water Act
CWC = California Water Code
ESA = Endangered Species Act
MOU = Memorandum of Understanding
NEPA = National Environmental Policy Act
NMFS = US Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service
NPDES = National Pollutant Discharge Elimination System
SHPO = State Historic Preservation Office
USACE = US Army Corps of Engineers
USC = *United States Code*
USFWS = US Fish and Wildlife Service
WDR = waste discharge requirement

CHAPTER 3

Process Improvements and Opportunities

While several institutional barriers challenge flood management in the USJR region, a variety of process improvements and opportunities can be pursued to overcome these challenges. The following sections outline improvements and opportunities related to multi-benefit projects, collaboration, funding, and regulatory compliance.

Multi-benefit Projects and Collaboration

Given the diverse set of interested parties in the USJR region, several opportunities for collaboration and implementation of multi-benefit projects exist where interests align. These opportunities can support improved flood protection, ecosystem restoration, groundwater recharge, and more. Furthermore, collaboration through these efforts can lead to lasting partnerships and additional support for implementation. These collaboration opportunities further detailed in this section.

Water Resilience Portfolio Action 25.4

The California Water Resilience Portfolio (WRP) contains recommended goals and actions for local and regional bodies to address water challenges throughout the state. These are divided into four main categories: maintain and diversify water supplies, protect and enhance natural ecosystems, build connections, and be prepared. The portfolio is a byproduct of Governor Newsom's Executive Order N-10-19 and was created with the following seven key principles in mind (DWR 2020a):

- Prioritize multi-benefit approaches that meet several needs at once.
- Use natural infrastructure such as forests and floodplains.
- Embrace innovation and new technologies.
- Encourage regional approaches among water users sharing watersheds.
- Incorporate successful approaches from other parts of the world.
- Integrate investments, policies, and programs across State government.
- Strengthen partnerships with local, federal and tribal governments, water agencies and irrigation districts, and other stakeholders.

WRP Action 25.4 seeks to "update and refine the regional flood management strategy in the Central Valley Flood Protection Plan to account for the projected impacts of climate change in order to protect vulnerable communities and infrastructure and restore floodplains along the San Joaquin River and its tributaries" (DWR 2020a). USJR RFMP staff have participated in the work groups to develop draft action plans for a number of topics critical to the region including subsidence, transitory storage, floodplain recharge, and modification of SPFC facilities. The 2021 Progress Report on WRP actions (DWR 2021) indicates that "DWR and the Flood Board are pursuing a San Joaquin basin regional flood strategy based on cutting-edge climate science that will consider traditional and nontraditional flood management strategies suited to the unique flood risks of the San Joaquin basin". This regional flood management strategy is also included in ongoing *California Water Plan Update 2023* development. Priorities from the WRP Action 25.4 specific to the USJR region are also related to several of the institutional barriers described in previous sections. These include:

- Improving the understanding of land subsidence impacts on flood system facilities in the San Joaquin Valley. This includes:
  - Identifying hot spots and critical facilities for subsidence.
  - Conducting regular data collection, surveys, and hydraulic analysis to mitigate subsidence.
  - Understanding how to release upstream flood flows to avoid downstream capacity reduction.
- Resolving deauthorization of the San Joaquin River Flood Control Project.
- Funding and implementing priority multi-benefit projects.

Increased Collaboration on Flood-managed Aquifer Recharge Opportunities

Collaboration between flood and groundwater managers has stimulated opportunities for flood-managed aquifer recharge (Flood-MAR) as a water resources management strategy. In 2018, DWR published a white paper on Flood-MAR (DWR 2018), highlighting this approach and its ability to provide flood risk reduction, drought resiliency, and ecosystem restoration in the face of climate change. Since then, this innovative approach has gained attention with different areas for implementation being considered and evaluated.

In 2019, the Flood-MAR Research Advisory Committee published the Flood-MAR Research and Data Development Plan (R&DD Plan) (Flood-MAR Research Advisory Committee 2019) to identify priority actions for expanding implementation of Flood-MAR projects in California. The Flood-MAR Research Advisory Committee is a multidisciplinary group of approximately 200 subject matter experts that represent 13 critical research areas that are needed for implementation. The R&DD Plan and white paper highlight the need for guidance, information, tools, and expert systems to support implementation of Flood-MAR projects.

DWR has partnered with Merced Irrigation District to produce the *Merced River Flood-MAR Reconnaissance Study* (DWR 2020b). Upon completion this pilot study will have published seven

technical memoranda that explore the feasibility and effectiveness of Flood-MAR in the Merced River watershed. These memoranda will also provide recommendations for successful project implementation. This two-phased project will identify opportunities to ameliorate hydrological impacts on the altered hydrological regime following construction and management of Friant Dam. DWR will provide technical services for the first phase of the project, and results will inform the Flood-MAR program and will benefit subsequent floodplain recharge strategies throughout the San Joaquin River Basin (DWR 2022a; San Joaquin River Conservancy 2021).

Sustainable Groundwater Management Act

Flood managers are also working with groundwater sustainability agencies to maximize use of flood waters for natural or managed groundwater recharge and achieve sustainable groundwater management. These approaches can also reverse negative impacts caused by land subsidence that have resulted in the loss of flood conveyance capacity and modified floodplains. The group of legislation known as the Sustainable Groundwater Management Act of 2014 (SGMA) provided a first-of-its-kind framework for sustainable groundwater management. The passage of SGMA also spurred renewed interest in watershed-scale solutions that account for water supply reliability, flood risk reduction, and ecosystem enhancements (DWR 2022a). Funding for SGMA implementation may also be leveraged as an opportunity for the USJR region to explore more innovative funding approaches.

Recent Executive Orders also support implementation of SGMA and groundwater recharge-focused projects. Executive Order N-3-23 directs DWR, SWRCB, and CDFW to expedite permitting processes for projects that provide sources of recharge from winter precipitation. Through this order, projects that utilize floodwaters to promote groundwater recharge may have less barriers, with respect to permitting, for implementation (Governor Newsom 2023a). Executive Order N-4-23 expanded on this approach by briefly loosening regulations related to the diversion of flood flows for groundwater recharge or managed wetlands. While these diversions were permitted until June 1, 2023, these orders recognize the value that flood-based groundwater recharge can provide (Governor Newsom 2023b). The subsequent Executive Orders N-6-23 and N-7-23 expanded the timeframe of floodwater diversion for certain geographies in response to the early 2023 storm events (Governor Newsom 2023c, 2023d). Passed in July 2023, SB-122 codified the diversion of floodflows for groundwater recharge without the requirement of a water right for diversions before January 2029 (California Senate 2023).

Ecological Floodplain Inundation Potential

As described in the *2022 Conservation Strategy Update*, DWR's Division of Multi-benefit Initiatives is facilitating use of an Ecological Floodplain Inundation Potential tool (EcoFIP) for use in Flood-MAR studies and projects. EcoFIP analysis builds on and furthers DWR's Floodplain Restoration Opportunity Analysis, a key component of the original 2012 CVFPP and 2016 Conservation Strategy. Floodplain Restoration Opportunity Analysis was previously focused on evaluating ecologically significant flows to support various species (for example, salmonids). EcoFIP incorporates additional capabilities such as the ability to evaluate any daily flow time

series, and outputs areas of inundations, suitable species habitat, or potential recharge volumes. EcoFIP can provide a comprehensive assessment of floodplain restoration and Flood-MAR opportunities along specific river reaches, as well as providing conceptual design analysis for suitable project locations.

EcoFIP has been used along the San Joaquin River from Friant Dam to Gravelly Ford to identify and evaluate potential project concepts. Additional analyses are forthcoming for the portion of the San Joaquin River that is encompassed by the USJR region. These results can serve as a valuable assessment of key areas in the region to provide additional flood protection, groundwater recharge, and floodplain restoration.

Pursuing Multi-benefit Projects

In the 2015 USJR RFMP (SJRFCPA 2015) and subsequent Draft *Regional Priorities White Paper* (SJRFCPA 2021), SJRFCPA has identified a suite of multi-benefit projects that are priorities for implementation. Development of multi-benefit projects can help to achieve broader regional goals such as improving habitat conditions, providing more climate variation resiliency, and improving recreational opportunities. Additionally, multi-benefit projects are consistent with CVFPP and Conservation Strategy objectives. Adding multi-benefit components into flood management projects make them more attractive to State and federal funding programs and help to obtain regulatory permits. In addition to collaborating with DWR, SJRFCPA seeks a proactive approach to working with CVFPB, CDFW, USFWS, NMFS, Reclamation, and USACE to develop projects that meet multiple objectives including long-term O&M considerations, and recovery of listed species and sensitive habitats. A separate white paper provides (SJRFCPA 2023c) detailed information regarding the planning, development, and implementation of multi-benefit projects. The following examples provide information about multi-benefit projects that have been constructed and the benefits associated with these types of projects. These projects have often been constructed using multiple funding sources under onerous permitting requirements, but the subsequent projects have resulted in flood- and climate-resilient alternatives to traditional fix-in-place approaches.

Further, the implications related to climate change and severe weather events have shown to substantially increase flood risks as described earlier in this white paper and in the 2022 CVFPP Update. To mitigate these risks, the 2022 CVFPP and Conservation Strategy recommend increasing the pace and extent of multi-benefit project implementation in the region. The key to accomplishing this is to identify and implement multi-benefit projects that:

- Improve flood conveyance and capacity, thereby reducing or minimizing catastrophic flood infrastructure failures during large events.
- Simultaneously provide ecological resiliency by re-establishing or improving fundamental ecological processes like floodplain activation and river meander.
- Allow the establishment of complex, inter-connected habitat assemblages along the channel corridor.

Multi-benefit Projects Examples

Several successful multi-benefit projects have been implemented in the USJR region and San Joaquin Valley as a whole. These success stories can serve as a blueprint for effective collaboration, integration and alignment of multiple interests, using innovating funding approaches, and navigating complex regulatory requirements while providing a range of benefits. The following subsections provide examples of these projects.

Black Rascal Creek Flood Control Project

The Black Rascal Creek Flood Control Project (Project) will construct a new embankment system to create a flood control detention basin that includes extensive habitat restoration. The Project includes restoration and enhancement of aquatic, riparian, and upland habitats in the footprint of the proposed detention basin. The detention basin will temporarily detain a 200-year storm event and limit flow in the diversion channel to 3,000 cubic feet per second, reducing peak flows in Bear Creek and flooding along the old Black Rascal Creek channel that flows through the City of Merced. The Project is designed to contain up to the 200-year flood event in compliance with the Central Valley Flood Protection Act of 2008.

Dos Rios Ranch Floodplain Expansion and Ecosystem Restoration

The Dos Rios Ranch Floodplain Expansion and Ecosystem Restoration Project is California's largest floodplain restoration effort to-date. Roughly 1,600 acres of floodplain and riparian habitat along 8 river miles have been restored through a controlled breach of agricultural berms. An additional 500 acres of restoration are planned, further expanding reconnected floodplains and restored habitat, reducing flood stage, and providing groundwater recharge. Acquisition of Dos Rios Ranch was led by River Partners and has incorporated collaboration among several State, federal, local, and private partners and $40 million in competitive grant funding. Dos Rios Ranch provides extensive habitat for at least 10 sensitive species as well a broad range of other native species including salmonids, white sturgeon, neotropical migratory songbirds, riparian brush rabbit (*Sylvilagus bachmani*), riparian woodrat (*Neotoma fuscipes riparia*), Swainson's hawk, and least Bell's vireo. Dos Rios Ranch is scheduled to be transferred to State ownership in 2023, becoming the newest California State Park (River Partners 2022a).

Three Amigos

The Three Amigos project was completed by River Partners in 2022 as a nonstructural flood enhancement and habitat restoration project, providing transient storage and floodplain habitat on more than 3,100 acres along 8 miles of the San Joaquin River near its confluence with the Tuolumne River. Prior to project implementation, levees in this area breached and overtopped multiple times, flooding agricultural lands within Reclamation Districts (RDs) 2100, 2102, and 2099. This area is now within the San Joaquin NWR Complex (River Partners 2022b).

Cottonwood, Dry, and Berenda Creeks Giant Reed Eradication and Removal

Giant reed eradication and removal in Cottonwood, Dry, and Berenda creeks was implemented by Root Creek Water District and involved reducing the extent of giant reed infestations and

25,000 tons of sediment along 17 miles of creeks. This project increased conveyance capacity of these creeks, improved the visibility of and access to the channels and levees for maintenance, improved groundwater recharge, and restored habitat.

San Joaquin River National Wildlife Refuge Boundary Expansion

In January 2017, USFWS approved a boundary expansion of the San Joaquin River NWR. This boundary expansion empowers the San Joaquin River NWR to purchase lands or easements from willing sellers within the boundary line. The San Joaquin River NWR's long-term goal is acquisition of nearly 11,000 acres within the expansion area for additional wetland, riparian woodland, native grassland, and vernal pool habitat (Mid San Joaquin River RFMP 2021).

Great Valley Grasslands Floodplain Restoration

This project is progressing under Permit 19513 issued by the CVFPB and aims to breach levees along the San Joaquin River at three locations. This will reconnect the San Joaquin River with 120 acres of historical floodplains in the Great Valley Grasslands State Park, restoring habitat for a variety of species. Initial project development was funded by the Proposition 1 Watershed Restoration Grant Program from CDFW and additional technical support was provided by DWR. Construction is scheduled to begin in 2023 (American Rivers 2023).

Funding

There are variety of opportunities related to funding that can minimize some of the existing institutional barriers that the region experiences. Many of these opportunities can leverage successful coordination and multi-benefit projects, as described previously, to instill more innovative funding approaches in the region. Additional recommendations related to funding are also outlined in the USJR finance white paper (SJRFCPA 2023b).

Partnerships around integrated water resources management can provide new funding opportunities. For example, the DWR and Merced Irrigation District partnership to explore Flood-MAR feasibility and secure water rights to excess flows on the Merced River brings nontraditional flood management partners into the funding equation. Additionally, as drought and rainfall events intensify, State agencies are shifting focus to integrated water resources management that considers how to address multiple water management challenges in a more holistic way. Integrated regional water management is a collaborative effort to implement water management solutions at a regional scale. Flood-MAR presents a unique opportunity to address water supply issues, groundwater overdraft challenges, and flood risk mitigation with a single approach. It can also help address subsidence issues in the region. In turn, it brings new funding partners to the table, including water and irrigation districts, and groundwater sustainability agencies, in addition to traditional flood management agencies. The USJR region should continue to look for opportunities to broaden and deepen collaboration across water sectors. The State has offered several integrated regional water management planning grants to help regions identify and implement regional strategies for water management, which could provide the USJR region with opportunities to further develop Flood-MAR projects.

Multi-benefit funding sources add complexity but provide additional opportunities. The State has outlined, in statewide planning and directional documents such as the CVFPP and the WRP, the need to increase the pace of multi-benefit project implementation. A major benefit of incorporating ecosystem benefits into a flood control project is the potential for applying funds from multiple sources that prioritize incorporating meaningful habitat components as an integral part of the project. Single-objective flood control projects must often be funded solely by the project proponent while a multi-objective project may be eligible for, and attractive to, a number of federal, State, and other grant programs. Through grant programs, funding is distributed via direct-assistance, competitive-grant, or budget processes across a multitude of State, federal, and local agencies. These opportunities for funding typically require some level of matching funds from local or other sources, similar to flood management cost-share requirements for DWR and USACE funded projects. These grants can support various components (depending on criteria) including planning, design, permitting, land purchases, implementation, and O&M. Table 3-3 in the 2022 Conservation Strategy Update is a comprehensive list of additional funding sources for multi-benefit and single-purpose habitat improvement projects.

The Black Rascal Creek Flood Control Project and the Grasslands Floodplain Restoration Implementation Project both included multiple benefits ranging from reducing risk for prime agricultural lands, water quality, soil quality and wildlife habitat benefits. As future projects are developed and scoped, considering multiple benefits will broaden the funding pool. Multi-benefit projects that include complex habitat restoration or other benefit categories can be more costly and time-consuming to implement compared to single-purpose flood control projects but are eligible to receive more State and federal support because of the wide-ranging benefits.

Other actions and opportunities that can support additional funding and reduction of institutional barriers for regional entities include the following:

- Work with State and federal partners to seek USACE reauthorization for PL 84-99 emergency rehabilitation assistance.
- Continue engagement in regional and State planning efforts to help identify remaining critical funding gaps and align local projects with statewide priorities for direct funding opportunities.
- Continue to look for opportunities to broaden and deepen collaboration across water sectors by actively engaging in integrated regional water management networks and local groundwater sustainability agency efforts.
- Advocate for lower local cost share or in-kind services for grant programs to assist small, rural, and/or DACs.
- Advocate for continued funding for DWR's direct funding programs and new direct funding programs that address underfunded critical needs such as non-SPFC facilities and emergency rehabilitation assistance.

- Work at the local or regional level to prioritize projects for pursuing State and federal grant funding.
- Take advantage of the California Governor's Office of Emergency Services *Prepare California* funding opportunities to support grant application efforts and help meet local cost-share requirements.

Regulatory Compliance

Table 4 summarizes some of the current expedited permitting options for multi-benefit projects. Many of these agencies also provide grant funding and, in that way, become partners in ensuring successful project implementation. In addition to the permit mechanisms provided below, CDFW currently has a program that waives permitting fees and regulatory requirements for ecological restoration projects. This includes the restoration management permit that provides take for:

- State listed and fully protected species.
- Restoration consistency determination that provides take for both State and federally listed species.
- Statutory exemption for restoration projects from CEQA that has no upper limit on project impacts, including non-biological effects.

Table 4. Expedited Compliance Mechanisms for Restoration and Multi-benefit Flood Projects

Agency	Statute	Expedited Compliance Mechanisms
Federal Agencies	Lead Federal Agency—NEPA	• NOAA Restoration Center Programmatic Environmental Impact Statement
	USACE—CWA Section 404; Section 10 of the Rivers and Harbors Act of 1899	• NWP 13 Bank Stabilization [a] • NWP 27 Aquatic Habitat Restoration • NWP 33 Temporary Construction Access and Dewatering • RGP 16 Anadromous Salmonid Fisheries Restoration
	USACE—Section 14 of the Rivers and Harbors Act of 1899 (33 USC 408)	• Categorical Permission Alteration 8 Environmental Restoration
	USFWS—ESA	• Multi-Agency Implementation of Aquatic, Riparian, Floodplain, and Wetland Restoration Projects to Benefit Fish and Wildlife in California (pending)
	NMFS—ESA; Magnuson-Stevens Fishery Conservation and Management Act [c]	• Programmatic Biological Opinion for Restoration Projects in the Central Valley of California
State Agencies	Lead State or Local Agency—CEQA	• Categorical Exemption 15333 Small Habitat Restoration Projects [b,c] • Categorical Exemption 15304 Minor Alterations to Land [d]

Agency	Statute	Expedited Compliance Mechanisms
	CDFW—Section 1600 of the California Fish and Game Code	• Habitat Restoration and Enhancement Act [e]
	CDFW—CESA	• Habitat Restoration and Enhancement Act [e]
	Central Valley Regional Water Quality Control Board—CWA (Section 401); Porter-Cologne Water Quality Control Act	• CWA Section 401 Water Quality Certification for Small Habitat Restoration Projects [f] • CWA Section 401 Water Quality Certification and WDRs for Restoration Projects Statewide (pending) [g]

Source: DWR 2022b

[a] Applicable to projects directly affecting 500 linear feet of streambank or less.

[b] Consultations on actions that may adversely affect essential fish habitat (required by the Magnuson-Stevens Fishery Conservation and Management Act) may be conducted in conjunction with NEPA compliance, ESA compliance, or USACE permitting, or as a separate consultation.

[c] Applicable to projects not exceeding 5 acres.

[d] State CEQA Guidelines Section 15300.2 describes exceptions to categorical exemptions (for example, if the project could cause a substantial adverse change in the significance of a historical resource).

[e] To qualify for the Habitat Restoration and Enhancement Act, projects must meet eligibility requirements for the Clean Water Act Section 401 Water Quality Certification for Small Habitat Restoration Projects. Restoration and enhancement projects approved by CDFW pursuant to the Habitat Restoration and Enhancement Act do not require additional permits from CDFW, such as a lake and streambed alteration agreement or CESA permit.

[f] Applicable to projects not exceeding 5 acres or a cumulative total of 500 linear feet of stream bank or coastline, and that also qualify for a CEQA Class 33 categorical exemption.

[g] Anticipated to be considered for approval by the State Water Resources Control Board in 2022.

CDFW = California Department of Fish and Wildlife
CEQA = California Environmental Quality Act
CESA = California Endangered Species Act
CWA = Clean Water Act
ESA = Endangered Species Act
NEPA = National Environmental Policy Act
NMFS = US Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service
NOAA = National Oceanic and Atmospheric Administration
NPDES = National Pollutant Discharge Elimination System
NWP = Nationwide Permit
RGP = Regional General Permit
SHPO = State Historic Preservation Office
USACE = US Army Corps of Engineers
USC = United States Code
USFWS = US Fish and Wildlife Service
WDR = waste discharge requirement

These compliance mechanisms benefit ecological restoration and multi-benefit projects in several ways. With their standardized measures and other requirements, they may provide greater certainty regarding the cost, timeline, and other implications of compliance with environmental laws and regulations. The design and planning practices (such as including biologists and regulatory agency staff in project planning) facilitate permitting; the avoidance and minimization measures are typically applicable and acceptable to multiple regulatory agencies.

The California Natural Resources Agency is also developing more efficient permitting mechanisms that are intended to support ecological restoration efforts (that is, habitat and multi-benefit projects). These mechanisms are relevant to the following actions, some of which may also benefit related O&M activities:

- Improvements to stream crossings and fish passage.
- Removal of pilings and other in-water structures.
- Removal of small dams, tide gates, and legacy structures.
- Bioengineered bank stabilization.
- Restoration of off-channel and side-channel habitat features.
- Restoration of floodplains.
- Restoration of tidal and nontidal wetlands.
- Restoration of riparian habitat.
- Removal of non-native invasive plants, including aquatic weeds and native plant revegetation. (DWR 2022b).

Multiple-objective Operations and Maintenance

The 2017 CVFPP Update planning process included development of the Multiple-objective Operations and Maintenance (MOOM) Technical Memorandum (DWR 2017), which examined five MOOM programs in parts of California outside of the Central Valley.

Examination of MOOM case studies was included in the 2017 CVFPP Update planning process because, along with addressing SPFC O&M challenges, CVFPP implementation includes multi-benefit projects throughout the SPFC that would need to be maintained for the variety of benefits they are intended to provide (for example, flood risk reduction, ecosystem vitality, recreation, water quality, and agricultural production). After project implementation, O&M of those multi-benefit SPFC improvements incorporates activities to maintain both flood protection and habitat quality.

CHAPTER 4

Summary and Recommendations

The USJR region experiences a wide range of institutional barriers related to State, federal, and local policies; regulatory compliance; and funding that challenge the implementation of flood protection actions and O&M. Despite these barriers, the region has made continued progress toward reducing flood risk for its communities. However, process improvements and opportunities to address these challenges are sorely needed to further facilitate implementation of flood risk reduction actions. With subsidence, insufficient or aging infrastructure, seepage, loss of hydraulic capacity due to sedimentation and vegetation encroachment, and complex system operations, continued and frequent investment into the flood system is needed.

The following items highlight key recommendations to reduce these institutional barriers to support improved management, continued O&M, infrastructure improvement, and upkeep of the USJR flood system:

- Work with State and federal partners to seek USACE reauthorization for PL 84-99 emergency rehabilitation assistance.
- Undertake key leadership activities to both effectively manage various project components (for example, financial, planning, design, permitting, construction, and outreach), and engage regulatory agencies (CVFPB, CDFW, USFWS, NMFS, USACE) to work together to endorse, permit, and fund projects in a timely manner.
- Use successfully implemented multi-benefit projects in the USJR and other regions as a framework for identifying potential funding sources and expediting the permitting process.
- Implement multi-benefit projects, where possible, to support improved flood protection, ecosystem restoration, groundwater recharge, and more; facilitate collaboration; align with State objectives and efforts; and secure additional funding sources.
- Continue to advocate for funding through existing funding programs and engage in regional and State planning efforts to identify additional and more innovative funding opportunities to support implementation of flood risk reduction actions.
- Align project objectives with efficient State permitting mechanisms to facilitate an expedited regulatory process.
- Identify and investigate priority project locations throughout the region and engage with interested stakeholders and State agencies to progress efforts in these areas.

CHAPTER 5

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