Draft Multi-Benefit Opportunities and Performance Tracking

Upper San Joaquin River

Regional Flood Management Planning

June 2023

Upper San Joaquin River Regional Flood Management Plan

San Joaquin River Flood Control Project Agency

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Acronyms and Abbreviations

CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
DWR	California Department of Water Resources
LMA	local maintaining agencies
MCFCWCA	Madera County Flood Control and Water Conservation Agency
MSG	Merced Streams Group
NWR	National Wildlife Refuge
O&M	operation(s) and maintenance
RFMP	Regional Flood Management Plan (Planning)
SJRECWA	San Joaquin River Exchange Contractors Water Authority
SJRFCPA	San Joaquin River Flood Control Project Agency
SJRRP	San Joaquin River Restoration Program
SPFC	State Plan of Flood Control
USJR	Upper San Joaquin River
CEQA	California Environmental Quality Act
DAC	disadvantaged community (ies)
USACE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
Flood-MAR	flood-managed aquifer recharge
State	State of California
Reclamation	US Department of the Interior Bureau of Reclamation
PPIC	Public Policy Institute of California
SB	Senate Bill

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) (SJRFCPA 2015) in support of the Central Valley Flood Protection Plan (CVFPP) effort. The SJRFCPA is a joint powers authority created to coordinate 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 the San Joaquin River Exchange Contractors Water Authority.

This white paper provides additional information about the current multi-benefit flood project opportunities in the USJR RFMP. It identifies the current status of identified flood protection projects that include multi-benefit opportunities and provides recommendations for facilitating the development and enhancement of multi-benefit projects. It also builds upon and advances the *Final Upper San Joaquin River Regional Flood Management Plan* (SJRFCPA 2015), which was published in 2015, as well as 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, institutional barriers and process improvements, climate resiliency, and others. Taken altogether, these white papers are meant to provide additional strategic planning support and advance the ability and capacity of the SJRFCPA to provide flood management improvements in the USJR region.

The USJR region's RFMP identifies and articulates flood management challenges and deficiencies at the regional level, and describes potential actions and projects identified by local agencies and interest groups. Phase 3 of the USJR RFMP began in 2020 as a way to achieve the following:

- Inform the 2022 CVFPP Update (California Department of Water Resources [DWR] 2022)
- Update previous RFMP project lists
- Re-analyze previous regional challenges
- Identify additional challenges and opportunities

USJR RFMP Phase 3 work included extensive outreach to inform interested parties about 2022 CVFPP Update activities, requesting input on flood protection and multi-benefit project priorities, and allowing project partners to review draft documents and materials, including the Draft *Regional Priorities White Paper* (SJRFCPA 2021).

In the 2015 USJR RFMP document and the subsequent Draft *Regional Priorities White Paper*, SJRFCPA has identified a suite of multi-benefit flood 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 objectives as provided in the CVFPP and accompanying Conservation Strategy. Adding multi-

benefit components into flood management projects make them more attractive to State of California (State) and federal funding programs and aid in obtaining regulatory permits. In addition to collaborating with DWR, SJRFCPA seeks a proactive approach to working with the Central Valley Flood Protection Board (CVFPB), California Department of Fish and Wildlife (CDFW), US Fish and Wildlife Service (USFWS), National Marine Fisheries Service, US Department of the Interior Bureau of Reclamation (Reclamation), and the US Army Corps of Engineers (USACE) to develop projects that meet multiple objectives including long-term operation and maintenance (O&M) considerations, and recovery of listed species and sensitive habitats.

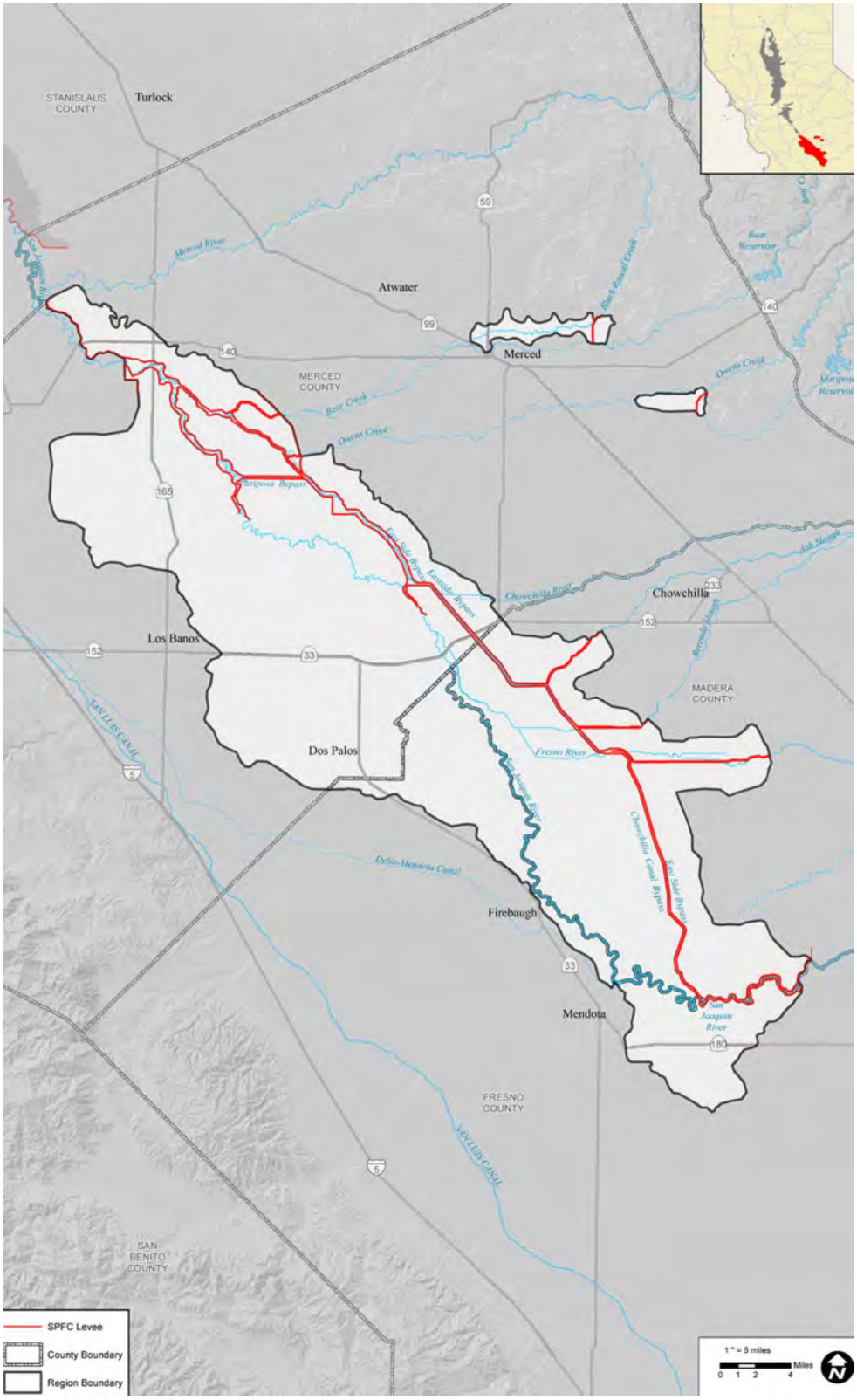
1.1 Regional Context

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 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 turn northwestward on the valley floor toward the Delta, where they meet the Sacramento River.

The USJR region (Figure 1-1) 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).

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



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 USJR region are considered disadvantaged communities (DACs) based on income level, and require significant financial support. Major cities in the USJR region include the cities of Firebaugh, Mendota, Dos Palos, Merced, and Los Banos. No known tribal lands are located in the region (SJRFCPA 2015).

1.2 Multi-Benefit Planning Background

The Central Valley Flood Protection Act of 2008 directed DWR to prepare the CVFPP for adoption by the CVFPB. The CVFPP addresses flood risks in an integrated manner while improving ecosystem functions, O&M practices, and institutional support for flood management. Specifically, Central Valley Flood Protection Act of 2008 stipulated that the CVFPP provide "a description of structural and nonstructural means for enabling or improving systemwide riverine ecosystem function, including, but not limited to, establishment of riparian habitat and seasonal inundation of available floodplains where feasible" (California Water Code Section 9614[j]).

A nature-based approach toward flood management, which seeks to restore natural processes and beneficially use floodplains to attenuate and store floodwaters, is integral to the CVFPP and the emerging State approach toward establishing resilient communities and ecosystems. A key element of the CVFPP is the Conservation Strategy. The Conservation Strategy describes how ecological components can be integrated into flood management projects and O&M. The Conservation Strategy also provides four goals for improving ecosystem functions and values associated with implementation of the CVFPP:

- **Ecosystem Processes:** Improve dynamic hydrologic (flow) and geomorphic processes in the State Plan of Flood Control (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—all critical factors in sustaining fisheries and riverine habitat.
- **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.
- **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.

- **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 for specific types of ecosystem improvements and sets long-term objectives for the number of these improvements that 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 and may also provide other public benefits.

The Conservation Strategy provides measurable objectives for the Upper San Joaquin River Conservation Planning Area that will guide multi-benefit projects under the RFMP. Table 1 summarizes the measurable objectives, with the "additional need" total values summed from other existing conservation plans in the region, and the "objective amount" total being the measurable objective value per the Conservation Strategy for the USJR region.

Table 1-1. CVFPP Conservation Strategy Summary Measurable Objectives for the USJR Region

Goal and Metric	Additional Need [a]	Objective Amount [b]	Contributions Since 2016
Ecosystem Processes			
Floodplain inundation: 2-year, 14-day, Dec–Mar (acres)	2,800	2,800	0
Riverine geomorphic processes: natural banks (miles)	0–23	8	0
Riverine geomorphic processes: meander potential (acres)	0–2,100	2,100	0
Habitats			
Shaded riverine aquatic cover: natural bank (acres)	0–23	8	0
Shaded riverine aquatic cover: riparian-lined bank (acres)	0–228	2	0
Riparian habitat (acres)	2,100	2,100–2,400	0
Marsh/other wetland (acres)	5,200	0	0
Stressors			
Fish passage barriers	23	Under evaluation	0
Invasive plants (acres)	677	143	0

Source: DWR 2016; 2021, 2022, Conservation Strategy Appendix F
Notes: [a] per other existing conservation plans
[b] per the Conservation Strategy for the USJR region

1.3 Purpose and Objectives

This white paper aims to provide additional information and a strategic approach toward advancing projects focused on flood management and flood risk reduction, which also provide crucial co-benefits for the USJR region, including:

- Ecosystem improvement and restoration
- Groundwater recharge and subsidence reversal
- Recreation
- Water quality
- Water supply
- Agriculture/economic vitality
- Long-term O&M

This white paper also seeks to advance multi-benefit projects that are compatible with the following priorities for the USJR region, which were identified in the Draft *Regional Priorities White Paper* (SJRFCPA 2021):

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

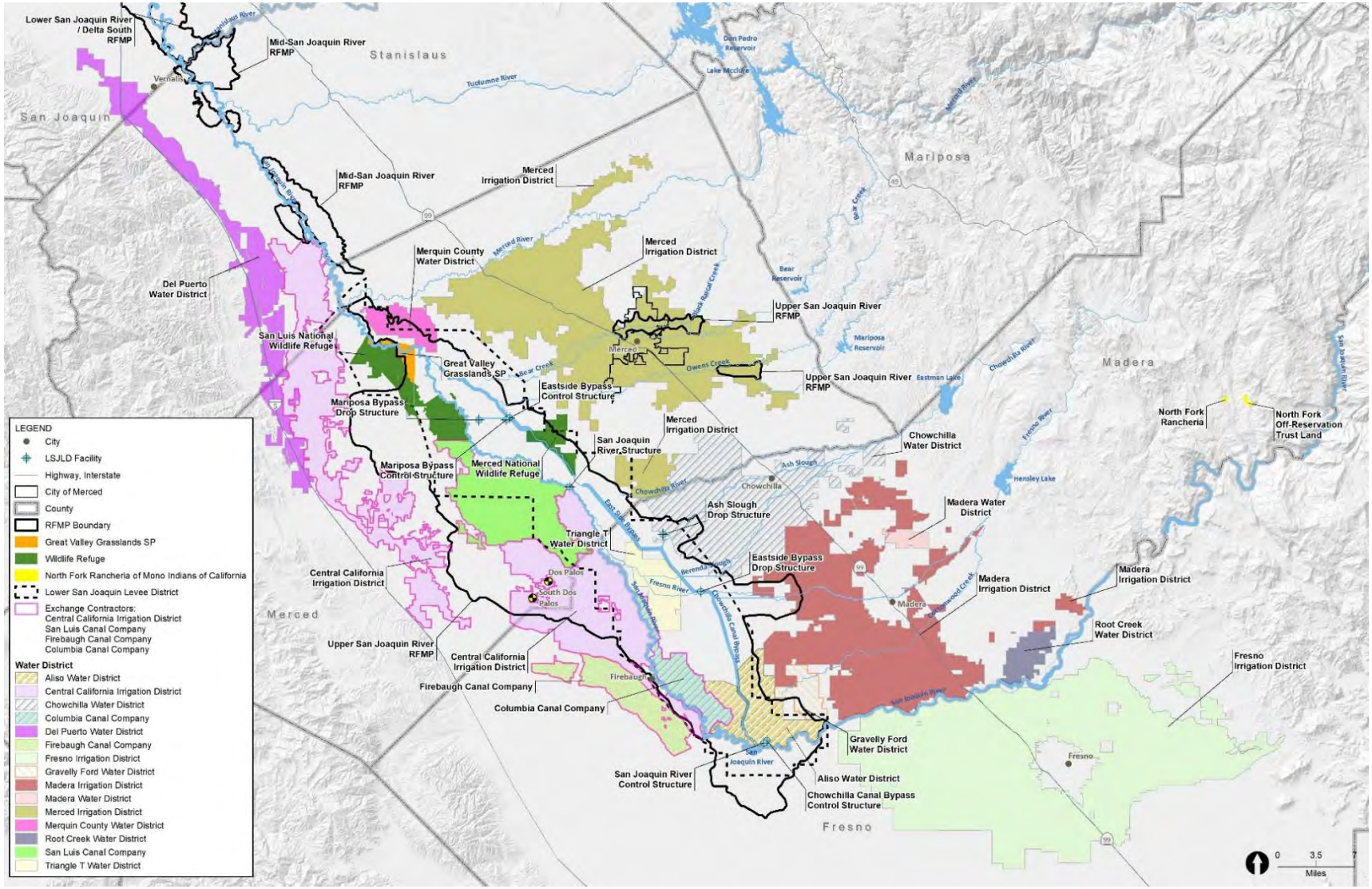
2 Participant Groups

In the USJR RFMP, multi-benefit project opportunities are identified and prioritized by regional participants and partners. The following participant groups have participated in USJR RFMP project development efforts:

- LSJLD
- City of Firebaugh
- San Joaquin River Exchange Contractors Water Authority (SJRECWA)
- Merced Streams Group (MSG)
  - Merced County
  - Merced Irrigation District
  - City of Merced
- Madera Region Participant Groups
  - Madera County
  - Madera Irrigation District
  - Gravelly Ford Water District
  - Chowchilla Water District
- San Joaquin River Refuges
  - US Fish and Wildlife Service
- Non-Governmental Organizations
  - American Rivers
  - River Partners
  - Audubon California
  - Trout Unlimited
  - Ducks Unlimited

The jurisdictions and service areas for these various entities are provided in Figure 2-1. The non-governmental organizations operate throughout the USJR RFMP area.

Figure 2-1. Jurisdictional Boundaries in the Upper San Joaquin Regional Flood Management Plan

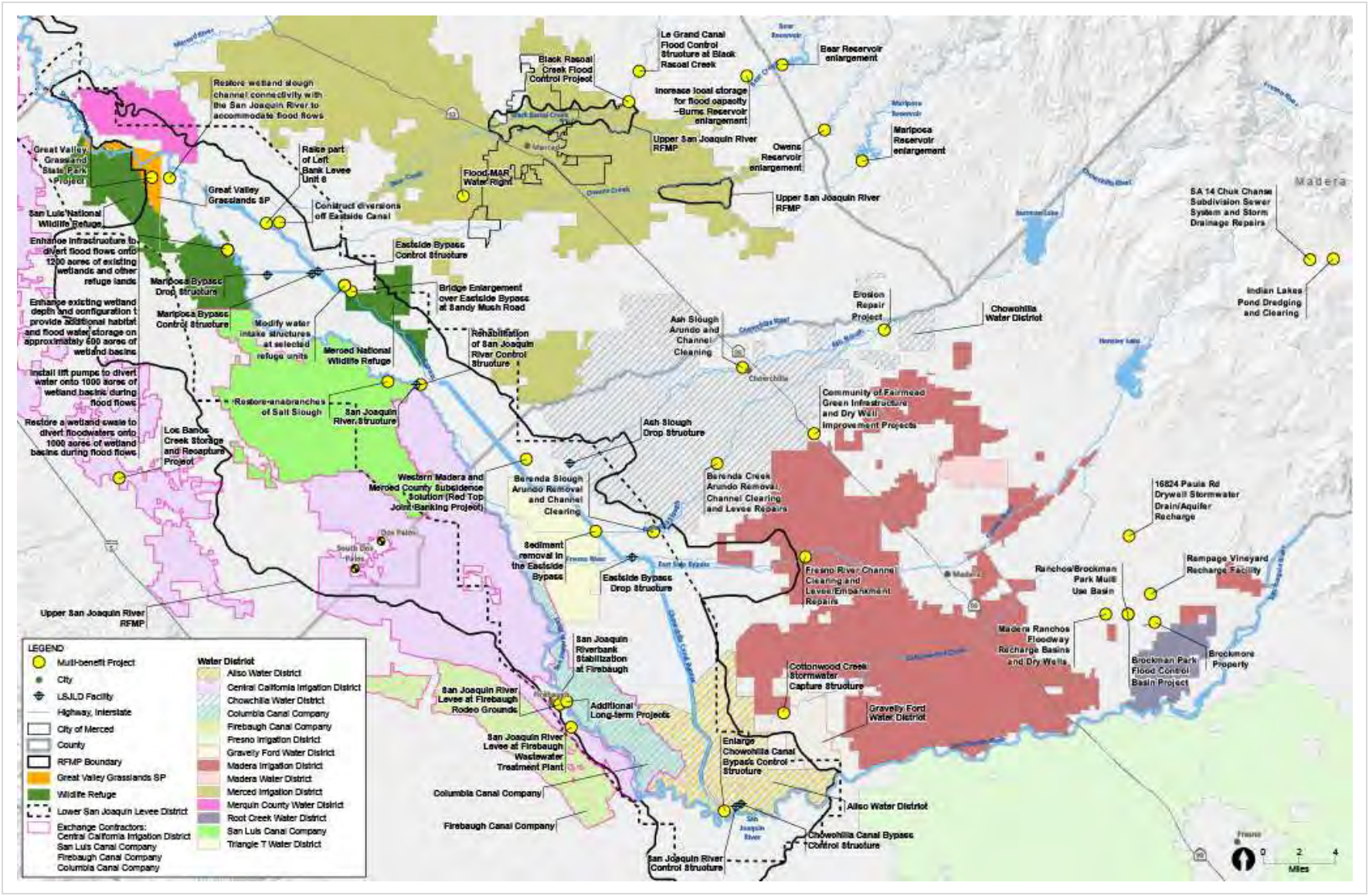


3 Multi-Benefit Opportunities

Multi-benefit flood project opportunities in the USJR RFMP were originally identified in the 2015 RFMP document (SJRFCPA 2015) through a series of workshops and meetings with regional partners. Most of those original opportunities were developed prior to the release of the 2016 Conservation Strategy, which provides key guidance for the ecological objectives associated with multi-benefit projects, as well as regional targets for conservation and restoration. As a result, many of the initial USJR multi-benefit project opportunities were further refined in the subsequent years as result of more specific planning guidance from the 2017 and 2022 CVFPP Updates, 2016 Conservation Strategy, and the 2022 Conservation Strategy Update. Additionally, more current understanding of the impact of extreme weather events, the resulting flood risk, and the increasing need to develop more resilient water and ecological management approaches has both elevated the urgency for multi-benefit project implementation and provided additional funding opportunities for multi-benefit project development. In Appendix H, *Climate Change Adaptation* of the 2022 Conservation Strategy Update, DWR provides specific guidance about opportunities for floodplain reconnection, habitat improvement, and target species conservation in the USJR region.

Current multi-benefit flood projection opportunities and priorities in the USJR region have been developed based on a series of meetings held with key partnering organizations identified in the previous section. These opportunities have been organized according to the project lead agency, and include the project name, project location, project cost, a brief project description, multi-benefit components, current status, and recommended next steps. Figure 3-1 shows the locations of these projects.

Figure 3-1. Upper San Joaquin Regional Flood Management Multibenefit Project Map



3.1 Lower San Joaquin Levee District Priority Projects

The LSJLD was formed in 1955 by special act of the legislature to operate, maintain, and perform minor repairs on levees, bypasses, and other facilities built in connection with the San Joaquin River Flood Control Project. DWR designed and constructed this project between 1959 and 1966 and is responsible for major capital repairs and improvements of the project. It is located along the San Joaquin River and portions of its east-side tributaries in Merced, Madera, and Fresno counties. The service area of the project covers 108 river miles (RM) and 192 miles of levees, which protect more than 300,000 acres of land (468 square miles). LSJLD is responsible for O&M and emergency management of SPFC facilities within LSJLD boundaries, which includes levees, channel bottoms, and flood management facilities. The LSJLD is not responsible for O&M of non-project levees along the San Joaquin River. The LSJLD is funded by property tax assessments on lands within the LSJLD boundaries that receive flood control benefits. As a result of conversion of lands to State and Federal ownership (primarily for wildlife areas), the LSJLD is facing a disappearing tax base at a time when O&M costs are rising. This is important because O&M will face additional costs to maintain the channel, levee, and related flood management facilities that might be constructed as part of the SJRRP, which will far exceed the LSJLD's current operating budget.

The LSJLD is primarily interested in multi-benefit projects that improve their ability to reduce flood risk, maintain infrastructure integrity, improve their ability to perform O&M, and attract additional funding.

Priority multi-benefit projects for the LSJLD include:

- Bridge Enlargement over Eastside Bypass at Sandy Mush Road
- Enlarge Chowchilla Bypass Control Structure
- Conveyance and Subsidence Rehabilitation Projects

Table 3-1 describes these projects further; Figure 3-2 is a map showing the approximate locations of these projects.

Table 3-1. Priority Projects for Lower San Joaquin Levee District

Project Lead	Project Name	Project Location	Estimated Cost ($M)	Project Description	Multi-Benefit Components	Project Status	Next Steps
LSJLD	Bridge Enlargement over Eastside Bypass at Sandy Mush Road	Merced County 37°11’10.14”N 120°39’35.40”W	$1.61	The Sandy Mush Road crossing of the Eastside Bypass Canal includes a bridge deck and piles with elevated road embankments at each end of the bridge. The current flow area under the bridge and between the embankments is much less than the upstream flow area of the bypass, which constricts flood flows. The elevated road embankments have been cut three times in the past to allow the flood flows to pass, which is problematic for Merced County because the road is an arterial evacuation route. The bridge needs to be lengthened to reduce flow constriction, or alternatively, culverts could be installed in the embankments to reduce the flow area.	Potential for riparian and wetland habitat enhancements as part of the bridge replacement; multi-benefit elements have yet to be defined.	Conceptual—not initiated	Undetermined—pending conversation with LSJLD
LSJLD	Enlarge Chowchilla Canal Bypass Control Structure	Madera County 36°46’26.44”N 120°17’4.19”W	$3.38	The control structure at the headwaters of the Chowchilla Canal Bypass would be enlarged with two additional gate bays to minimize upstream seepage and levee failure, increase the emergency flow capacity and increase operational flexibility of the structure. The bypass channel may need to be evaluated for increased channel capacity.	System improvement would require geotechnical analyses and would include fish passage. Also potential to integrate this project with floodplain reconnection and levee setbacks on properties adjacent to the control structure.	Conceptual—not initiated	Undetermined—pending conversation with LSJLD
LSJLD	Conveyance and Subsidence Rehabilitation Projects	Merced and Madera Counties 36°46’23.81”N 120°17’6.62”W	$17.62	This project involves improving flood infrastructure and mitigating the impacts of subsidence and sedimentation along portions of the Eastside Bypass, including raising part of Left Bank Levee Unit 6, rehabilitation of San Joaquin River Control Structure, and sediment removal. Portions of the left bank levee Unit 6 were constructed as much as 2 feet lower than the right bank levees and need to be raised to provide the design freeboard. System improvement would require modeling of the system in the area to set levee elevation. Settlement at the San Joaquin River Control Structure has resulted in the wing walls separating from the structure. The wing wall backfill could be excavated and voids could be grouted under the spread footings, or spread footings could be added or enlarged to minimize further settlement. The project would evaluate and implement sediment removal actions in the Eastside Bypass to restore channel design capacity.	Depending on phasing and/or timing, the design could be coordinated with the SJRRP 2B project to allow incorporation of fish passage and/or habitat restoration elements within the project footprint. Potential for other multi-benefits improvements to be integrated into these actions, but these have not been identified as of 2023.	Conceptual—not initiated	Undetermined—pending conversation with LSJLD

3.2 City of Firebaugh Priority Projects

The City of Firebaugh is located in Fresno County in the Central San Joaquin Valley, is about 35 miles west of the City of Fresno. Firebaugh is a DAC with high flood vulnerability, and is located on the west side of the San Joaquin River. Firebaugh lies within the planning area for the SJRRP; the restoration flow release for the San Joaquin River is 4,500 cubic feet per second, which is 500 cubic feet per second above the flow rate that results in flood risks in Firebaugh.

The geomorphic and ecological conditions of the San Joaquin River near Firebaugh is highly degraded because of water diversions at Friant Dam, conversion of riparian habitat to farmland, and river channelization for flood control. The size, quality and connectivity of aquatic, marsh and riparian ecosystems in the area are greatly reduced compared to historical conditions. Additionally, Firebaugh has limited recreational options such as trails or facilities. Existing trails are impacted by seasonal inundation. Storms events even at the 10-year storm return period in Firebaugh require sandbagging. The *Firebaugh Multi-Benefit Flood Management Project Flood Risk Reduction Feasibility Study* (Firebaugh Feasibility Study) (City of Firebaugh 2022) ultimately seeks to offer a 100-year flood protection based on US Federal Emergency Management Agency standards along Reach 3 of the San Joaquin River (Figure 3-3). This would help to protect Firebaugh. The Feasibility Study identifies several key infrastructure elements that are most vulnerable to flood damage. The next step is to seek funding for the design phase for projects addressing these vulnerabilities.

Priority multi-benefit projects for City of Firebaugh include:

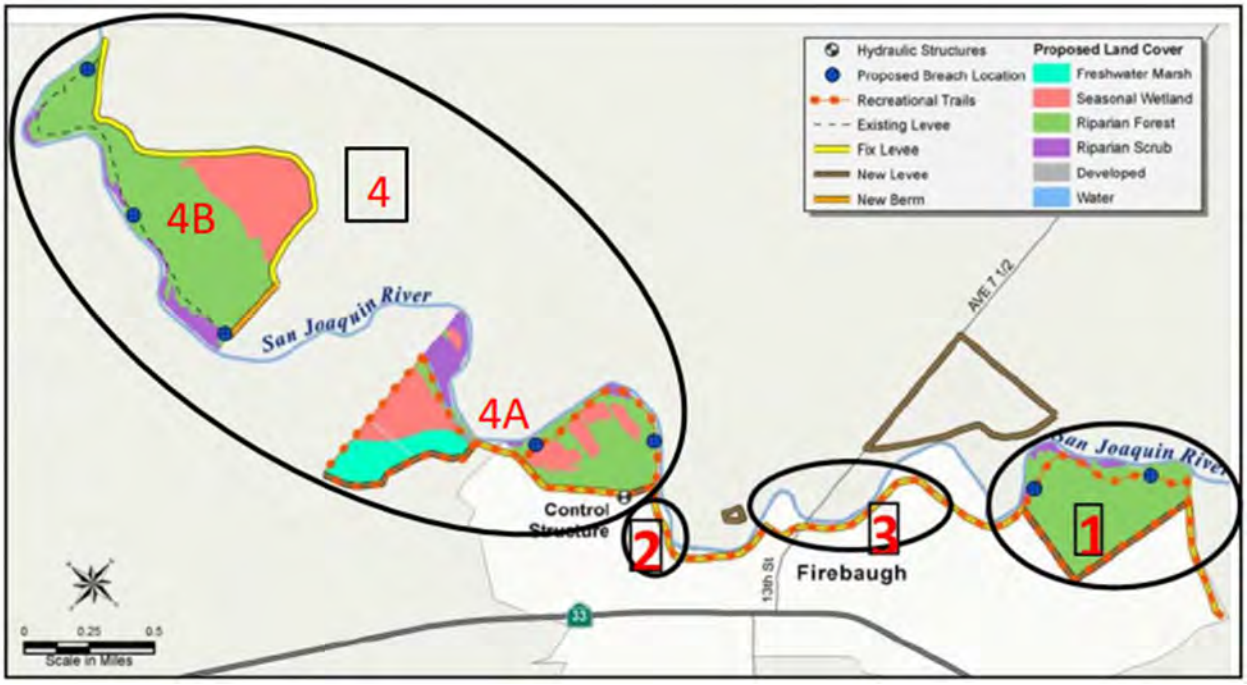
- San Joaquin River Levee at Firebaugh Wastewater Treatment Plant
- San Joaquin Riverbank Stabilization at Firebaugh
- San Joaquin River Levee at Firebaugh Rodeo Grounds
- Ecosystem Restoration Projects
- Additional Long-term Projects

Table 3-3 further describes these projects, and Figure 3-2 is a map with approximate project locations.

Table 3-2. Priority Projects for City of Firebaugh

Lead Agency	Project Name	Project Location	Estimated Cost ($M)	Project Description	Multi-Benefit Components	Project Status	Next Steps
City of Firebaugh	San Joaquin River Levee at Firebaugh Wastewater Treatment Plant	Firebaugh, Fresno County 36°50'54.57"N 120°26'5.15"W	$15.7	Setback levee and riparian restoration at the wastewater treatment plant. Firebaugh's wastewater treatment plant is located near the west bank of the San Joaquin River at the south end of Firebaugh. Flood flows in the river have threatened the treatment plant in recent years. Constructing an earthen levee between the river and the treatment plant would protect it against future flooding. Vacant land along the upper floodplain of the river is available for the proposed levee. Untreated effluents from the Firebaugh's wastewater treatment plant would threaten water quality in the San Joaquin River in the case of catastrophic flooding in the area. A study will evaluate the feasibility of the levee alignment and inclusion of recreation and environmental enhancement components.	Flood risk management, Ecosystem improvement/ restoration, recreation	Seeking funding for project design and implementation	Seek funding
City of Firebaugh	San Joaquin Riverbank Stabilization at Firebaugh	Firebaugh, Fresno County	$3.5	The San Joaquin River makes a sharp turn to the northeast near the intersection of 9th and Q streets in Firebaugh. The west bank at this turn is steep, unstable, and less than 50 feet from several residences. These residences are threatened because of bank erosion, and the next major storm is likely to flood these homes.	Undetermined; potential to use vegetated bank stabilization approach to provide habitat benefits	Seeking funding for project design and implementation	Seek funding
City of Firebaugh	San Joaquin River Levee at Firebaugh Rodeo Grounds	Firebaugh, Fresno County	$2.9	Well 11 is located south of 13th Street near the City's rodeo grounds and park. Flood flows in the San Joaquin River have inundated the rodeo grounds and threatened the treatment plant in recent years.	Undetermined	Seeking funding for project design and implementation	Seek funding
City of Firebaugh	Ecosystem Restoration Projects	Firebaugh, Fresno County	$70	To restore the ecology and incorporate multi-benefit features into the City of Firebaugh's flood improvement projects, freshwater marsh, seasonal wetland, and riparian habitat restoration are proposed for Project Area 4 (Figure 3-3). Levee crowns near the city could be used as recreational trails.	Floodplain reconnection, habitat restoration, recreational enhancement, river access	Seeking funding for project design and implementation	Seek funding
City of Firebaugh	Additional Long-term Projects	Firebaugh, Fresno County	$46.6	Long-term projects include replacing levees, constructing recreational trails, improvements in Eastside Acres, other projects.	Undetermined	Seeking funding for project design and implementation	Seek funding

Figure 3-2. Project Locations in the Firebaugh Feasibility Study Area



Source: Firebaugh Multibenefit Flood Management Project Flood Risk Reduction Feasibility Report, 2022
Project Area 1 – Setback levee and riparian restoration at wastewater treatment plant
Project Area 2 – Stabilize eroding bank at sharp bend in river
Project Area 3 – Setback levee segment to protect water treatment plant/rodeo grounds
Project Area 4 – Ecosystem restoration projects

3.3 San Joaquin River Exchange Contractors Water Authority

The San Joaquin River Exchange Contractors Water Authority (SJRECWA) is a joint powers authority and water management agency representing the San Joaquin River Exchange Contractors (SJREC) in California. Established in 1939, SJRECWA serves as a collective entity for the member agencies and districts that hold long-standing water contracts within the San Joaquin River system. Its members include: Central California Irrigation District, Columbia Canal Company, Firebaugh Canal Water District and San Luis Canal Company.

SJRECWA's primary objective is to secure and manage water supplies for its members, which include agricultural districts and urban water suppliers. Through collaborative efforts, SJRECWA coordinates water deliveries from the Central Valley Project and the State Water Project to meet the diverse water needs of its members, which include irrigation, municipal water supplies, and environmental management. SJRECWA plays a crucial role in water resource planning, water rights advocacy, and overall water supply reliability in the San Joaquin Valley. SJRECWA services approximately 240,000 acres of agricultural land east of Interstate (I-)5 and largely west of the San Joaquin River. The service area spans Fresno, Madera, Merced, and Stanislaus counties.

SJRECWA's highest priorities for multi-benefit project development include the following:

- Develop and implement multi-benefit project opportunities for regional self-sufficiency and diversification of water supplies by the diversion of flood waters for storage and groundwater recharge to reverse the deterioration of facilities due to land subsidence.
- Implement Sustainable Groundwater Management Act projects consistent with local groundwater sustainability plans in collaboration with regional partners.

Table 3-3 further describes SJRECWA multi-benefit projects, and Figure 3-4 is a map showing approximate project locations.

Table 3-3. Priority Projects for San Joaquin River Exchange Contractors Water Authority

Lead Agency	Project Name	Project Location	Estimated Cost ($M)	Project Description	Multi-Benefit Components	Project Status	Next Steps
Central California Irrigation District	Los Banos Creek Detention Reservoir Regulation and Storage	Additional information needed	$3.50	Project partners Central California Irrigation District and San Luis Water District and Grasslands Water District will realize an average annual increase in water supplies of 8,000 acre-feet per year. The project will provide a long-term solution to flooding, drought resilience, groundwater overdraft and subsidence risks. Properties, facilities and/or communities to directly benefit from this project include the rock quarry (Triangle Rock/CalMat) and other private property such as dairies and farmland in the project area, county roads and bridges, Highway 152/Pacheco Boulevard, the Delta Mendota Canal, the City of Los Banos, and Merced Community College Los Banos Campus. The project will use an existing reservoir for water supply resiliency.	• Flood management • Drought resilience • Reduce groundwater overdraft and subsidence risks	In progress	Undetermined, pending further conversation
Central California Irrigation District	Los Banos Creek Storage and Recapture Project	Merced County	$10.00	The Los Banos Creek Recharge & Recovery Project includes construction of 103 acres of recharge ponds and six recovery wells along Los Banos Creek between the California Aqueduct and the Central California Irrigation District's Outside Canal. The project would receive surface water from Los Banos Creek, SJRECWA, San Luis Water District, and the Central California Irrigation District's Main and Outside Canals, or through exchange from other contractors. The Delta-Mendota Canal and Outside Canal would be used to convey the water to the bank. Water wells will be piped to the Delta-Mendota and Outside canals.	• Flood risk reduction • Water supply provision • Groundwater recharge, subsidence prevention	As of December 2020, the project partners, SJRECWA and the San Luis Water District would develop about 35,000 acre-feet of locally controlled groundwater storage for use in drought resiliency and for groundwater management consistent with the sub-basins' Groundwater Sustainability Plans.	Undetermined, pending further conversation
Red Top Area Growers	Western Madera and Merced County Subsidence Solution (Red Top Joint Banking Project)	Madera County 36°59'45.95"N 120°26'29.75"W	$13.90	The Red Top Area Joint Banking Project would consist of a combined banking and overdraft correction program in the Red Top/El Nido (Washington Avenue) areas east of the San Joaquin River in an effort to reduce groundwater pumping from below the Corcoran Clay. Significant subsidence has been observed lately in this area. Red Top Area Growers are planning to develop 720 acres of recharge ponds, 30 new shallow water wells, and surface water distribution to 26,000 acres of land currently irrigated with well water. The recharge areas could be expanded, and if flood flows occur before vine or tree budding, larger cropped areas could be flooded. Based on current projections, the 720 acres of ponds can provide capacity to absorb about 180 cubic feet per second off the flood system.	• Groundwater Recharge • Floodwater management • Subsidence prevention	In progress	Undetermined, pending further conversation

3.4 Merced Streams Group

MSG is a nonbinding partnership between the City of Merced, County of Merced, and Merced ID. The MSG project was authorized by the Flood Control Act of 1944, which was part of the comprehensive plan for flood control for the Sacramento and San Joaquin River Basins. This project was completed in 1957 and consists of four flood control reservoirs on Burns, Bear, Owens, and Mariposa creeks, including downstream improvements. In the 1970s, the MSG project was reauthorized in the Flood Control Act of 1970. This authorization provided for enlargement of the four existing reservoirs, construction of three new reservoirs, and channel improvements along Bear Creek and Mariposa Creek systems; however, only Castle Dam was completed (in 1992). Recently, MSG and the USACE have been developing feasibility studies to support the construction of a dam on Black Rascal Creek that would provide a portion of the city of Merced with 200-year protection. MSG is responsible for O&M on approximately 107 miles of natural channels within Merced County, covering nine creeks (Black Rascal, Burns, Bear, Canal, Edendale, Fahrens, Miles, Mariposa, and Owens creeks). MSG facilities within the USJR region include 6 miles of levees and channel along Black Rascal Creek and Owens Creek, the Owens Creek Siphon Structure, and the Black Rascal Creek Drop Structure.

MSG's highest priorities for flood planning include the following:

- Seeking assistance from DWR and CVFPB to facilitate a successful and timely Clean Water Act Section 408 permit process for the Black Rascal Creek Flood Control Project.
- Evaluating options for creating a formal joint powers authority agreement among partner agencies to support improved O&M.
- Seeking assistance for creating a major amendment to the County/CDFW O&M permit currently under development. Also seeking support for proposing revisions to the draft agreement measures that protect fish and wildlife resources and the requirements for additional environmental review.
- Promoting synergies between flood and groundwater management through flood-managed aquifer recharge (Flood-MAR) partnerships with Merced Irrigation District and DWR.
- Improving existing flood facilities to provide the required 100- and 200-year levels of flood protection.

Multi-benefit project opportunities in the Merced region include developing groundwater recharge, invasive vegetation management, and ecosystem enhancement components of regional flood risk reduction projects.

Table 3-4 further describes MSG multi-benefit projects; Figure 3-5 is a map showing approximate project locations.

Table 3-4. Priority Projects for Merced Streams Group

Lead Agency	Project Name	Project Location	Estimated Cost ($M)	Project Description	Multi-Benefit Components	Project Status	Next Steps
Merced County	Black Rascal Creek Flood Control Project	Merced County	$33.0	This project involves construction of a regulating reservoir on the Black Rascal Creek Watershed and system to provide protection against a 200-year storm event and flood control on the currently unprotected watershed. The new reservoir would maintain a deadpool for wildlife purposes. During flood season, the reservoir would be used primarily as a flood retention basin. During irrigation season, the reservoir would regulate irrigation flows and improve efficiency of Merced Irrigation District's water system without impacting California Independent System Operator power generation scheduling at New Exchequer Dam.	• Flood management • Wildlife habitat • Agricultural irrigation	In progress	Undetermined, pending conversation with Merced County
Merced Irrigation District	Le Grand Canal Flood Control Structure at Black Rascal Creek	Merced County	$1.6	DWR's Division of Safety of Dams considers Le Grand Canal the official spillway to Lake Yosemite. The canal begins at the Lake Yosemite and traverses southeasterly along the foothills' toe contour toward the town of Planada. As a result, the canal intercepts or bypasses all creeks and ravines draining the foothills. The first major waterway the canal crosses Black Rascal Creek. Le Grand Canal crosses Black Rascal Creek via a double-barrel reinforced concrete box. At the end of each irrigation season, Merced Irrigation District breaches the right bank of the canal and places a temporary dam so that all flood flows from Lake Yosemite are deposited to Black Rascal Creek. At the beginning of every irrigation season, the Le Grand Canal is repaired and flows continue downstream. This project proposes a control structure that would connect to Merced Irrigation District's supervisory control and data acquisition system. This would allow the district to react in a timely manner to flow conditions and divert all or portion of flood flows as needed.	• Floodwater management • Riparian and wetland habitat	In progress	Undetermined, pending conversation with Merced Irrigation District
Merced Irrigation District	Flood-MAR Water Right	Merced County	$40.0	This project would install pumps to decrease downstream flooding. Project description and cost on DWR's Flood-MAR website is TBD.	• Groundwater recharge • Floodwater management	In progress—possibly granted	Undetermined, pending conversation with Merced County
Merced Streams Group	Increase local storage for flood capacity (Burns Reservoir enlargement, Bear Reservoir enlargement, Mariposa Reservoir enlargement, and Owens Reservoir enlargement)	Merced and Mariposa Counties	$363.5	Burns, Bear, Mariposa and Owen reservoirs were originally constructed in the early 1950s to provide protection for up to a 50-year storm event. However, the State has since adopted legislation that calls for a minimum 200-year level of flood protection in urbanized areas. Additionally, the Flood Control Act of 1970 called for three additional flood control reservoirs, enlargement of existing reservoirs, and 52 miles of levee and channel modifications. To date only one additional reservoir has been built (Castle Dam). These projects could help to meet the requirements of the new flood control legislation while also providing increased flood protection to the most urbanized areas of Merced County.	• Flood protection • Riparian and wetlands enhancement	Not initiated	Undetermined, pending conversation with MSG

3.5 Madera County

Madera County participants include Madera County Flood Control and Water Conservation Agency (MCFCWCA), Madera Irrigation District, Gravelly Ford Water District and Chowchilla Water District. MCFCWCA was formed in 1969 to be responsible for flood control planning in the county. MCFCWCA is responsible for maintaining 75 miles of channels and more than 26 miles of SPFC levees on Ash Slough, Berenda Slough, and on the Fresno and Chowchilla River systems.

MCFCWCA's ability to engage in and advance multi-benefit projects depends on the following actions:

- Regaining sustainable funding to meet O&M obligations.
- Maintaining the existing system, including removing sediment from channels, removing invasive vegetation from channels and levees, and abating rodents.
- Coordinating regionally with permitting agencies to develop a streamlined, cost-reimbursable permitting program to reduce time and costs associated with routine maintenance actions.
- Gaining support to develop Systemwide Improvement Frameworks for Ash Slough, Berenda Slough, and Fresno River levees.

A March 3, 2023 meeting with MCFCWCA highlighted invasive vegetation management and groundwater recharge projects as key elements of Madera County multibenefit projects.

Table 3-5 describes MCFCWCA multi-benefit projects further, and Figure 3-6 is a map showing approximate project locations.

Table 3-5. Priority Projects for Madera County Participants

Lead Agency	Project Name	Project Location	Estimated Cost ($M)	Project Description	Multi-Benefit Components	Project Status	Next Steps
Madera County	Ash Slough Arundo and Channel Cleaning	Madera County	1.50	This project covers approximately 21 miles of channel clearing and Arundo eradication and channel clearing within Ash Slough. Because of the project's high cost and lack of funding, Arundo has been allowed to grow unabated and is now constricting flood flows and reducing channel capacity. USACE has indicated that Ash Slough is no longer Public Law 84-99 eligible.	• Invasive vegetation management • Remove constrictions on channel capacity • Unconstrict flood flows	Last maintenance action for Ash and Berenda was in 2014 : Prop 84 was related to sediment removal and invasives removal. Project is always ongoing if there is funding.	Undetermined, pending further conversation
Madera County, Madera County Flood Control & Water Conservation District, Madera Irrigation District	Berenda Creek Arundo Removal, Channel Clearing and Levee Repairs	Madera County	0.5	Arundo has been allowed to grow unabated and is now constricting flood flows and reducing channel capacity. Approximately 13 miles of channel clearing and Arundo eradication and channel clearing within Berenda Creek. Because of the project's high cost and lack of funding, Arundo has been allowed to grow unabated and is now constricting flood flows and reducing channel capacity. As of October 2020, the project is not active but the lead agencies would pursue the project. The project extent is Berenda Creek between Avenue 20½ and Road 14.	• Invasive vegetation management	Last action for Ash and Berenda was in 2014 : Prop 84 was related to sediment removal and invasives removal. On going - when funding is available	Undetermined, pending further conversation
Madera County, Madera County Flood Control & Water Conservation District	Berenda Slough Arundo Removal and Channel Clearing	Madera County	1.0	Arundo is an aggressive bamboo weed that requires continual herbicide treatment to fully eradicate. Due to the project's high cost and lack of funding, Arundo has been allowed to grow unabated and is now constricting flood flows and reducing channel capacity. On Berenda Slough between Road 17 and Road 9, this project covers approximately 18 miles of channel clearing and Arundo eradication, and channel clearing within Berenda Slough.	• Invasive vegetation management • Remove constrictions on channel capacity • Unconstrict flood flows	Last action for Ash and Berenda was in 2014. Prop 84 was related to sediment removal and invasives removal.	Undetermined, pending further conversation
Madera County, Madera County Flood Control & Water Conservation District	Erosion Repair Project	Madera County	1.5	Erosion repairs are needed in Fresno River and Berenda Slough.	• Erosion management	Ongoing - when funding is available	Undetermined, pending further conversation
Madera County	Cottonwood Creek Stormwater Capture Structure	Madera County	0.1	The project would rebuild the crossing and replace the boards at the Intersection of Avenue 7 and Road East 1 mile, south by.5 mile, where Cottonwood Creek runs through property.	• Stormwater infiltration	Undetermined, pending further conversation	Undetermined, pending further conversation
Madera County	Fresno River Channel Clearing and Levee/Embankment Repairs	Madera County	0.1	This project involves removing approximately 23 miles of Arundo, excess overgrown vegetation, sediment deposition in the river channel, and making permanent repairs to the river's embankments and levees which were damaged during recent floods. This project would be located on the Fresno River between Road 28½ and Road 9.	• Invasive vegetation management	Undetermined, pending further conversation	Undetermined, pending further conversation
Madera County	16824 Paula Rd Drywell Stormwater Drain/Aquifer Recharge	Madera County	0.05	This project would construct a dry well (or alternate buried infiltrative device) on the west side of the property at 16824 Paula Road in Madera to help with stormwater management and recharge the water table in the area.	• Groundwater recharge • Stormwater management	Undetermined, pending further conversation	Undetermined, pending further conversation

Lead Agency	Project Name	Project Location	Estimated Cost ($M)	Project Description	Multi-Benefit Components	Project Status	Next Steps
Madera County	Brockman Park Flood Control Basin Project	Madera County	1	The project includes building an initial basin covering 5 acres of a proposed 13-acre site and additionally, a pipeline will be built to deliver surface water from the Madera Irrigation District's Lateral 6.2 to the basin for additional groundwater recharge.	• Groundwater recharge	Undetermined, pending further conversation	Undetermined, pending further conversation
Madera County	Rampage Vineyard Recharge Facility	Madera County	0.10	A specific location for a 10- to 20-acre recharge pond will be identified for this project. Subsurface borings, layout of the facility including basin, pipeline and pump station, and design drawings would be produced in an updated feasibility study. The project location covers Township 11, range 19 East, portions of Sections 25, 26, 27, 36, Mount Diablo Baseline, Meridian/Avenue 13 to the south, Road 36 to the west, and Road 39 to the east.	• Groundwater recharge	Undetermined, pending further conversation	Undetermined, pending further conversation
Fairmead Community and Friends	Community of Fairmead Green Infrastructure and Dry Well Improvement Projects	Madera County	1.2	In the community of Fairmead east of Highway 99 in Chowchilla, this project would include green infrastructure, dry wells, and/or community drainage improvements.	• Further discussion needed to determine multibenefit projects	Undetermined, pending further conversation	Undetermined, pending further conversation
Madera County	Brockmore Property	Madera County	TBD	Groundwater recharge/floodplain restoration. North of Avenue 12, East of Road 38.	• Groundwater recharge • Floodplain restoration	Undetermined, pending further conversation	Undetermined, pending further conversation

3.6 San Luis National Wildlife Refuge Complex

In the USJR RFMP region, the San Luis National Wildlife Refuge (NWR) complex includes two management units:

- San Luis NWR encompassing over 26,800 acres of wetlands, riparian woodlands, native grasslands, and vernal pools
- Merced NWR encompassing more than 10,200 acres of wetlands, native grasslands, vernal pools, and riparian areas.

These NWRs are administered by the USFWS and consist of managed wetlands units that provide habitat for large concentrations of waterfowl, shorebirds, and other waterbirds, as well as other wetland-dependent wildlife, songbirds, uplands-associated wildlife, and endangered species. The San Luis NWR is comprised of six contiguous units: San Luis, East Bear Creek, West Bear Creek, Freitas, Blue Goose, and Kesterson. The eastern portion of the NWR is adjacent to and bisected by the San Joaquin River.

There were many potential projects identified in the 2015 RFMP to beneficially use flood waters for refuge management and habitat enhancement on different units of the San Luis and Merced NWRs. Many of these projects focused on re-engineering or optimizing existing diversions or drainage infrastructure to more effectively divert flood flows onto adjacent NWR floodplains. On January 17, 2023, Jacobs staff met with USFWS San Luis NWR Manager Sean Brophy and staff to discuss the status of multi-benefit project opportunities on NWR units, the prioritization of multi-benefit projects, and funding and implementation for high-priority projects. These San Luis NWR projects include opportunities to reconnect floodplains and provide additional water for the managed wetlands complex, and to improve drainage onto floodplains and through the channel network adjacent to NWR units.

Table 3-6 summarizes USFWS San Luis NWR projects, and Figure 3-7 is a map showing approximate project locations.

Table 3-6. Priority Projects for USFWS San Luis National Wildlife Refuge Complex

Lead Agency	Project Name	Project Location	Estimated Cost ($M)	Project Description	Multi-Benefit Components	Project Status	Next Steps
USFWS	Modify water intake structures at selected refuge units	Merced NWR	Undetermined	Along flood control levees at Merced, Lonetree, and Sno-Bird units of Merced NWR, existing flapgates would be replaced with new screw gates and catwalks as needed to allow for controlled diversion of floodwaters onto NWR lands at approximately 15 locations. The project would require manual operation, unless automated technology is feasible. For some locations, the project would require improving access to flapgates during high water events to allow operation. New water conveyance facilities would be constructed or existing ones could be armored as needed.	• Ecosystem improvement (divert floodwaters to critical habitat) • Flood risk reduction • Groundwater recharge	In-progress/concept still valid. New flapgates and structures installed during SJRRP/DWR's 2020 Lone Tree levee rebuild, but was a straight replacement of existing gates and does not allow inflow of floodwater into NWR units.	• Further investigate opportunities to retrofit existing flapgates at Merced NWR to allow better control of intake of water from the San Joaquin River. • Assist USFWS NWR staff further investigate feasibility and grant funding opportunities.
USFWS	Enhance infrastructure to divert flood flows onto 1200 acres of existing wetlands and other refuge lands	Merced NWR Merced Unit	Undetermined	On the NWR Merced unit, there are numerous locations with where pipes with flapgates are present in flood control levees of the Eastside Bypass, which could lead to diverting floodwaters onto NWR lands. A direct connection is needed to move water out into the NWR water conveyance system. The NWR currently uses a pipeline to move water throughout the managed wetland units and other NWR lands. The pipeline is in close proximity to the flood control levee. Additionally, there are NWR pumps in place that could be used to lift water from the Eastside Bypass into the pipeline, but they are currently not connected to the pipeline.	• Ecosystem improvement (divert floodwaters to critical habitat) • Flood risk reduction • Groundwater recharge	Priority project	• Further investigate opportunities to retrofit existing flapgates and connect lift pumps to conveyance pipeline at NWR Merced unit to allow better control of intake of water from the San Joaquin River. • Help USFWS NWR staff to further investigate feasibility and grant funding opportunities.
USFWS	Construct diversions off Eastside Canal	Merced NWR Sno-Bird Unit	Undetermined	Excess floodwater from the Eastside Canal, which runs along the northern boundary of the Sno-Bird unit, can be diverted onto Refuge floodplain lands, to prevent canal from exceeding conveyance capacity and flooding out downstream locations. As part of this process, a new canal turnout structure would need to be installed in the Eastside Canal at the northwest corner of the Sno-Bird unit. Additionally, sediment must be removed from the canal at the existing weir diversion structure and the first section of the existing canal downstream of the weir must be rehabilitated.	• Ecosystem improvement (divert floodwaters to critical habitat) • Flood risk reduction • Groundwater recharge	Priority project	• Evaluate both during and after current high water in Bear Creek and Eastside Canal to inform for both Sno-Bird and Arena Plains units. • Help USFWS NWR staff to further investigate feasibility and grant funding opportunities.

Lead Agency	Project Name	Project Location	Estimated Cost ($M)	Project Description	Multi-Benefit Components	Project Status	Next Steps
USFWS	Modify Water Intake Structures at Selected NWR Units	East Bear Creek Unit, West Bear Creek Unit, and San Luis Unit	Undetermined	There are 40 locations on the NWR East Bear Creek unit, West Bear Creek unit, and San Luis unit where pipes with flapgates are present in flood control levees of the San Joaquin River and Eastside Bypass. Some of these locations are well-situated to divert floodwaters onto NWR lands, with screwgates installed where needed and catwalks and catwalks to these screwgates could be placed on existing pipes. In some locations water control structures and/or armoring of existing water conveyance facilities would be needed. This would allow multiple controlled diversions onto NWR floodplain lands.	• Ecosystem improvement (divert floodwaters to critical habitat) • Flood risk reduction • Groundwater recharge	In-progress; some modified flap-gates were installed in December 2020. Opportunity to retrofit more flapgates, improve access, and improve operations.	• Evaluate which diversion points for floodwater would provide benefits to wildlife conservation and floodwater storage objectives. Enhancing existing channels may be necessary to achieve desired outcome. Goal is place water into already defined managed wetlands, manage riparian habitat or low elevation uplands that evolved under conditions indcluding low depth (that is, sheet water) flooding. • Evaluate potential to improve maintenance access to flap-gates during flooding events. • Help USFWS NWR staff to further investigate feasibility and grant funding opportunities.
USFWS	Enhance existing wetland depth and configuration to provide additional habitat and flood water storage on approximately 500 acres of wetland basins	San Luis NWR East Bear Creek Unit	Undetermined	A portion of the existing restored wetlands in the East Bear Creek unit, which currently comprise some 1,000 acres, could be enhanced by deepening, expanding, and reconfiguring the current wetland acreage. This work would increase the capability of the unit for transitory floodwater storage while improving the wetlands for wildlife. This project would identify several options to achieve these objectives and fully develop and implement those options most feasible and efficient to meet the desired objectives.	• Ecosystem improvement (divert floodwaters to critical habitat) • Flood risk reduction • Groundwater recharge	In progress, project has received over a million dollars through Ducks Unlimited, Wildlife Conservation Board grants, North American Wetlands Conservation Act grants and private donations for two project phases. This has allowed for construction of new interior structures that put the NWR in a better position to use pulse flows and drain them; there is further potential here NS at Merced NWR in the Lone Tree unit.	• Evaluate opportunities to expand project with additional flapgates and use or expand existing water conveyance systems and canals to allow inflow of floodwaters at a given stage without compromising levee integrity. Opportunity exists both on the San Joaquin River and Bear Creek sides of the NWR East Bear Creek unit. • Help USFWS NWR staff to further investigate feasibility and grant funding opportunities.
USFWS	Install lift pumps to divert water onto 1,000 acres of wetland basins during flood flows	San Luis NWR East Bear Creek Unit	Undetermined	The East Bear Creek unit has a pumping plant on Bear Creek that is used to flood approximately 1,000 acres of managed wetlands when the water surface elevation of Bear Creek is between 66 feet and 83 feet. When water surface elevation exceeds 83 feet (a common condition during flood events) the pumping plant intake alarm goes off and the pumping plant is shut down and becomes inoperable. This project would install lift pumps at several locations to allow NWR staff to continue floodwater diversions regardless of water surface elevation.	• Ecosystem improvement (divert floodwaters to critical habitat) • Flood risk reduction • Groundwater recharge	In-progress; initial step has been pursued with North American Wetlands Conservation Act grantors, and the general concept developed. High priority project for the San Luis NWR.	• Help USFWS NWR staff to further investigate feasibility and grant funding opportunities. • Inundation pulse is expected to last at least 2 weeks or longer; this project would allow the NWR to use flood waters as the NWR enters a drying cycle. Opportunity exists both on the San Joaquin River and Bear Creek sides of the NWR East Bear Creek unit. The NWR has riparian and appropriative water rights on both areas; could leverage this to allow pumping of water during flood and non-flood flows.

Lead Agency	Project Name	Project Location	Estimated Cost ($M)	Project Description	Multi-Benefit Components	Project Status	Next Steps
USFWS	Restore a wetland swale to divert floodwaters onto 1,000 acres of wetland basins during flood flows	San Luis NWR East Bear Creek Unit	Undetermined	This project would use an existing pipe and screwgate on the flood control levee east of the USFWS pumping station to divert floodwaters. The project would construct a wide swale leading from the levee to an existing refuge ditch to convey water to the restored floodplain swales and basins extending across the East Bear Creek unit.	• Ecosystem improvement (divert floodwaters to critical habitat) • Flood risk reduction • Groundwater recharge	Eliminated	• This project has been eliminated and will not be considered unless a new landowner is interested in collaborating. • This project was feasible but not without damaging the adjacent Bear Creek Ranch, which is currently privately owned. However, Bear Creek Ranch is likely to get sold again, and would require a new landowner with interest who saw the benefit (not that during floods, the grazing land would be flooded). The River Partners and other conservation land trusts are aware of this potential project.
USFWS	Restore anabranches of Salt Slough	San Luis NWR Freitas Unit	Undetermined	During flood events, water from the San Joaquin River backs up into and raises the level of Salt Slough. Numerous anabranches extend out of Salt Slough and have potential to spread water westward out into the Freitas floodplain. However, the capacity for this is limited because most of the anabranches are silted in at their confluences with Salt Slough. Silt removal could be implemented to lower channel grades to a level that would more readily accept high water from Salt Slough and floodwaters would be spread out into floodplain basins and swales west of SR-165.	• Ecosystem improvement (divert floodwaters to critical habitat) • Flood risk reduction • Groundwater recharge	In progress; this project would provide gains but is challenging	• This project would require partnership with the California Department of Transportation and a large capital investment; it would require elevating the roadway and improving the existing conveyance. • Project concepts could include: – Simplifying the project by improving the crossings under State Route (SR-)165 to allow the floodplain to activate without so much constriction under the route. – Enlarging the project by creating a connection through the levee from the main San Joaquin River branch to the NWR West Bear Creek unit and across SR-165 to the main NWR Freitas units. The C Canal is a main artery of the NWR, and runs from the southeast boundary of the NWR San Luis unit for 11 miles to SR-165 just before Stevinson Bridge. Any work would have to go under, over, or around the C Canal while maintaining levee integrity at the same time. San Luis NWR has a 2001 study design of connecting the main San Joaquin River under or through the C Canal and across the landscape. The issue would be impacts to SR-165. • Help USFWS NWR staff to further investigate feasibility and grant funding opportunities.

Lead Agency	Project Name	Project Location	Estimated Cost ($M)	Project Description	Multi-Benefit Components	Project Status	Next Steps
USFWS	Restore wetland slough channel connectivity with the San Joaquin River to accommodate flood flows	San Luis NWR West Bear Creek Unit	Undetermined	This project seeks to enhance an existing location where a pipe and screwgate already permit diversion of flood flows from the San Joaquin River into a water delivery canal that provides water to some 3,500 acres of wetlands. This project would enhance the size of the structures both leading into and exiting this canal at a location that would allow the diversion of water into a naturally existing floodwater basin that is currently cut off from the San Joaquin River.	• Ecosystem improvement (divert floodwaters to critical habitat) • Flood risk reduction • Groundwater recharge	In-progress; this project would allow for more effective conveyance through Salt Slough channel network.	• Help USFWS NWR staff to further investigate feasibility and grant funding opportunities. • The project would require modifications to existing culverts in at least four locations, and additional conveyance modifications to tie into the C Canal.

3.7 Non-Governmental Organizations

Non-governmental and non-profit organizations such as American Rivers and River Partners are active in the USJR region, both in terms of multi-benefit flood and environmental planning, and in land acquisition, land management, and project implementation. As part formulating the 2015 USJR RFMP, other non-governmental organizations such as Trout Unlimited, California Trout, Audubon California, and Ducks Unlimited were consulted, but have since not been as active in RFMP planning.

American Rivers is helping to formulate and lead implementation of the Great Valley Grasslands Project, along with the California Department of Parks and Recreation. Additionally, American Rivers is currently engaging the USJR region and advocating for floodplain reconnection and restoration projects.

River Partners is managing and removing invasive vegetation along several portions of the San Joaquin River channel in the USJR region, and is actively identifying floodplain reconnection and levee setback opportunities in other regions of the San Joaquin River such as the Mid-San Joaquin RFMP, where they have implemented the Dos Rios and Three Amigos multi-benefit projects, the largest public-private floodplain restoration project in California.[1] As described further in the Recommendations section below, there are opportunities to leverage current planning efforts and identify other suitable public-private floodplain restoration and levee setback projects in the USJR region; River Partners would likely play a large role in those multi-benefit projects.

River Partners is interested in re-engaging more actively in invasive vegetation control throughout the USJR region. This could be facilitated by taking advantage of the "cutting the green tape" exemptions on California Environmental Quality Act and Section 1600 permitting for multi-benefit flood management projects. These exemptions have recently been enacted by the State, and are described in the *Institutional Barriers White Paper* (Jacobs 2023), and in the Recommendations section below. River Partners' previous work controlling invasive vegetation was halted due to complexities around permitting; with current permitting exemptions, there is an opportunity to develop partnerships between among DWR, LSJLD, and River Partners to re-engage and manage invasive vegetation throughout the USJR region.

[1] https://riverpartners.org/project/dos-rios-ranch-preserve/

4 Recommendations

Multi-benefit flood protection projects identified in the USJR region are in various stages of project formulation and implementation. Many of them have not progressed beyond initial concepts or feasibility analyses because of financial constraints and institutional and regulatory challenges as described in the *Institutional Barriers White Paper* (Jacobs 2023). Other projects, such as the Great Valley Grasslands and Black Rascal Creek Flood Control Project , are in the process of being implemented.

As described in the recently published 2022 CVFPP Update and the 2022 Conservation Strategy Update, the USJR region will face escalating risks of catastrophic flooding and impacts to riverine habitats and native species from extreme weather and increasing hydrologic variability in the coming decades. Additionally, aging infrastructure and oftentimes divergent or competing priorities among federal, State, and local flood, water supply, and ecosystem managers create significant barriers to advancement of these much-needed multi-benefit projects. Recent record snowfall and high runoff events along the San Joaquin River and tributaries in 2023 illustrate the current seepage vulnerabilities of the flood management system (Figure 4-1).

Figure 4-1. High Flows on May 23, 2023 With Seepage Impacts Agricultural Lands North of the San Joaquin River Upstream of the Bifurcation Structure

Source: LSDLD 2023

Despite these challenges, there are also opportunities to capitalize on current State and federal programs and initiatives that can provide additional funding, regulatory compliance support, and effective partnerships for the USJR region to advance multi-benefit projects identified in the previous section. These opportunities are described below.

Leverage Collaboration

Leverage collaborations with California flood and water management programs, including Flood-MAR and Water Resilience Portfolio Action 25.4 to provide additional funding and support for multi-benefit flood management projects that include Flood-MAR and ecosystem enhancements.

Leverage Funding and Grants

Leverage recent federal funding opportunities and grant programs that have become available for multi-benefit flood management and project implementation. This includes recent Water Resource Development Act and Infrastructure Act funding, as described in the *Draft Financial Planning and Funding Support White Paper* (Jacobs 2023).

Cut the Green Tape

Take advantage of California's recent "cutting the green tape" initiative that includes CEQA and Section 1600 exemptions for multi-benefit projects. This provides an immediate opportunity to advance specific capital improvement projects for the USJR region, and could help initiate multi-benefit O&M projects such as invasive vegetation management, fish passage improvements, and floodplain reconnection and channel restoration.

Engage Regionally

Engage in regional Ecological Floodplain Inundation Potential studies that will identify locations where levee setbacks and floodplain reconnection would be most beneficial for localized flood risk reduction, ecological improvements, and groundwater recharge. These studies will provide the opportunity to fund and implement local multi-benefit projects that include improvements to flood infrastructure in a manner consistent with State flood management and water resilience objectives.

These improvements could also be accomplished through partnerships with local land trusts such as River Partners or The Nature Conservancy to acquire and restore these properties, and through working with State and federal agencies to implement floodplain reconnection, levee setback, and infrastructure upgrades.

This approach has been employed successfully in the Mid-San Joaquin RFMP region, with projects such as Dos Rios Ranch Preserve Project, Three Amigos Non-Structural Alternative, and Hidden Valley Ranch Project.

Advance Achievable Projects Sooner Rather than Later

Advance “low-hanging fruit” multi-benefit projects on lands with willing project partners. For example, the San Luis NWR projects provide opportunities to partner with USFWS to modify existing infrastructure in a manner that allows flood flows to be diverted onto NWR lands, providing localized and regional reductions in flood stages while simultaneously providing ecosystem benefits.

Strengthen Partnerships

Strengthen and leverage partnerships with other regional flood management entities, such as the Mid-San Joaquin and Lower San Joaquin/Delta North RFMPs, to better understand how multi-benefit projects that provide flood attenuation in the USJR region provide downstream benefits for communities and landowners.

In particular, seek a better understanding of how investments in the USJR RFMP can provide benefits to urban communities in the Lower San Joaquin RFMP such as Manteca, Lathrop, and Stockton, and how they may provide a more effective mechanism for attracting funding for capital projects. For example, a strategically placed large-scale levee setback or floodplain attenuation project in the USJR region may provide flood risk reduction benefits that could be realized regionally and locally.

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