

Lower San Joaquin River Regional Flood Risk Reduction & Climate Resilience Reconnaissance Study

Phase 2 Final Grant Close Out Report

November 1, 2024

Prepared For



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Acknowledgements

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Table of Contents

1. Executive Summary	1
Purpose	1
Approach	1
Conclusions	2
2. Key Personnel	6
2.1. Grant Manager	6
2.2. Other Key Personnel	6
3. Problem Statement	6
4. Project Description	7
5. Project Results	8
5.1. Actual Outcomes.....	8
5.2. Barriers Encountered and External Factors	8
5.3. Participating Stakeholders	8
5.4. Lessons for Other Communities Considering Similar Projects	9
6. Next Steps	9

ATTACHMENT A: Complete Study Report (Attached Separately)

1. Executive Summary

The San Joaquin Area Flood Control Agency (SJAFC) conducted the *Lower San Joaquin River Regional Flood Risk Reduction & Climate Resilience Reconnaissance Study (LSJR Climate Resilience Study)* through funding provided by the Bay Area Council Foundation’s 2021 California Resilience Challenge (CRC) grant program.

Purpose

The primary purpose of the *LSJR Climate Resilience Study* is to prioritize, coordinate, and analyze systemwide strategies for mitigating the flood risk impacts of projected climate change scenarios on the Lower San Joaquin River (LSJR). Potential flood impacts from climate change are depicted in Figure ES-1.

Approach

The study was conducted at a reconnaissance level of detail (ie- pre-feasibility level) and was completed in two phases. The initial effort (“Phase 1”) of the *LSJR Climate Resilience Study* focused on (a) identifying goals, problems, opportunities, and constraints, (b) reviewing information and key findings from past and ongoing studies, and (c) conducting initial screening and prioritization of systemwide flood risk reduction concepts to advance for further study

At a reconnaissance level, systemwide flood risk reduction concepts were prioritized based on their potential for reducing future flood risk along the LSJR corridor and based on feedback received from stakeholders. The strategies that were recommended for further study are listed below and presented in Figure ES-2:

- Paradise Cut Bypass Expansion
- Modifications at Upstream Reservoirs
- Flood-MAR Opportunities on Tributary Streams

Following completion of the activities outlined in “Phase 1” of the *LSJR Climate Resilience Study*, “Phase 2” of the study included preliminary qualitative and quantitative analyses of the concepts to assess their effectiveness of addressing flood risk and future climate change within the SJAFC planning area.

The array of concepts was further developed to identify alternative strategies to evaluate. Hydraulic modeling sensitivity analyses were conducted for the 50-, 100-, and 200-year events under both existing climate conditions and future climate change conditions (6 hydrologic scenarios total).

Conclusions

Based on the preliminary evaluations in this Study, the top climate resiliency strategies for flood risk reduction in the LSJR include:

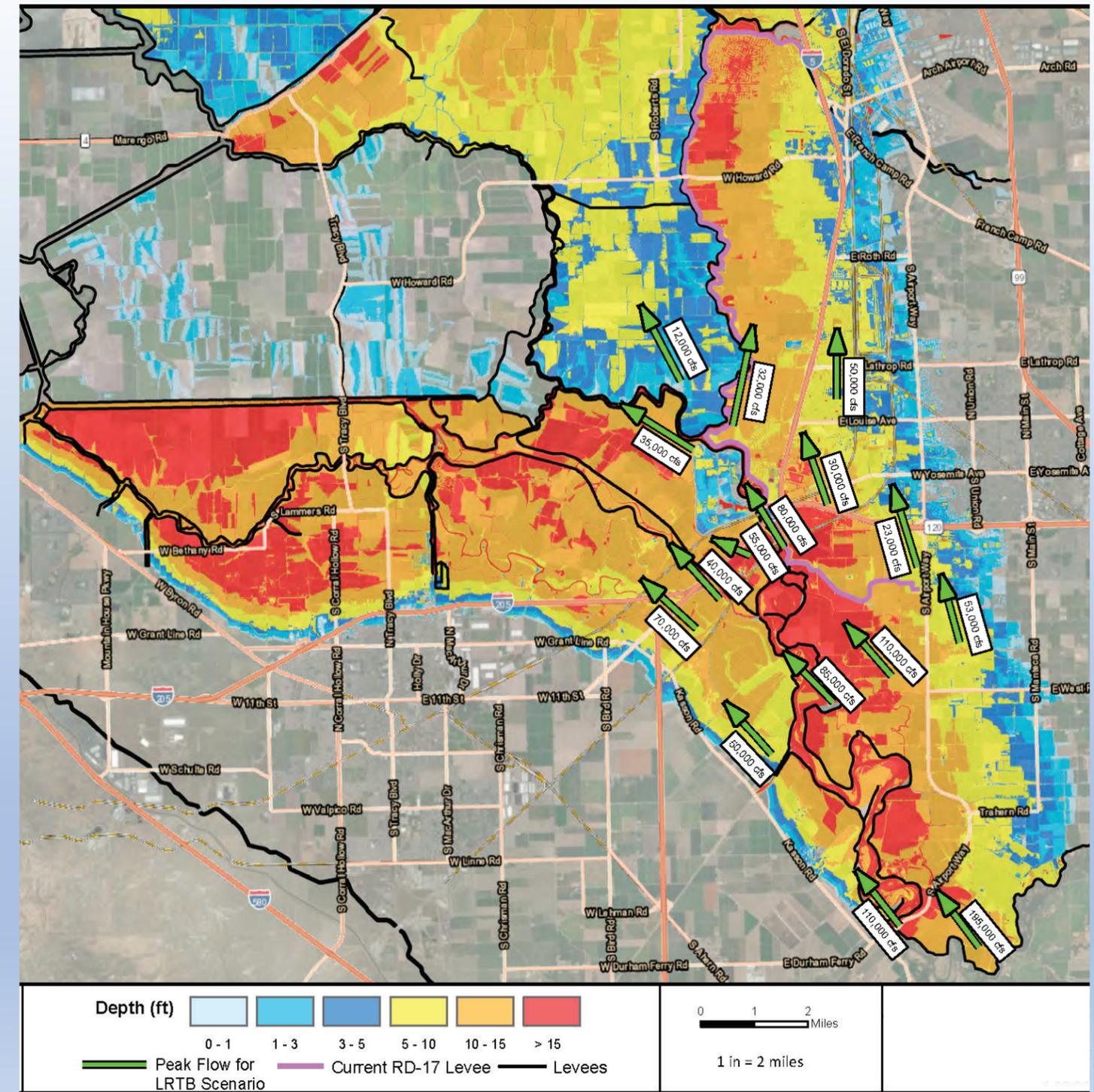
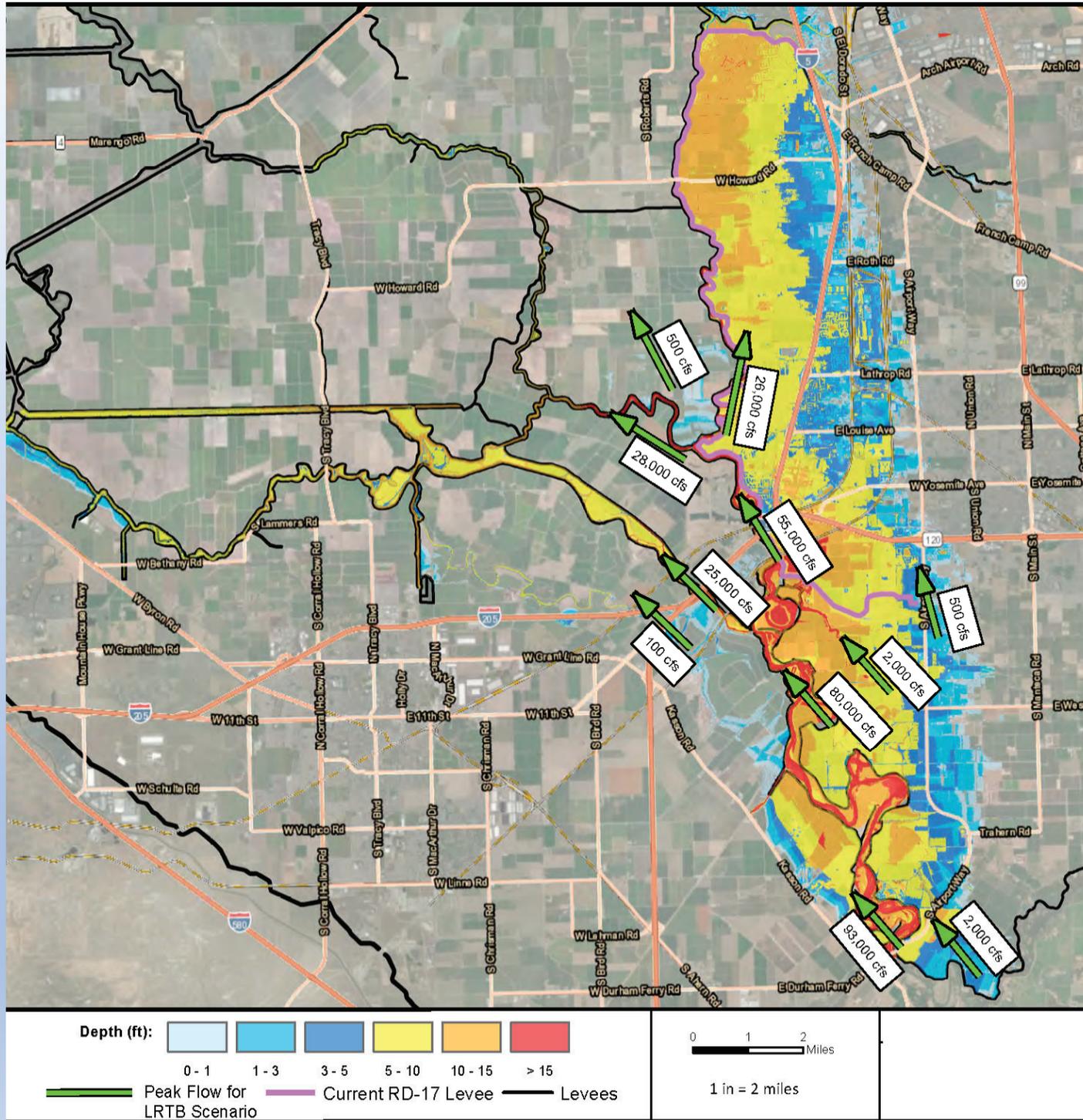
1. Reservoir modifications at Don Pedro
2. Paradise Cut Bypass Expansion
 - a. CVFPP Version
 - or-
 - b. “Widened” Version
3. Reservoir modifications at New Exchequer

These strategies rose to the top primarily due to their effectiveness of reducing flood flows along the LSJR during large flow events. Their potential with regards to achieving supporting goals, such as increasing water supply reliability and enhancing ecosystem restoration, also contributed to their success within the Study’s prioritization matrix.

The other strategies evaluated in this Study (FloodMAR along tributary streams, reservoir modifications at other reservoirs) had meaningful flood risk reduction benefits within other areas of the SJR system, as well as important groundwater recharge and water supply benefits, but were given a lower ranking in this Study based on their limited flood risk reduction potential for the LSJR (ie- at Vernalis).

A large portion of the LSJR study area is considered disadvantaged or severely disadvantaged communities (see Figure ES-3). These communities would be the beneficiaries of substantial flood risk reduction benefits and other multi-benefit opportunities with the advancement of these strategies.

The recommendations in this Study are intended to provide preliminary insights and guidance for decision makers to consider when deciding on the where to focus efforts for flood risk reduction and climate resiliency in the Lower SJR area. Additional, more comprehensive analyses on the strategies considered in this Study will be needed to further inform the effectiveness and feasibility of these options. However, the goal of this Study was to conduct screening-level evaluations that could help to focus and guide future flood risk reduction planning efforts.

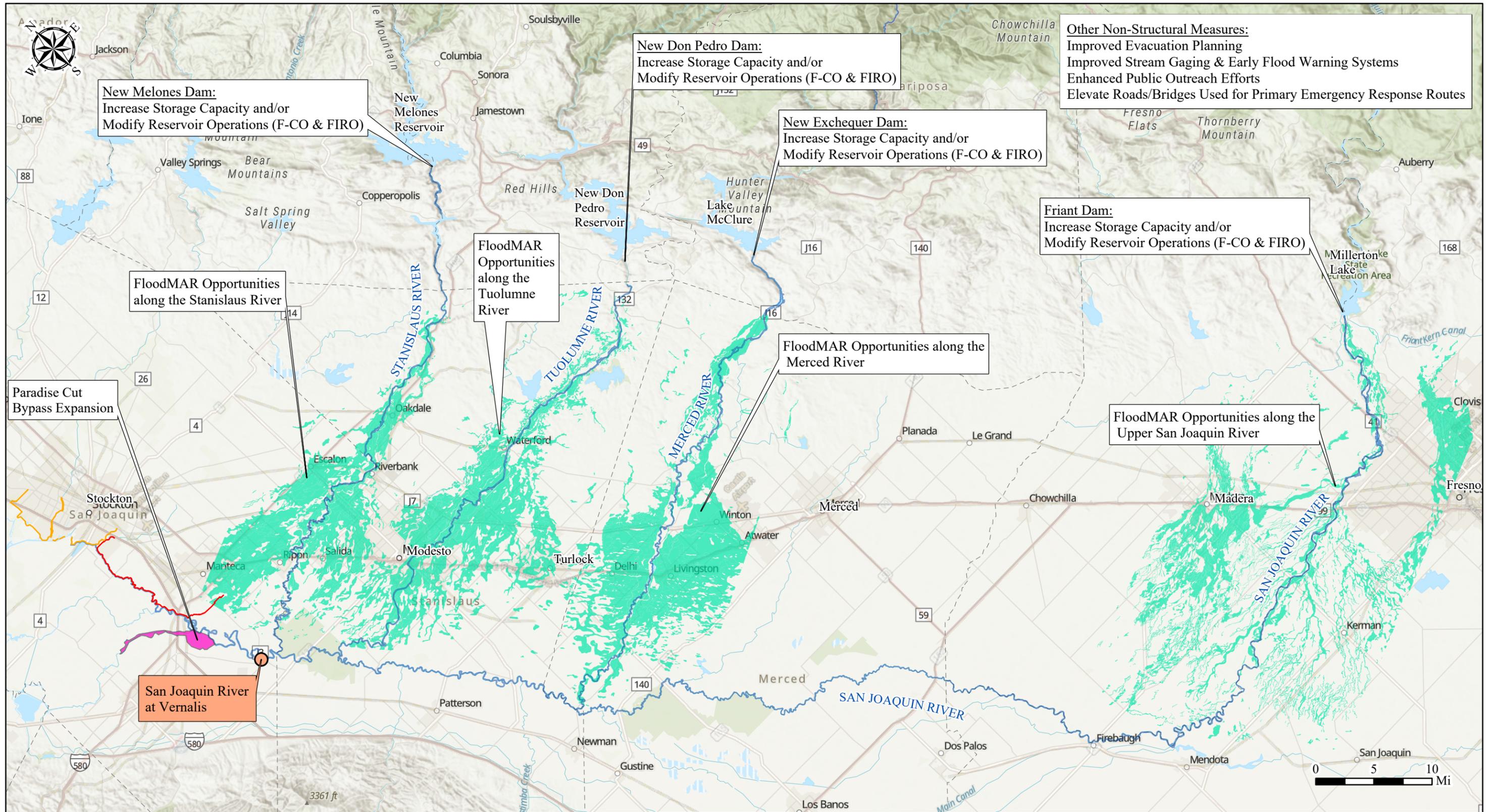


Lower San Joaquin River
Current 200-year Floodplain

Lower San Joaquin River
200-year Floodplain with Climate Change
(Based on California DWR's Projected Climate Change for Year 2065)

Source of Floodplain Maps: Mossdale Tract UFRR Study (PBI, 2021)

Figure ES-1. 200-year flooding along the Lower San Joaquin River - Current Climate vs. Projected Future Climate Conditions



New Melones Dam:
Increase Storage Capacity and/or
Modify Reservoir Operations (F-CO & FIRO)

New Don Pedro Dam:
Increase Storage Capacity and/or
Modify Reservoir Operations (F-CO & FIRO)

New Exchequer Dam:
Increase Storage Capacity and/or
Modify Reservoir Operations (F-CO & FIRO)

Friant Dam:
Increase Storage Capacity and/or
Modify Reservoir Operations (F-CO & FIRO)

Other Non-Structural Measures:
Improved Evacuation Planning
Improved Stream Gaging & Early Flood Warning Systems
Enhanced Public Outreach Efforts
Elevate Roads/Bridges Used for Primary Emergency Response Routes

FloodMAR Opportunities
along the Stanislaus River

FloodMAR
Opportunities
along the
Tuolumne
River

FloodMAR Opportunities along the
Merced River

FloodMAR Opportunities along the
Upper San Joaquin River

Paradise Cut
Bypass Expansion

San Joaquin River
at Vernalis

- Areas of "Good" to "Excellent" Groundwater Recharge Suitability along Selected SJR Tributary Streams
(Source: UC Davis Soil Agricultural Groundwater Banking Index)
- San Joaquin River and Select Tributary Streams of Interest
- Mossdale Levee Improvements
- USACE LSJRP Levee Improvements

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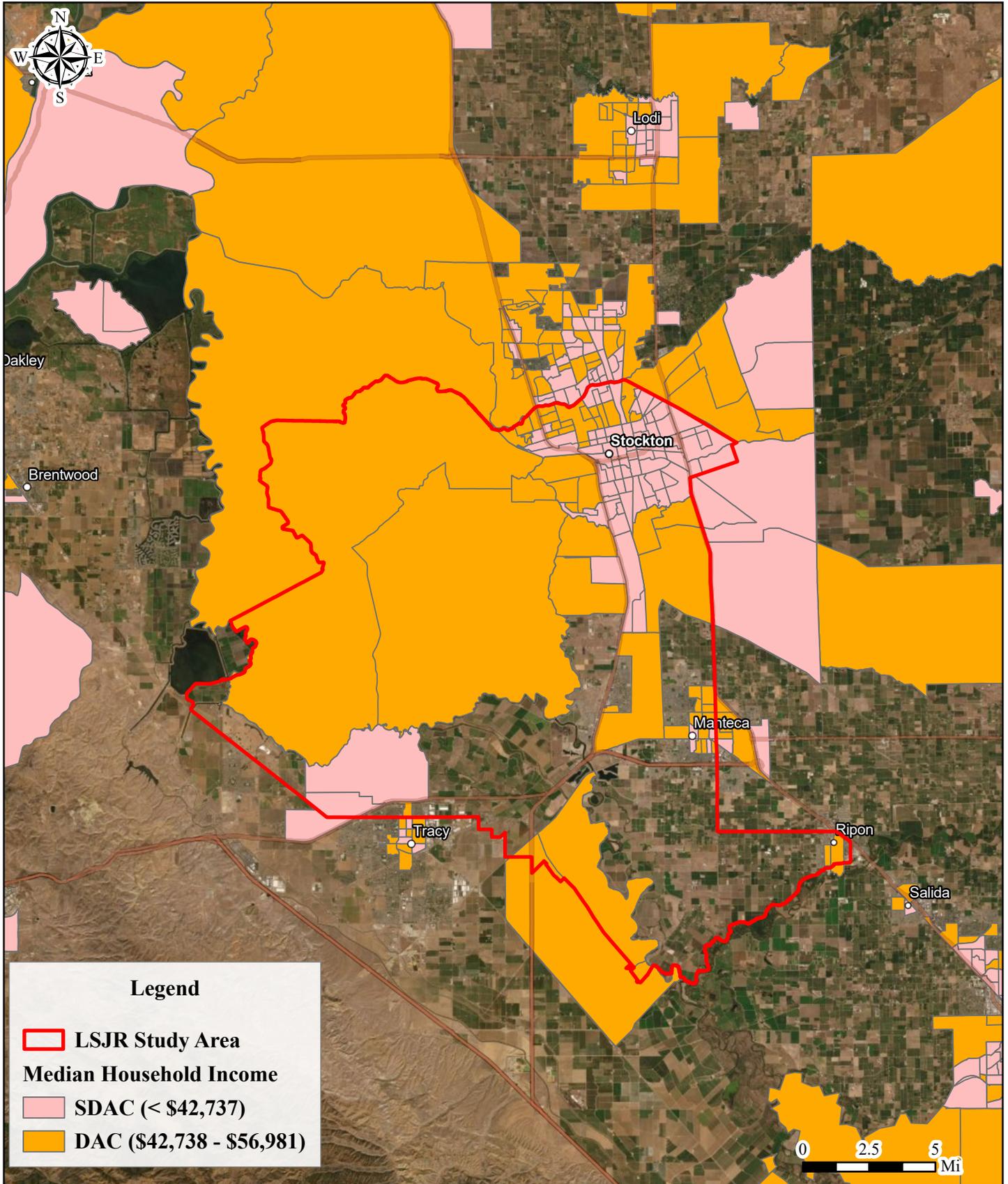
San Joaquin Area Flood Control Agency

**Lower San Joaquin River Climate Resilience Strategies:
Selected Concepts for Further Study**

Figure ES-2

March 2023

Path: C:\Users\BraydenLeach\R&F Engineering, Inc\R&F Engineering - Documents\4.0 GIS\Project\SJAFCA\Climate Resilience Challenge\Phase 1 Conclusion Figure.aprx



2. Key Personnel

2.1. Grant Manager

San Joaquin Area Flood Control Agency (SJAFCA)

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2.2. Other Key Personnel

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3. Problem Statement

Through past and ongoing planning efforts as well as supplemental hydraulic analyses conducted for the *LSJR Climate Resilience Study*, issues related to potential future flood risk along the LSJR were identified, including:

- **Increased Future Flood Risk Due to Climate Change** – DWR studies estimate that climate change may have extreme impacts on SJR hydrology. For example, median DWR projections of the 200-year flows along the LSJR anticipate a tripling of the peak flood flow in the next 50 years.

Figure ES-1 demonstrates the 2022 CVFPP climate change projections along the LSJR for the year 2072 and how they compare to current climate hydrology.

The existing flood control infrastructure would not be able to adequately handle a major flood event of these magnitudes, which poses a significant threat to residents, structures, critical infrastructure, and the economy.

- **Disadvantaged Communities At-Risk** – A large portion of the population in the LSJR Region resides in areas that are designated by the State of California as economically “disadvantaged” communities in which median household incomes (MHI) are less than 80% of the MHI for the overall State (Figure ES-4). The ability of the LSJR Region to raise local revenues for flood risk reduction projects is an ongoing economic justice issue.

4. Project Description

The *LSJR Climate Resilience Study* was conducted at a reconnaissance level of detail (ie- pre-feasibility level) and was completed in two phases. The initial effort (“Phase 1”) of the study focused on:

- a) Identifying goals, problems, opportunities, and constraints,
- b) Reviewing information and key findings from past and ongoing studies,
- c) Improving coordination and planning amongst key stakeholders within the LSJR Region as well as with stakeholders in upstream areas of the SJR watershed, and
- d) Conducting initial screening and prioritization of systemwide flood risk reduction concepts to advance for further study

The strategies that were identified in Phase 1 for further study include:

- **Paradise Cut Bypass Expansion** – two different concepts, including:
 - CVFPP Concept
 - Widened Concept
- **Modifications at Upstream Reservoirs** – four different reservoirs/dams, including:
 - Don Pedro
 - New Melones
 - New Exchequer
 - Friant
- **Flood-MAR Opportunities on Tributary Streams** – four different tributaries, including:
 - Stanislaus River
 - Tuolumne River
 - Merced River
 - Upper San Joaquin River

Following completion of Phase 1, the study advanced to “Phase 2” with additional funding provided by the Bay Area Council Foundation. The Phase 2 scope of work included preliminary qualitative and quantitative analyses on the prioritized array of systemwide flood risk reduction strategies that were identified in Phase 1. The strategies were evaluated on various metrics including opportunities for: Flood Risk Reduction, Promoting Ecosystem Functions, Promoting Multi-Benefit Opportunities, Improving Institutional Support, Improving Operations and Maintenance, and Cost Efficiency. The outcome includes a sensitivity analysis showing the potential effectiveness of each strategy and a final ranking of recommended strategies that can serve as a guide for future efforts. The additional information gathered through Phase 2 analyses will allow for further conversations with stakeholders as outreach and collaboration efforts continue.

The stakeholder feedback, background information, and preliminary evaluations gathered from the *LSJR Climate Resilience Study* are intended to serve as a starting point and feed into efforts with larger State and federal studies on the SJR Basin.

5. Project Results

5.1. Actual Outcomes

The result of the *LSJR Climate Resilience Study* was a narrowed-down list of concepts selected for advancement and stakeholder discussions that can serve to guide the direction of SJAFCA's future climate resilience planning efforts. A full study report was prepared (see Attachment A) to describe the purpose, background, evaluations, selected strategies, and recommended next steps for SJAFCA. The Don Pedro reservoir modifications strategy was identified as the most effective in achieving flood risk reduction goals, providing benefits across various flood scenarios. The combination of this strategy with others, such as the Paradise Cut bypass expansion, could further enhance flood resilience. The other strategies do have the potential to provide localized flood risk reduction in the upstream tributaries and valuable opportunities for promoting multi-benefit opportunities for more localized areas, but ranked lower in their potential for providing flood risk reduction along the *lower* San Joaquin River.

Recommendations and next steps include: (a) further outreach to key stakeholders, communities, and regulatory agencies to refine and further study the strategies discussed in this report, and (b) pursuit of funding opportunities to advance the highest ranking strategy/strategies further towards implementation.

5.2. Barriers Encountered and External Factors

Barriers encountered during the study were minimal. The study achieved its goal of providing an overview of climate resiliency strategies for the lower San Joaquin River. External factors and barriers that may be encountered in the future as these strategies begin to be advanced towards implementation. There are many stakeholder with many different interests that will need to be involved when implementing the complex strategies discussed in this study.

5.3. Participating Stakeholders

Outreach was a critical element to the success of the *LSJR Climate Resilience Study*. The following is a list of SJAFCA partners and stakeholders throughout the SJR Basin who participated in outreach activities in Phase 1:

- SJAFCA Member Agencies
 - City of Lathrop
 - City of Manteca
 - City of Stockton
 - County of San Joaquin
- SJAFCA Board members
- County of Merced
- County of Stanislaus
- Reclamation District (RD) in the LSJR Region
- San Joaquin County Advisory Water Commission

- California Department of Water Resources (DWR) Technical Teams
 - San Joaquin Water Resilience Portfolio 25.4 Transitory Storage working group
 - FIRO-MAR learning group
 - Central Valley Flood Protection Board (CVFPB)
 - CVFPP Project Team
- Non-Governmental Environmental Organizations
 - River Partners
 - American Rivers

SJAFCA plans to utilize the results of this Study in future stakeholder discussions.

5.4. Lessons for Other Communities Considering Similar Projects

- Stakeholder outreach efforts were a key component of the *LSJR Climate Resilience Study*.
 - SJAFCA met with cities, counties, reclamation districts, environmental NGOs, the State Department of Water Resources and other representatives and stakeholders throughout the San Joaquin River Basin.
- One of the most beneficial outcomes of the *LSJR Climate Resilience Study* was the improved coordination and planning amongst key stakeholders within the LSJR Region as we begin to look at options at a systemwide scale for mitigating the flood risk impacts of climate change.
- We found it was best to come to stakeholders with a wide array of initial ideas to help start the conversation, rather than trying to start the conversation with a blank slate.
 - Stakeholders were more likely to chime in and provide feedback when they had a starting point for the conversation.

6. Next Steps

Recommendations and next steps include: (a) further outreach to key stakeholders, communities, and regulatory agencies to refine and further study the strategies discussed in this report, and (b) pursuit of funding opportunities to advance the highest ranking strategy/strategies further towards implementation.

ATTACHMENT A

Lower San Joaquin River
Regional Flood Risk Reduction &
Climate Resilience Reconnaissance Study
November 1, 2024

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