



A Vision for the San Joaquin Valley

The Realm of the Possible for Surface Water and Groundwater

PURPOSE

The San Joaquin Valley faces some of California's most pronounced, interconnected water problems. For decades, the valley has experienced longstanding water supply, flood management, groundwater, and ecosystem challenges that will worsen with climate change. Hard choices will need to be made to determine the valley's future and innovative, integrated solutions are needed to support a glide path toward a more sustainable and resilient San Joaquin Valley.

Three California Department of Water Resources (DWR) planning studies—the San Joaquin Basin Flood-MAR Watershed Studies (Watershed Studies), State Water Project Adaptation Strategy, and the San Joaquin Valley Conveyance Study—inform near- and long-term strategies for addressing water sustainability and resilience in the San Joaquin Valley. This document provides a high-level overview of key findings from the three studies and describes strategies for State investment and policy.

On the eastern side of the San Joaquin Valley, local tributaries and associated reservoirs provide most of the surface supply. The Watershed Studies analyzed the potential effectiveness of forecast-informed reservoir operations (FIRO) and groundwater recharge to provide water supply, flood, environmental and equity benefits for the eastern San Joaquin Basin.

The western side of the San Joaquin River and the Tulare Hydrologic Region rely more heavily on imported water delivered from the Sacramento-San Joaquin Delta (Delta) through the State Water Project (SWP) and the Central Valley Project (CVP). The SWP Adaptation Strategy analyzed actions to improve delivery of imported water through the SWP.

The San Joaquin Valley Conveyance Study analyzed local and regional conveyance needs in the valley floor. An integrated analysis assessed how recommended actions from each of the studies would perform together.

STATE WATER
PROJECT
ADAPTATION
STRATEGY

SAN JOAQUIN
BASIN
WATERSHED
STUDIES

SAN JOAQUIN
VALLEY
CONVEYANCE
STUDY

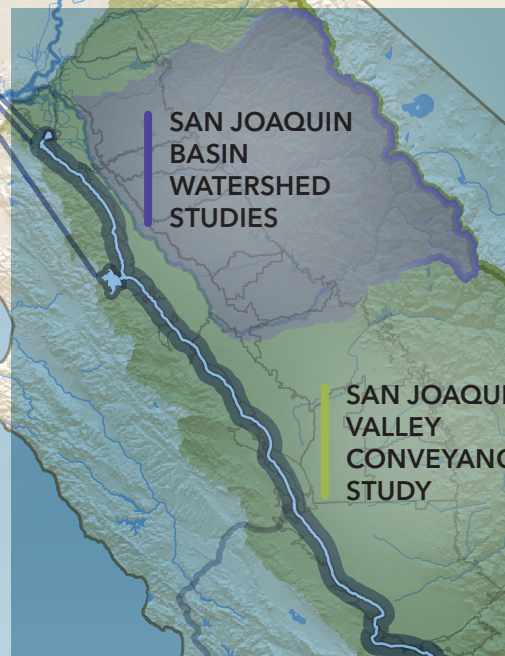
SAN JOAQUIN
BASIN
FLOOD-MAR
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SAN JOAQUIN
VALLEY
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STATE WATER
PROJECT
ADAPTATION
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The Challenge

In the early 1900s, uneven water availability, a growing population, expanding agriculture, and widespread groundwater declines created the need for new surface water supplies in the San Joaquin Valley, which were provided through the construction of the CVP and SWP. These new surface water supplies supported a booming agricultural economy. However, agricultural and urban development, the construction of levees, and other human-induced factors impacted the natural environment. This led to altered natural flows, degraded habitat quantity and quality, and the decline of many native species.

As societal values shifted toward environmental preservation, the identification and listing of water-dependent species in the Delta has had a driving influence on operations of the SWP and the CVP. In recent decades, persistent droughts, regulatory changes, and increased agricultural demands have constrained surface water availability in the San Joaquin Valley. The amount of imported water from the SWP and CVP has declined since the mid-1990s, due in part to changing regulatory requirements on Delta outflow, pumping, and water quality. Additionally, firm agricultural demands in the San Joaquin Valley have increased with conversion of annual crops to permanent crops.

With annual demands consistently exceeding available surface water supply, groundwater pumping has been used to bridge the gap, leading to widespread groundwater overdraft. The region is home to many communities vulnerable to water supply disruptions or contamination. During the 2012-16 drought, an estimated 3,500 domestic wells in the San Joaquin Valley went dry, leaving households without water.

Land subsidence caused by excessive groundwater pumping has damaged the major federal and State canals that bring river water to the region. Subsidence also has damaged flood-control levees, bridges, roads, and other infrastructure.

Flood risk in the San Joaquin Valley is among the highest in the nation. The valley is home to many disadvantaged and vulnerable communities that lack the ability to plan for, respond to, and recover from the impacts of flood events.

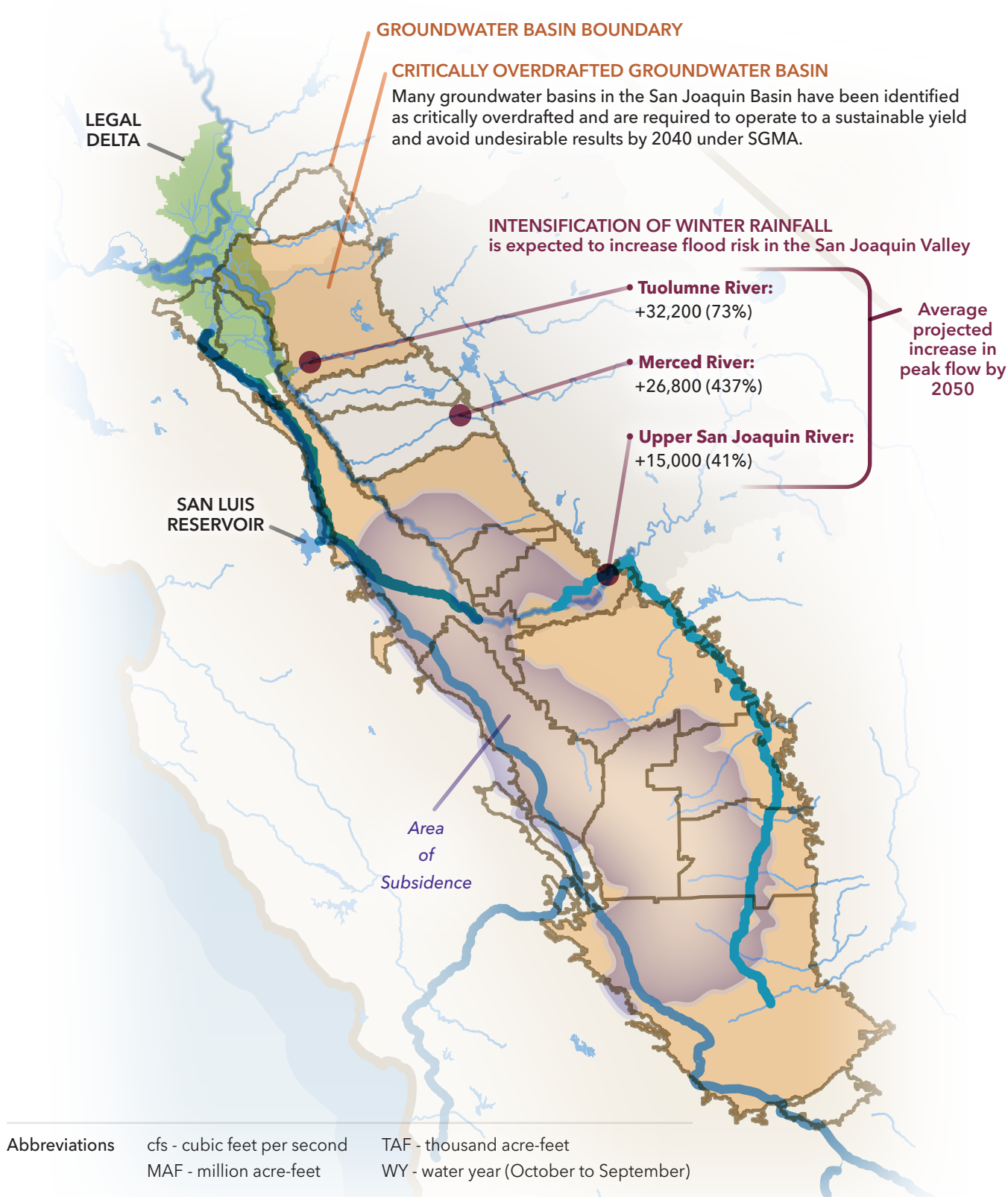
Implementation of the Sustainable Groundwater Management Act (SGMA) requires local agencies to bring overdrafted basins into sustainable conditions by 2040. This has the potential to reduce subsidence, protect domestic wells, and transform water management in the region. Bringing basins into sustainable conditions will, however, require the repurposing or fallowing of hundreds of thousands of acres of farmland, with consequences to local agricultural economies and regional communities.

CLIMATE CHANGE WILL FURTHER CONSTRAIN WATER SUPPLIES AND INCREASE FLOOD RISK

- Climate change will shift runoff to earlier in the winter and spring, intensifying winter storms, reducing spring snowmelt runoff, and prolonging dry periods.
- Climate change is predicted to cause a 12% to 23% decline in SWP deliveries by 2043—without considering reductions related to canals damaged by subsidence. The same climate change risks that will reduce SWP deliveries will also affect local supply networks.
- Climate change will create a more volatile environment that threatens the survival of native species and further intensifies ecosystem challenges.
- Flood risk in the San Joaquin Valley is expected to increase with warmer weather that intensifies rainfall-driven events and causes more rapid snowmelt. The high-elevation, snow-dominated watersheds of the San Joaquin Valley are uniquely susceptible to flood impacts from climate change.
- Increased variability and intensity of precipitation, warming temperatures, and sea-level rise will challenge aging infrastructure.
- The widening gap between water supply availability and peak water demand will place increased stress on surface water and groundwater supplies.
- Disadvantaged and vulnerable communities are often more exposed to existing water management challenges (e.g., water shortages, water quality issues or affordability challenges) and more vulnerable to future climate change threats.

CLIMATE CHANGE WILL INTENSIFY EXISTING RESOURCE CHALLENGES

As resource managers in the San Joaquin Valley work to address the effects of decades of groundwater overdraft, they must also contend with new and future climate-driven changes to flood risk and water supply.



SWP Adaptation Strategy

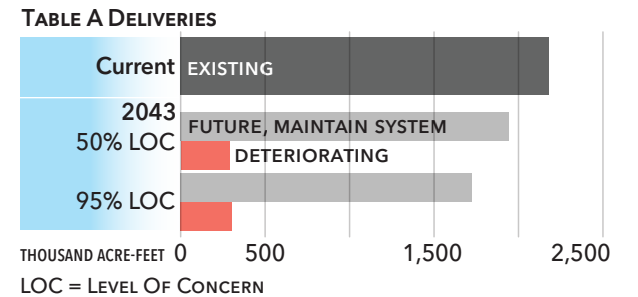
The SWP Adaptation Strategy evaluates 18 different adaptation strategies and quantitatively evaluates five major strategies to help sustain SWP reliability under future climate change.

DELTA CONVEYANCE PROJECT

- The Delta Conveyance Project is a highly effective investment that provides significant water supply benefits (341,000-411,000 acre-feet increase in total SWP exports per year).
- The Delta Conveyance Project is the most effective climate adaptation strategy on its own, but also amplifies the impact of other strategies.

CALIFORNIA AQUEDUCT SUBSIDENCE PROGRAM

- Continued maintenance and additional restoration of the infrastructure system, including repairing subsidence-damaged sections of the California Aqueduct is the highest priority investment for the SWP.
- Without investments, Table A deliveries diminish from over 2,100,000 acre-feet to 300,000 acre-feet per year by 2043 due to limited California Aqueduct conveyance capacity from unchecked subsidence. Table A deliveries represent a portion or all of the annual Table A amount requested by SWP Contractors and approved for delivery by DWR based on hydrologic conditions, current reservoir storage, and combined requests from the SWP Contractors.
- Restoring degraded conveyance capacity in the California Aqueduct restores Table A deliveries compared to a future without these investments.



FIRO AT OROVILLE

- Forecast-informed reservoir operations at Oroville is a safe, cost-effective adaptation investment that has few, if any, drawbacks.

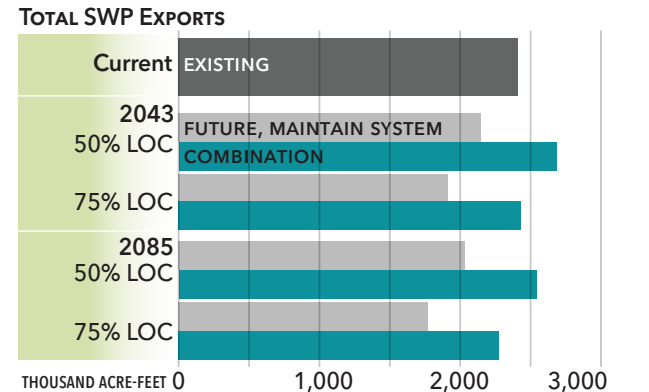
- FIRO at Oroville provides drought resilience by allowing greater storage of water in Lake Oroville under more variable hydrology (e.g, in years that go from wet to dry within the same year).
- FIRO becomes even more effective with increasingly severe impacts of climate change on hydrology.

SOUTH-OF-DELTA STORAGE

- Annual average Table A deliveries improve by 3-6% by implementing SOD storage alone, with most benefit occurring during drought years.
- Additional SOD storage can provide an effective strategic water reserve for dry years. By 2085, Table A deliveries during a six-year drought improve by 39-41%.
- Benefits of south-of-Delta storage increase when implemented together with the Delta Conveyance Project.

PORTFOLIO APPROACH

- The scope and scale of the San Joaquin Valley's water challenges will require an integrated portfolio approach. The strategies identified here provide unique responses to different climate stressors that, when implemented in combination, are projected to significantly improve SWP exports with relatively minor changes to Delta outflow by taking advantage of high flow during wet periods and more efficient operations.
- When implementing all strategies in combination, reductions to Delta outflow are relatively small (3%) while Table A and Total SWP export improvements are substantial (25-32% and 25-29% respectively).
- In all but the most extreme 2085 climate scenario, implementing a combination of strategies maintains Table A deliveries at or above current levels.



San Joaquin Basin Watershed Studies

This study was developed in partnership with federal, State, and local stakeholders to evaluate climate change vulnerability and potential benefits of recharge-related adaptation strategies across the five eastern tributary watersheds of the San Joaquin River (Calaveras, Stanislaus, Tuolumne, Merced, and Upper San Joaquin).

Two adaptation strategies are evaluated for each watershed: 1) MAR 90/20, which is a strategy derived from the State Water Resources Control Board's streamlined permitting process for managed aquifer recharge of available high flows. 2) Integrated Forecast-Informed Resource Management (I-FIRM), which is a comprehensive strategy integrating managed aquifer recharge with forecast-informed reservoir operations, also known as FIRO-MAR.

The studies showcase the potential of combining FIRO with watershed-scale recharge projects to a) enhance water supply, supporting sustainable groundwater management and water equity, b) reduce flood risk in the San Joaquin Basin, and c) diversify and enhance ecosystem functions. This integrated approach has far greater benefits than either FIRO or groundwater recharge when implemented alone.

The Watershed Studies assess the physical water available for recharge and were not limited to existing water rights. Translating San Joaquin Basin Watershed Studies findings into on-the-ground action will require coordinated policy, regulatory and governance solutions to enable timely and equitable diversion of high flows for recharge.

Key Findings

REPORTING AVERAGE FUTURE PERFORMANCE BY 2050

STRATEGY 1: MAR 90/20 RECHARGE OF AVAILABLE HIGH FLOWS

- Reduces peak flows by <5%;
- Recharges 96,000 acre-feet per year on average, roughly 3% of November-March basinwide runoff;
- Reduces groundwater overdraft by 4%-12% (33,000 acre-feet per year basinwide).

STRATEGY 2: I-FIRM (also known as FIRO-MAR)

FLOOD MANAGEMENT

- Reduces peak flows by 30-55%, as well as frequency and duration of flood flows in the downstream channel.

RECHARGE

- Recharges 410,000 acre-feet per year on average, roughly 14% of November-March basinwide runoff.

- More than 70% of the applied recharge volume is on-farm recharge—voluntarily inundating seasonal and perennial cropland with additional floodwater beyond crop needs.

GROUNDWATER

- Improves groundwater levels across all major aquifers.
- Reduces groundwater overdraft by 12%-38% across watersheds (103,000 acre-feet per year basinwide).
- Reduces the projected rate of permanent storage loss due to subsidence by 9,000 acre-feet/year (nearly 100% reduction in the projected rate of increase under future climate conditions).

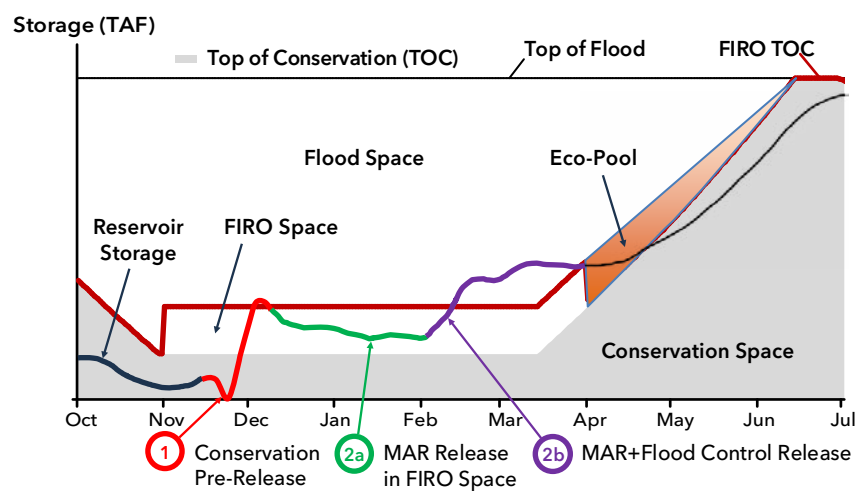
ECOSYSTEM BENEFITS AND TRADEOFFS

- Diverting high flows can reduce the duration and extent of floodplain inundation, but integrated strategies can improve ecosystem conditions
- Improves groundwater-dependent ecosystems through improved groundwater conditions
- Opportunities to create new ecological assets
 - ▶ Preserves storage for functional ecosystem releases in the spring that result in enhanced instream flows that increase instream spawning habitat by up to 50% in some watersheds
 - ▶ When combined with channel restoration, creates better quality off-channel rearing habitat.
 - ▶ Thousands of acres of seasonal shorebird habitat creation during March–April through establishing “eco-pools” of water
 - ▶ 8,000+ acres of flow-through basins along smaller creeks to provide temporary multi-benefit riparian habitat while attenuating peaks of flashy creek flows.

EQUITY BENEFITS

- Strategic placement of recharge water can create localized benefits, particularly for disadvantaged communities that rely on groundwater.
- Recharge was targeted near disadvantaged communities and regions with known groundwater level cones of depression.
- Expanded recharge access to white areas—lands outside irrigation district boundaries that currently lack access to surface water infrastructure and are dependent almost entirely on groundwater.

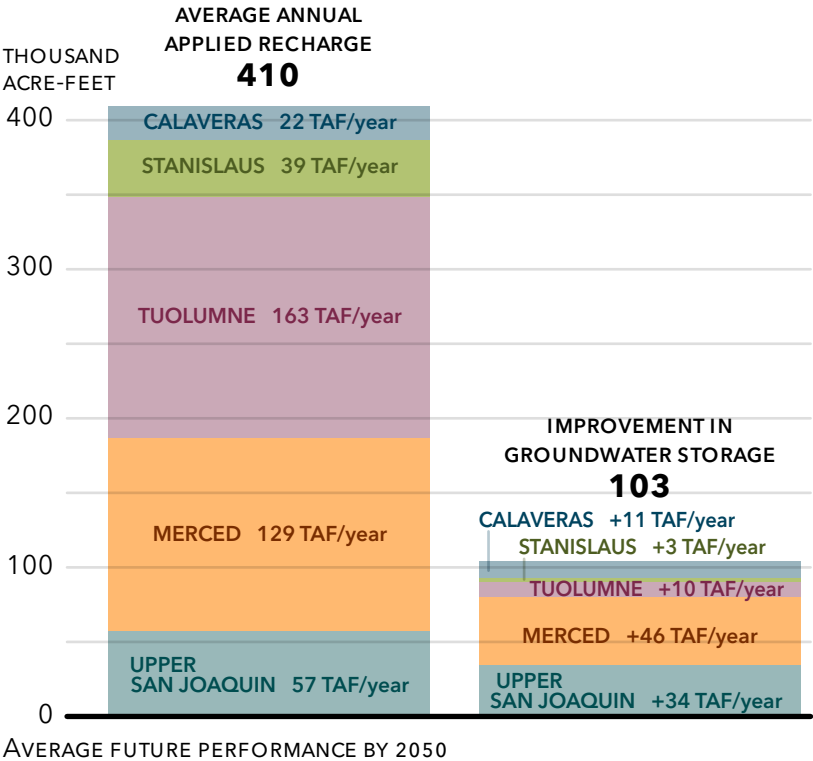
FIRO integrated recharge involves a FIRO space above the conservation space. If storage is forecasted to rise above the FIRO space, water is pre-released (1) when storage is still in the conservation zone. MAR releases (2a) move water to groundwater storage when reservoir storage is within the FIRO space. If storage is forecasted to rise above the FIRO space, a flood control release (2b) is made in addition to the MAR release to bring reservoir storage back within the FIRO space. The FIRO space also includes an “eco-pool” dedicated to ecosystem enhancements such as spring recession flows or creation of managed shorebird habitat.



APPLIED RECHARGE AND IMPROVEMENT IN GROUNDWATER STORAGE

FIRO-integrated recharge operations could provide 410,000 acre-feet of average annual applied recharge, which improves groundwater storage by 103,000 acre-feet per year. Analysis assumed that neighboring subbasins outside the study area maintain groundwater

levels at the minimum thresholds defined in their Groundwater Sustainability Plans, and that no additional agricultural or urban development occurs within the study area beyond baseline demands.



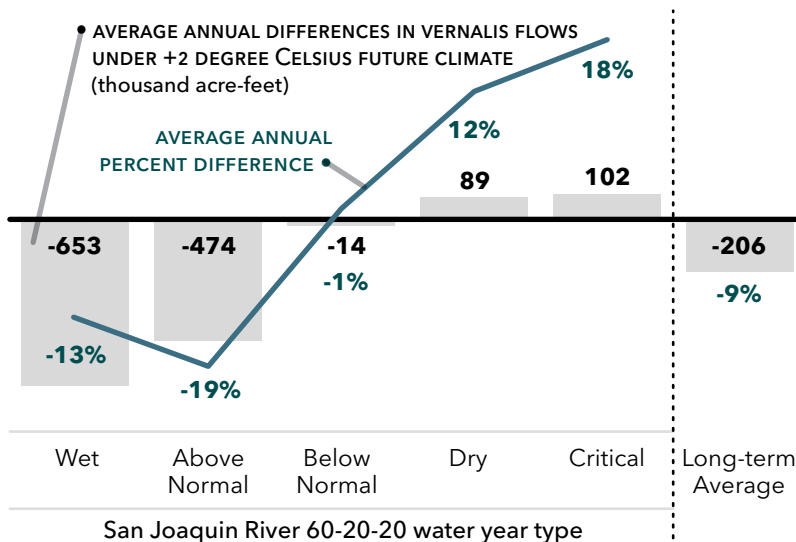
STUDY AREA	CHANGE IN PEAK FLOW DUE TO RECHARGE AND FIRO
CALAVERAS	-4,800 cfs (38%) near Bellota
STANISLAUS	-2,300 cfs (29%) below Goodwin
TUOLUMNE	-24,400 cfs (32%) at Modesto
MERCED	-17,800 cfs (54%) below Crocker Huffman Diversion Dam
UPPER SAN JOAQUIN	No changes in peak flow (52,000 cfs); however, the duration and frequency of high flows reduces by 50%



CHANGE IN VERNALIS FLOW FROM UPSTREAM FIRO AND RECHARGE OPERATIONS IN THE SAN JOAQUIN BASIN

Average annual streamflow decreases in wetter years (during active upstream recharge) and increases during drier years (due to higher baseflow). Average annual streamflow decreases by 206,000 acre-feet per year

(53% of upstream applied recharge). This will likely reduce Delta exports during wet and above normal years, but potentially increase Delta exports during critical and dry years.



Recharge operations combined with FIRO in the San Joaquin Basin can reduce flood risk, improve long-term groundwater conditions, enhance habitat, and boost baseflows during drier periods.

San Joaquin Valley Conveyance Study

The purpose of the San Joaquin Valley Conveyance Study was to:

- Describe the impacts of subsidence on San Joaquin Valley conveyance facilities.
- Evaluate the need for improved or expanded conveyance facilities throughout the San Joaquin Valley.

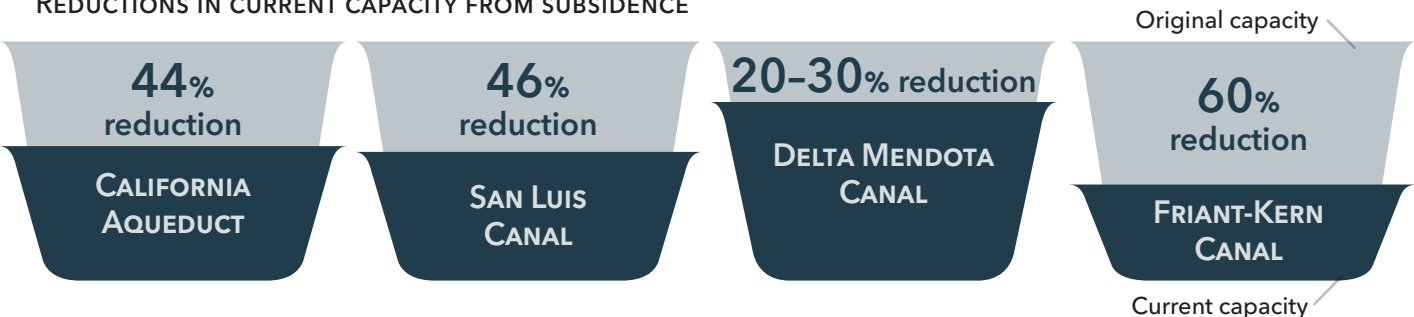
Critical components of California’s conveyance infrastructure, such as the California Aqueduct, San Luis Canal, Delta-Mendota Canal, and Friant-Kern Canal are already experiencing reductions in conveyance capacity due to subsidence. In addition to these CVP and SWP conveyance facilities, subsidence is also impacting many local conveyance facilities.

If subsidence continues at rates consistent with the past 10 years, it will have catastrophic effects on the ability to supply water to support California’s economy, communities, and natural environment.

The top conveyance priority in the San Joaquin Valley is to minimize or stop subsidence impacts, especially near main conveyance facilities of the SWP and CVP. This is needed to sustain lasting value from planned subsidence repairs that restore lost conveyance capacity and preserve the surface water deliveries needed for the westside of the San Joaquin Valley.

The key to minimizing ongoing subsidence and avoiding future subsidence is a recovery of groundwater levels to elevations above critical head as high and as quickly as possible. Critical head level is the groundwater level below which irreversible subsidence occurs.

REDUCTIONS IN CURRENT CAPACITY FROM SUBSIDENCE



Repairing subsidence: The upper sections of concrete, lighter in color, are part of subsidence repair work done on a section of the California Aqueduct near Lost Hills, in Kern County. As the canal sinks, it distorts, becoming wider with lower freeboard, which impedes conveyance.

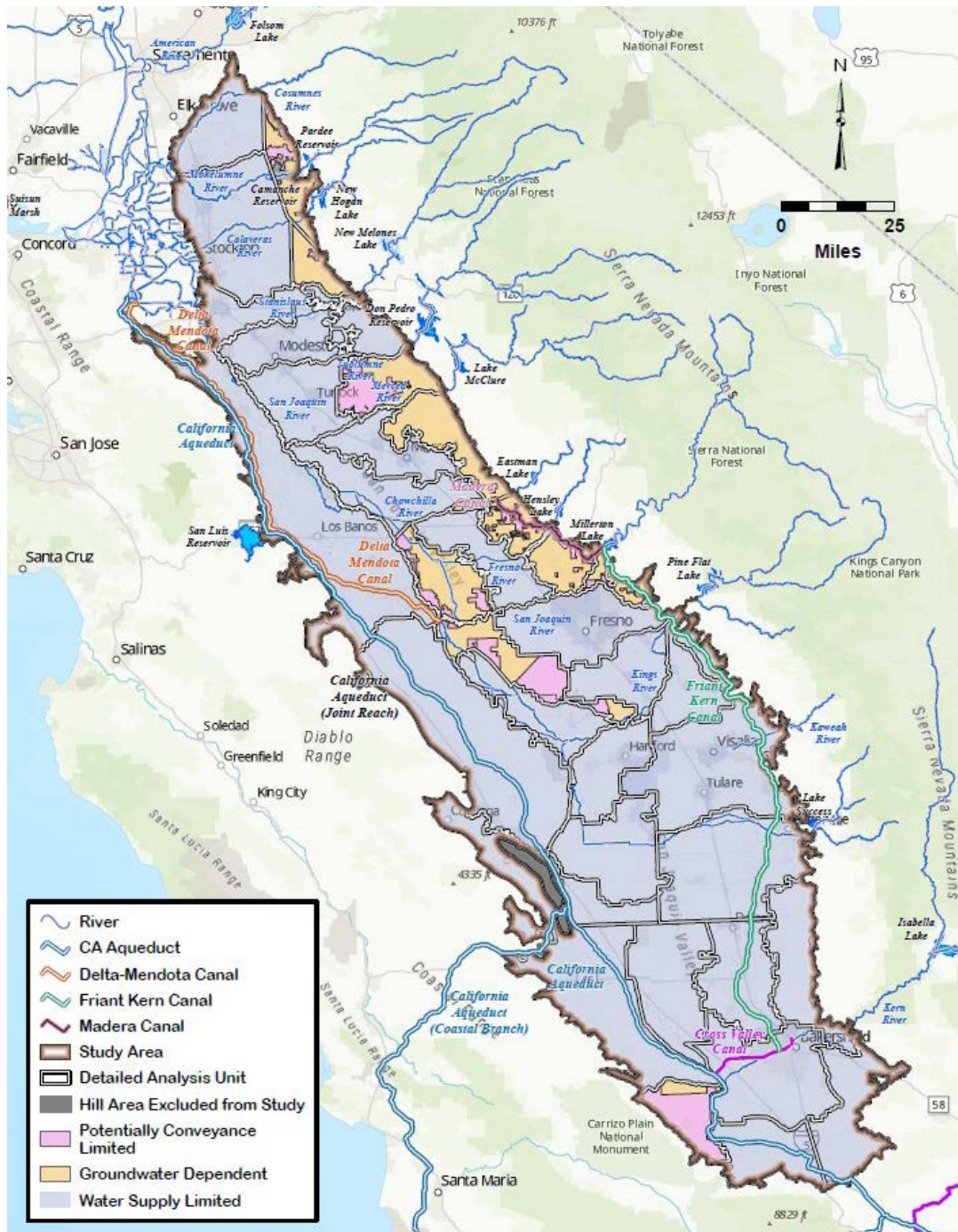


Conveyance Needs Assessment

A reconnaissance conveyance needs assessment found that, outside of areas impacted by subsidence, many San Joaquin Valley areas are constrained by inadequate surface water availability relative to demand, and not by conveyance capacity during most years.

San Joaquin Valley conveyance facilities are infrequently being filled to their maximum capacity (except for conveyance facilities impacted by subsidence).

Water transfers generally take place in dry and critical years and are not limited by conveyance capacity, but are influenced by availability of transferable waters.



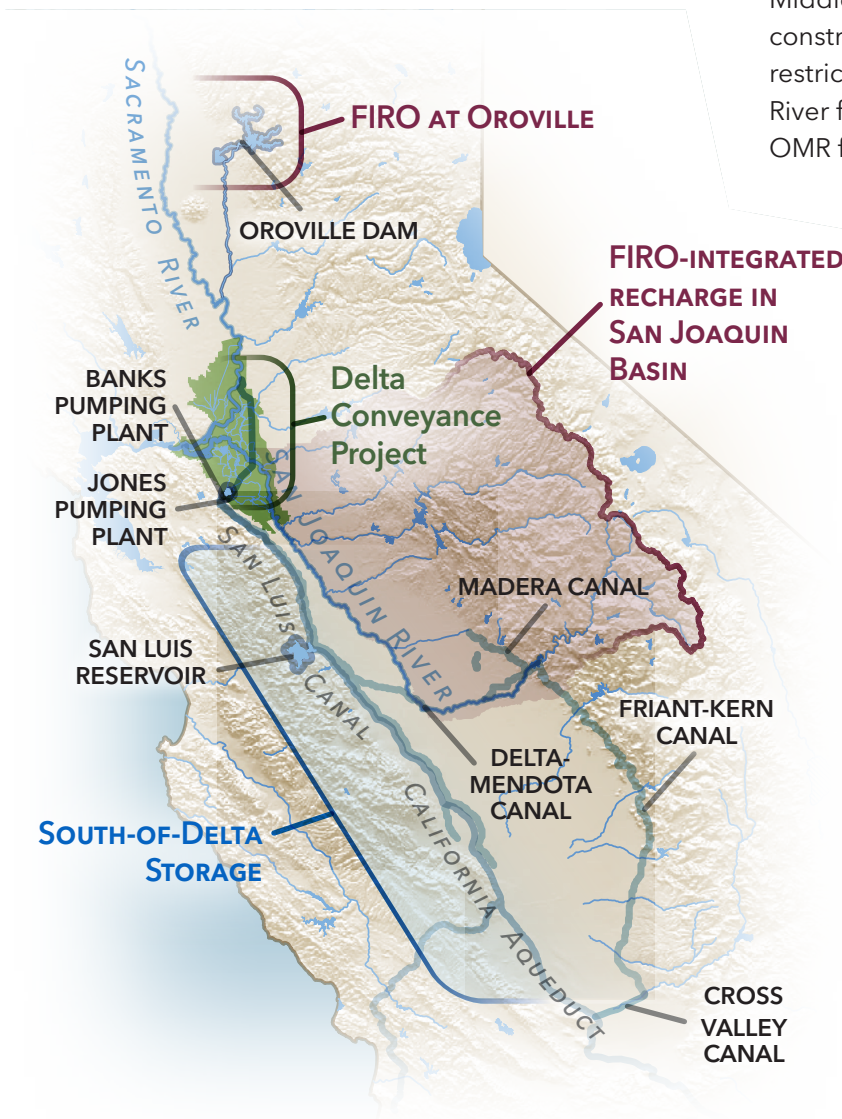
State Water Project Adaptation Strategy and San Joaquin Basin Flood-MAR Watershed Studies

DWR conducted an integrated modeling analysis to explore how recommended strategies described in the SWP Adaptation Strategy and Watershed Studies would perform together if implemented. Integrated analysis is essential to understand how actions performed in one part of the system affect conditions elsewhere. Analysis of the combined performance of recommendations from the SWP Adaptation Strategy and Watershed Studies help identify potential tradeoffs, avoid unintended consequences, and capture system-level benefits.

The SWP Adaptation Strategy recommended a combination of strategies including the Delta Conveyance Project, FIRO at Oroville Reservoir, and south-of-Delta storage, known as the SWP Adaptation Strategy Combination Scenario. The Watershed Studies recommended FIRO-integrated recharge in five eastern San Joaquin Basin watersheds, known as the I-FIRM Scenario (also known as FIRO-MAR).

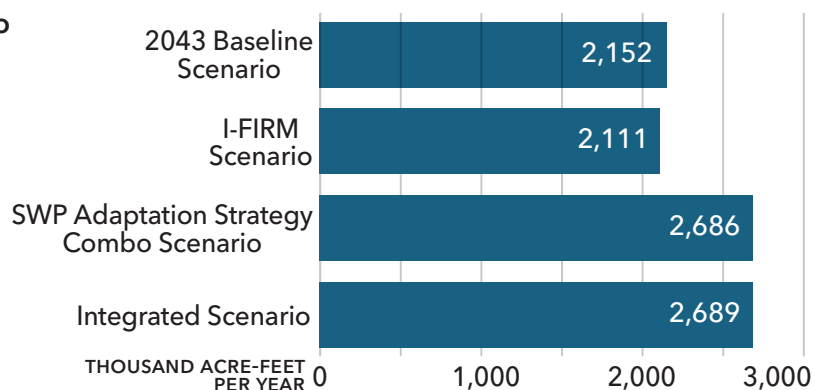
Findings of the integrated modeling analysis include:

- Regulations limiting reverse flows on Old and Middle River (OMR) flows are the most frequent constraints on Delta exports during “excess with restrictions” conditions. Reductions in San Joaquin River flows can lead to more frequent reversed OMR flows.
- The I-FIRM Scenario causes reductions in San Joaquin River flows during wet years but increases in dry and critical years. This causes a net long-term average reduction in Delta exports, primarily driven by OMR flow regulations.
- The Delta Conveyance Project would provide the ability to divert water using north Delta diversions during high-flow events without impacting OMR flows.
- Modeling shows that recommended actions in the SWP Adaptation Strategy has the potential to significantly reduce net long-term average reduction in SWP exports caused by the I-FIRM Scenario.



Average Annual State Water Project Expo

SWP exports were reduced by approximately 41,000 acre-feet by the I-FIRM Scenario. The SWP Adaptation Combination Scenario increased SWP exports by 534,000 acre-feet due primarily to the effects of the Delta Conveyance Project and south-of-Delta storage. The Integrated Scenario, which includes the SWP Adaptation Strategy Combination and I-FIRM scenarios showed an additional 3,000 acre-feet increase on top of the SWP Adaptation Combination Scenario (+537,000 acre-feet from baseline). The I-FIRM strategy causes negative and positive single-year effects to both the SWP and CVP exports. The modeling shows that potential increases in SWP and CVP exports during drier periods from increased San Joaquin River baseflows could balance out reductions in exports during wetter periods, producing a more muted response on an average annual basis. It is understood that monitoring and agreements would be needed to ensure that modeled increases in San Joaquin River baseflows would occur in practice. Additional modeling, pilot projects, and partnerships are needed to better understand potential downstream impacts and how they can best be addressed. Recharge that impacts water rights holders like the SWP will need to be worked out cooperatively.



The analysis demonstrates the need to explore how major infrastructure improvements perform together to avoid double counting and understand potential impacts. It also shows how investments in surface water and groundwater are interdependent.

Although Sites Reservoir was not analyzed in any of these studies, cumulative performance of Sites Reservoir and recommendations from the SWP Adaptation Strategy is an important area for further study.

Joint performance of the recommendations of the SWP Adaptation Strategy and Watershed Studies highlight a flexible system that can more nimbly adapt to climate change and use the latest science and technology to inform operations to store water during wet years so they can be later used during dry years. Combined benefits from these recommendations promote groundwater sustainability, address environmental needs, and provide shared public benefits across watersheds. Collaboration across diverse partners will be needed to leverage potential synergies across actions.

The *2027 Central Valley Flood Protection Plan Update*, will also include recommendations from these studies to enhance multi-benefit flood risk reduction actions for the valley.

Key Findings

- The San Joaquin Valley is on an unsustainable path due to severe groundwater overdraft and land subsidence.
- Climate change is projected to widen the gap between water supply and demand while increasing flood risks.
- The combination of heightened flood risk and depleted groundwater aquifers presents a unique opportunity to recharge floodwaters during wet years and to create a vital water supply for dry and critical years.
- Implementation of I-FIRM and maximizing recharge will require changes to existing regulations and water rights, which can be a time consuming and complicated process. I-FIRM implementation would also have environmental tradeoffs, but through careful planning could open the door to new and innovative approaches for managing limited supplies in a way that is environmentally beneficial.
- Restoring degraded capacity caused by subsidence in SWP and CVP conveyance facilities is a key investment priority.
- Restoring groundwater levels above critical head is needed to stop or minimize subsidence and preserve the value of planned subsidence repairs to SWP and CVP conveyance facilities.
- The majority of the San Joaquin valley is limited by inadequate water supply availability relative to demand and not by conveyance capacity during most years.
- Integrating FIRO and groundwater recharge in the eastern San Joaquin Basin can offer significant public benefits for flood management, water supply, groundwater sustainability, ecosystems, and equity.
- Strategically located recharge sites can create localized benefits, particularly for disadvantaged communities and areas prone to subsidence.
- The Delta Conveyance Project offers a promising solution to increase diversions of floodwater within existing regulatory constraints. It also enhances the value of many other adaptation actions.
- Additional south-of-Delta storage can provide an effective strategic water reserve for dry years, especially when implemented with the Delta Conveyance Project.
- FIRO at Oroville provides drought resilience by allowing greater storage of water in Lake Oroville under more variable hydrology.
- Modeling shows that recommended actions in the SWP Adaptation Strategy have the potential to significantly reduce net long-term average reduction in SWP exports caused by the I-FIRM Scenario. Additional modeling, pilot projects, and partnerships are needed to better understand potential downstream impacts and how they can best be addressed.
- Integrated strategies should be explored together because many of them are interdependent. These strategies need to be advanced together to leverage their benefits to the greatest extent. Collaboration between diverse partners will be needed.
- This integrated look at multiple studies hints at the realm of what's possible for surface water and groundwater available in the San Joaquin Valley, if certain projects and practices were adopted. All of those actions, taken together, are not enough to bring San Joaquin Valley groundwater basins into sustainability. Significant demand management will still be needed to halt the worst effects of groundwater overdraft.
- This analysis does not address specific demand management strategies. Private and local decision makers determine how and where to irrigate farmland. The California Department of Conservation administers the Multi-Benefit Land Repurposing Program to help local communities plan the repurposing of agricultural land in ways that support community health, economic wellbeing, water supply, habitat, and climate benefits.

The Strategies

To achieve water resilience in the San Joaquin Valley, an integrated approach is needed that leverages local, State, and federal partnerships. Some strategies can deliver results relatively quickly. Others require sustained focus and investment. Many of these actions are interdependent because of the dynamic interplay of surface water and groundwater. Investing in the SWP and minimizing subsidence provide greater opportunities to recharge groundwater during wet years, that in turn, supports water systems throughout the San Joaquin Valley, in both wet and dry years.

Near-Term Strategies

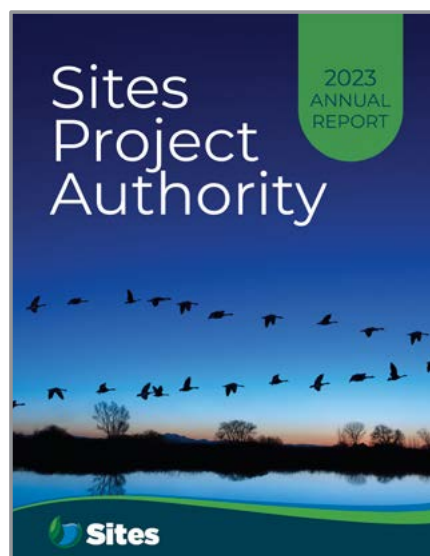
- **Pilot test implementation of an integrated FIRO and MAR strategy in San Joaquin Basin watersheds.** DWR will collaborate with local, State, and federal partners to incorporate FIRO-MAR strategies in water control manual updates (or as a deviation) for San Joaquin reservoirs in pilot watersheds. DWR will facilitate partnerships with the State Water Resources Control Board on addressing water rights, permitting, and water accounting issues associated with integrated FIRO-MAR strategies. DWR will also pursue agreements with downstream users to address potential effects from upstream groundwater recharge.
- **Promote and support implementation of SGMA, including addressing critical subsidence impacts that continue to degrade conveyance system capacity.** To avoid or minimize subsidence, groundwater levels need to rise as quickly as possible above critical head levels. Critical head level is the groundwater level below which irreversible subsidence occurs. Sustainable management criteria for groundwater levels must be established or updated utilizing critical head values and must be regionally coordinated. DWR has released Best Management Practices for Land Subsidence to support groundwater sustainability agencies in addressing this urgent issue.
- **Improve operational flexibility of the San Luis Canal and the California Aqueduct, despite ongoing subsidence, through the California Aqueduct Subsidence Program interim action projects.**
- **Empower local water districts to better capture high flows to recharge groundwater.**
- *Coordinate with local groundwater sustainability agencies to identify significant groundwater recharge opportunities and monitor progress on demand management.* DWR will continue to provide technical assistance that supports bringing groundwater aquifers into balance and preserving agriculture lands that can be sustainably irrigated.
- *Support development of groundwater sustainability agency accounting and allocation processes that provide credits for recharged water to incentivize landowner participation.*
- *Implement groundwater recharge regulatory reforms.* Current processes for appropriative water rights pose challenges for local agencies to divert high flows for recharge, such as costs to develop applications and infrequency of water availability. Process improvements, including regulatory streamlining as identified in the [2022 Water Supply Strategy](#), could help reduce timelines and accelerate review for new recharge-related water right applications but will require legislative updates to existing statutory requirements.
- *Enable local water agencies to develop flood thresholds on local streams to make groundwater recharge easier when opportunities arise and develop necessary documentation.* Existing law allows a streamlined pathway for diversions of floodflows for groundwater recharge without a water right when a local agency has issued a public notice that flows are at imminent risk of flooding. These determinations must be based off local planning documents that many local agencies have yet to prepare.
- DWR will develop a document to support local determinations about appropriate flood thresholds, prioritizing first streams in counties where floods threatened or claimed lives and destroyed property during recent flood events.

- DWR will provide technical assistance to support local development of local flood control plans that enable flood diversion and groundwater recharge.
- *Showcase a public dashboard with the information San Joaquin Valley water managers and users need to determine if water may be diverted for recharge when local flood conditions exist.* This [recently launched dashboard](#) includes hydrological conditions in the San Joaquin River watershed, restrictions on SWP and CVP pumping in the Delta, river stages, and existing flood thresholds where available.
- **Complete all permitting for the Delta Conveyance Project.**
- **Conduct additional watershed studies in other regions to identify and evaluate specific FIRO-MAR opportunities that reflect local conveyance constraints.**
- **Investigate South of Delta groundwater or surface water storage opportunities to better capture and store high flows during wet years.**
- **Continue coordination and adaptive management of long-term operation of the CVP and SWP.**

Long-Term Strategies

- **Restore lost conveyance capacity in the San-Luis Canal and the California Aqueduct through long-term improvement projects.**
- **Construct the Delta Conveyance Project and expand project beneficiaries.**
- **Construct the Sites Reservoir Project in Glenn and Colusa counties to store high Sacramento River flows for local water agency investors, including several in the San Joaquin Valley.** Sites Reservoir Project's potential to capture runoff from extreme storm events makes it a key element of the Governor's statewide water supply strategy.

Key studies and projects explore the realm of what is possible for surface water and groundwater availability.



In Closing

This report ties together the results of three separate studies that consider:

- How to sustain SWP supplies into a more extreme climate future.
- How integrating FIRO and groundwater recharge could help ease flood and drought in the valley.
- How subsidence and limited surface water availability are constraining the ability to convey and supply water in the San Joaquin Valley.

This integrated look shows that no quick or singular fix will solve the San Joaquin Valley's water problems. The valley cannot sustainably irrigate all the farmland now in production. Hard choices are unavoidable. But with planning, creativity, thoughtful investment, and sustained coordination, we could maintain and modernize the SWP, convert flood flows to water supply, and halt subsidence while repairing canals already damaged by over-pumping of groundwater. Together, those actions would help stabilize water supplies while the valley adjusts to a changed climate and corrects a century of groundwater overdraft.

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