

San Joaquin River Restoration Program



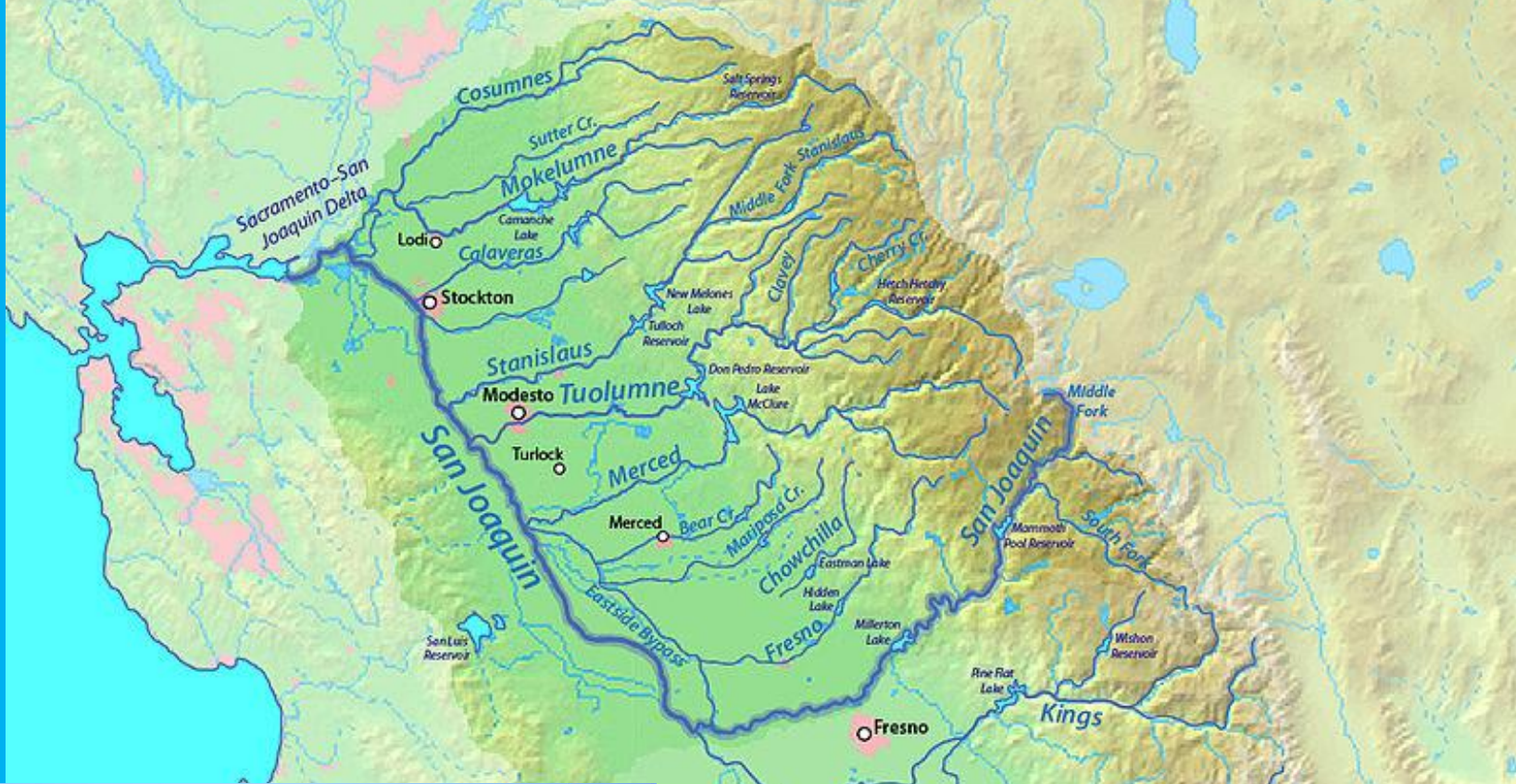
Restoration Program Overview

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Water Education Foundation
San Joaquin River Tour
November 7 & 8, 2018



LET'S GET OUR BEARINGS...





- Reaches of the San Joaquin River under evaluation include the following:**
- **Reach 1** – Friant Dam to Gravelly Ford
 - **Reach 2** – Gravelly Ford to Mendota Dam
 - **Reach 3** – Mendota Dam to Sack Dam
 - **Reach 4** – Sack Dam to the confluence of Bear Creek and the Eastside Bypass
 - **Reach 5** – Eastside Bypass/Bear Creek confluence to the Merced River confluence





THE HISTORY



- Construction begins on Friant Dam in 1939.
- Built for water supply for southern San Joaquin Valley through Friant-Kern Canal and Madera Canal.
- Authorized for both water supply and flood control
- 520,000 acre-feet, 15 miles north of Fresno, CA

- Friant Dam completed in 1942 as part of the Central Valley Project, effectively trapping the full flow of San Joaquin River.

- Historic spawning habitat of largest and southern-most spring-run Chinook salmon eliminated.

- Spring-run extirpated from the river.



Settlement History

Fast forward 46 years...

1988

Lawsuit filed challenging Reclamation's renewal of the long-term contracts with Friant Division contractors

2004

Federal Judge rules Reclamation violated Section 5937 of the California Fish and Game Code:

"The owner of any dam shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around or through the dam, to keep in good condition any fish that may be planted or exist below the dam..."



Settlement History

2005

Settlement negotiations
reinitiated

2006

Settlement reached;
implementation begins

2009

Federal legislation enacted
(Public Law 111-11) to fund
the Program





The “Players”

Settling Parties

- NRDC Coalition
 - 14 organizations
- Friant Water Authority
 - 17 water agencies intervened
- Federal Government
 - Department of the Interior
 - Bureau of Reclamation
 - Fish and Wildlife Service
 - Department of Commerce
 - National Marine Fisheries Service
- State of California
 - Department of Water Resources
 - Department of Fish and Wildlife
- Restoration Administrator
- Third Parties



Implementing Agencies



Settlement Goals

- **Restoration Goal**

- To restore and maintain fish populations in “good condition” in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.



- **Water Management Goal**

- To reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.



Key Restoration Goal Activities

- Increase flows from Friant Dam
- Improve channel and structures to convey flows and improve fish passage
- Reintroduce spring-run and fall-run Chinook salmon





Key Water Management Goal Activities

- Water Accounting and Recovery

- Restoration Flow Guidelines (Completed 12/2013)
- Recovered Water Account
- Recapture and re-circulate Restoration Flows



- Physical Projects

- Friant-Kern Canal Capacity Correction
- Madera Canal Capacity Correction
- Friant-Kern Canal Reverse Flow
- Part III Groundwater Projects



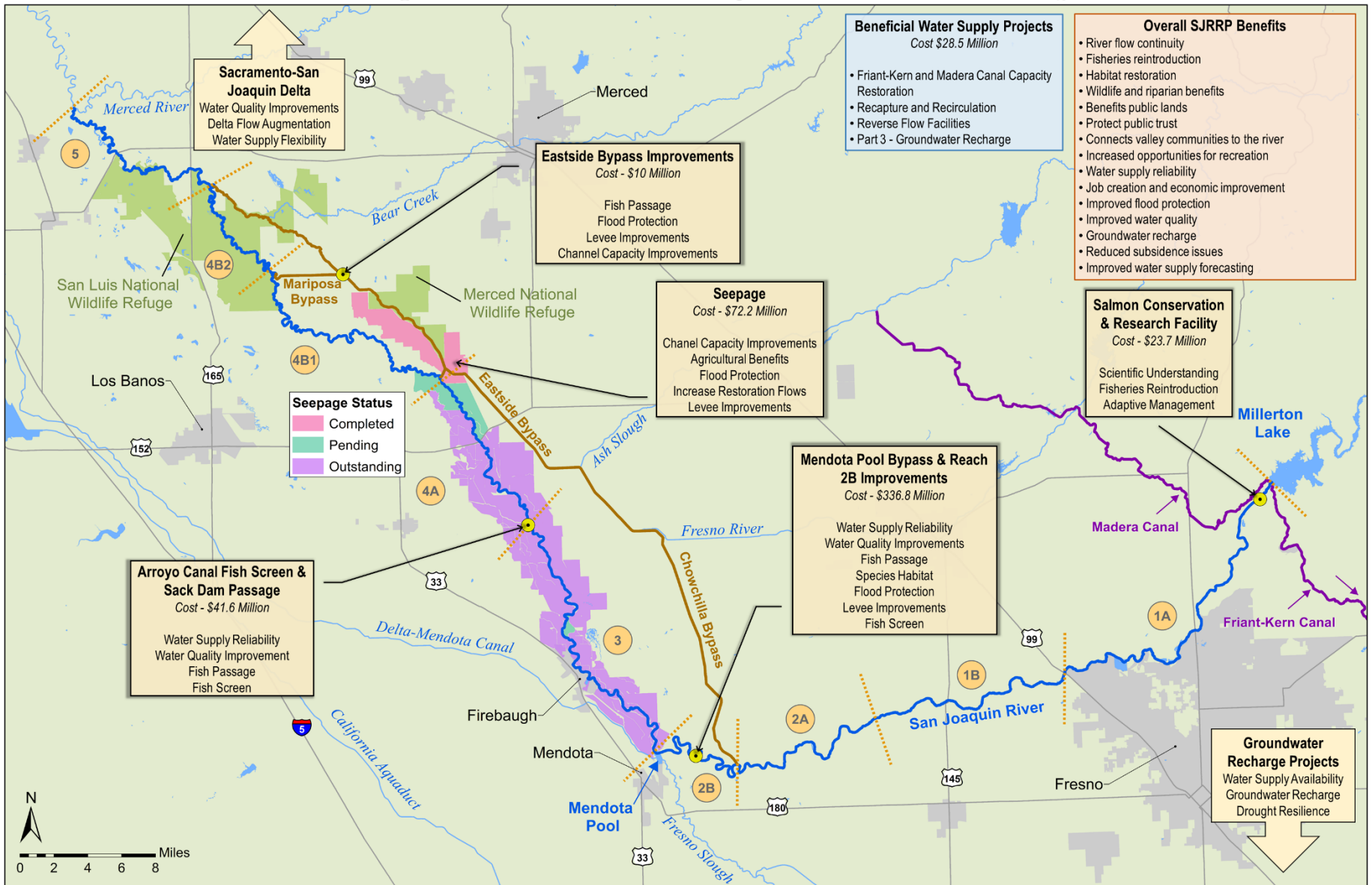


Key Guiding Program Documents

How Restoration and Water Management goals are implemented:

- Settlement & Act (legally binding)
- 2015 Revised Framework for Implementation
 - Provides timeline for Program implementation in 5-year increments
- 2018 Fisheries Framework
 - Outlines fish reintroduction strategy and stressors
- 2018 Funding Constrained Framework
 - Program priorities into next decade given budgetary constraints (through 2024)

San Joaquin River Restoration Program Cost & Benefits Map



Funding Constrained Framework - Stage 1: FY 2015 to FY 2024

- **Goal: Begin the reestablishment of spring-run and fall-run Chinook salmon**
- **Construction / completion of the following:**
 - Mendota Pool Bypass, Fish Screen, and Reach 2B Project
 - Seepage and levee stability projects to achieve up to 2,500 cfs capacity in all reaches
 - Arroyo Canal Fish Screen and Sack Dam Fish Passage Project
 - Conservation Facility construction
 - Fish passage and levee improvement actions in the Eastside Bypass
 - All remaining funding provided for the Friant-Kern Canal and Madera Canal Capacity Restoration projects



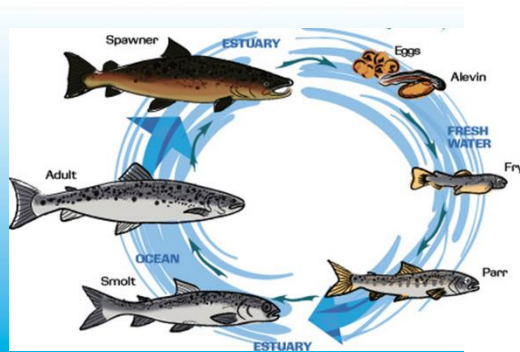
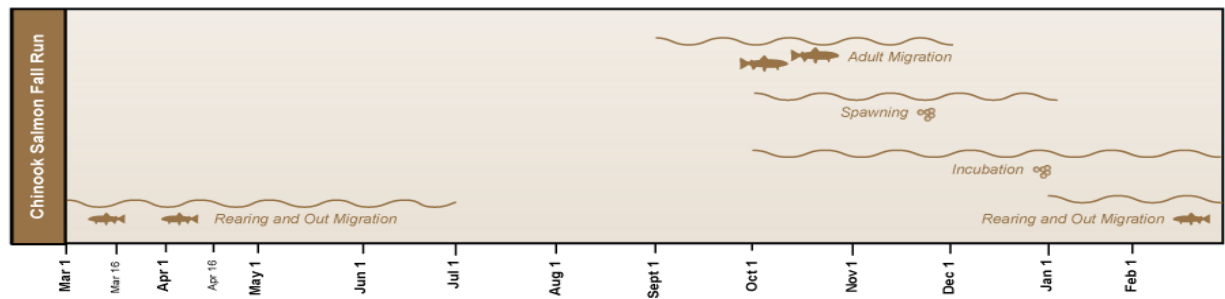
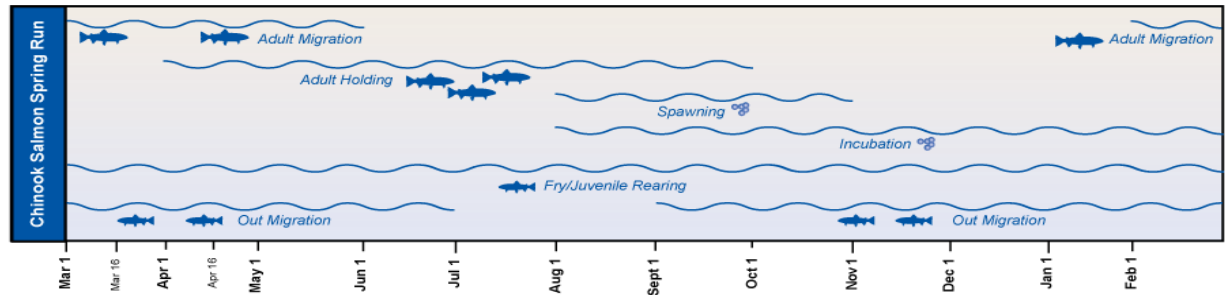
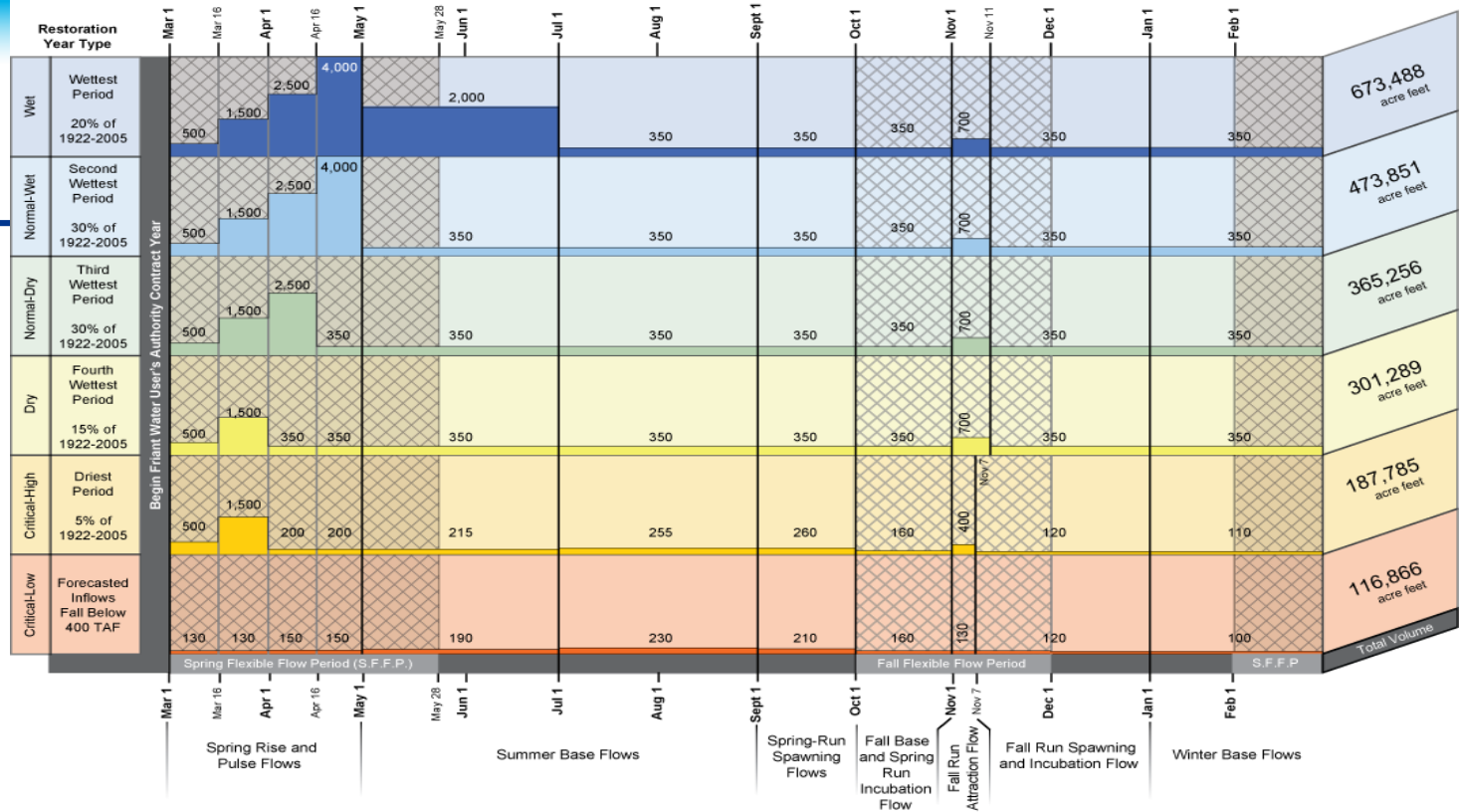
Flows

A large, abstract, blue-toned image of water splashing or flowing, occupying the bottom half of the slide. The image is semi-transparent and serves as a background for the lower portion of the page.



Friant Release Schedule with Fisheries Migration Timing

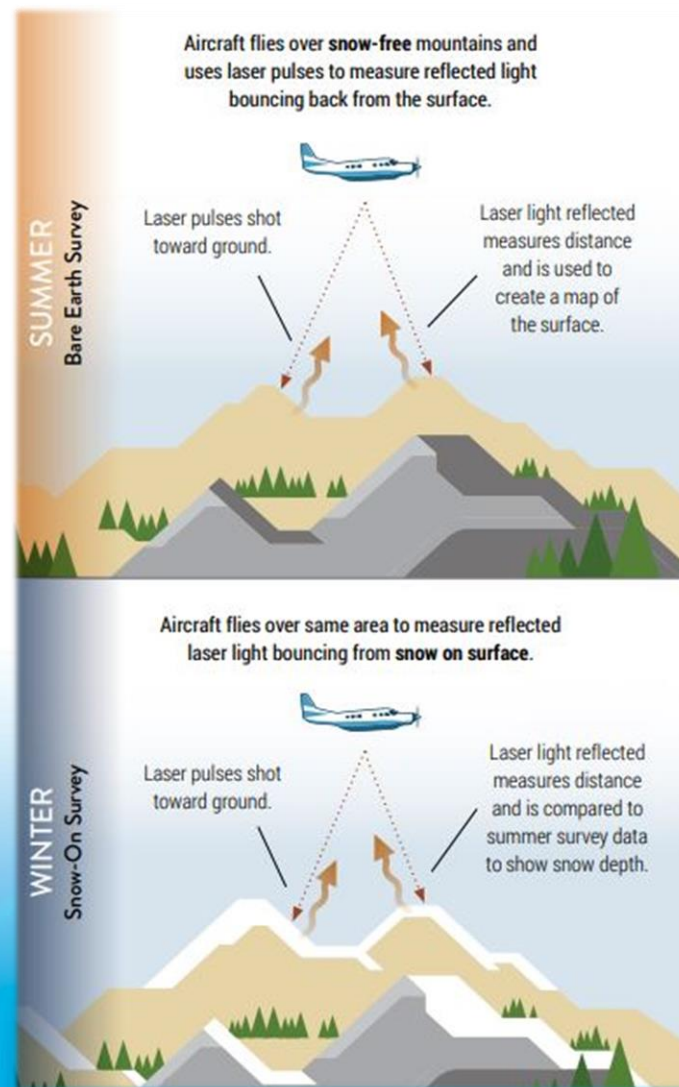
- Interim Flows began in 2009
- Restoration Flows began in 2014





Runoff Forecasting

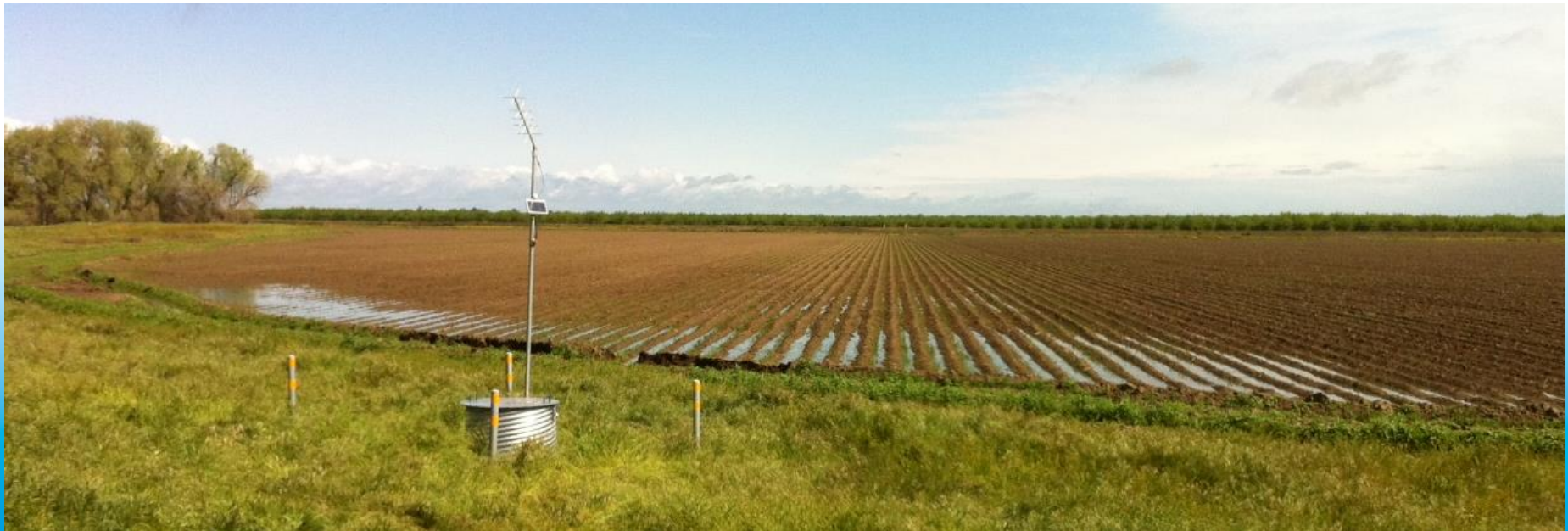
- Determining how much water is available for flows is critical
 - Determines water year type
 - Restoration Flows
 - Water User availability
- Use a number of tools including:
 - Blended forecasts from DWR and NWS
 - NASA's Airborne Snow Observatory. Accurate and early warning of runoff addresses multiple challenges across all four realms





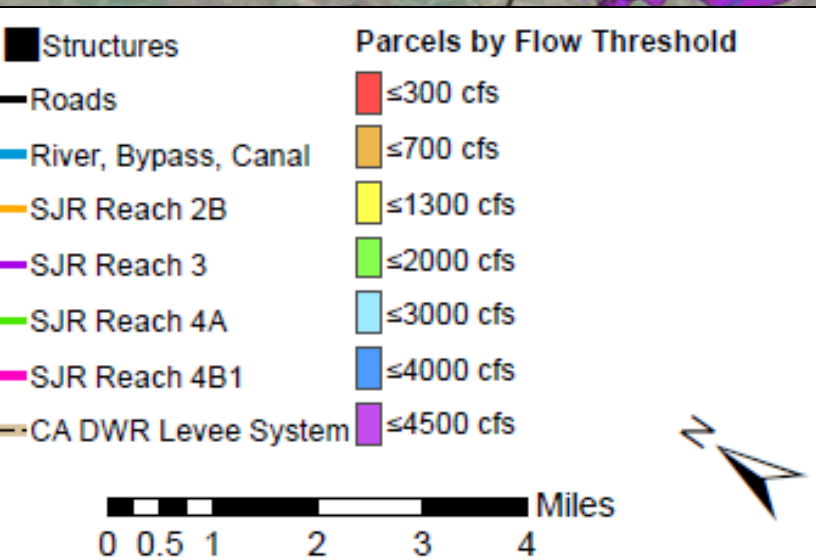
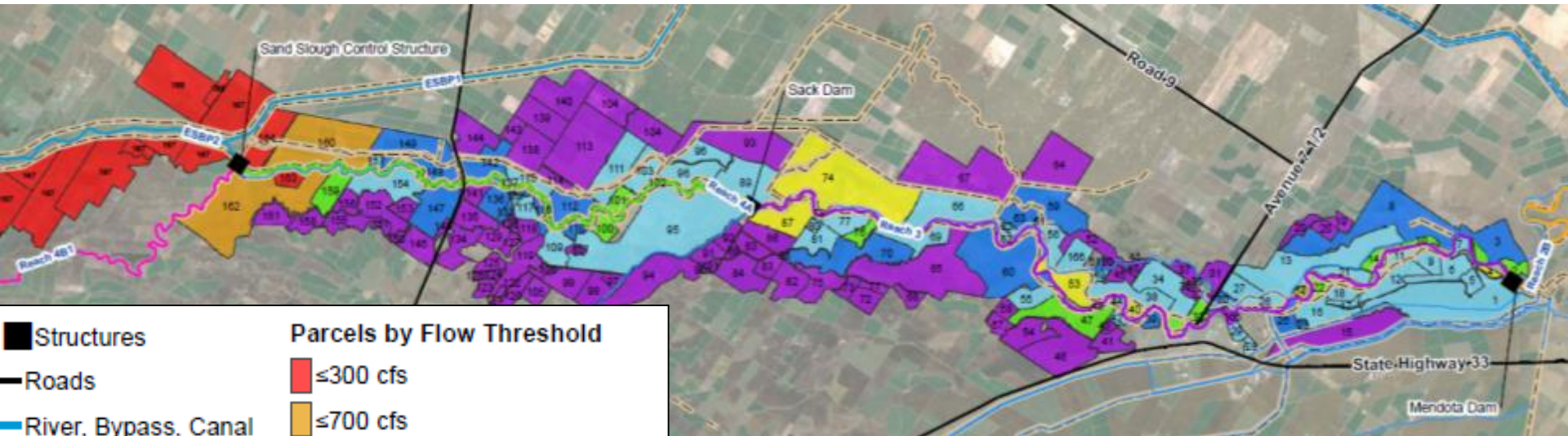
Seepage Management

- Rewetting the San Joaquin River increases shallow groundwater elevations
- Can effect crop productivity (i.e. increased salinity and water logging of crops)





Seepage Management

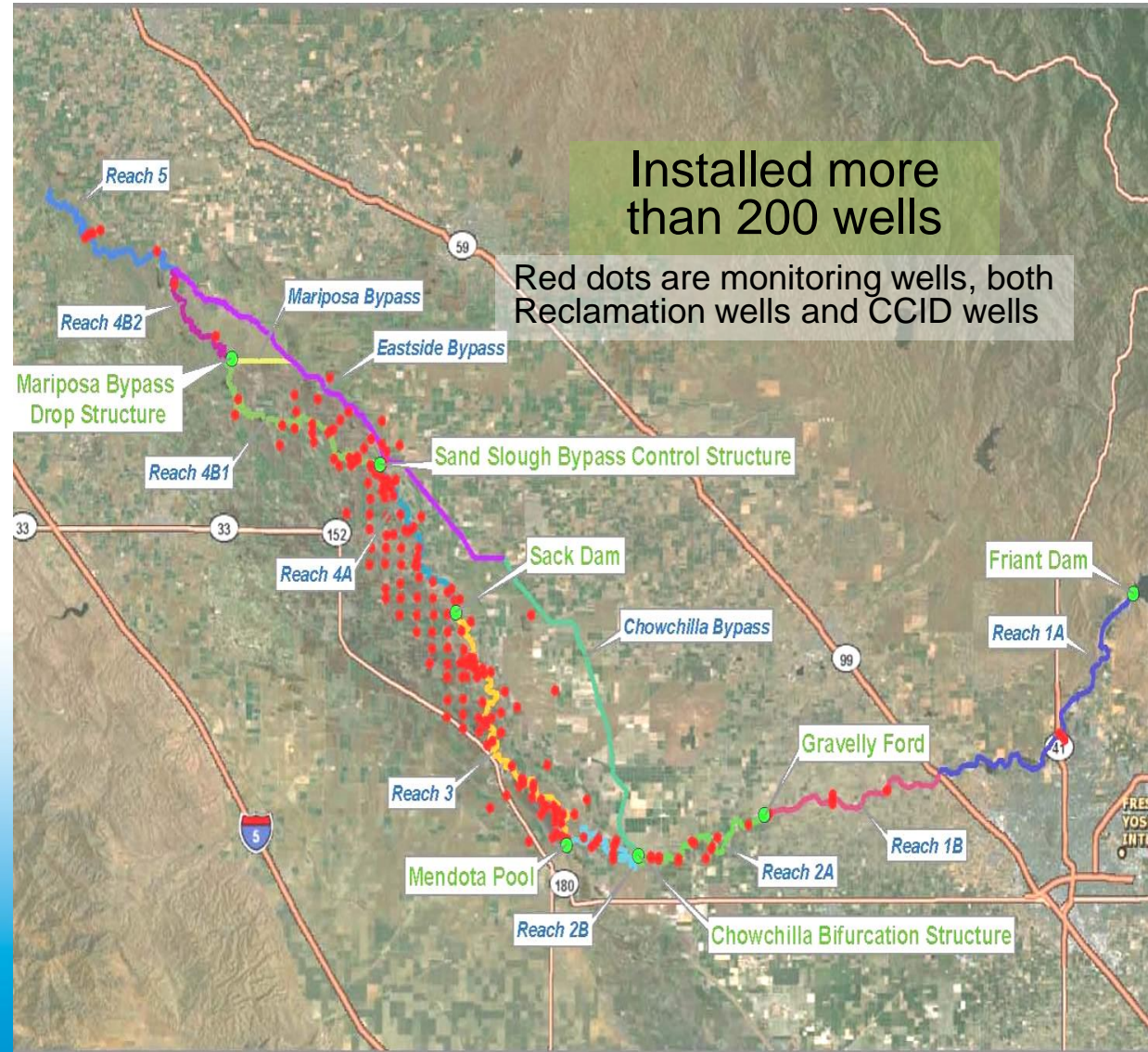


Approximately 25,000 acres needs to be addressed between Mendota Pool and Merced National Wildlife Refuge

SJRRP Monitoring Well Network

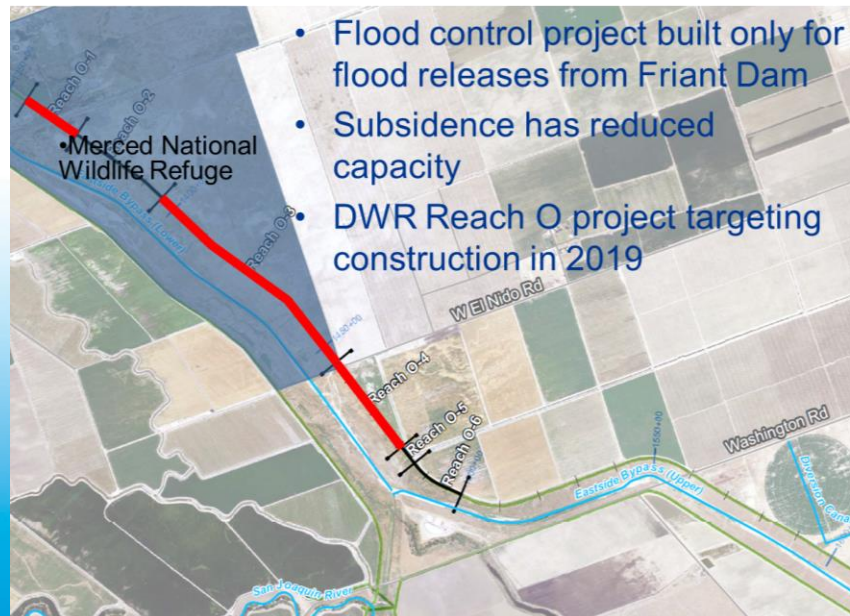
Data Reporting

- Real-time wells online
- Weekly measurements for key wells
- Monthly or quarterly for all other wells depending on site conditions
- Pressure transducers gathering hourly data
- Well Atlas provides well locations, groundwater elevations, topography and similar items and is updated about quarterly



Levee Stability & Channel Capacity

- Flood control project designed and built assuming only flood releases from Friant Dam
- Levee improvements needed to address long-term flows
- Channel capacity limits flow levels that meet USACE Safety Factors for Levee Slope Stability and Underseepage



Reach	Flood Design Flows (cfs)	2017 Then-Existing Channel Capacity (cfs)	How Capacity is Determined
2A	8,000	6,000*	Geotechnical
2B	2,500	1,120	In-channel
3	4,500	2,860*	In-channel
4A	4,500	2,840*	Geotechnical/ In-channel
4B2	10,000	930	In-channel
5	26,000	2,350	In-channel
Middle Eastside Bypass	16,500	580 (0)	Geotechnical
Lower Eastside Bypass	18,500	2,890	In-channel
Mariposa Bypass	8,500	350	In-channel

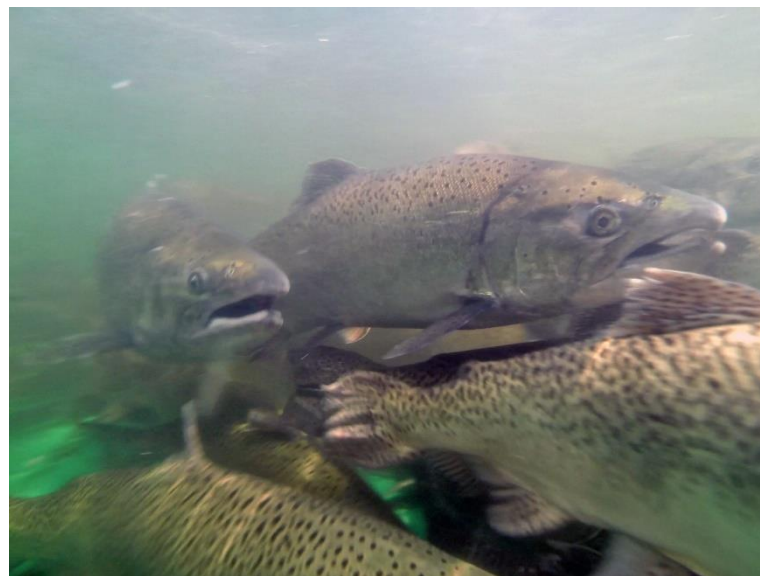


Passage and Habitat



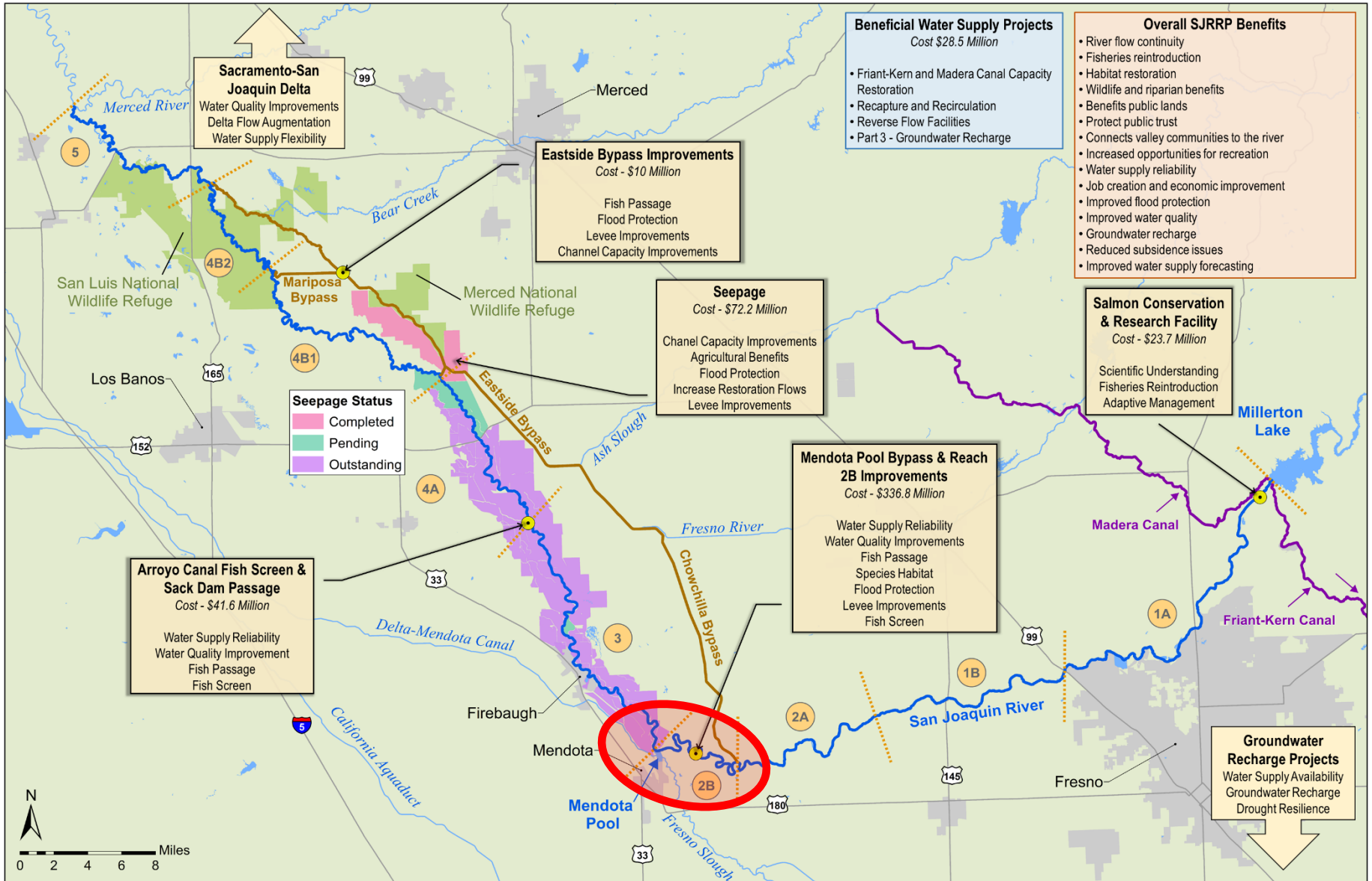
Key actions for fish survival

- Volitional upstream migration of adult and downstream emigration of juvenile fall-run and spring-run Chinook salmon
- Eliminate stranding and entrainment potential
- Create habitat needed for holding, spawning, rearing, and migration.



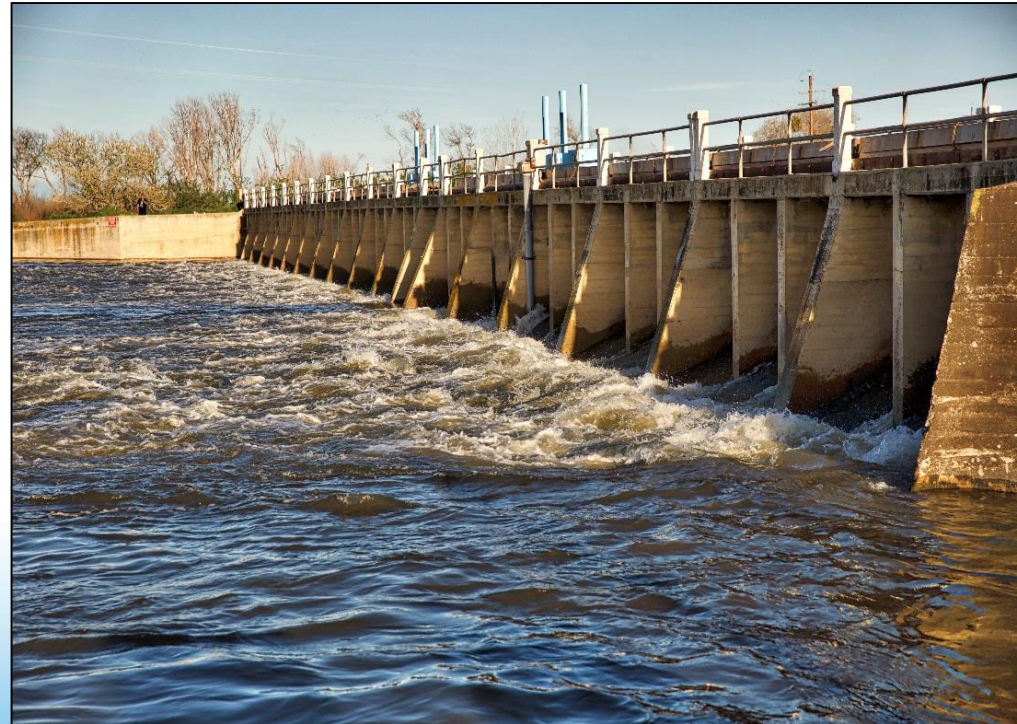
Reach 2B

San Joaquin River Restoration Program Cost & Benefits Map



Reach 2B and Mendota Pool Bypass Project

- Area between Chowchilla Bypass and Mendota Pool
 - Most is not part of Flood Control Project
 - Original design capacity was 2,500 cfs
 - Current capacity is ~1,300 cfs
 - Levees built by landowners of native soil and will need to be rebuilt





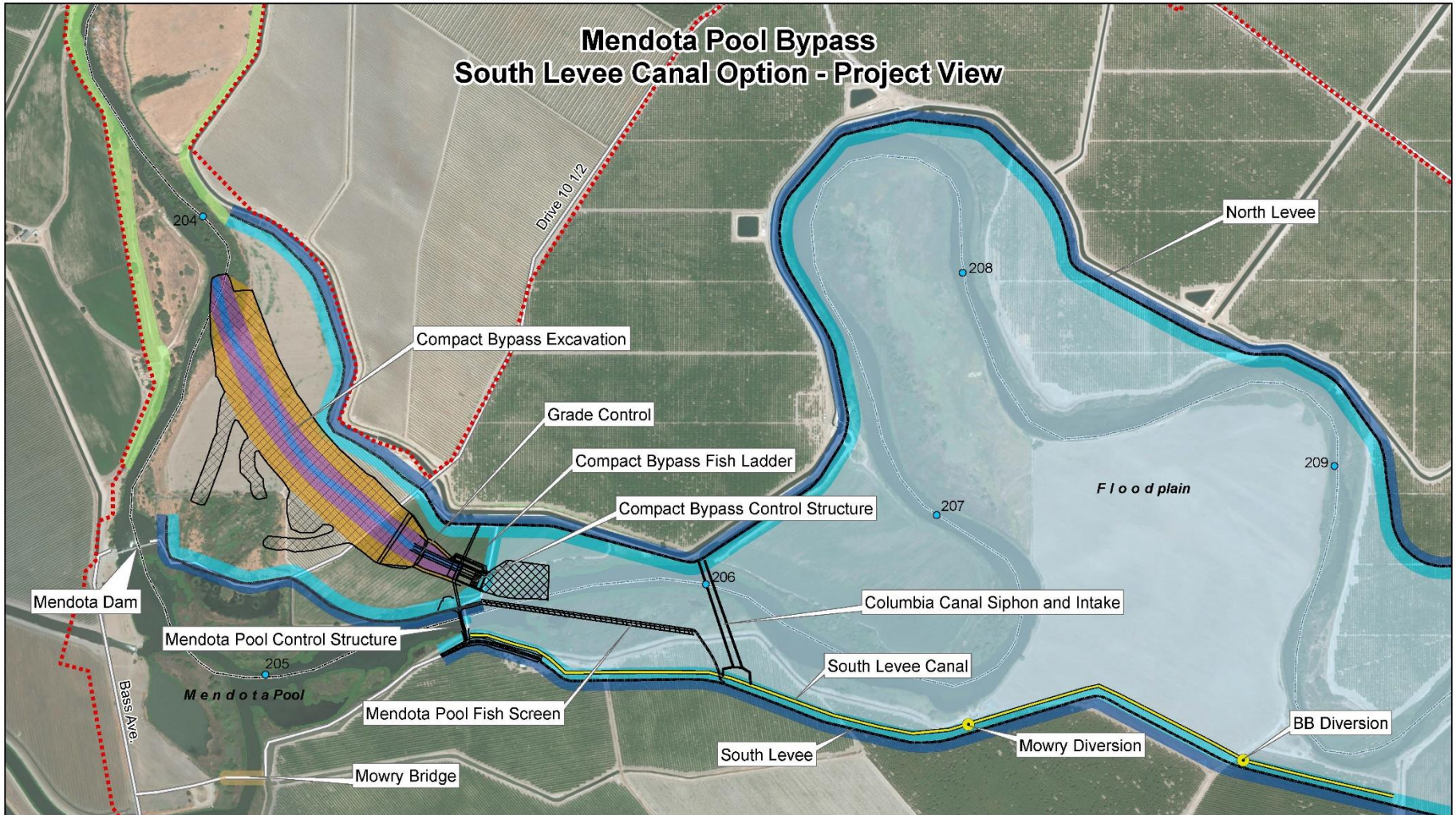
Mendota Pool Bypass and Reach 2B Channel Improvements Project

RECLAMATION
Managing Water in the West

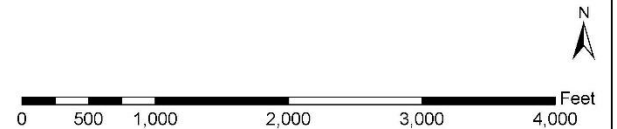


- Create bypass channel around the Mendota Pool (about 3/4 mile of new river channel)
- Expand Reach 2B capacity to convey at least 4,500 cfs (11 miles of new levee and flood plain habitat)
- *Current Schedule:* ROD – October 2016
- Land acquisition 2017/2018
Construction start date – 2019
- *Cost:* \$336 million

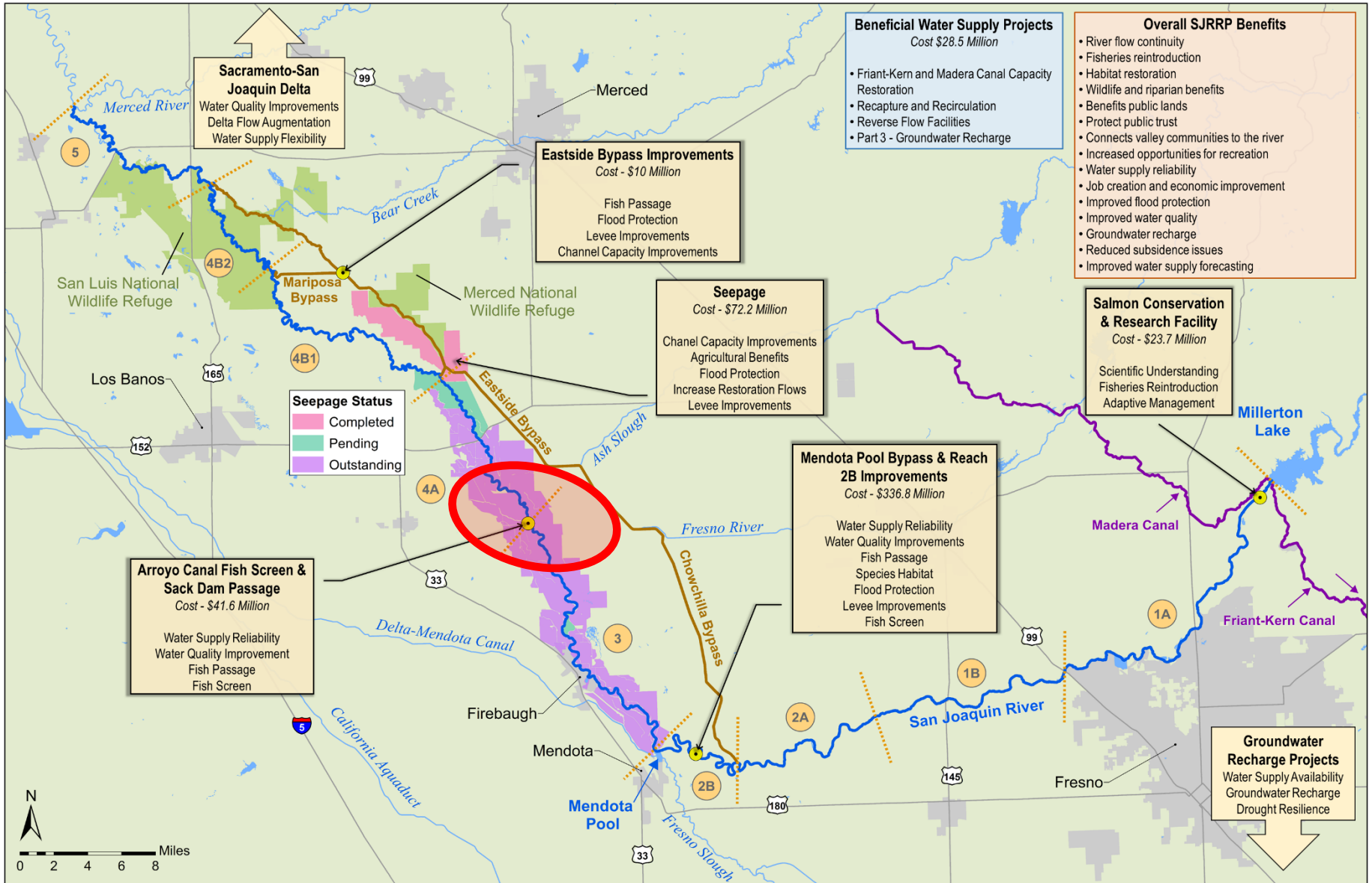
Mendota Pool Bypass



- Project Boundary
- County Boundary
- Construction Access Route
- River Mile Post
- Compact Bypass Channel**
- Low Flow
- Floodplain
- Levee
- Mowry Bridge Replacement
- Bankfull
- Top of Floodplain
- Levee - 100ft Buffer
- Reach 3 Levee Improvement



San Joaquin River Restoration Program Cost & Benefits Map



Arroyo Canal Fish Screen and Sack Dam Fish Passage Project



Sack Dam – Modify for fish passage

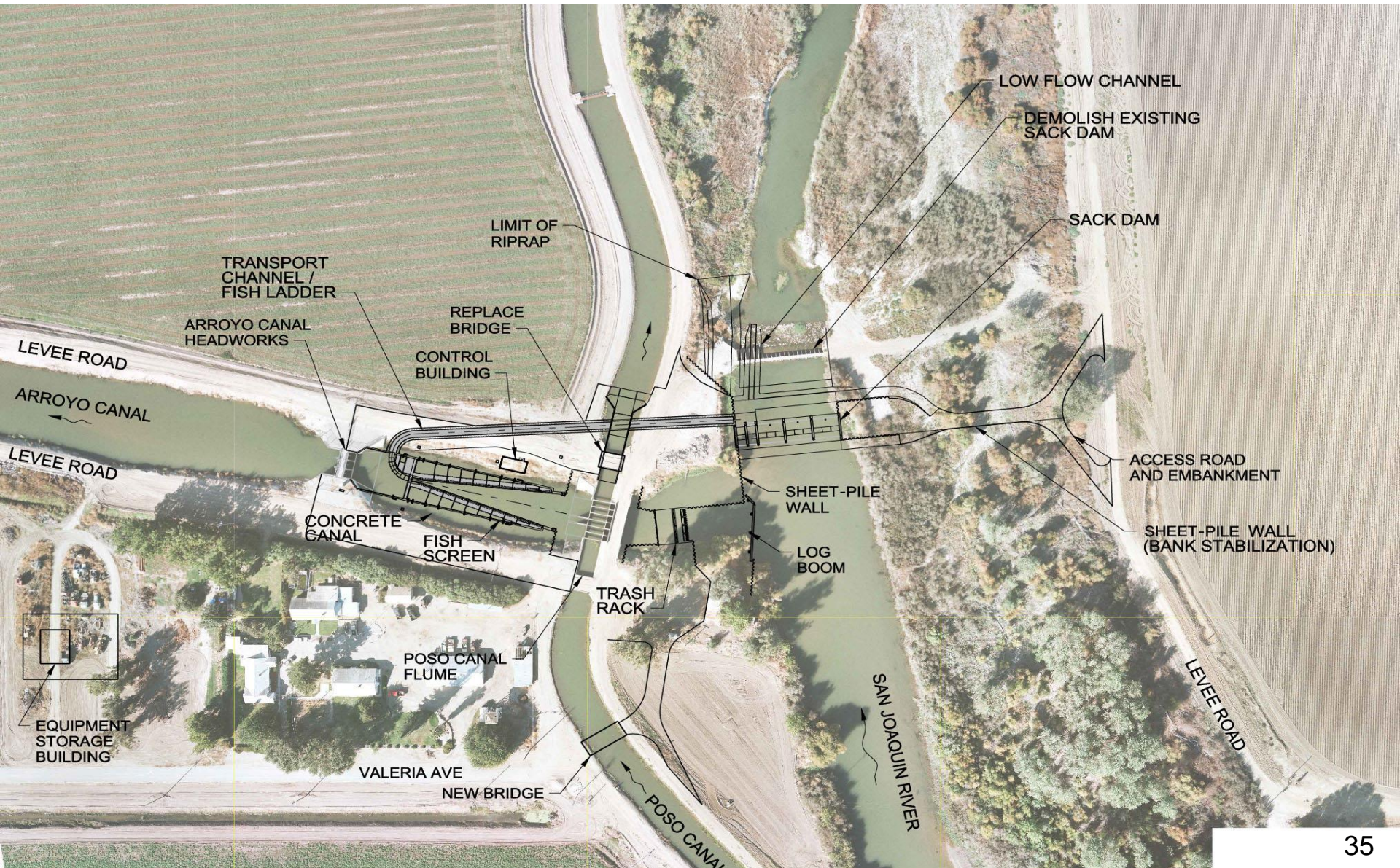
NEPA and CEQA completed

Construction – Redesign for project underway to address subsidence.

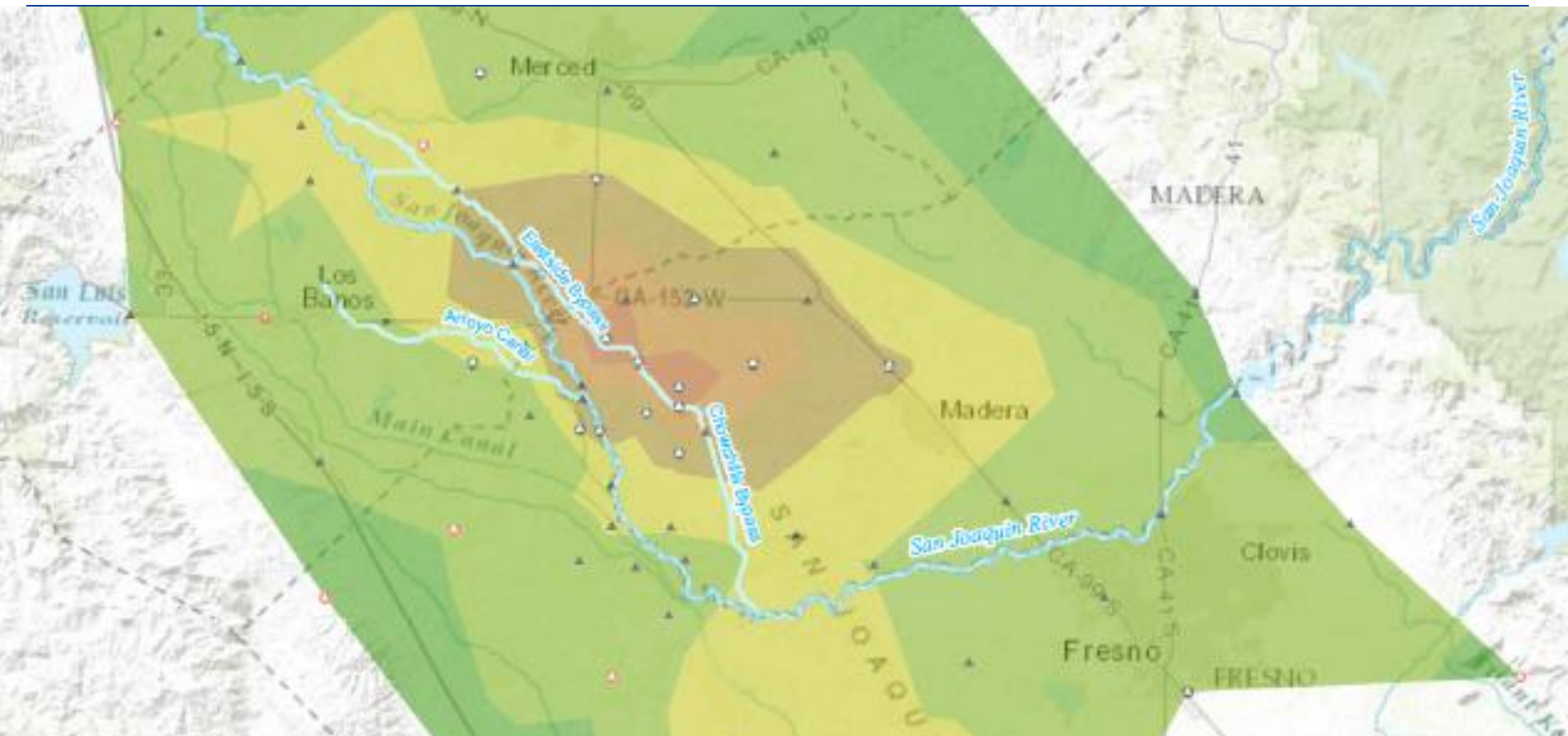


Arroyo Canal – Screen to prevent fish entrainment

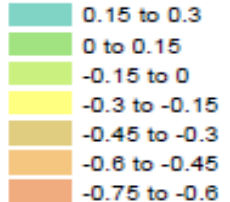
Arroyo Canal Fish Screen and Sack Dam Fish Passage Project



Subsidence, Control Point Survey Results

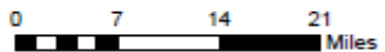


**Subsidence Rates (feet/year)
July 2012 to July 2016**



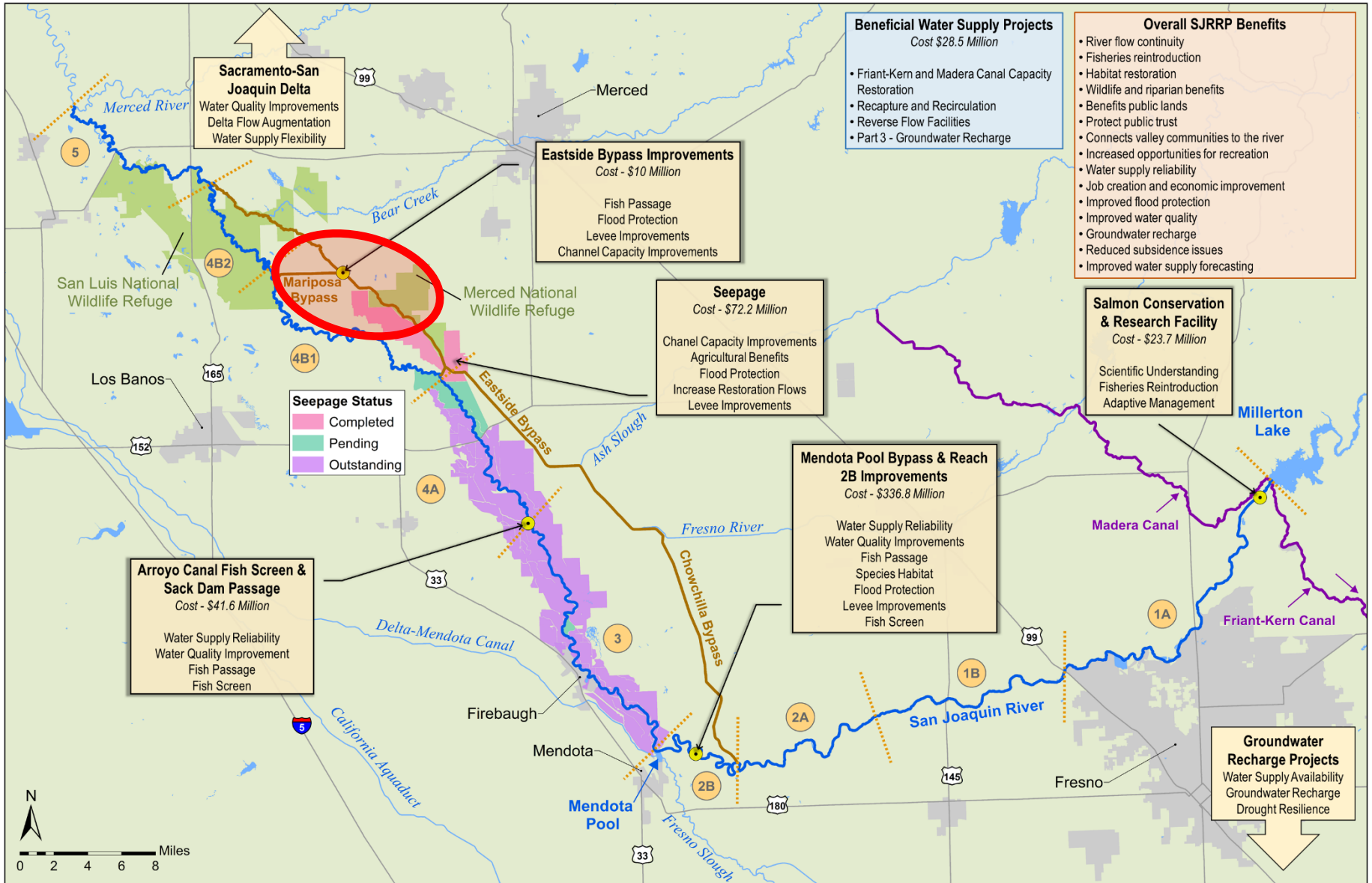
GPS Coordinates

- ▲ GPS Point-December 2011
- GPS Point-added July 2012
- ◌ GPS Point-added December 2013

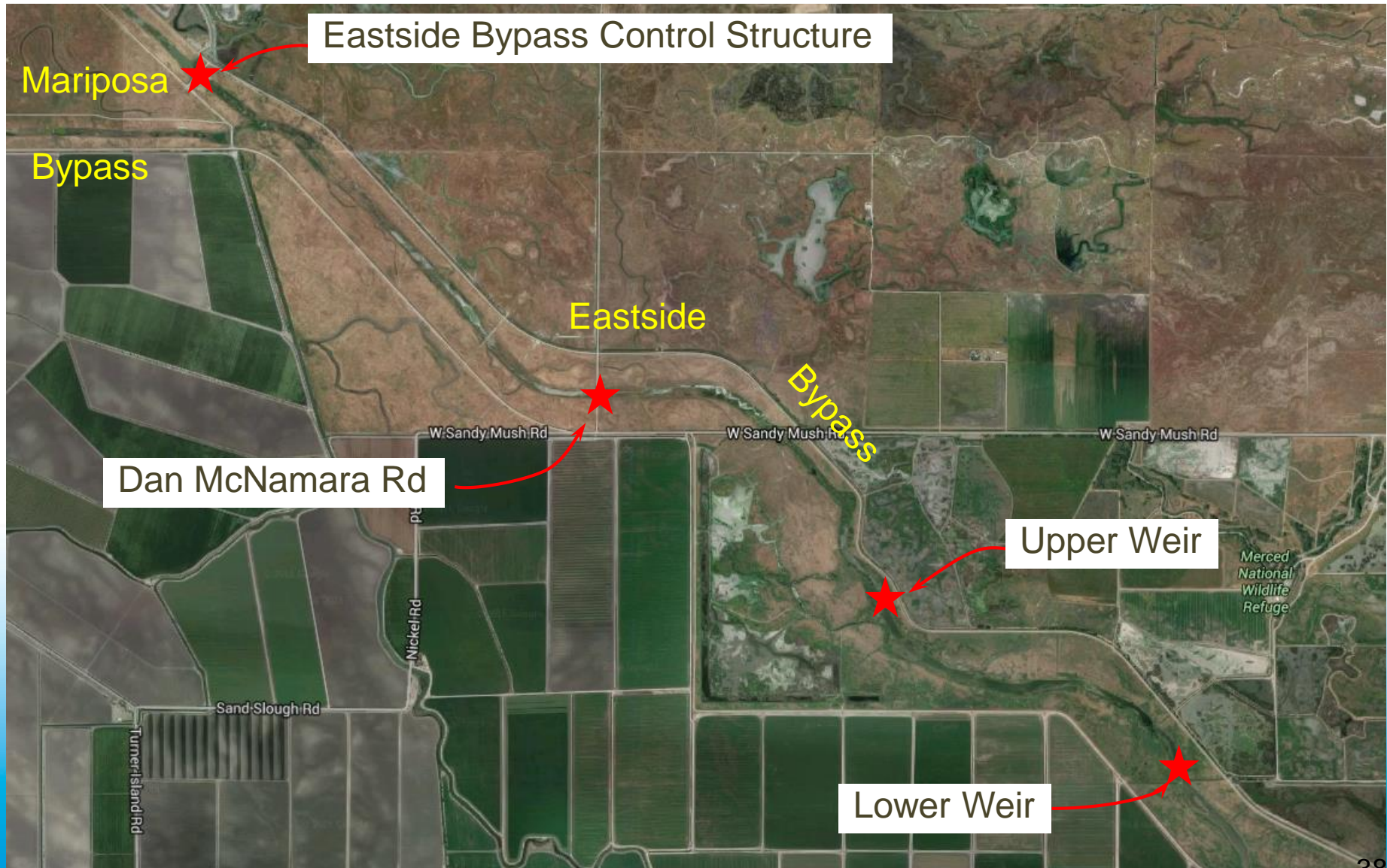


Arroyo Canal Fish Screen and Sack Dam Fish Passage Project

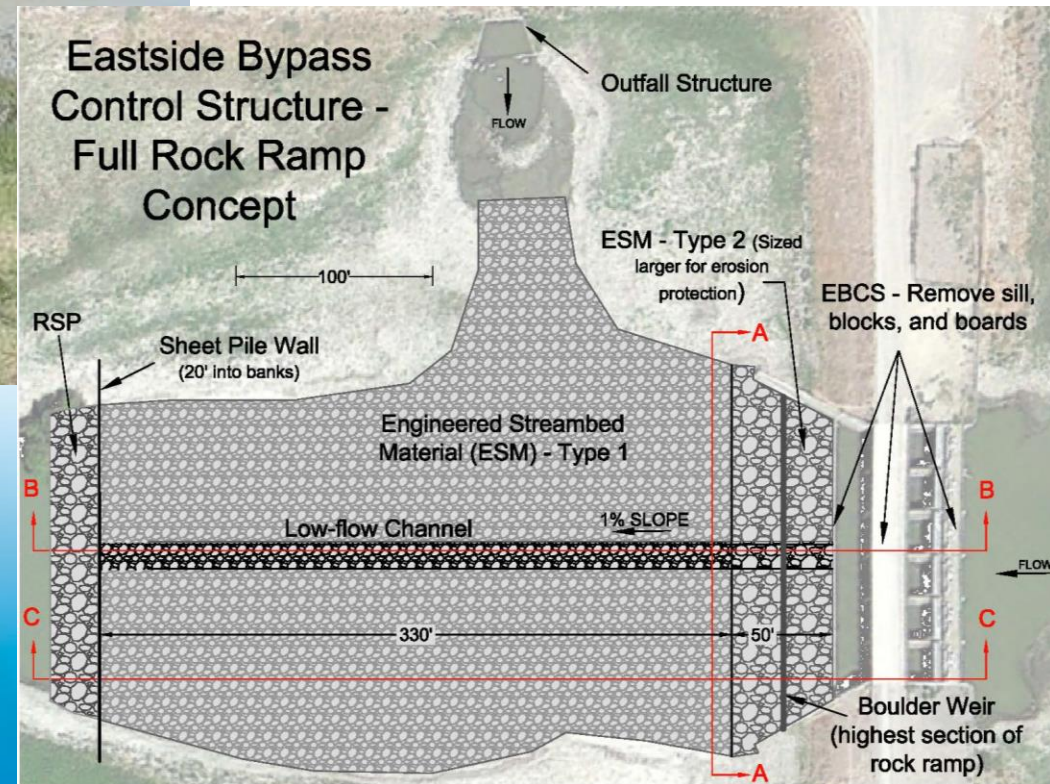
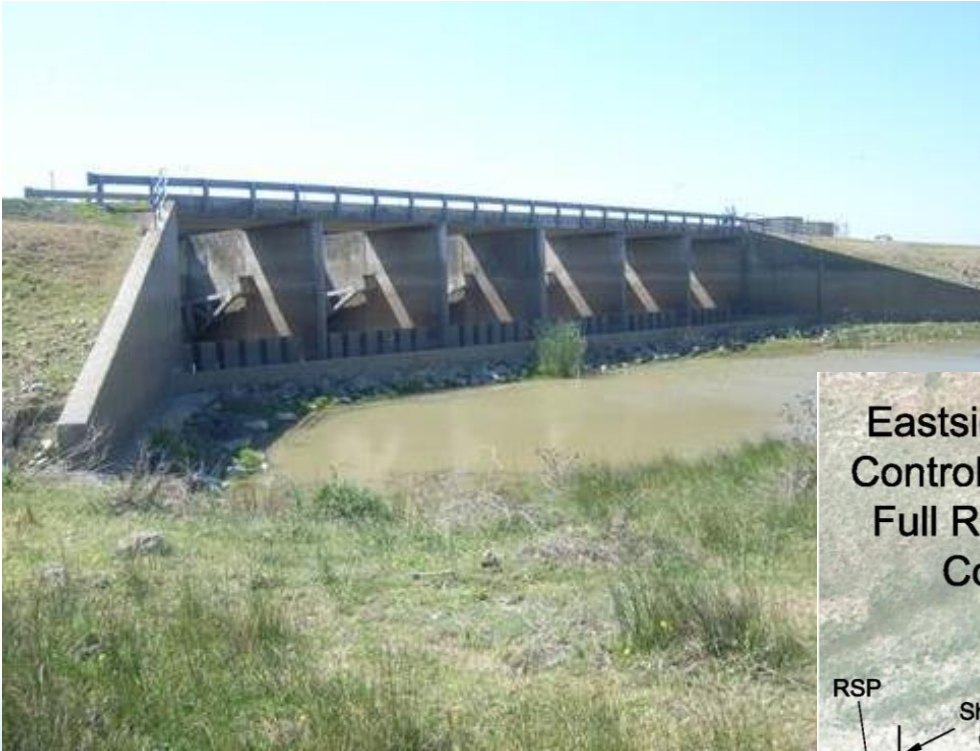
San Joaquin River Restoration Program Cost & Benefits Map



Eastside Bypass Fish Passage Projects



ESBP Control Structure Rock Ramp



National Wildlife Refuge

Weirs



•Upper Weir



•Lower Weir



Salmon Reintroduction



Salmon Conservation and Research Facility (SCARF)

- Broke ground in April 2017 with construction complete in 2019
- Construction Cost = \$23.7 million (state \$)
- Develop captive broodstock
- Create experimental population (Feather River stock)
- 1M juvenile annually





Salmon Reintroduction

- Settlement requires reintroduction of spring-run and fall-run Chinook salmon
- Spring-run broodstock efforts began in 2012 at the Interim Salmon Conservation and Research Facility
- April 2014: First direct release of juvenile spring-run into the river for study purposes; continued annually since then.



SJRRP Biologists release juvenile spring-run Chinook salmon to river



Juvenile Chinook Salmon

Juvenile Salmon Monitoring



Coded Wire Tag Implantation

2018 Juvenile releases:

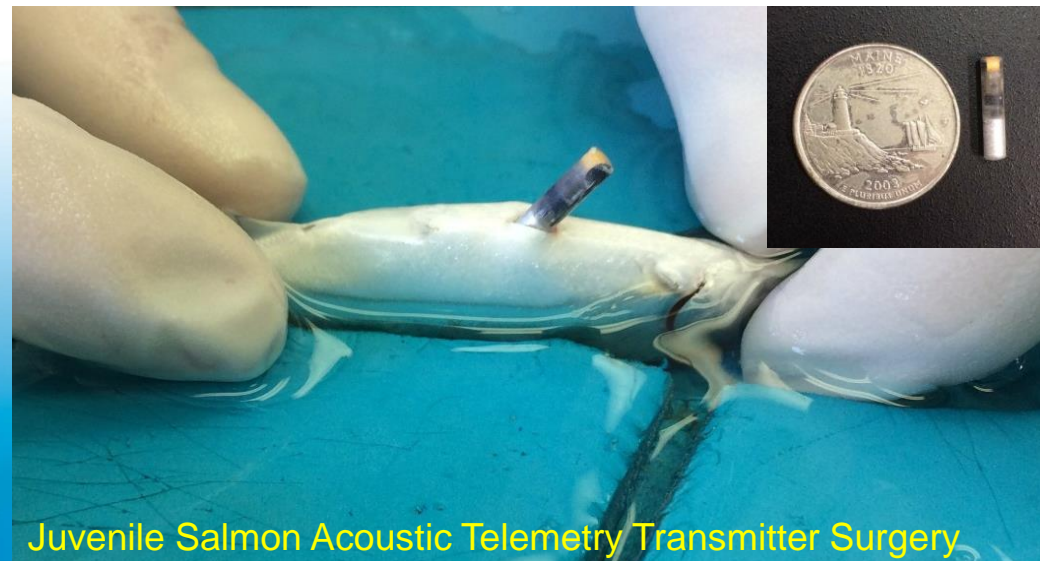
January 19th: 31,184

January 26th: 49,549

March 2nd: 87,115



Rotary screw trap monitoring



Juvenile Salmon Acoustic Telemetry Transmitter Surgery



Salmon Reintroduction

- 2012 – 2016: Adult fall-run Chinook salmon trapped and transported from Reach 5 to spawning habitat in Reach 1
- 2016 – 2018: Adult spring-run Chinook salmon released to holding areas below Friant Dam to begin to assess holding and spawning habitat



Fall-run Chinook salmon released to Reach 1



Spring-run Chinook salmon equipped with acoustic telemetry transmitters before release

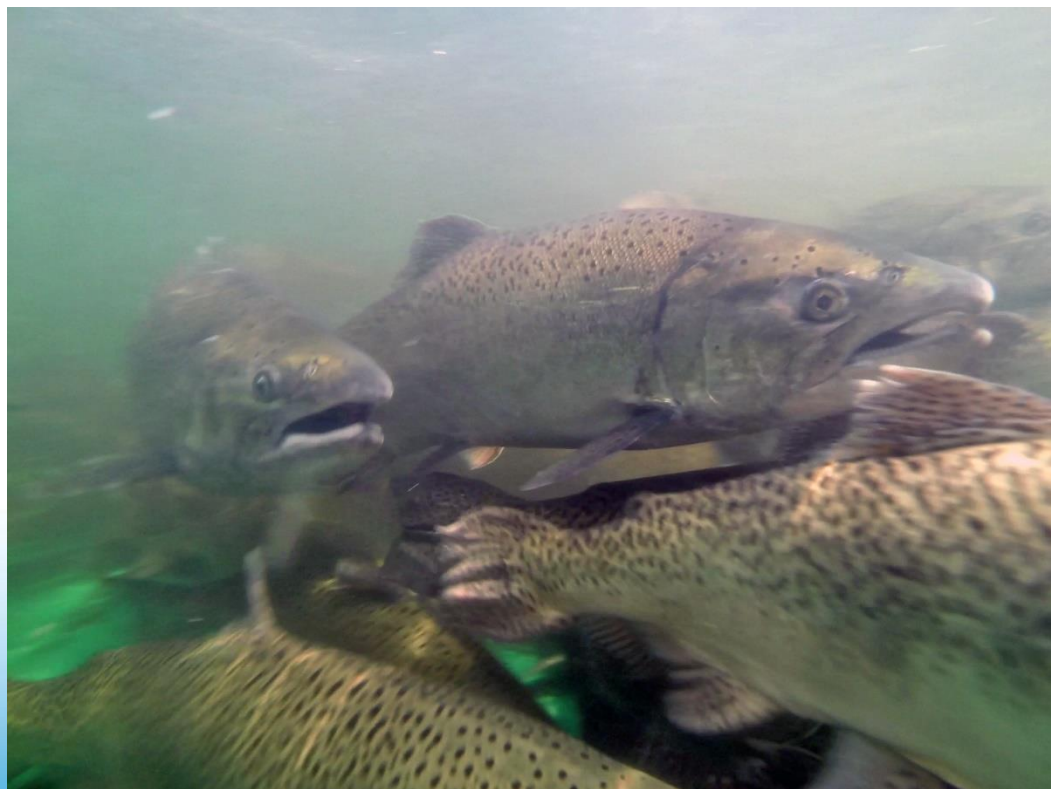


Fish Monitoring

Adult spring-run
Chinook salmon
releases of ancillary
broodstock

2017: 115 adult spring-
run Chinook released;
13 redds confirmed.

2018: 179 adult spring-
run Chinook released;
41 redds confirmed to
date!





Not just Chinook Salmon...



Over 12,000 Pacific lamprey were detected in the Restoration Area in 2018.



