San Joaquin River Restoration Program

Framework for Implementation

Restoration Goal Technical Feedback Group Meeting

November 23, 2015

Agenda

1. Why Update the Framework?
2. Framework Overview
3. 5-Year Vision
4. 10-Year Vision
5. 15-Year Vision
6. Beyond 15-Year Vision
7. Costs
8. Implementation - Quarterly Meetings

Why did we Update the Framework?

1. Establish a common vision/path forward for implementing the Program

2. Identify Implementing Agencies roles and responsibilities with more accountability

3. Set realistic schedules and funding outlooks so the Program can demonstrate success

Actions Within the Scope

SJRRP Challenges and Problems? → None here → Great. We're done!

↓ Yes

↓ Can Implementing Agencies do something about it?

↓ No → Outside of Scope of Framework

→ Yes → Within Scope of Framework

Did Not Consider…

- Changes to or violations of the Settlement
- Changes to or violations of the Act
- Changes to or anything inconsistent with Reclamation law or policy
- Anything that violates State or Federal law
- Returning to court for a “better” deal
- “Just get more money”
- Not implementing the entire Settlement or Settlement Act (no cherry picking actions)
- Miracles in addressing staffing, schedule, and process constraints
- Reclamation/Congress just go “fix it”
- Hoping it fixes itself

Key Foundational Factors and Assumptions

- Around $50 million per year maximum additional federal appropriations
- Everyone gets better together
  - NRDC: Flows and fish in the river
  - Friant: Progress on Water Management Goal commensurate with increases of flows
  - 3rd Parties: “Protections” built as flows increase
- Only specific 3rd Party protections are required to be in place before actions are taken

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Vision Approach and Key Actions

2015-2019	2020-2024	2025-2029	2030+
Goal: 1,300 cfs Capacity in all Reaches	**Goal: Increased Capacity**	**Goal: Phase 1 Projects Complete**	**Goal: All Remaining Projects Complete**
• Friant-Kern Capacity Restoration • Madera Canal Capacity Restoration • Mendota Pool Bypass • Conservation Facility • Seepage Projects to 1,300 cfs	• Part III / Financial Assistance for Groundwater Banks • Reach 2B • Arroyo Canal and Sack Dam • Reach 4B Land Acquisition • Seepage Projects to 2,500 cfs • Levee Stability to 2,500 cfs	• Reach 4B • Mud and Salt Sloughs • Seepage Projects to 4,500 cfs • Levee Stability to 4,500 cfs	• Ongoing Operations and Maintenance

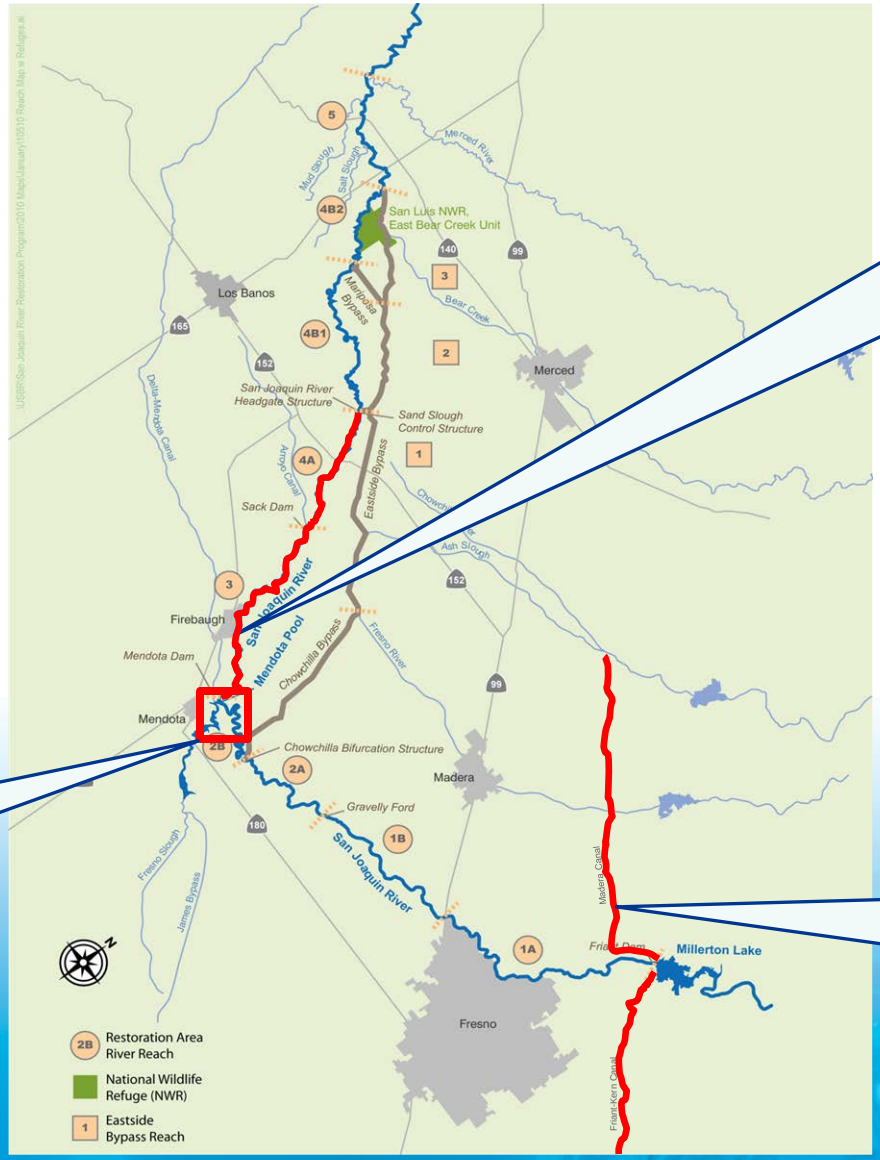
5 Year Vision: Capacity in all Reaches
(FY 2015 – 2019)

- Flow connectivity and fish passage, such that adult and juvenile salmon can complete migration without human assistance

- Continue to implement Water Management actions to reduce or avoid supply impacts to Friant Division contractors

5 Year Vision: Capacity in all Reaches
(FY 2015 – 2019)

Key Elements



Seepage Projects and Levee Improvements to allow for flows up to 1,300 cfs

Mendota Pool Bypass Completed

Friant-Kern and Madera Canal Capacity Restoration

Flow Related Activities – 5 Year

- PEIS/R ROD Conservation Strategy and Mitigation Actions

- Seepage and Levee Stability to allow up to 1,300 cfs in all reaches

Channel and Structural Improvements – 5 Year

- Mendota Pool Bypass
  - Minimize trap and haul of fish
- Reach 4B, Eastside Bypass/Mariposa Bypass EIS/R and Report to Congress
  - Routing decision to determine bypass levee repairs
- Passage at Key Barriers
  - Minimize trap and haul of fish

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Fish Reintroduction – 5 Year

- Construction & operation of Salmon Conservation and Research Facility
- Spring-run donor stock collection and tagging
- Trap and haul of fish as passage barriers still exist
- Permit for and possible use of wild stock

Water Management – 5 Year

- Continued Recapture and Recirculation of Restoration Flows, RWA accounts
- Recapture and Recirculation Plan
- Recapture and Recirculation EIS
- Friant-Kern and Madera Canal Capacity Restoration Projects
  - Construct ASAP to maximize funding value (costs not indexed)

10 Year Vision: Increased Capacity
(FY 2020 – 2024)

- SJR Restoration Fund available without further appropriation in FY 2020
  - Level of construction action increases with available funding
  - Make all major project decisions and award funds

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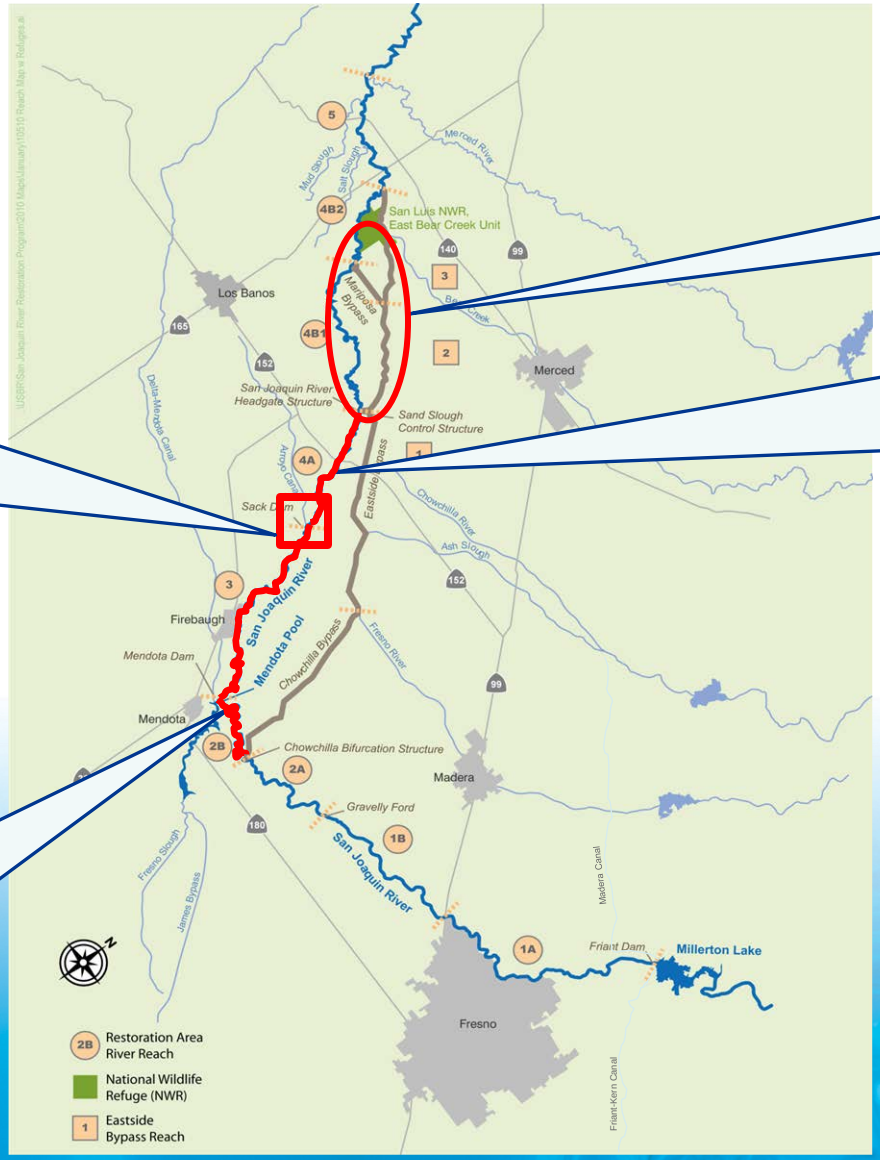
10 Year Vision: Increased Capacity
(FY 2020 – 2024)

Key Elements

Arroyo Canal Fish Screen & Sack Dam Fish Passage construction

Increase Reach 2B channel capacity to 4,500 cfs, levee construction



Reach 4B land acquisition

Seepage Projects and Levee Improvements to allow for flows up to 2,500 cfs

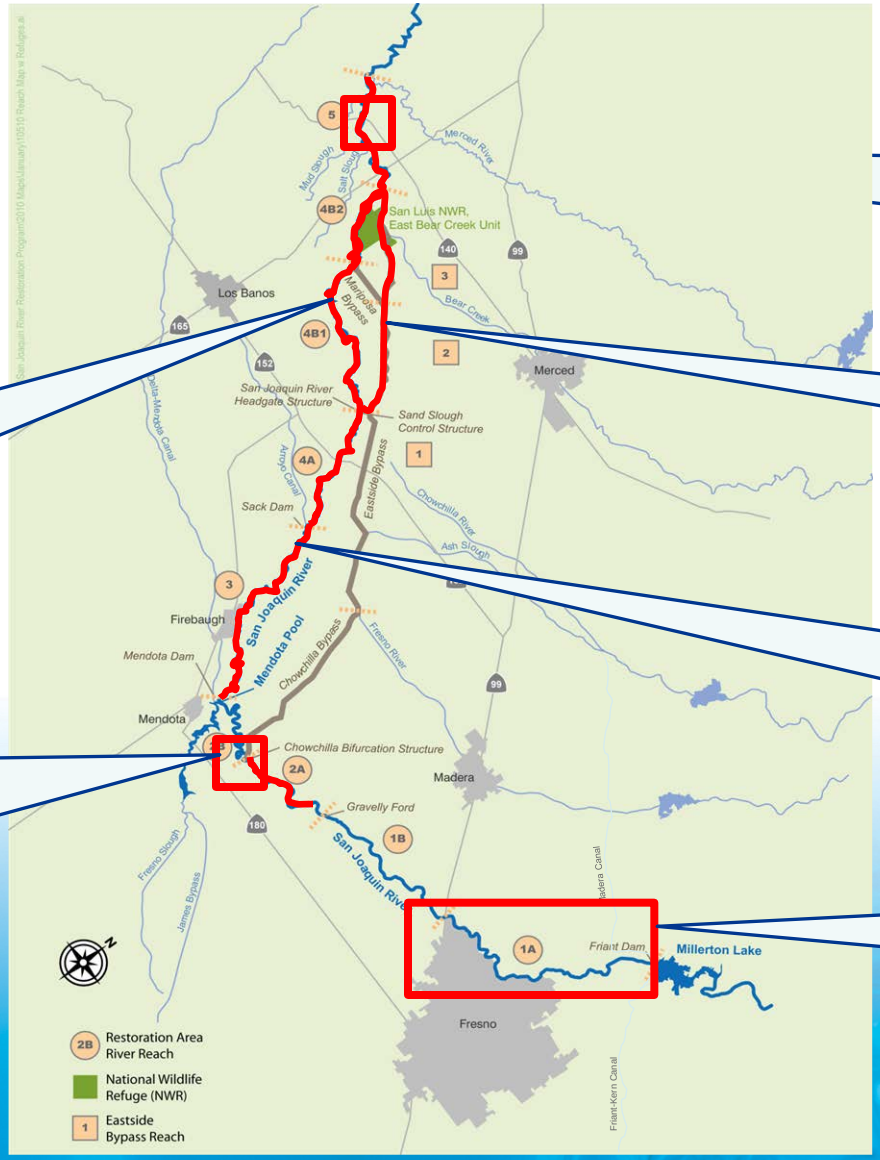
Continue Implementing Water Management Goal; Award remaining funds for groundwater banking projects

15 Year Vision: Conveyance
(FY 2025 – 2029)

- Increase capacity of all reaches to 4,500 cfs
- Reach 4B Project
- Continue to implement Water Management Actions to reduce or avoid supply impacts to Friant Division contractors

15 Year Vision: Conveyance
(FY 2025 – 2029)

Key Elements



Salt and Mud Slough Seasonal Barrier projects

Beyond 15 Year Vision (FY 2030+):

Monitoring, Maintenance and Final Project work

- Complete any remaining construction actions
- Paragraph 12 projects, if any recommended
- Monitor and maintain system for long-term
- Phase out hatchery production
  - Phase out hatchery production and population augmentation
  - Monitor self-sustaining, naturally reproducing populations
- Continue implementing Water Management Goal
  - Continue recapture and recirculation, tracking and allocating RWA water

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Cost Summary

Action	2015 Revised (2015 $)
Staffing and Administration	$124
Flow Actions	
Conservation Strategy / Mitigation Measures	$38
Flows	$26
Channel and Structural Improvements	
Mendota Pool Bypass and Reach 2B	$336
Reach 4B, Eastside Bypass and Mariposa Bypass	$264
Arroyo Canal Fish Screen and Sack Dam Fish Passage	$29
Salt and Mud Slough Seasonal Barriers	$6
Passage at Key Barriers	$6
Fish Reintroduction	
All Other Fish Reintroduction	$12
Conservation Facility	$26
Water Management Goal & Friant Division Improvements	$96
Total	$962
Seepage Projects	$189
Total "Core" Projects	$1,150
Chowchilla Fish Passage	$20
Gravel Pits Filling or Isolation	$14
Miscellaneous	$49
Total Settlement	$1,232
Levee Stability	$307
Total	**$1,539**

Key Changes in Costs

- Program extended 10 years – increased admin costs
- Reach 4B costs increased
- Seepage and levee stability costs increased
  - About $500M total
- Added Paragraph 11(b) projects
- Costs now provided in 2015 dollars

Implementation – Quarterly Progress Meetings

- Quarterly meetings to review progress on:
  - Schedule
  - Budget
  - Staffing needs
  - Issues that need resolution
- First Quarterly meeting today from 1 to 4 pm
- Contact Ali Forsythe at aforsythe@usbr.gov to be on distribution list for future meetings

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QUESTIONS?

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Channel Capacity and Seepage Update

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Channel Capacity

- Restoration Flows are released up to then-existing channel capacity
  - Hydraulic modeling for capacity determination
  - Geotechnical investigation
  - Levee stability projects
- Flows are constrained to avoid material adverse groundwater seepage impacts
  - Groundwater monitoring
  - Seepage projects

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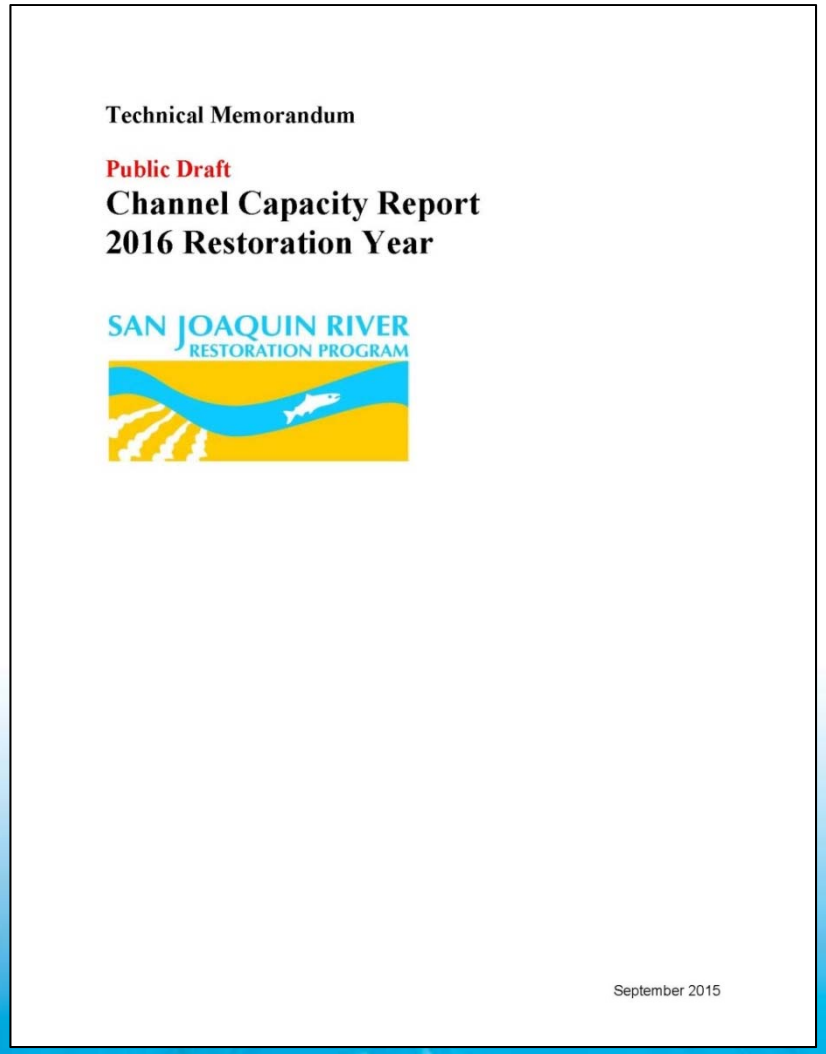
Channel Capacity Schedule

Year	Levee Capacity Maximum in Reaches 2A through 5	Groundwater Seepage Maximum Release (cfs)	Reach 2B capacity	Friant Dam Maximum Release (cfs)	Maximum flow through SJRRP Area (cfs)	Constraint on Maximum Flow
2016	580	300	1,120	1,490	300	Groundwater seepage
2017	580	500	1,120	1,490	500	Groundwater seepage
2018	580	1,300	1,120	1,490	580	2A-5 Levees
2019	580	1,300	1,120	1,490	580	2A-5 Levees
2020	1,300	1,300	1,120	1,490	1,120	2B Levees
2021	1,300	1,300	1,120	1,490	1,120	2B Levees
2022	1,300	2,500	1,120	1,490	1,120	2B Levees
2023	1,300	2,500	1,120	1,490	1,120	2B Levees
2024	1,300	2,500	1,120	1,490	1,120	2B Levees
2025	2,500	2,500	4,500	2,725	2,500	2A-5 Levees
2026	2,500	2,500	4,500	2,725	2,500	2A-5 Levees
2027	2,500	2,500	4,500	2,725	2,500	2A-5 Levees
2028	2,500	2,500	4,500	2,725	2,500	2A-5 Levees
2029	2,500	2,500	4,500	2,725	2,500	2A-5 Levees
2030	4,500	4,500	4,500	4,500	4,500	2A-5 Levees

CHANNEL CAPACITY REPORT

Channel Capacity Report

- Commitment in the Program Environmental Impact Statement/Environmental Impact Report to minimize increases in flood risk in the Restoration Area due to the release of restoration flows.



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PEIS/R Commitment Requirements

- Determine and update estimates of then-existing channel capacities
- Maintain interim and restoration flows at or below capacities*
- Monitor erosion and reduce flows or perform maintenance as needed
- Establish a Channel Capacity Advisory Group (CCAG)

*Then existing channel capacity corresponds to flows that would not significantly increase flood risk from SJRRP flows in the Restoration Area. The Channel Capacity Report will annually recommend updating then-existing channel capacities based on updated data and analysis.

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Advisory Group Composition

- California Department of Water Resources
- Bureau of Reclamation
- U.S. Army Corps of Engineers
- Lower San Joaquin Levee District
- Central Valley Flood Protection Board

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What is Included in Report

- Results of completed and on-going SJRRP studies and monitoring
- Proposals and descriptions of future SJRRP studies and monitoring with potential to inform then-existing channel capacity
- Future non-SJRRP actions with the potential to inform then-existing channel capacity

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What is Not Included in Report

- Seepage Management Plan actions as they relate to agricultural land seepage
  - However, seepage management projects will be closely coordinated to determine if there are any changes in channel capacity as a result of those actions
- Other non-channel capacity specific Restoration or Water Management Goal actions

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In-channel Flow Capacity

- Flows would remain “in-channel” until adequate data are available on the levees
- In-channel flow is the discharge at which the water surface elevation would reach the ground elevation on the land-side of the levee
- Initial in-channel capacities were used to prioritize the levees for geotechnical assessment

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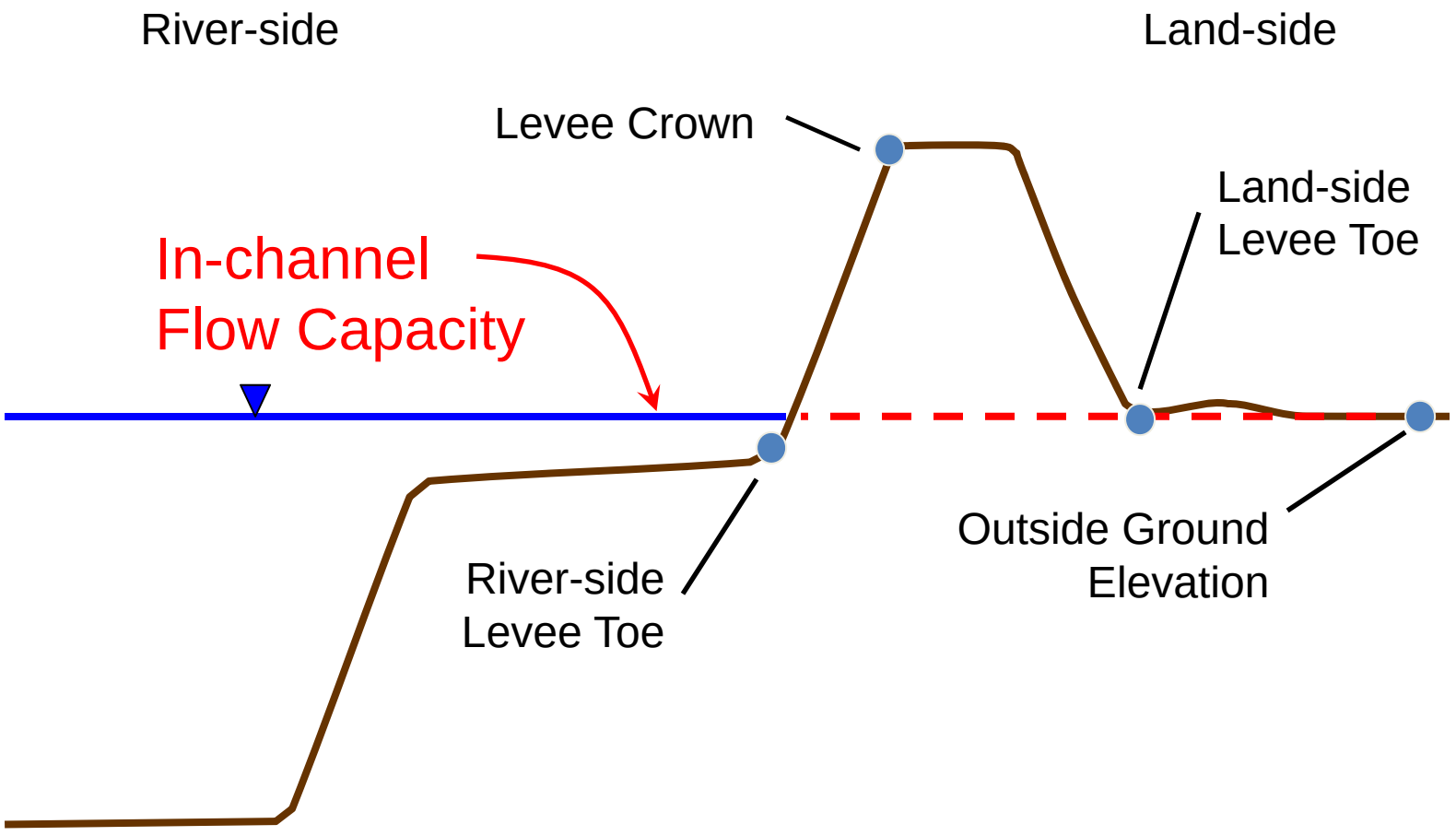
In-Channel Flow Capacity



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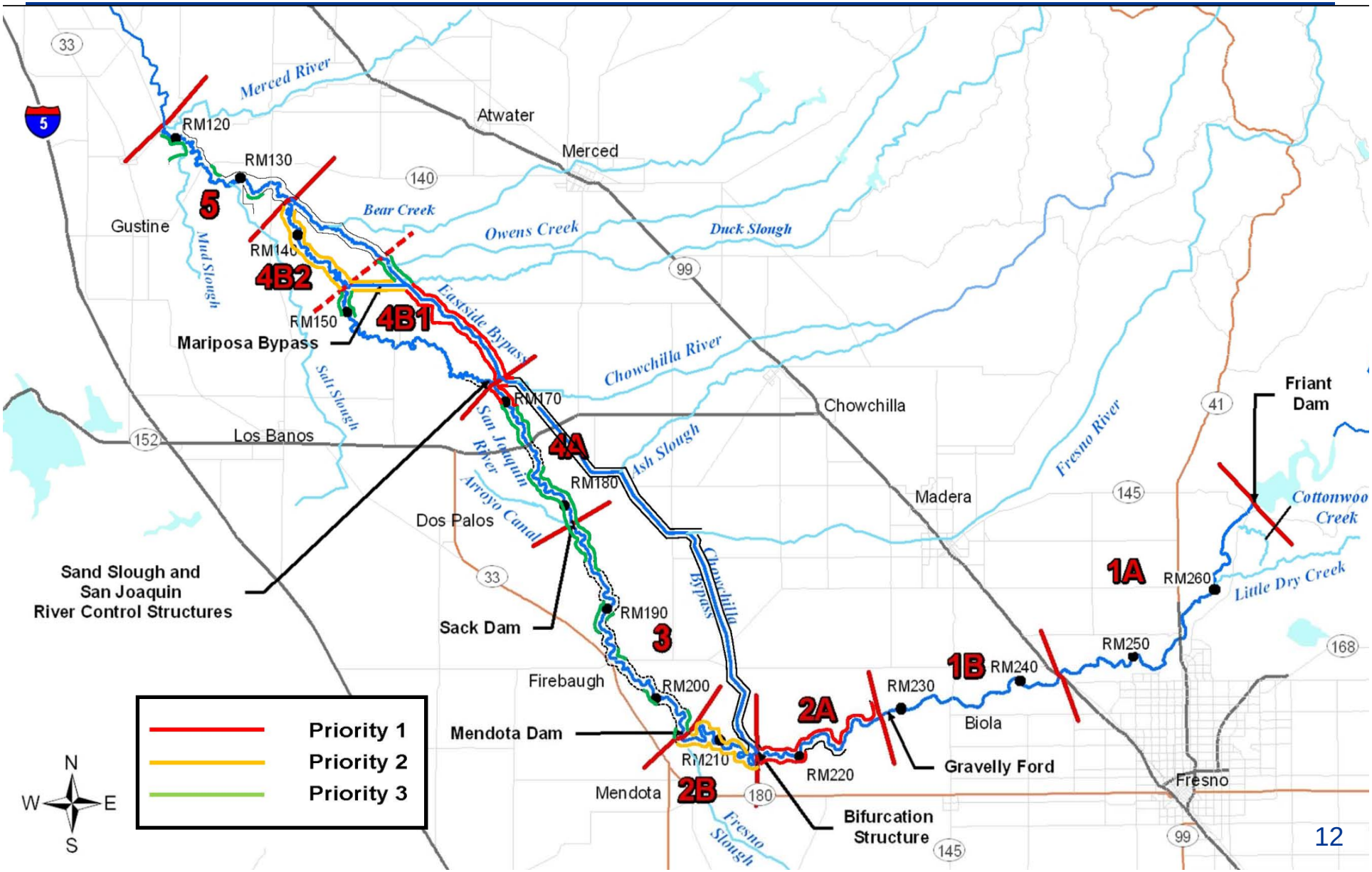
Prioritized Levees



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Completed Reports to Date

- Restoration Year 2014:
  - Initial report included all of the studies considered to determine then-existing channel capacity
  - Then-existing channel capacity based primarily on in-channel capacity and a preliminary geotechnical study in the Middle Eastside Bypass
- Restoration Year 2015:
  - Then-existing channel capacity did not change
- Restoration Year 2016:
  - Then-existing channel capacity was updated to consider subsidence, geotechnical data in some reaches, and operations within the Merced National Wildlife Refuge

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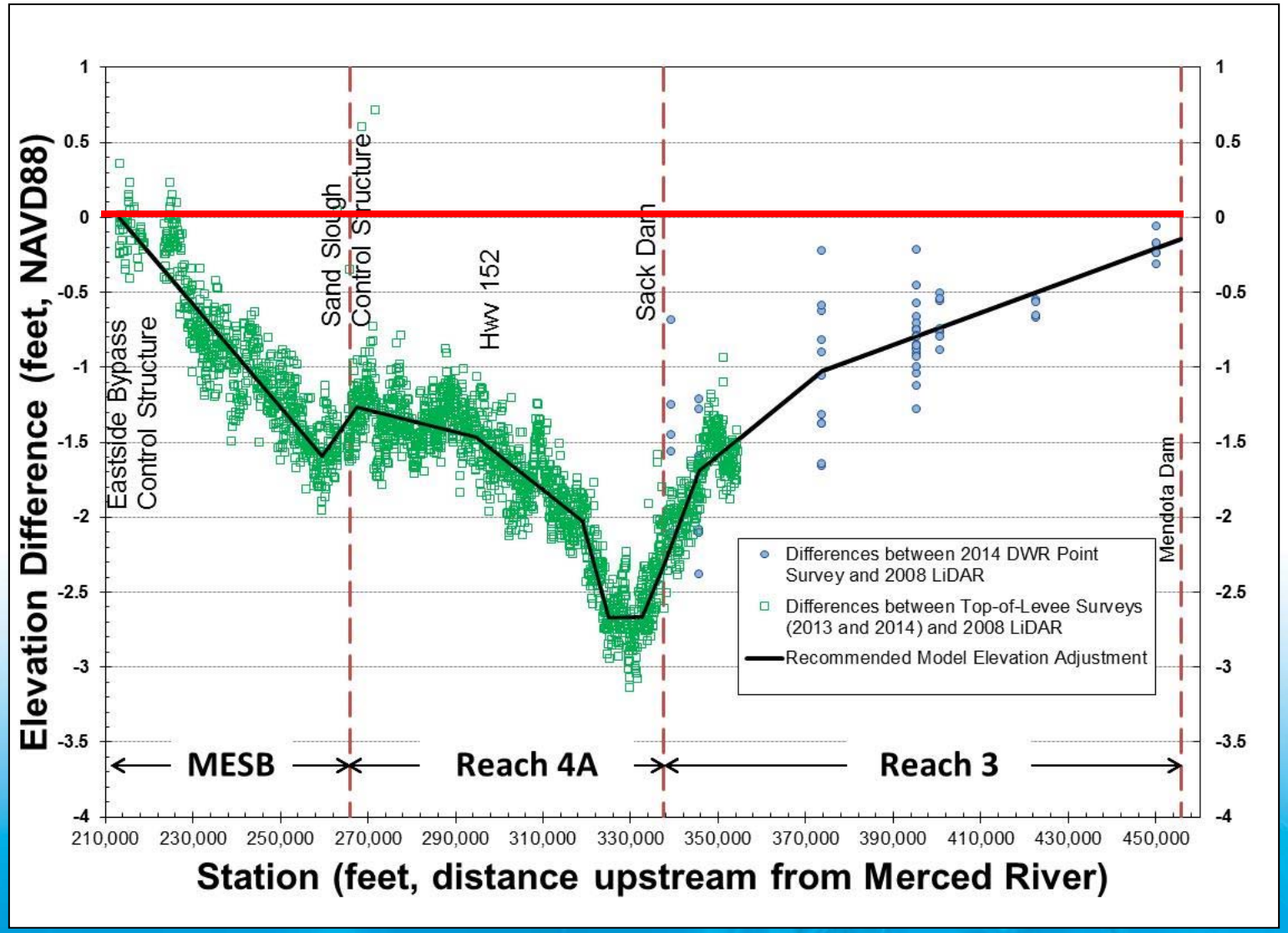
Subsidence Updates



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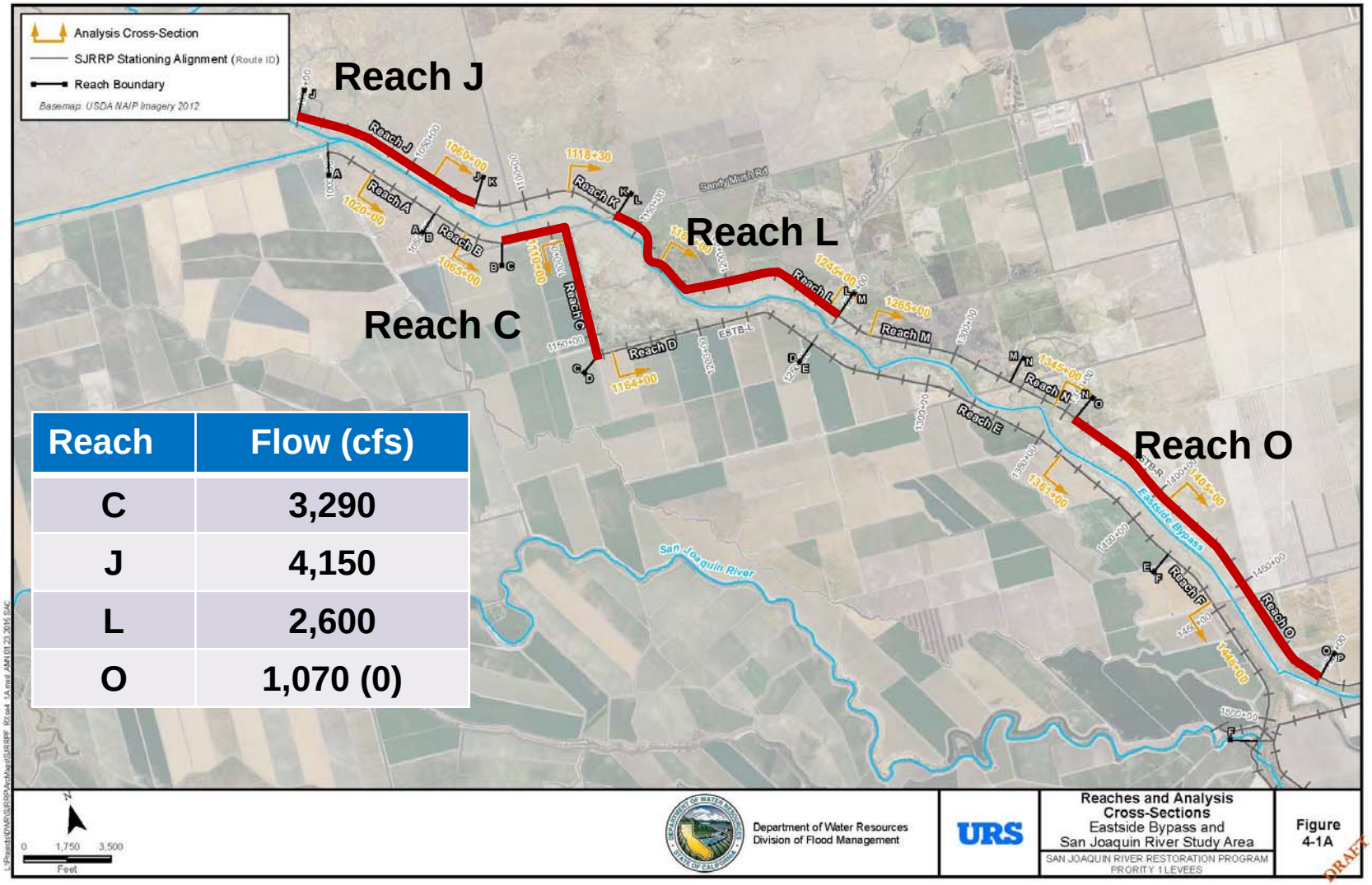
Geotechnical Evaluations



Reach	Flow (cfs)
C	3,290
J	4,150
L	2,600
O	1,070 (0)

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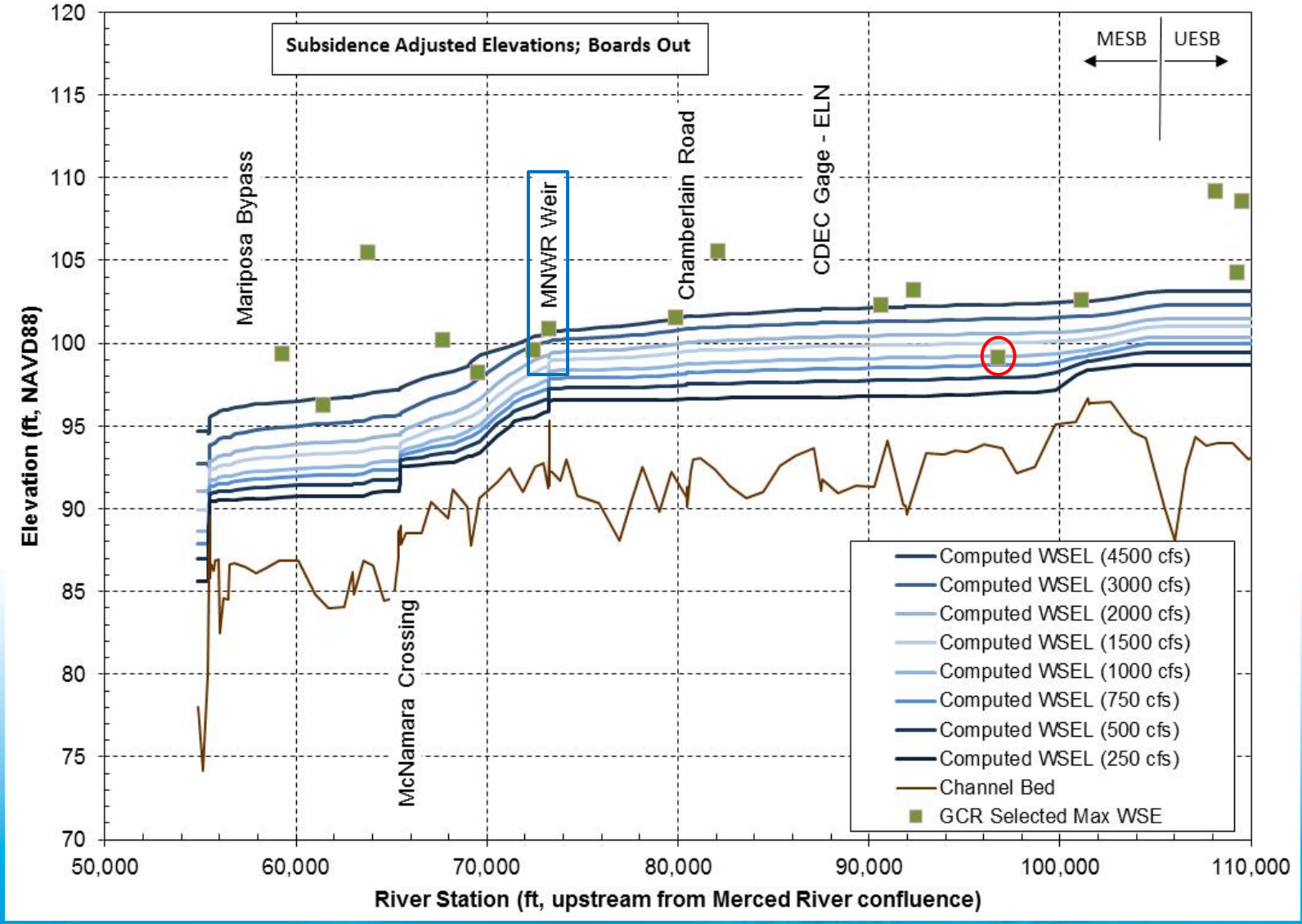
Refuge Operations



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Then-existing Channel Capacity

Reach	2015 (cfs)	2016 (cfs)	Based on?
2A	1,630	6,000	Geotech
2B	1,120	1,120	In-channel
3	2,760	2,860	In-channel
4A	970	2,840	Geotech & In-channel
4B2	930	930	In-channel
5	1,940	2,350	In-channel
Middle ESB	370	580*	Geotech
Lower ESB	2,890	2,890	In-channel
Mariposa Bypass	350	350	In-channel

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Next Steps

- Levee Evaluations
  - Perform feasibility-level evaluations and design for critical levee segment (Reach O Improvements)
  - Complete Priority 2 drilling and evaluations
  - Initiate Priority 3 drilling and evaluations
- Studies and Modeling
  - Subsidence
  - Sediment transport
- Monitoring
  - Water surface elevation and flow
  - Erosion
  - Vegetation

SEEPAGE PROJECT STATUS

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Seepage Management

- Reduce or avoid material adverse seepage impacts – Public Law 111-11
  - Waterlogging (disease, anoxia, temperature)
  - Root zone salinity

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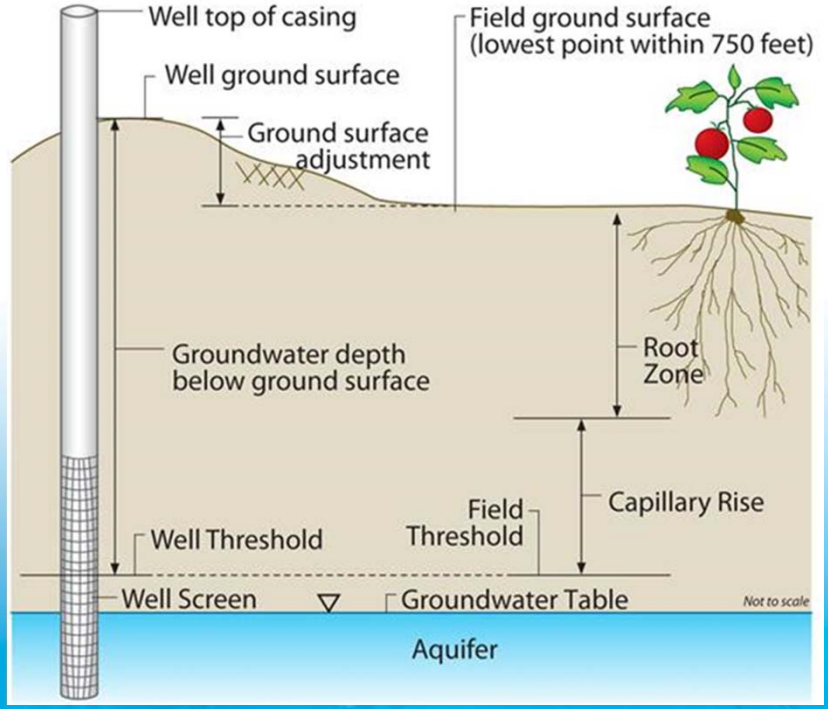
Seepage Management Goal 1

- Limit Restoration Flow releases based on groundwater seepage thresholds
  - Thresholds based on local crop type or historical level
  - Keep groundwater levels below thresholds
    - Water surface elevation level below threshold elevation
    - Projected rise not above threshold



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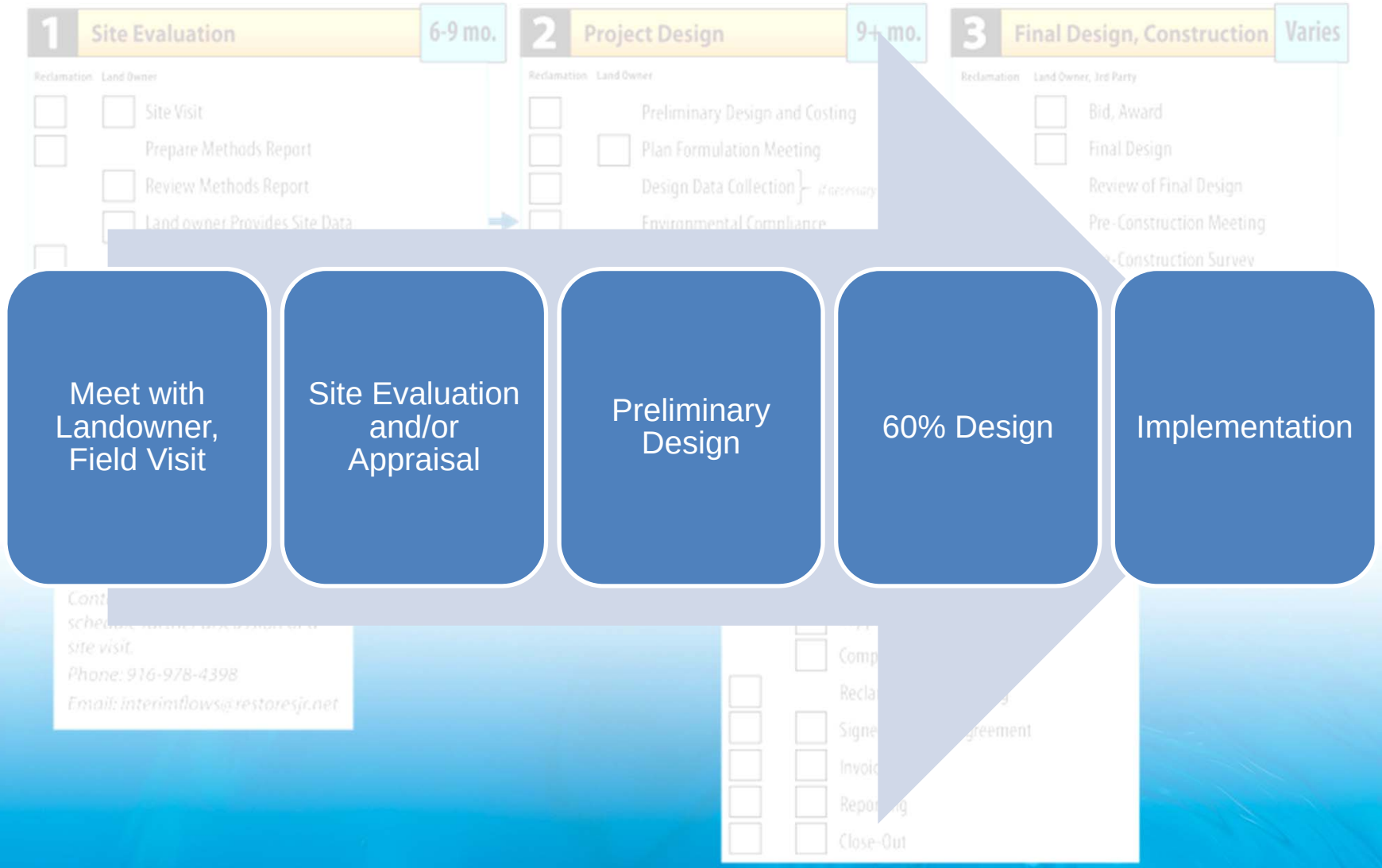
Seepage Management Goal 2

- Identify locations and mitigate to allow increased flows without groundwater impacts
  - Locations prioritized based on hydraulic model and ground surface DTM
  - Slurry Walls
  - Interceptor Lines
  - Shallow Groundwater Pumping
  - Seepage Easements
  - Land Acquisition

Seepage Project Process



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Timelines

- Acquired 400 acres
- Easement on 4,500 acres
- Completed 20% of acres

Flow	# Projects	Year Complete
300 cfs	3	2016
700 cfs	2	2017
1,300 cfs	6	2019
2,000 cfs	11	2024
4,500 cfs	70	2029
Total	**92**	

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Seepage Projects Summary

Allowable Flow in SJR Before Seepage Impacts Occur	Number of Sites	Site Visits Performed	Site Evaluation	Preliminary Design	60% Design	Project
> 300 cfs	3	3	3	3	0	2
		0	0	0	1	1
		0	0	0	0	0
300 - 700 cfs	2	2	2	0	0	0
		0	0	2	2	2
		0	0	0	0	0
700 - 1,300 cfs	6	5	3	1	0	0
		0	0	2	1	3
		1	1	1	2	0
1,300 - 2,000 cfs	11	5	2	0	0	0
		0	2	2	1	0
		6	7	9	10	11
2,000 - 4,500 cfs	70	3	0	0	0	0
		0	1	1	0	1
		67	69	69	70	69
Total	92	18	10	4	0	2
		0	3	7	4	6
		74	77	79	83	81

Completed | In Progress | Not Started

Maximum Allowable Releases in 2016

- Channel Capacity
  - 580 cfs (up to 1,070 cfs depending on Refuge weir operations)
- Agricultural land seepage
  - 300 cfs

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Near-Term Fish Passage Actions

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Project Objectives

- Provide unimpeded fish passage for spring-run and fall-run adult Chinook salmon
- Minimize impacts to flood operations
- Provide provisions within the designs to account for ground subsidence
- Implement fish passage improvements by 2019 that are also consistent with the Reach 4B project

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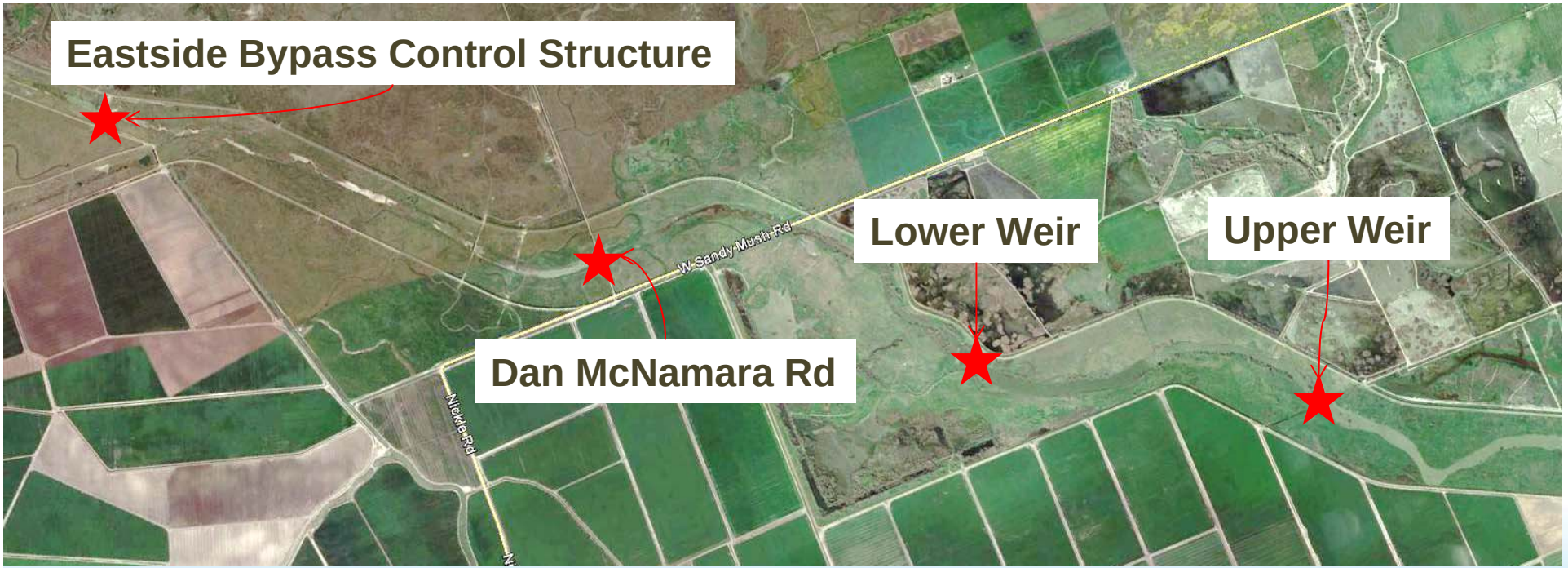
Structures



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National Wildlife Refuge Weirs

Alternatives:

- Weir Removal and Screened Pump Intake Facility
- Weir Removal and Direct Pumping System
- Series of New Weirs

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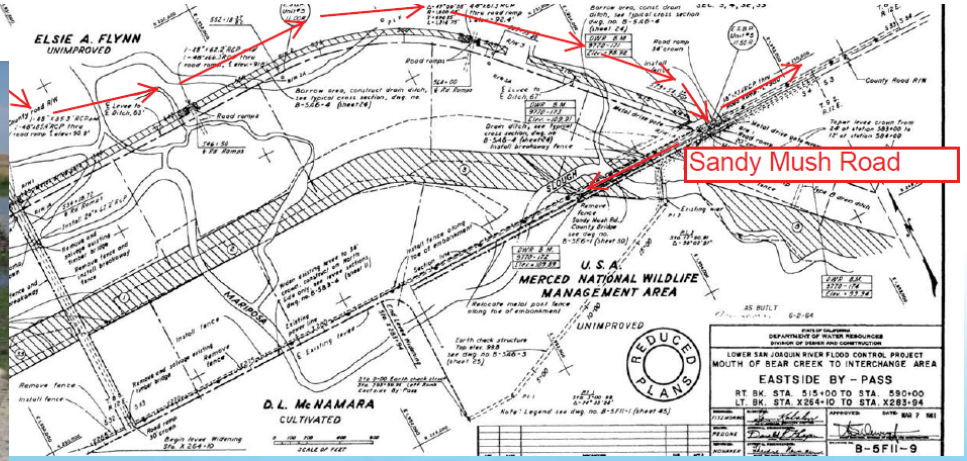
Dan McNamara Road

Alternatives

- Culvert Replacement
- Crossing Removal
- Crossing Removal with Modified Permanent Detour



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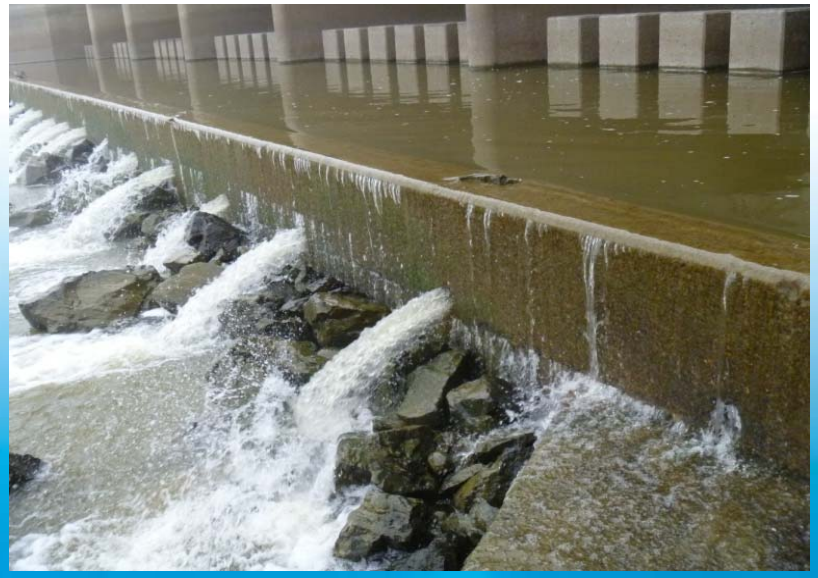
Eastside Bypass Control Structure

Alternatives

– Structure Modification w/ Rock Ramp Approach

– Bypass Fishway

– Vertical Slot Ladder



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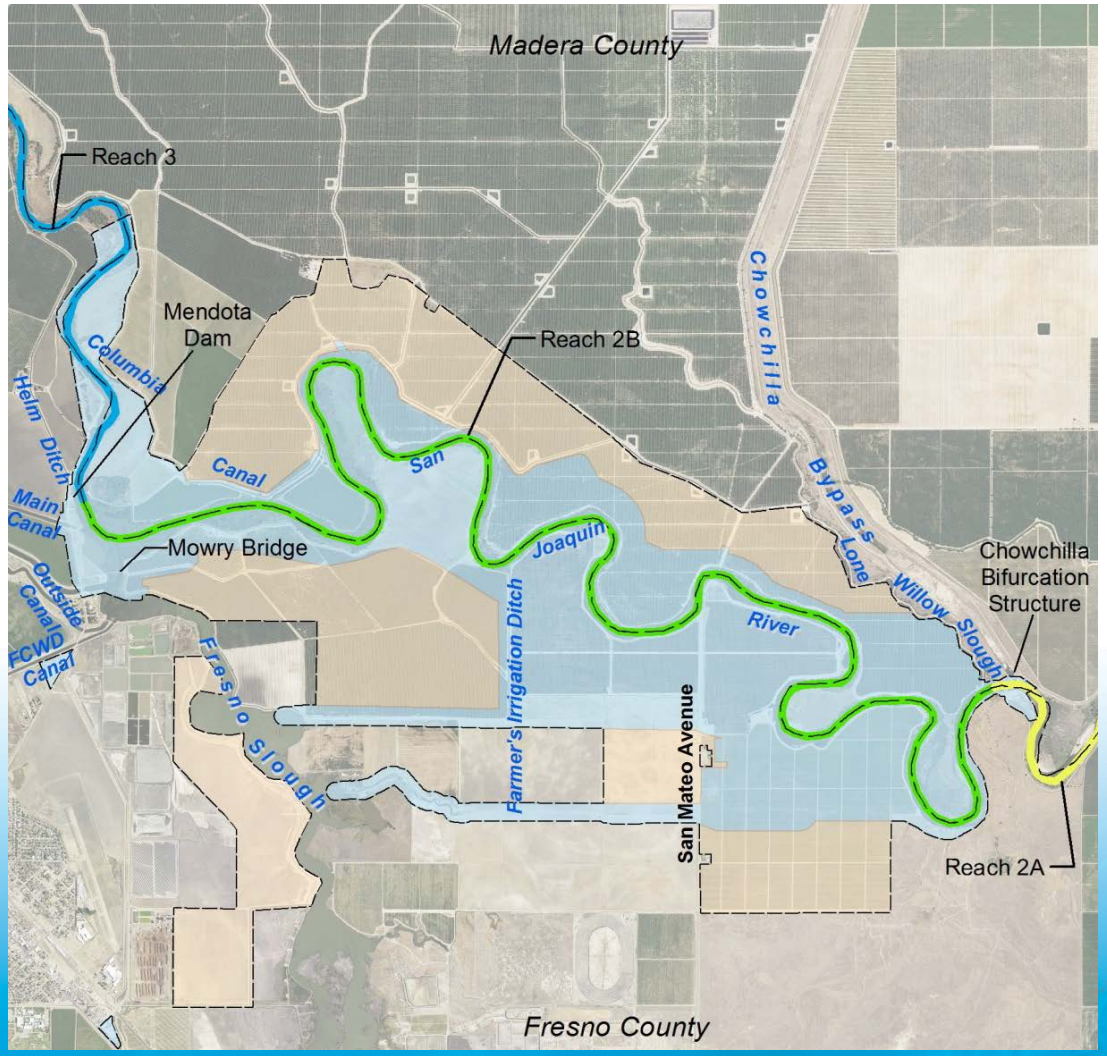
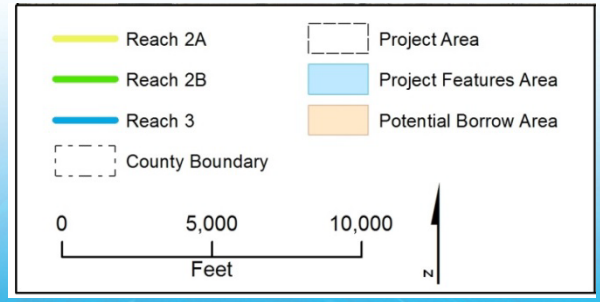
Mendota Pool Bypass and Reach 2B Improvements Project

Restoration Goal TFG Meeting

Reach 2B Project Area



- Reach 2B is a Phase 1 project of the San Joaquin River Restoration Program



Reach 2B Project

- Expand Reach 2B channel capacity to convey at least 4,500 cubic feet per second (cfs) (11 miles of levee and floodplain habitat)
  - 4,500 cfs is required in the Settlement
  - 4,500 cfs is the design capacity of the river near Firebaugh

Reach 2B Project

- Bypass channel around the Mendota Pool (about ½ mile of new river channel)
- New structure for water deliveries to Mendota Pool up to 2,500 cfs

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Project Alternatives

- **Alternative A** – Compact Bypass with Narrow Floodplain and South Canal
- **Alternative B** – Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure
- **Alternative C** – Fresno Slough Dam with Narrow Floodplain and Short Canal
- **Alternative D** – Fresno Slough Dam with Wide Floodplain and North Canal

Consensus-Based Process

- Compact Bypass
  - Landowner preferred
  - Larger floodplain
  - Same Delta Mendota Canal / Mendota Pool operations
- Fresno Slough Dam
  - Reduces Mendota Pool volume
  - Changes to Mendota Pool operations
  - Mendota Dam recently repaired

➢ Compact Bypass is Preferred

Consensus-Based Process

- Consensus-Based Levee Alignment
  - Based on landowner input
- Narrow Levee Alignment
  - Minimizes land out of production
- Wide Levee Alignment
  - Maximizes fish habitat

➢ Consensus-Based Alignment is Preferred

Consensus-Based Process

- Bifurcation Structures
  - Minimize land out of production
- South or North Canal Options
  - Create access issues to farms – would require bridges
  - Take land out of production away from the river
  - Moves the San Joaquin River control structure of the Chowchilla Bifurcation Structure downstream
    - Impacts flood operations

➢ Bifurcation Structures are Preferred

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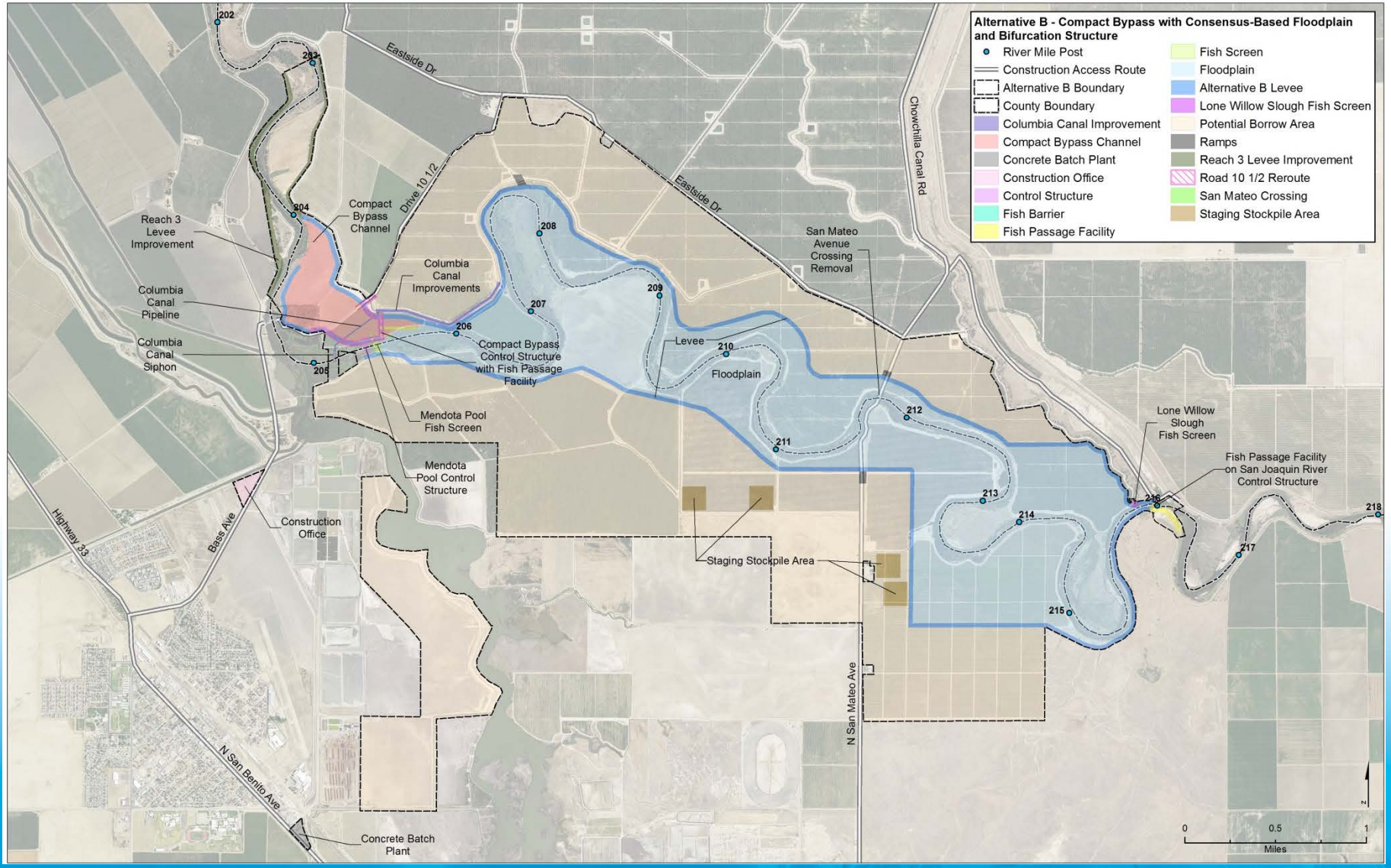
Alternative B



Phased Approach

- Compact Bypass
  - Construction 2017-2020
  - Obtains fish passage
- Reach 2B setback levees and floodplain
  - Construction 2021-2025
  - Increases Capacity
- Keeps annual expenditures reasonable while accomplishing SJRRP goals

Current Status

- Public Draft EIS/R was out for public review – closed 8/10/2015
- Design underway
- Stakeholder meetings held 2/12 and 11/18 to discuss design
- Stakeholder meeting held 8/12 regarding land acquisition

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Next Steps

- Final EIS/R - Spring 2016
- Record of Decision - Summer 2016
- Compact Bypass Land Acquisition – Fall 2016 – Spring 2017
- Columbia Canal Siphon Construction Contract Award – Summer 2017

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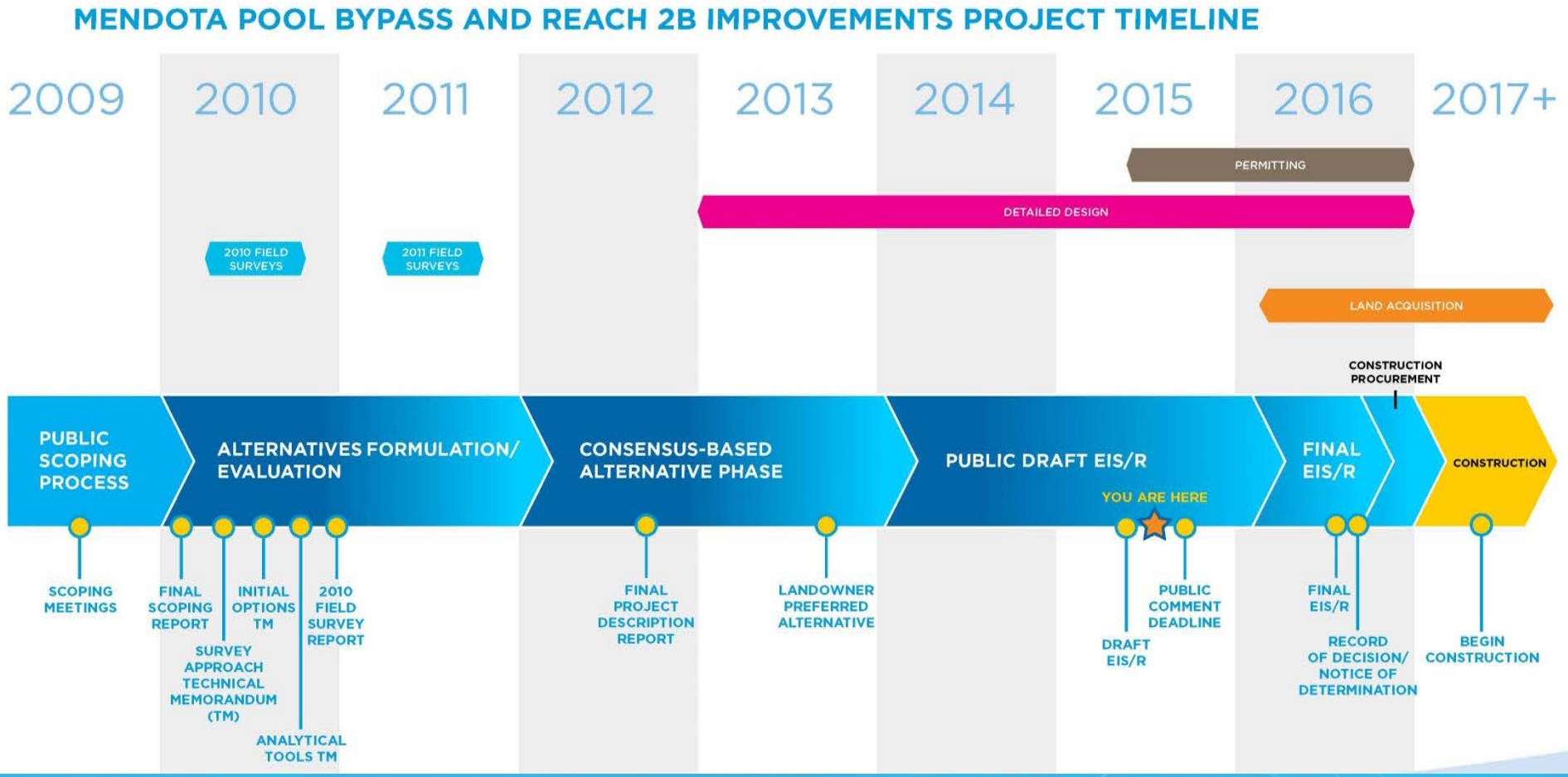
Project Schedule



Thank You

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www.restoresjr.net

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4B, Eastside Bypass, and Mariposa Bypass Structural Improvements

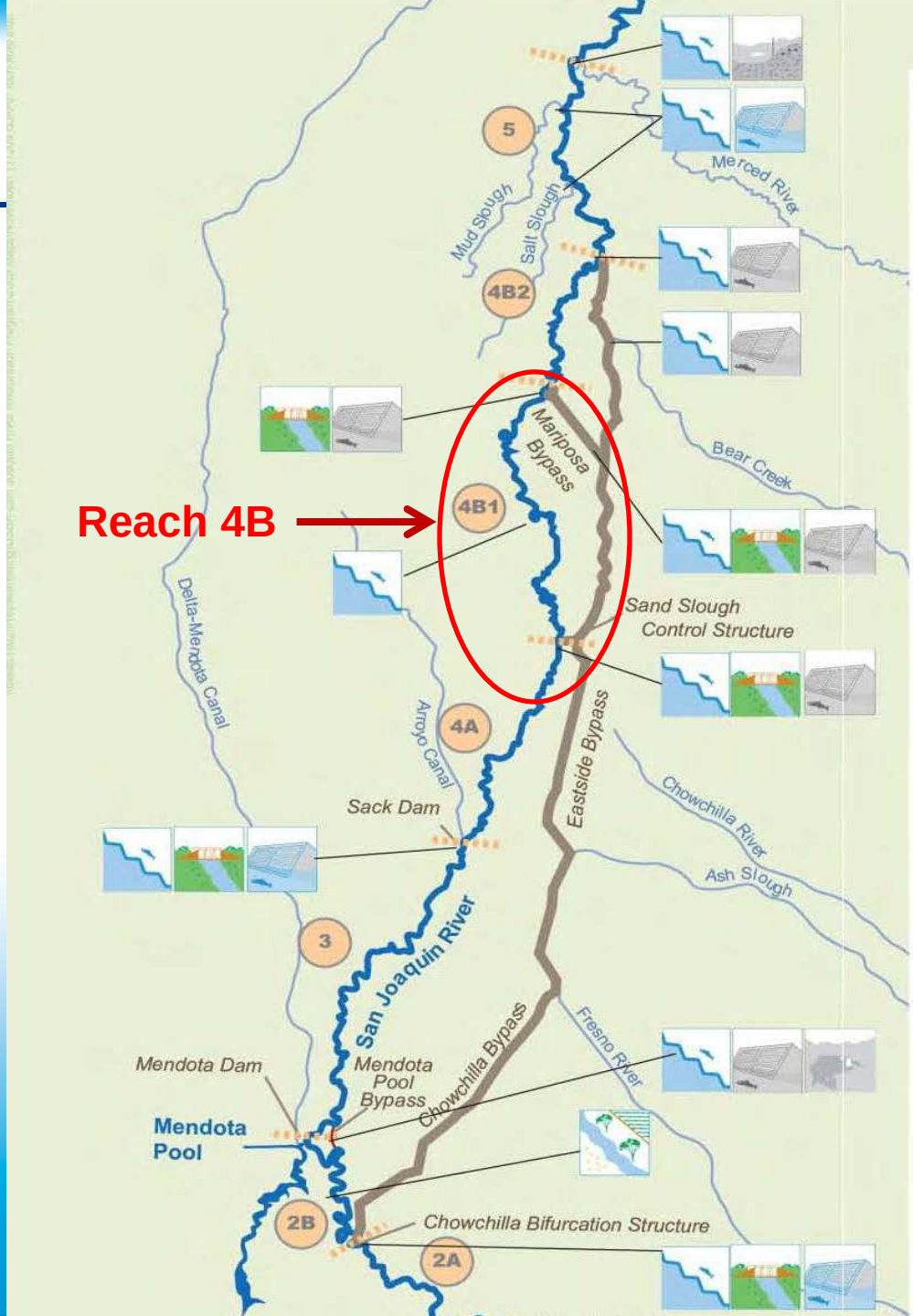
Restoration Goal Technical Feedback Group Meeting

November 23, 2015

Requirements from the Settlement

- Reach 4B
  - Modify to convey *at least* 475 cfs, possibly up to 4,500 cfs
  - Modify Sand Slough and Reach 4B headgates for flows and fish passage
- Eastside and Mariposa Bypass
  - Modify structures for fish passage
  - Establish low-flow channel
- Current Schedule:
  - Draft EIS/R – mid 2017
  - Final EIS/R – mid 2018
  - Construction start date – 2025

SAN JOAQUIN RIVER
RESTORATION PROGRAM

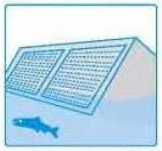


Restoration actions specified in Paragraph 11 of the Settlement


Enable fish passage and prevent straying


Modify structures


Increase channel capacity and integrate floodplain habitat


Reduce potential for fish entrainment

Other Restoration actions that may be implemented under Paragraph 12 of the Settlement

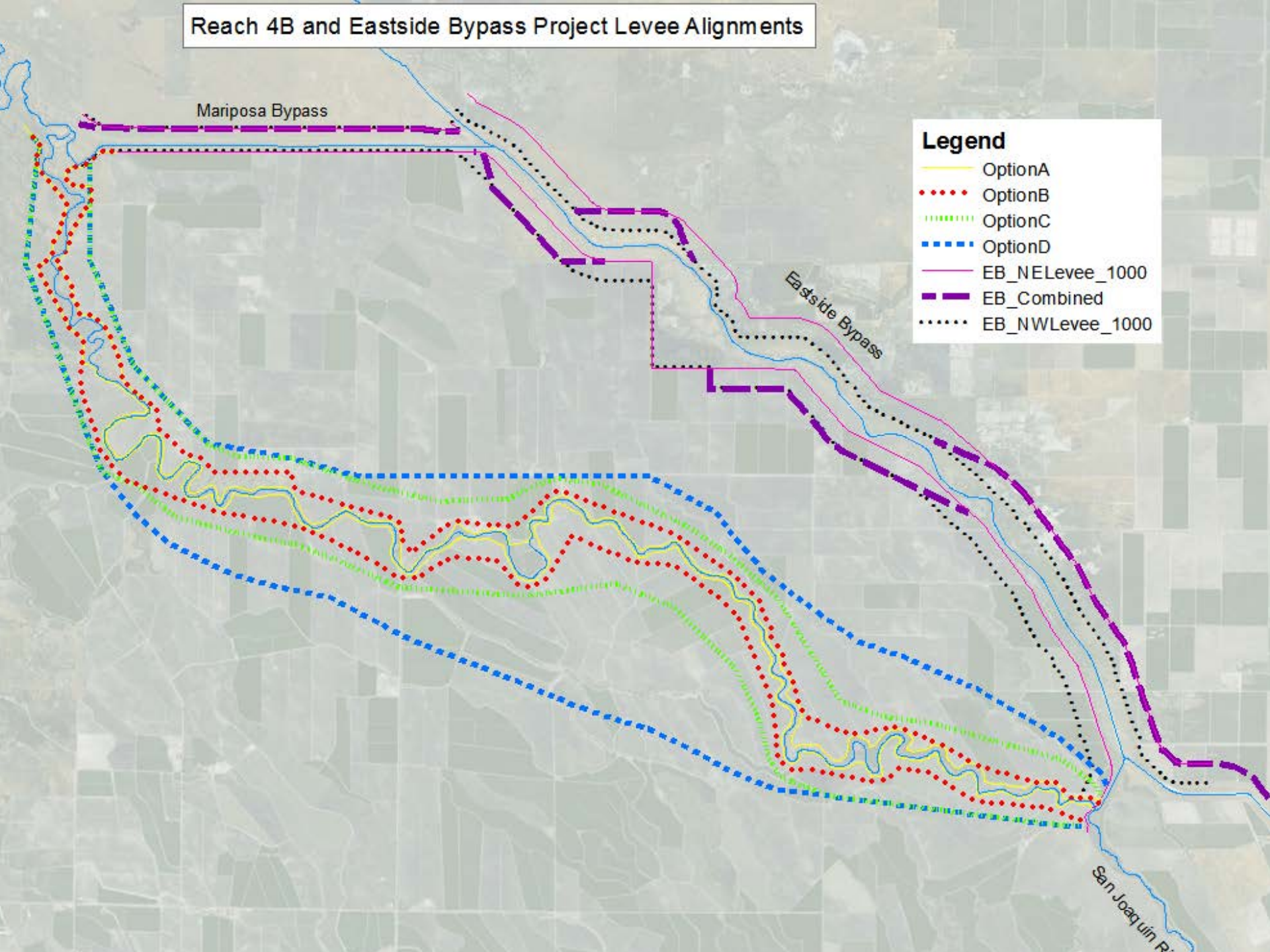

Supplement spawning gravel


Prevent redd superimposition


Prevent aquatic predation of juvenile salmonids


Supplement the salmon population


Reduce potential for fish entrainment


Reach 4B and Eastside Bypass Project Levee Alignments
Mariposa Bypass
Eastside Bypass
San Joaquin R
Legend
OptionA
OptionB
OptionC
OptionD
EB_NELevee_1000
EB_Combined
EB_NWLevee_1000

Consensus Based Alternative Process

- Stakeholder-driven process
- Thoughtful consideration of competing goals and objectives
- Progress to-date:
  - August meeting
  - November meeting
  - Check-in with Stakeholders in January

San Joaquin River Restoration Program

Fish Reintroduction Actions for the San Joaquin River Restoration Program

John Netto

U.S. Fish and Wildlife Service

November 23, 2015

SAN JOAQUIN RIVER RESTORATION PROGRAM

Overview

- Conditions for salmon in Restoration Area through 2019
- Adult fall-run conditions and actions in Fall of 2015
- Adult spring-run conditions and actions in Spring of 2016
- Juvenile migration and production in spring of 2016
  - Fall-run and spring-run

Schedule of Key Actions

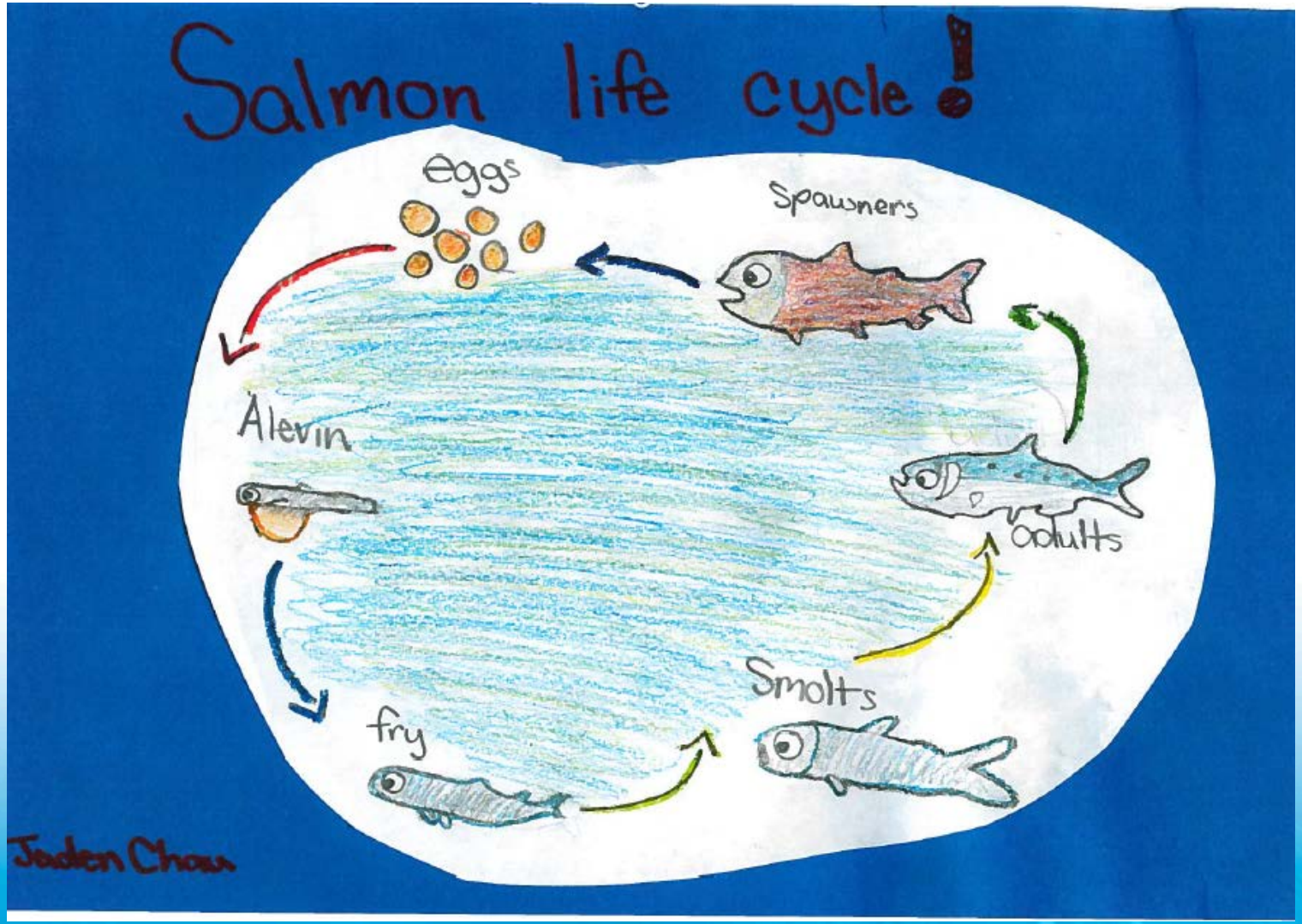
2015-2019
Goal: 1,300 cfs Capacity in all Reaches
• Friant-Kern Capacity Restoration
• Madera Canal Capacity Restoration
• Mendota Pool Bypass ⟸
• Conservation Facility ⟸
• Seepage Projects to 1,300 cfs ⟸
• Passage at all key barriers ⟸

Current Fishery Actions

- Move reintroduction process forward
- Work within available habitat
- Inform future decisions/ actions
- Refine operations
  - Proof of concept
  - Small scale (pilot actions) action
- Adaptive Management

SAN JOAQUIN RIVER RESTORATION PROGRAM

Salmon Life History



SAN JOAQUIN RIVER RESTORATION PROGRAM

What do Salmon Need?

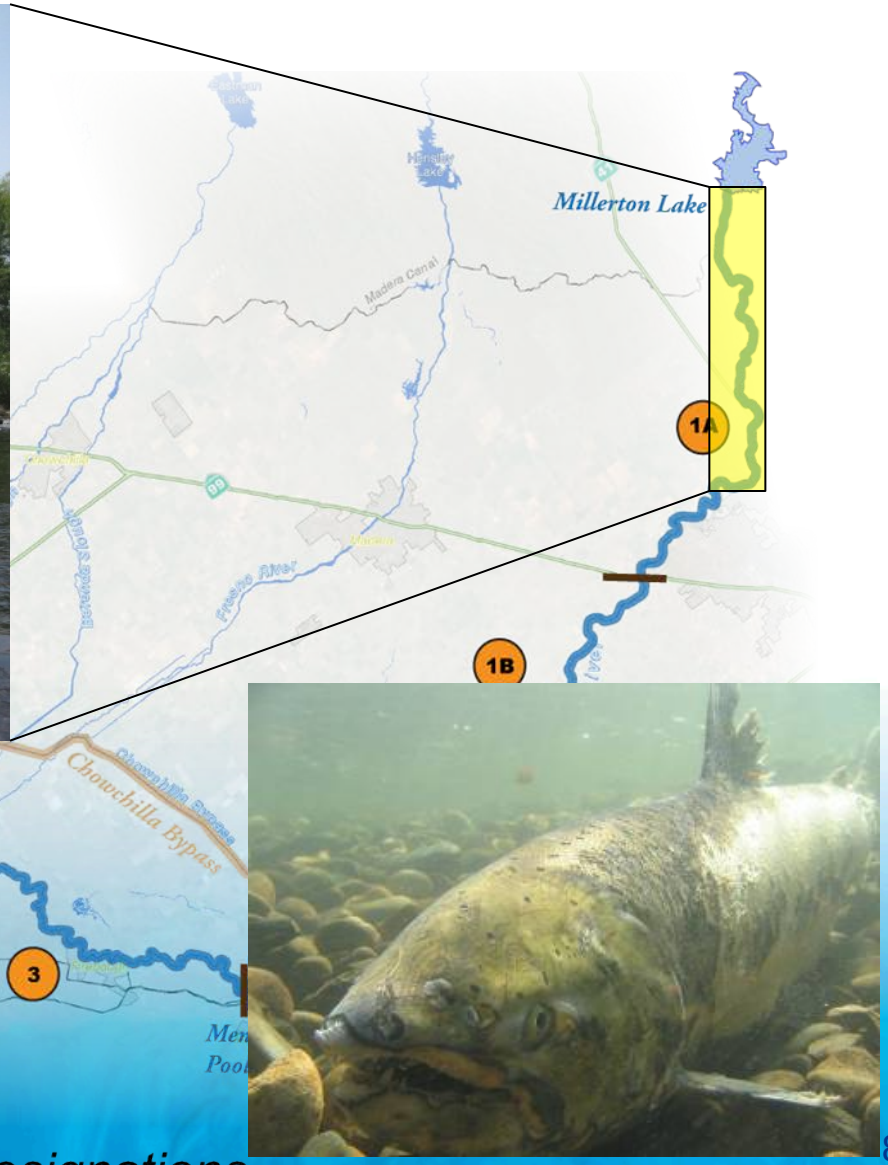
- Adult Passage
  - Flow connectivity, passage at barriers
  - Trapping and Transportation
- Adult holding habitat
- Spawning and egg incubation habitat

SAN JOAQUIN RIVER RESTORATION PROGRAM

Adult Passage

Map of San Joaquin River with reach designations

Spawning and Holding Habitat



Map of San Joaquin River with reach designations

SAN JOAQUIN RIVER RESTORATION PROGRAM

Egg/Juvenile Habitat

Map of San Joaquin River with reach designations

Adult Chinook Salmon Actions

- Capture adults above Merced River
- Transport to Reach 1
- Monitor
  - Spawning site selection
  - Spawning success
  - Survival to emergence
  - Carcass collections

Spring-run vs. Fall-run

- Similar passage conditions as fall-run
- Unknown/Longer migration window
- Adult returns from Program releases
  - Juvenile releases in 2014 and 2015
- Longer holding period

SAN JOAQUIN RIVER RESTORATION PROGRAM

Streamside spawning

- Ripe Fall-run adults spawned
- Rear eggs streamside
- Grow out juveniles in net-pens

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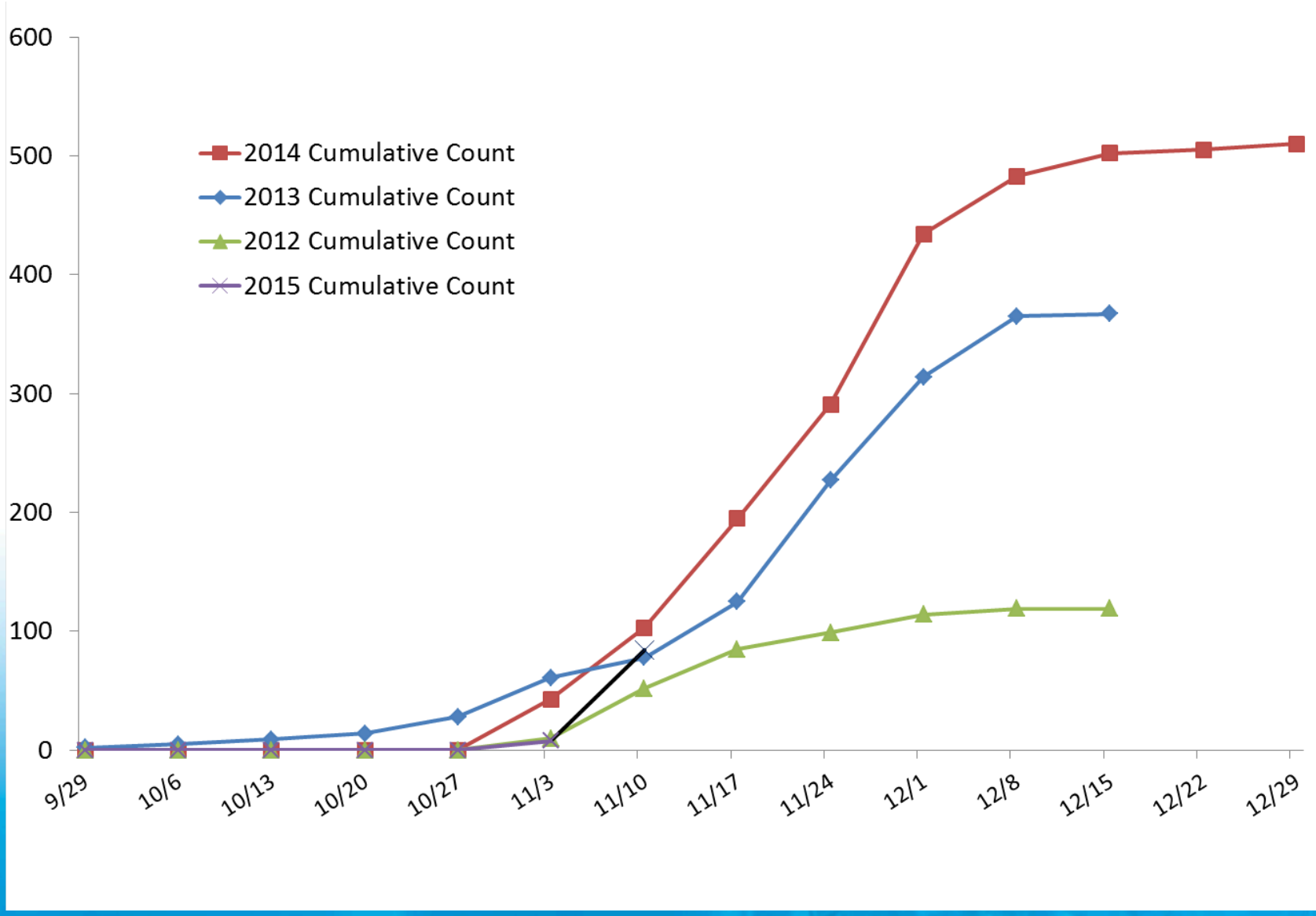
Adult Fall-run Captures



SAN JOAQUIN RIVER RESTORATION PROGRAM

What do Salmon Need?

- Juvenile rearing habitat
  - Quantity and quality
- Juvenile passage
  - Flow connectivity
  - Entrainment protection (e.g. fish screens)
  - Lower river releases
  - Juvenile capture and transport

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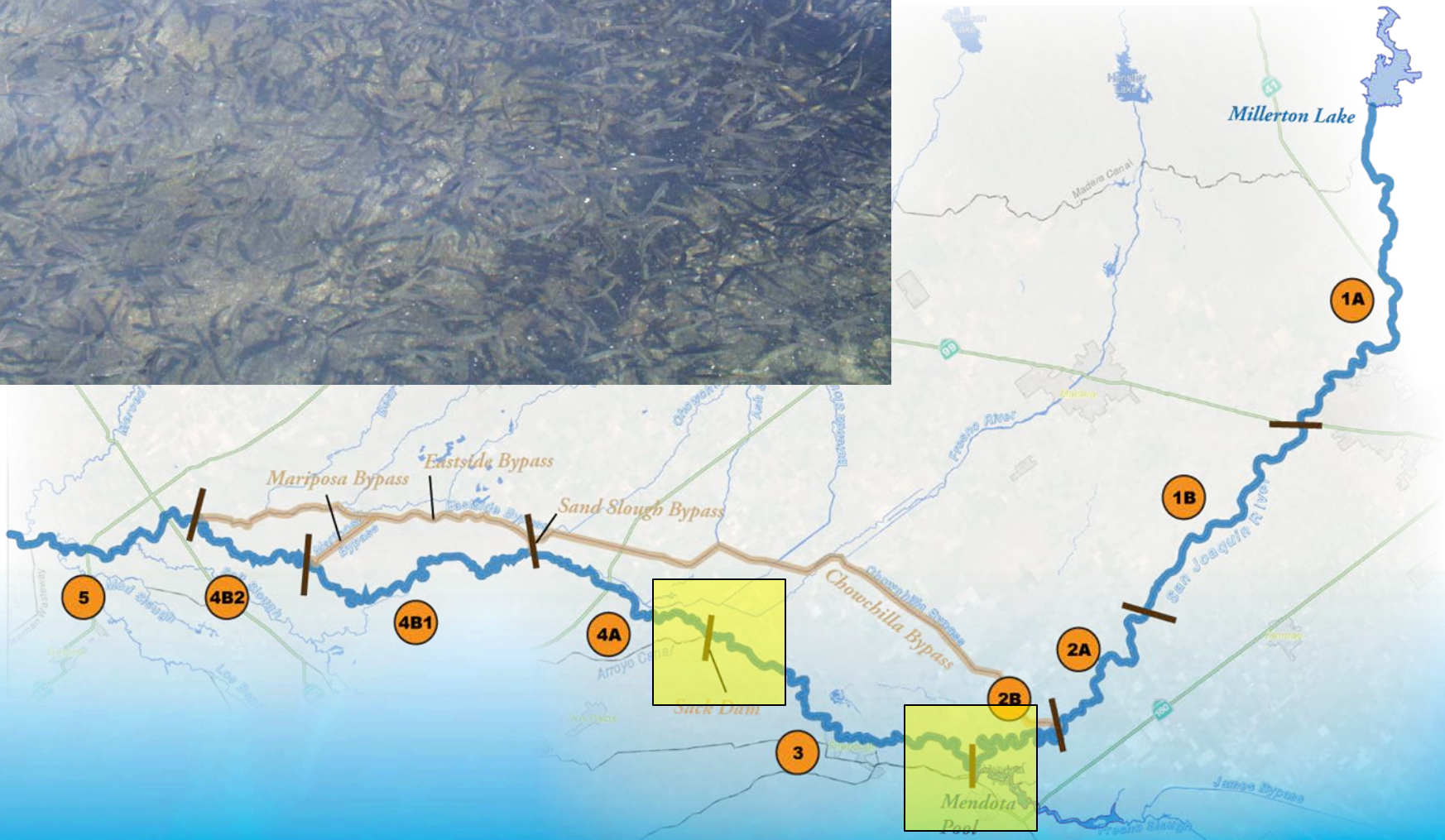
Juvenile Migration



Map of San Joaquin River with reach designations

Interim Conservation Facility

- Captive Brood Stock Program
  - Expect 80,000 juveniles
  - All ad-clipped and CWT
  - Release near confluence
  - Expected adult returns in 2018

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Spring-run Releases

- Feather River Hatchery
  - 50-60K juveniles
  - Held in San Joaquin
  - Released in lower river

Juvenile Migration

- Trapping techniques tested in 2014/15

- Objectives in 2016
  - Refine trapping methods
  - Assess potential locations
  - Test trap efficiency
  - Survival to traps
  - Juvenile FRC releases.
  - Flow dependent

Summary – Path Forward

- Fishery actions dependent on physical actions
- Hatchery construction and captive broodstock
- Juvenile fish releases
  - Conditions
  - Operations
- Test ability to provide passage assistance
  - Juveniles
  - Adults

More Information

- Program website
  - www.restoresjr.net
- Program Documents
  - Program Management Plan
  - Fisheries Management Plan
  - Technical Documents
- For more information: john_netto@fws.gov

SAN JOAQUIN RIVER RESTORATION PROGRAM

CALIFORNIA DEPARTMENT OF FISH and WILDLIFE

Salmon Conservation and Research Facilities

Gerald Hatler, Program Manager

Brian Erlandsen, Senior Environmental Scientist

November 23, 2015

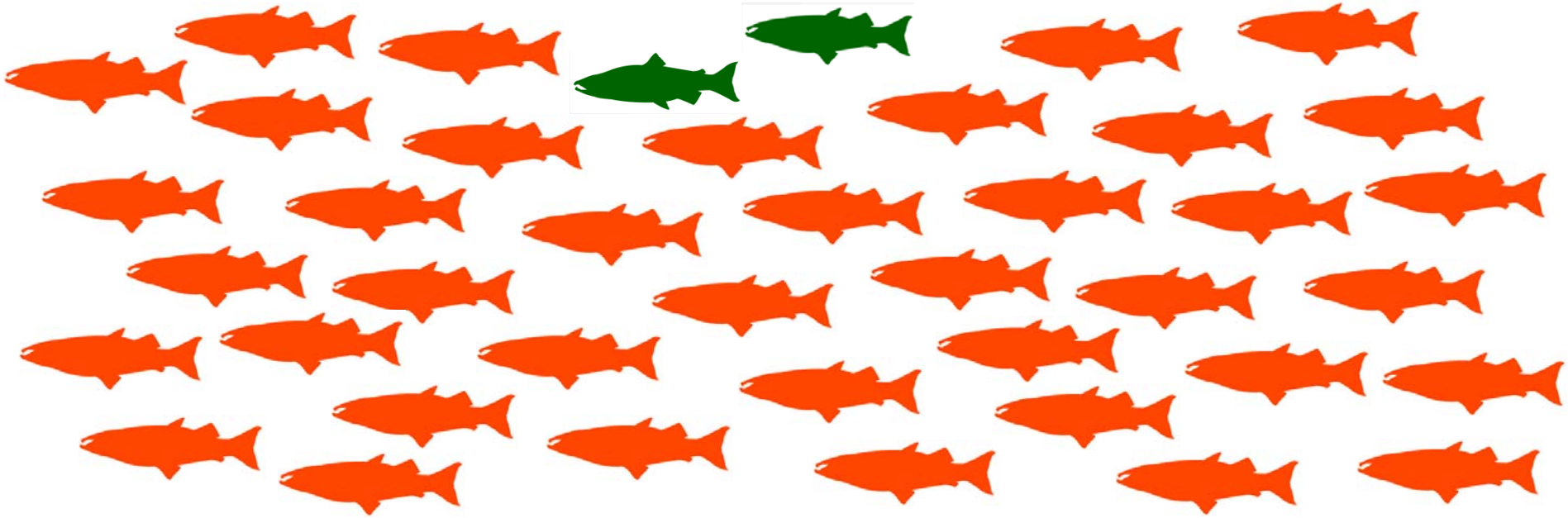
SAN JOAQUIN RIVER RESTORATION PROGRAM

CONSERVATION STRATEGIES

Why do we need a hatchery?

SAN JOAQUIN RIVER RESTORATION PROGRAM

CONSERVATION STRATEGIES



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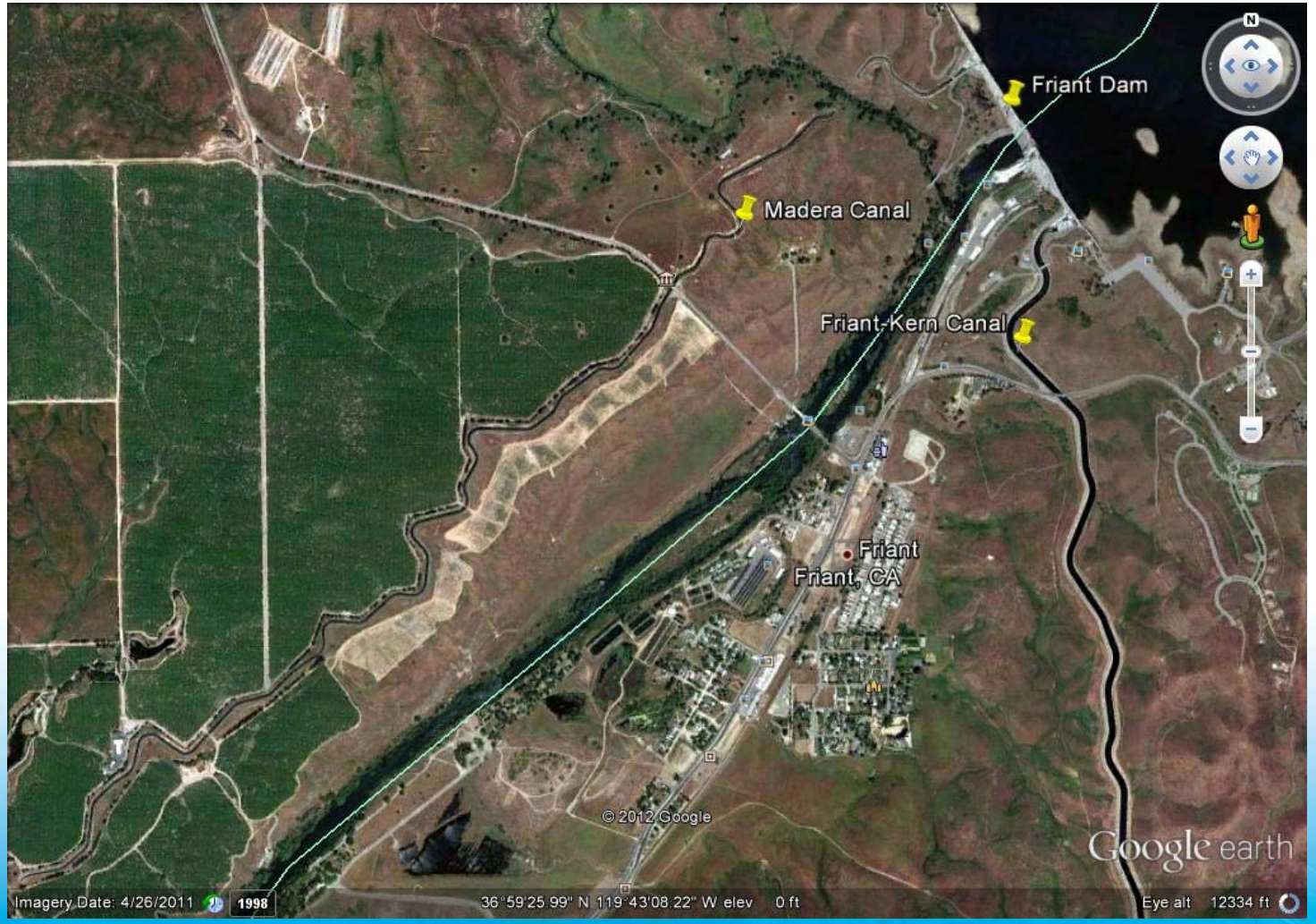
SALMON CONSERVATION AND RESEARCH FACILITY (SCARF) – PROJECT AREA



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SCARF – PROJECT LOCATION

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RESTORATION PROGRAM

SCARF – ARTIST'S RENDITION

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INTERIM SALMON CONSERVATION AND RESEARCH FACILITY (ISCARF)

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SCARF OPERATIONS GUIDANCE – CALIFORNIA HATCHERY SCIENTIFIC REVIEW GROUP

- Formed to evaluate salmon hatchery operations in California
- Goal is to ensure hatchery operations address conservation of natural salmon populations
- In California, each salmon hatchery has formed a Hatchery Coordination Team (HCT) to facilitate implementation of the HSRG recommendations

SCARF OPERATIONS GUIDANCE – HABITAT GENETICS MANAGEMENT PLAN (HGMP)

- Promote and protect genetic diversity within the reestablishing populations while safeguarding against negative genetic effects to out-of-basin source and non-target populations
- Establish self-sustaining natural populations of spring-run and/or fall-run Chinook salmon that are specifically adapted to conditions in the upper San Joaquin River
- Establish populations of spring-run and fall-run Chinook salmon that are demographically diverse in any given year, so returning adults represent more than two age classes
- Ten years following reintroduction, less than 15% of the Chinook salmon population should be composed of hatchery origin fish

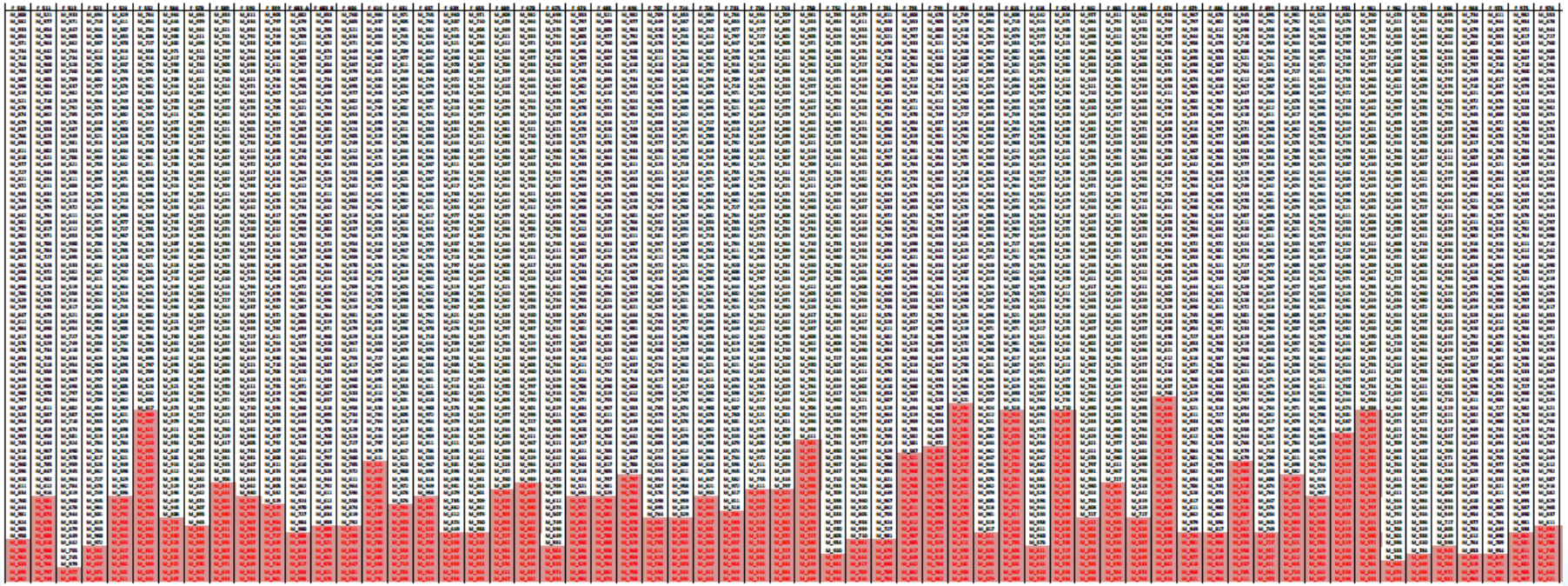
SCARF OPERATIONS GUIDANCE – BREEDING MATRIX

- Female spawners identified by PIT tag number in columns
- Male spawners are listed below each female based on their genetic relatedness
- Rxy is the relatedness factor between male and female; the smaller the number-the less related they are

F_510	rxy	F_511	rxy	F_513	rxy
M_808	-0.3082	M_521	-0.2998	M_933	-0.3581
M_582	-0.3057	M_977	-0.2567	M_971	-0.2171
M_933	-0.3015	M_854	-0.2481	M_847	-0.19
M_854	-0.2716	M_760	-0.2358	M_905	-0.1878
M_971	-0.2623	M_964	-0.2155	M_862	-0.1813
M_734	-0.2539	M_642	-0.208	M_764	-0.1803
M_710	-0.2353	M_709	-0.1867	M_734	-0.1777
M_764	-0.2302	M_960	-0.1791	M_528	-0.1723
M_755	-0.2202	M_507	-0.1784	M_760	-0.1685
M_507	-0.2059	M_805	-0.1689	M_709	-0.1667
M_598	-0.183	M_984	-0.1595	M_837	-0.1568

SAN JOAQUIN RIVER
RESTORATION PROGRAM

BREEDING MATRIX



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Spawning In 2015

- Monitored sexual maturity using ultrasound beginning in June, then again in August to determine potential spawners

- Determined 50 females and 66 males from broodyear 2012, and 27 “jack” males from broodyear 2013 should be ready to spawn

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Spawning In 2015

Ended up with 43 females to spawn, each crossed with a minimum of 4 of the least related males

Each female produced an average of about 2,000 eggs

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Spawning In 2015

We currently have approximately 80,000 eggs being incubated on chilled water at the Interim Facility

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Spawning in 2015

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ISCARF – DROUGHT IMPROVEMENTS

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RESTORATION PROGRAM

ISCARF – DROUGHT IMPROVEMENTS

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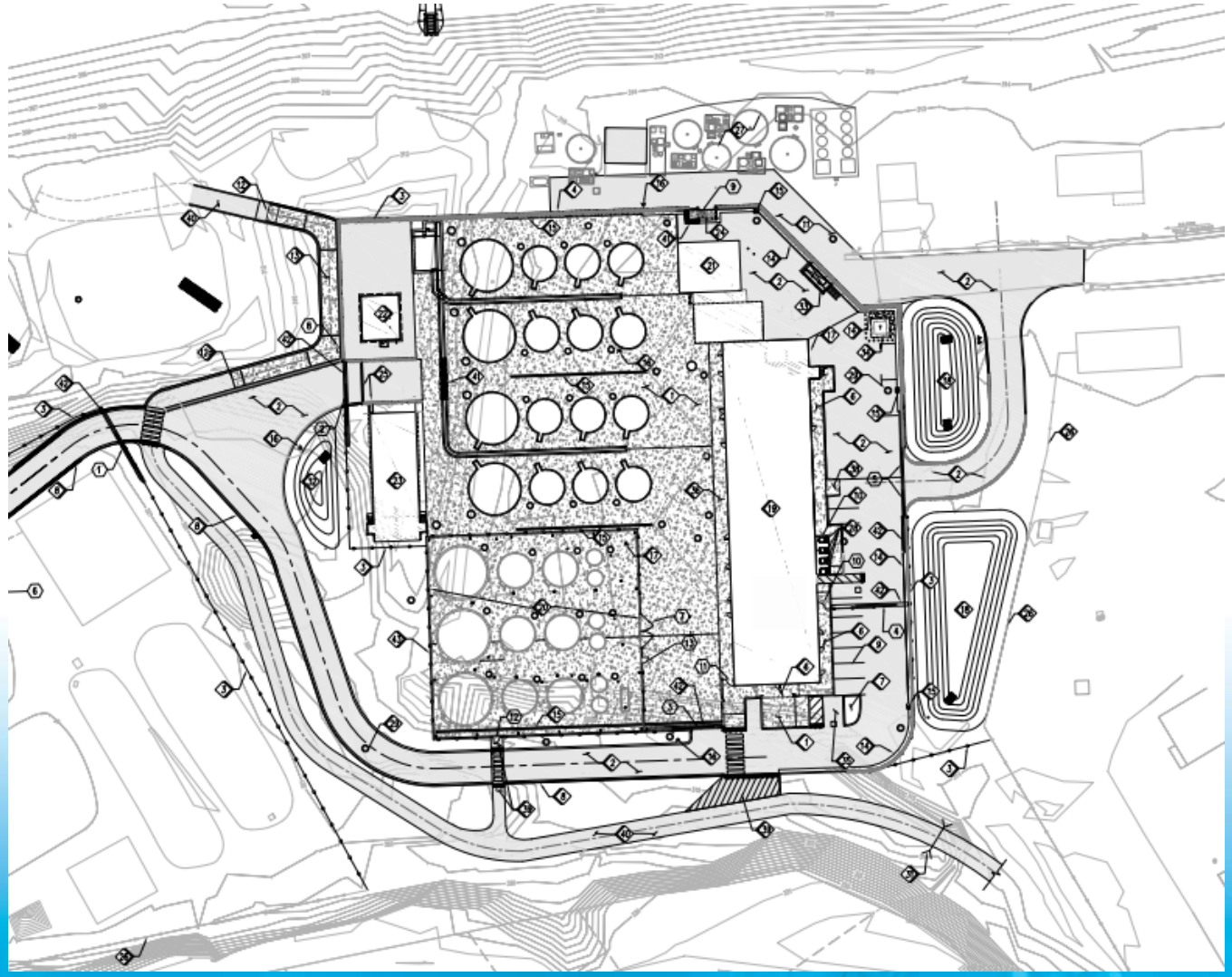
SCARF – DESIGN PLAN DRAWINGS



SAN JOAQUIN RIVER RESTORATION PROGRAM

SCARF - CONSTRUCTION TIMELINE

CONSTRUCTION PHASE	515 days	Thu 6/2/16	Mon 10/30/17
NOTICE TO PROCEED	30 days	Thu 6/2/16	Sat 7/2/16
CONSTRUCTION	425 days	Sat 7/2/16	Thu 8/31/17
CLOSE OUT	60 days	Thu 8/31/17	Mon 10/30/17

SAN JOAQUIN RIVER
RESTORATION PROGRAM

Questions?

San Joaquin River Restoration Program

Update on SJRRP Science Studies

(Monitoring & Analysis Plan)

Panorama of Millerton Lake

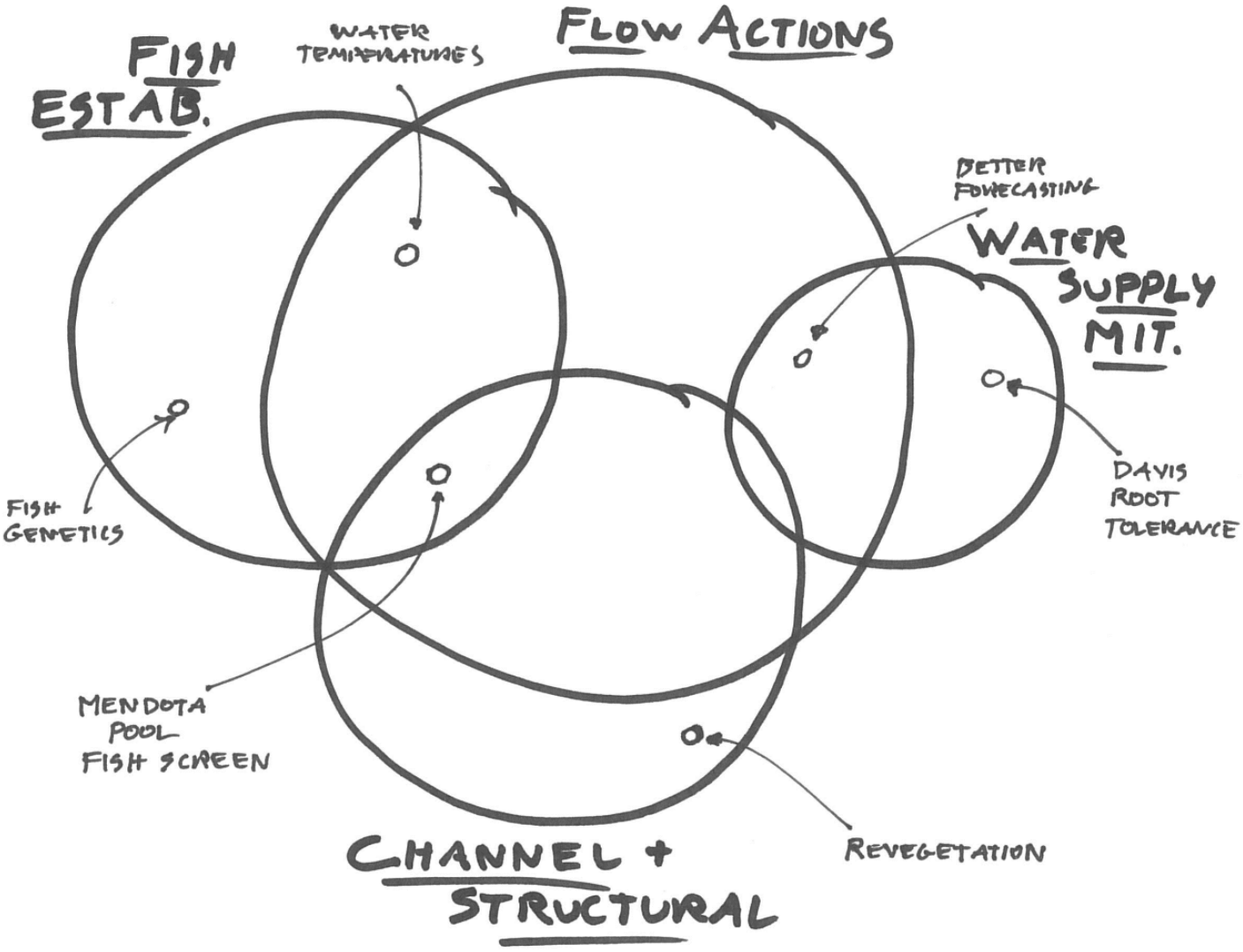
11/23/2015

Monitoring & Analysis Plan

- MAP is the process SJRRP uses to task scientific investigations and to inform critical decisions
  - Flow Actions
  - Fish Establishment
  - Channel Improvement Projects
  - Water Management (occasionally)
- MAP Oversight Panel duties
  - Ensure Framework drives science actions
  - Collects input from RA/TAC, SIGs, RGTFG
  - Synthesizes state of knowledge
  - Funds and coordinates investigations

SAN JOAQUIN RIVER RESTORATION PROGRAM

Monitoring & Analysis Plan



Monitoring & Analysis Plan

- MAP funds about 1/3 of investigations, remainder funded as fixed line-item in Framework or by other agencies

- Science budget has been reduced
  - $750K per year over next several years
  - Natural evolution

- Oversight Panel Response
  - Prioritize with Framework for Implementation
  - Greater synergy and coordination to stretch $

Science Meeting

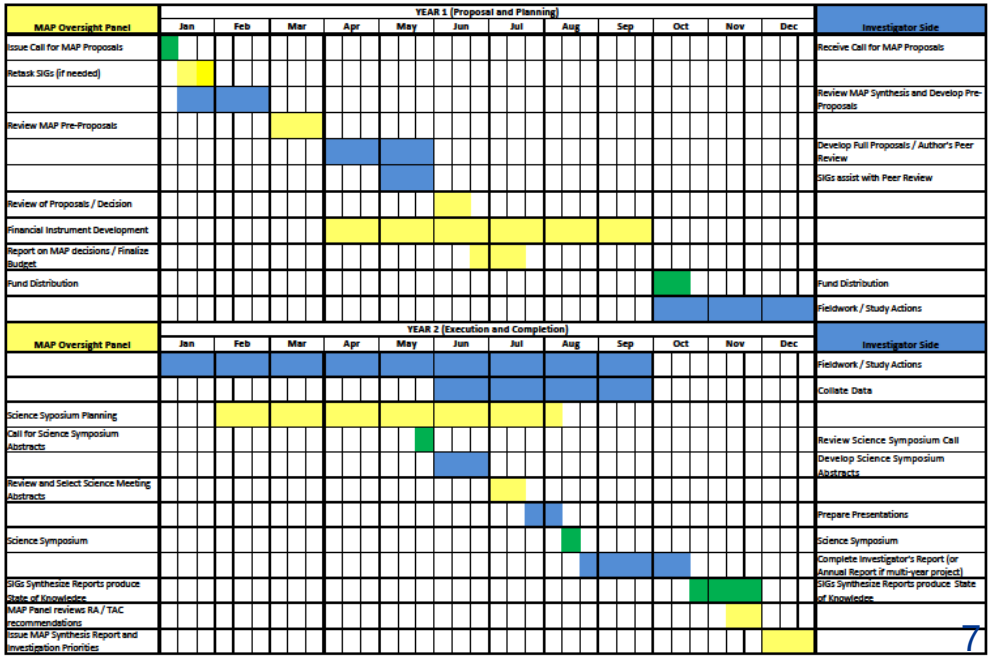
- 2015 Science Meeting
  - Took the place of interim reports
  - Preliminary results of investigations
  - Well attended and diverse audience
  - Positive feedback (survey summary provided)
  - Agenda provided
- 2016 Science Meeting
  - Scheduled for August in Fresno
  - Moderated sessions
  - Continue to expand number and diversity of attendees

2016 MAP Studies

- 2016 Priorities
  - ID Key salmon lifecycle constraints
  - Revegetation strategy
  - Sediment mobility
  - Influences on water temperature
  - Barriers to fish migration
  - Is there adequate spawning habitat
- 2016 Investigations
  - Submitted in March, selected in July, funding now, work commences in 2016
  - List provided

2017 MAP Process

- Rolling 2-year schedule
  - Spaces out tasks
  - Integrates Science Meeting
  - Synthesizes information prior to new proposal cycle
  - Allows for multi-year proposals



2017 MAP Process

- Updated Template for Proposals
  - More detail in budget and timelines
  - Reference Framework for Implementation
  - Reference other MAP studies
  - Peer-review of full proposals
  - Flexible format for multi-year projects

2017 MAP Process

- Small Interdisciplinary Groups (SIGs)
  - Critical role of synthesizing information
  - Realign SIGs
    - Reduce # of SIGs from 10 to ~ 6
    - Create more task-oriented SIGs
    - Keep productive SIGs intact
    - Ensure we have diverse perspectives
    - Complete by Autumn 2016

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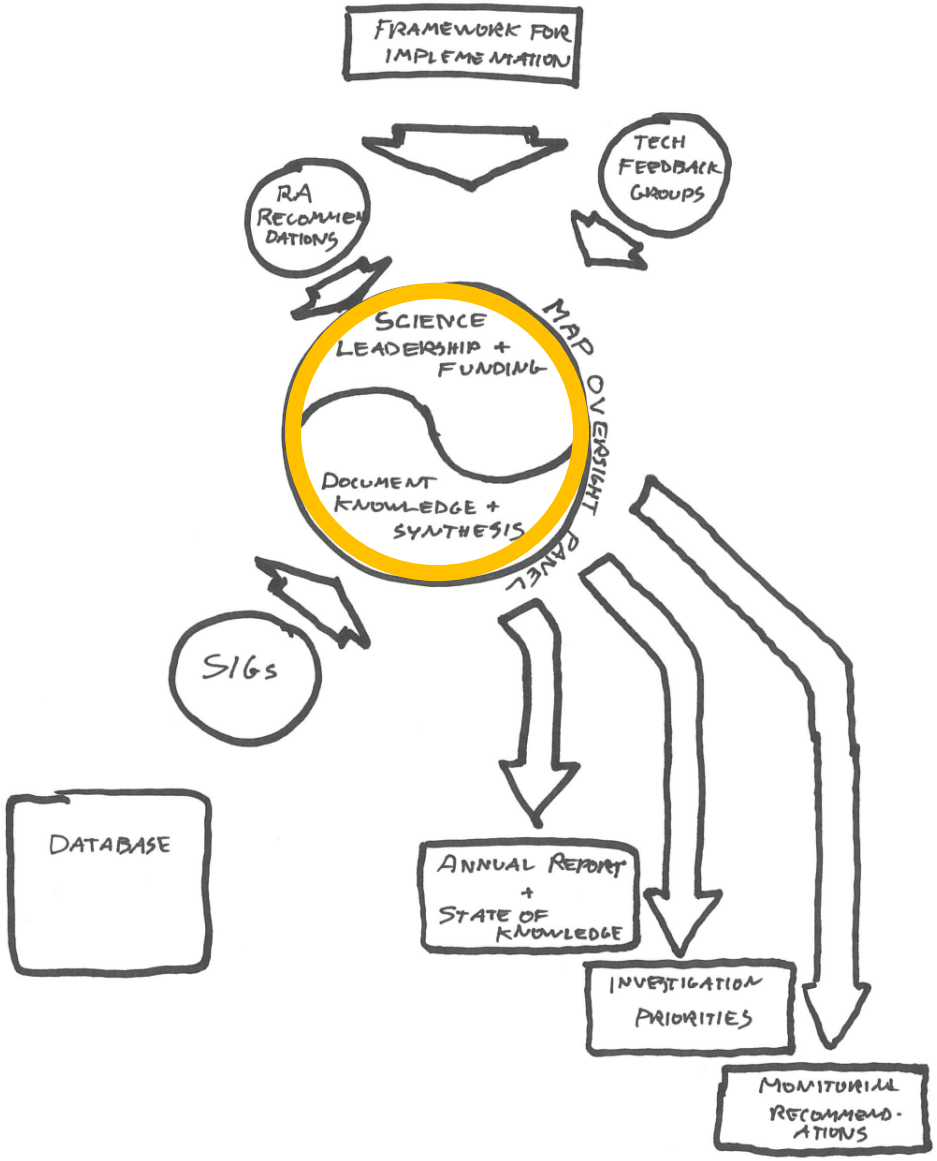
2017 MAP Process



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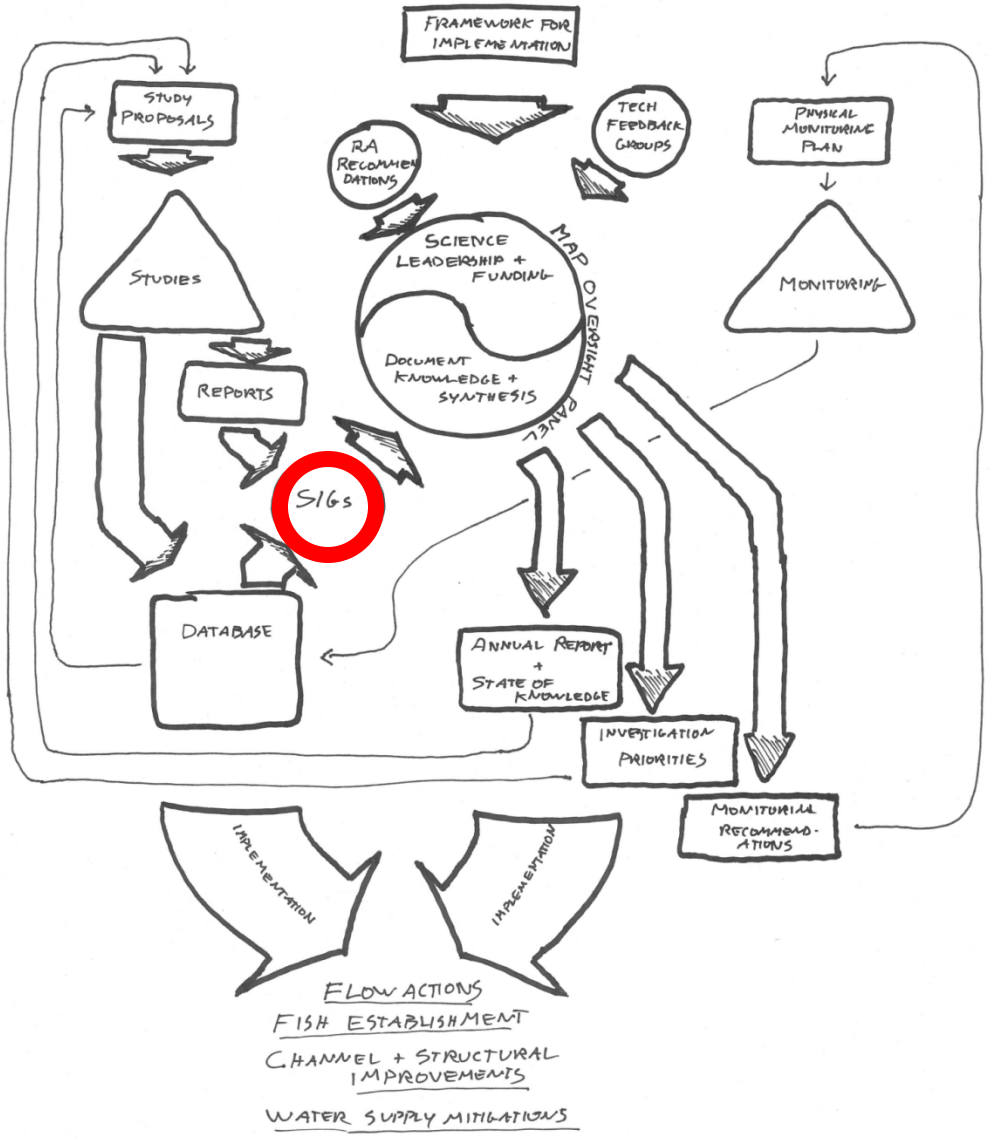
2017 MAP Process



2017 MAP Process

- Community Engagement
  - SJRRP Science is opportunity to engage youth and broader community with the goal of creating long-term stewards of restoration project
  - Would require close coordination with non-profit partners and other agencies
  - Dept. of Interior Youth Initiative
  - Optional, but encouraged, for investigations

Key Points

- **Diminished MAP funding compensated for by tighter integration with Framework**
- **SIGs will be reinvigorated and serve in critical role of synthesis of information**
- **Science Meeting a regular part of revised MAP schedule**
- **SJRRP Science an opportunity to inspire a generation of river stewards**

Opportunity for TFG Input

- **Input to MAP Oversight Panel to set investigation priorities**
- **Support of planned community engagement actions**
- **Individuals may be interested in participating in Small Interdisciplinary Groups**

San Joaquin River Restoration Program

Panorama of Mendota Dam

Chad Moore

cmoore@usbr.gov

Restoration Flow and Science Coordinator