San Joaquin River Restoration Program

Water Management Technical Feedback Meeting

Visalia, CA

March 18, 2016

SAN JOAQUIN RIVER RESTORATION PROGRAM

Agenda

- Introductions
- Long-term Recapture/Recirculation of Restoration Flows EIS
  - New Facility Screening
- 2016 Restoration Flows Outlook
  - Restoration Flows
  - Unreleased Restoration Flows
  - 2016 Recapture/Recirculation
- Part III Projects
- 2016 Meeting Dates
- Adjourn

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LONG-TERM RECAPTURE AND RECIRCULATION OF RESTORATION FLOWS EIS

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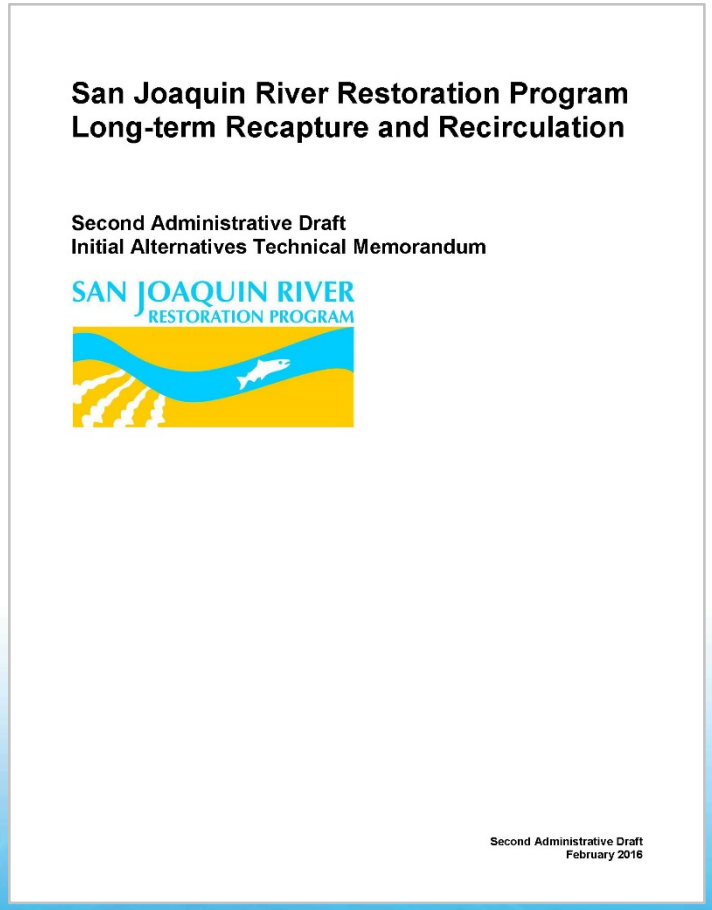
Overview

- Initial Alternatives Technical Memorandum
- Recapture Facility Investigation
  - Existing Facility Capacity
  - New Facility Location and Size
- Next Steps and Schedule

Initial Alternatives TM

- Distributed to the Settling Parties, Friant Contractors and Cooperating Agencies in February
- 32 Recapture, Recirculation and Storage Options
- Evaluated options to formulate 4 Action Alternatives



Summary of Initial Alternatives

	Alternative 1: No Action	Alternative 2: Continue Existing Actions	Alternative 3: Maximize Use of Existing Facilities	Alternative 4: Improve Existing Facilities	Alternative 5: Construct New Facilities
Recapture	Delta Diversions Recapture w/in Restoration Area		Existing BCID, WSID, PID	Expanded BCID, WSID, PID	New Intake Facility
Recirculation	FKC Pump Back	Direct Delivery FKC Exchanges (Kings River, Kaweah/Tule River, Kern River) Transfers	Alternative 2	Alternative 3 + Shafter Wasco Expanded Direct Delivery/Exchange Arvin Edison Expanded Direct Delivery/Exchange Fresno River Exchanges (Red Top) Fresno ID Exchange	Alternative 4
Storage	Storage in San Luis			Surface Storage CCWD or MWD	Alternative 4 + Groundwater Storage

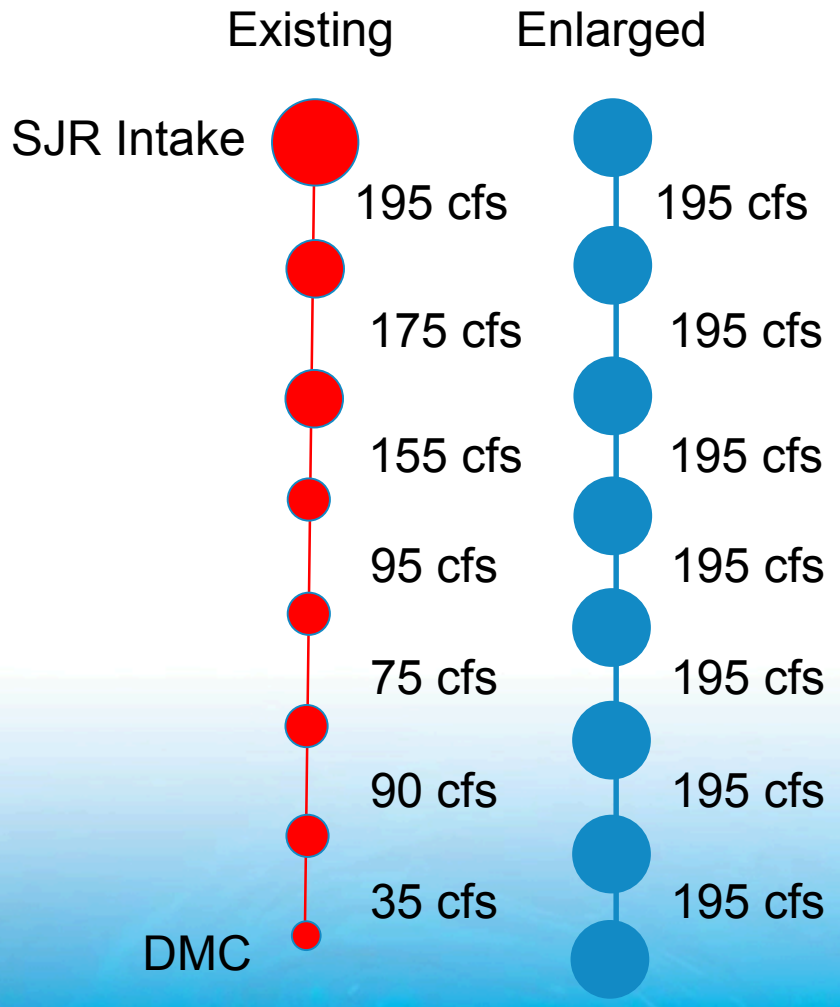
Recapture Facility Investigation

Refinement of existing and new recapture facility options

- Clarify existing and potential expanded capacity and timing
- Field investigation of the potential sites for new facility
- Study sizing options

PID Existing and Expanded Facilities

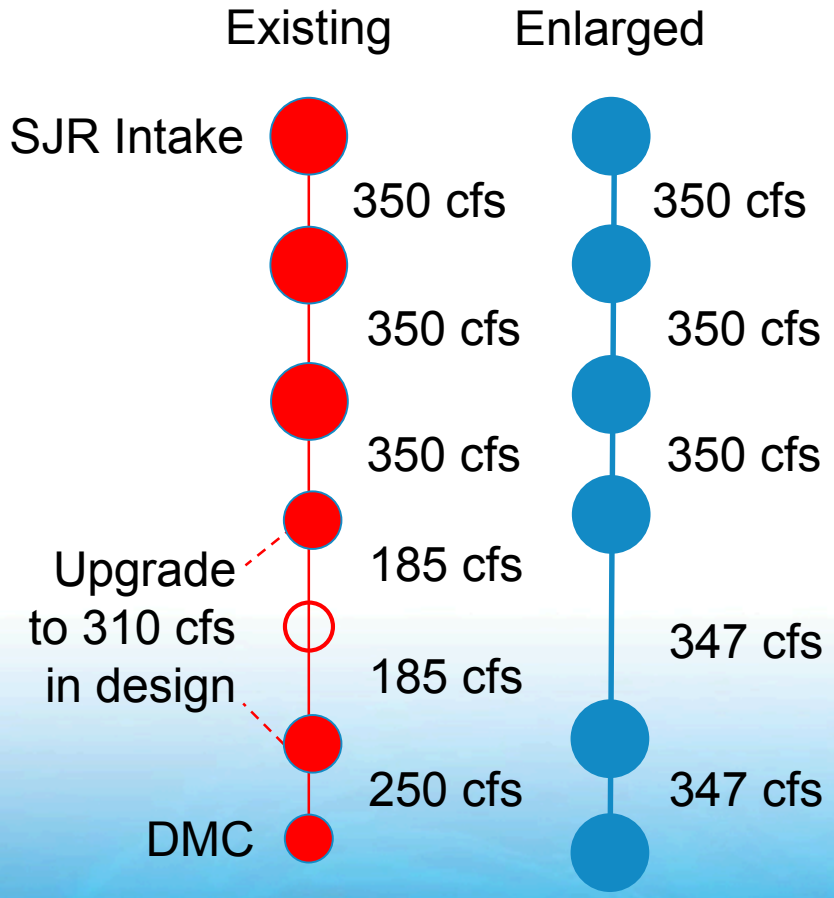
- Facility with diversion and fish screen capacity of up to 195 cfs
- Conveyance capacity to DMC of 35 cfs



West Stanislaus Existing and Expanded Facilities

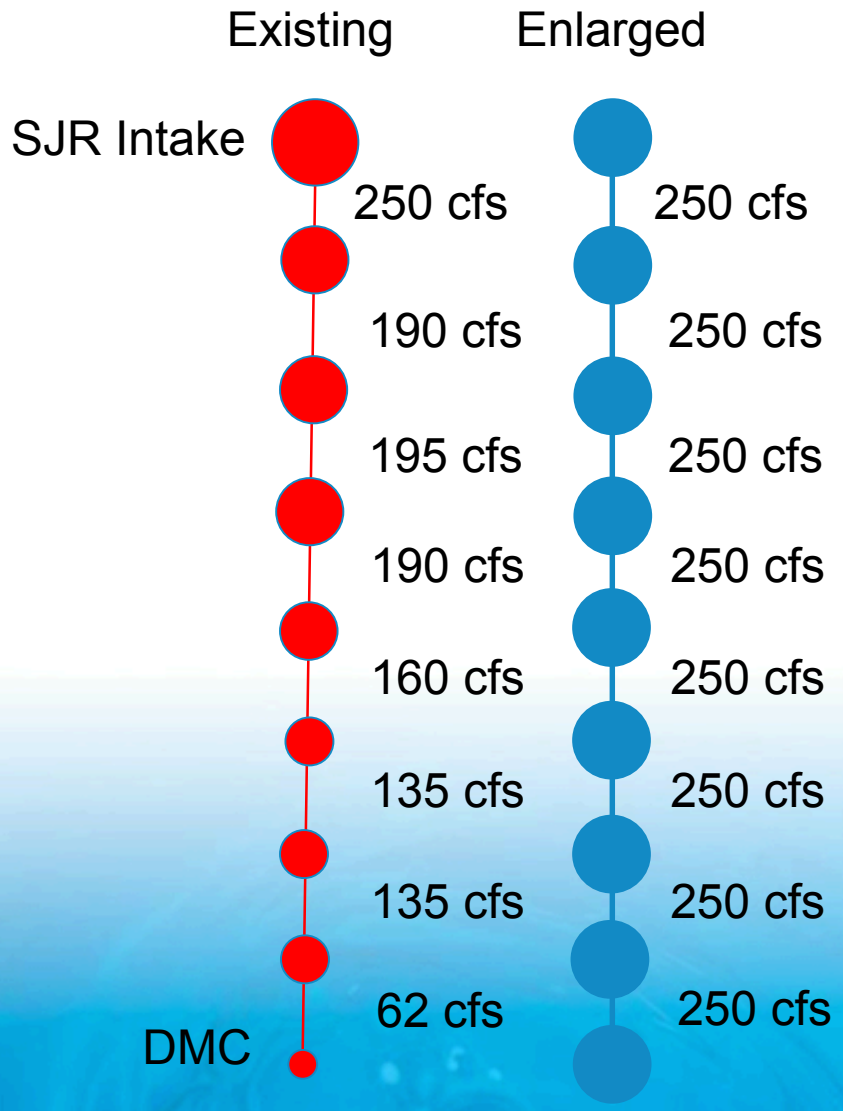
Reclamation Assumes:

- That the District will construct a fish screen with a 347 cfs capacity, and
- The District's pump station upgrade currently underway will increase conveyance capacity to the DMC from 185 cfs to 250 cfs



BCID Existing and Expanded Facilities

- Facility and fish screen capacity of up to 250 cfs
- Conveyance capacity to the DMC of 62 cfs



Combined Capacity To Recirculate at Existing Intakes (cfs)

Existing Diversions[1]	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Patterson Irrigation District	25	38	15	14	16	38	99	82	25	5	10	21
West Stanislaus Irrigation District[2]	241	241	246	246	243	228	210	157	131	109	100	234
Banta Carbona Irrigation District	8	11	6	5	6	0	0	0	0	0	0	17
Total	**274**	**290**	**267**	**265**	**265**	**266**	**309**	**239**	**156**	**114**	**110**	**272**

1. Available unused capacity calculated utilizing in-district monthly water demand values provided by the districts.
2. Inclusion of West Stanislaus ID in Alternative 3 is contingent on their completion of the river diversion fish screen currently under design.

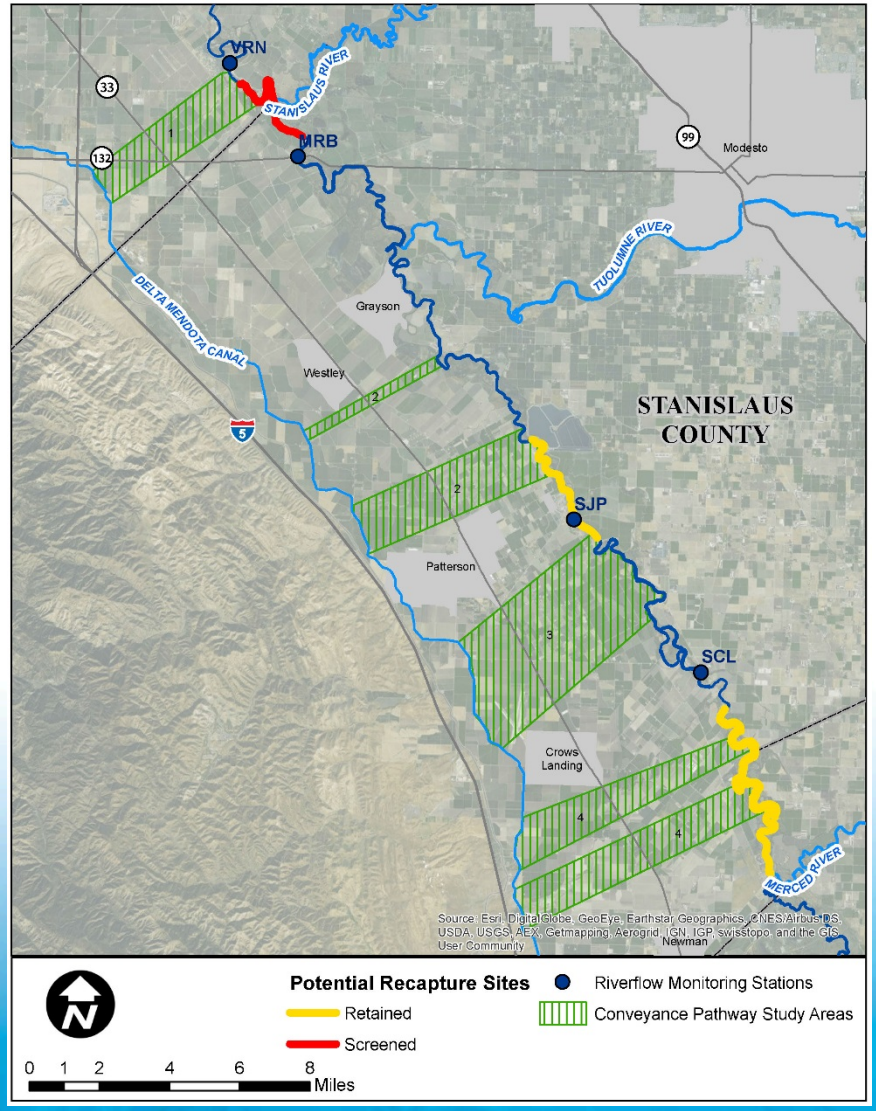
Combined Capacity To Recirculate at Expanded Existing Intakes (cfs)

Expanded Existing Diversions[1]	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Patterson Irrigation District	45	58	35	34	36	58	119	102	45	25	30	41
West Stanislaus Irrigation District[2]	278	278	283	283	280	265	247	194	168	146	137	271
Banta Carbona Irrigation District	63	66	61	60	61	55	55	55	55	55	55	72
Total	**386**	**402**	**379**	**377**	**377**	**378**	**421**	**351**	**268**	**226**	**222**	**384**

1. Expanded capacity calculated using the existing in-district monthly water demand values provided by the districts combined with the conveyance segment with the smallest capacity increase realized.
2. Inclusion of West Stanislaus ID in Alternative 4 is contingent on their completion of the river diversion fish screen currently under design.

New Recapture Facility Site ID

- Eleven potential sites capable of diverting 1,000 cfs.
- Three sites near the Stanislaus River were screened due to issues with geomorphic stability and habitat sensitivity



New Recapture Facility Site ID

- Site surveys of 8 remaining sites to develop a preliminary ranking
- Next steps on site refinement include:
  - Evaluation of land use availability
  - Conveyance path routing
  - On-ground surveys of sites and conveyance paths for sensitive species

New Recapture Facility Size Evaluation

Evaluation compared:

- Recently built diversions in California for facility footprint and cost
- Restoration Flow volume potentially recaptured
- Modeled DMC conveyance capacity to recirculate recaptured Restoration Flows
- Proportion of total river flow potentially diverted by a 1,000 cfs and a 500 cfs facility

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Capacity and Cost Comparison

Project:	Capacity of Intake: (CFS)	Construction Cost: (MILLION)	Length of Fish Screen: (LF)	Total Facility Footprint (ac)	Number/Size of Pumps	Time to Construct
Freeport Regional Water Project	286	85*	160	10	8 - 36 cfs	3 years
Woodland Davis	400	60*	200	3	5 - 80 cfs 4 - 20 cfs	Currently in Construction (app. 4 years)
TCCA Fish Passage Improvement Project at Red Bluff	2,500	200	1,118	30	10 - 218 cfs 1 - 80 cfs	2 Years
CCWD Middle River Intake and PS *(former Alternative Intake Project)*	250	99	110	3	5 - 50 cfs	3 years
New SJRRP Recapture Facility	1,000	160	500	12		

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Volume Potentially Recaptured (AF)

Water Year Type[1]						
Diversion	**Wet (20%)**	**Normal-Wet (30%)**	**Normal-Dry (30%)**	**Dry (15%)**	**Critical-High (5%)**	**Critical-Low**
Total Restoration Flow	482,655	293,300	188,274	127,132	50,827	0
100 cfs	63,551	61,736	61,736	61,736	8,132	0
200 cfs	104,997	91,082	88,851	86,619	15,769	0
300 cfs	130,732	104,719	99,512	94,306	21,471	0
400 cfs	153,939	115,826	107,645	99,463	24,645	0
500 cfs	176,651	126,438	115,281	104,124	27,819	0
600 cfs	197,874	135,562	121,430	107,297	30,992	0
700 cfs	219,097	144,686	127,579	110,471	34,166	0
800 cfs	240,321	153,811	133,728	113,645	37,339	0
900 cfs	261,544	162,935	139,876	116,818	40,513	0
1,000 cfs	282,768	172,059	146,025	119,992	43,687	0

1. Computed using Restoration Flow Hydrograph for Reach 5

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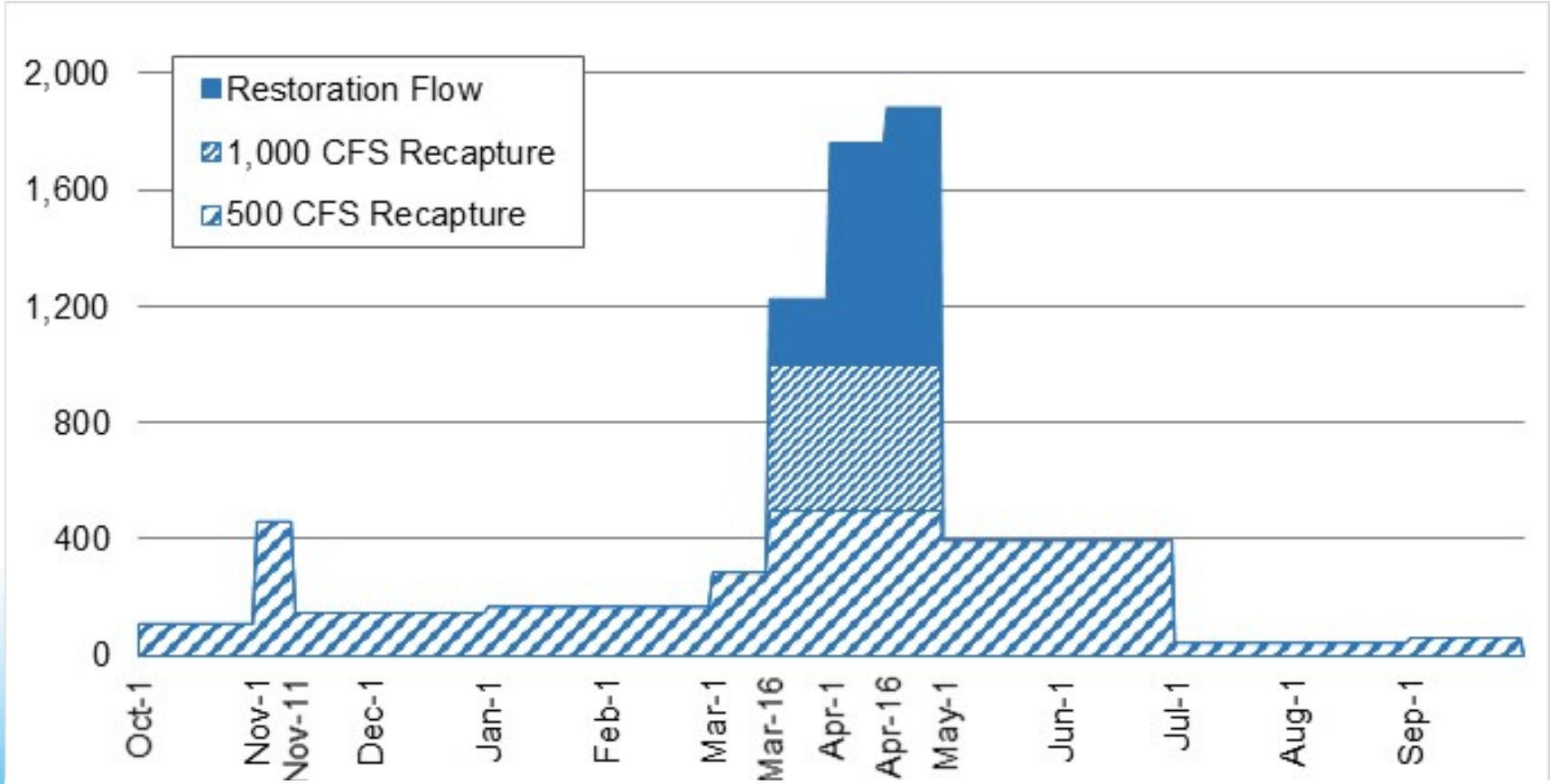
Flow Potentially Recaptured (cfs)



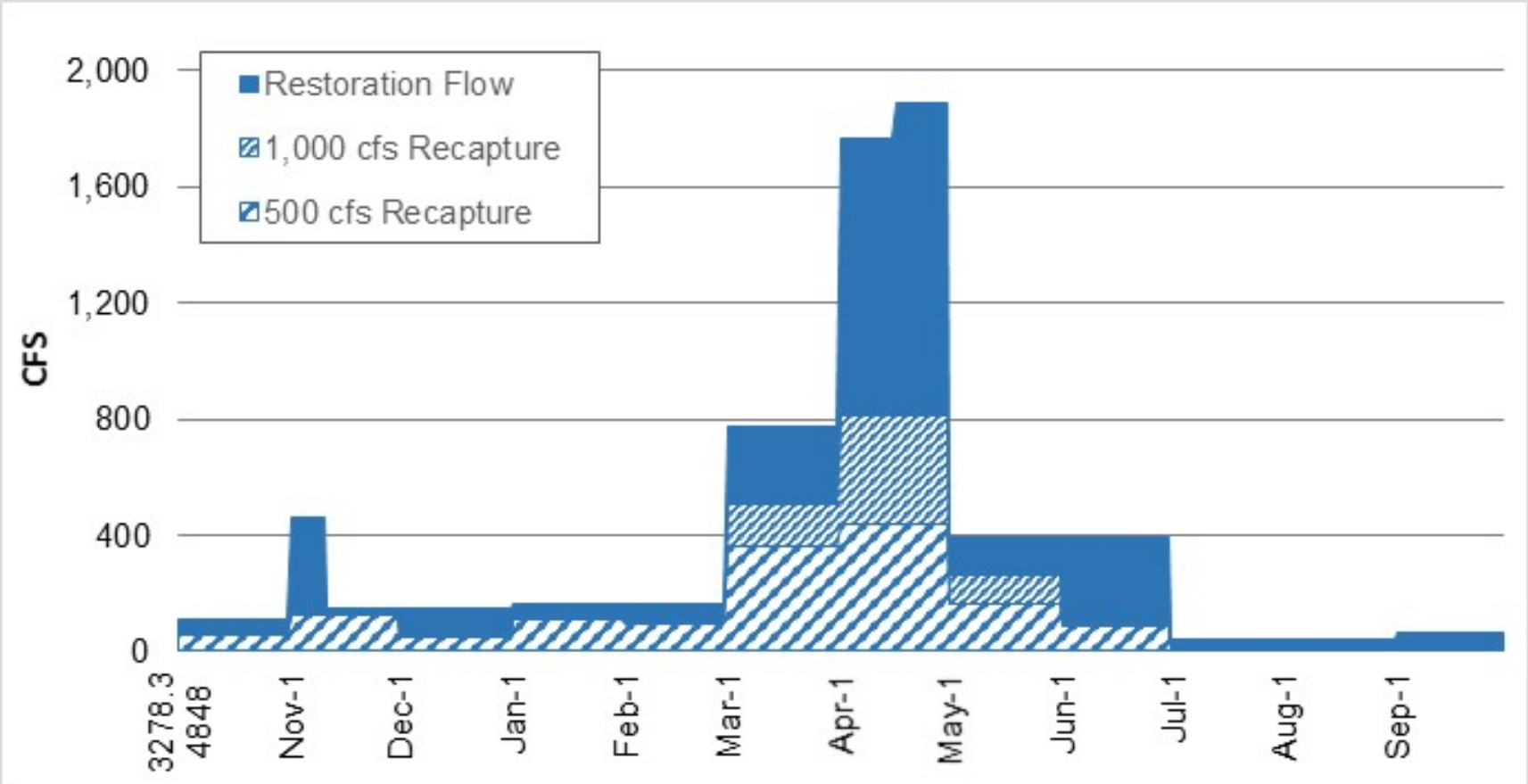
Note:
Developed utilizing a weighted average of the flows from the Restoration Flow Hydrograph for Reach 5

Volume Potentially Recirculated in DMC (AF)

Water Year Type[1]						
Diversion	Wet (20%)	Normal-Wet (30%)	Normal-Dry (30%)	Dry (15%)	Critical-High (5%)	Critical- Low
Total Restoration Flow	482,655	293,300	188,274	127,132	50,827	0
100 cfs	36,571	35,191	40,334	43,037	6,149	0
200 cfs	60,994	53,774	58,315	60,637	12,298	0
300 cfs	78,921	66,212	70,005	70,482	18,446	0
400 cfs	95,307	76,068	81,080	77,674	24,595	0
500 cfs	111,491	84,969	92,154	84,815	30,744	0
600 cfs	127,012	93,625	103,105	90,630	36,893	0
700 cfs	141,871	102,200	113,573	96,267	43,041	0
800 cfs	155,359	108,894	120,532	98,160	45,107	0
900 cfs	168,202	114,844	125,184	98,160	45,107	0
1,000 cfs	181,045	120,795	129,328	98,160	45,107	0

1. Calculated in CalSim as the minimum of available RF (after losses) and available capacity in the DMC above San Luis Reservoir

Flow Potentially Recirculated in DMC (cfs)



Note:
Calculated in CalSim as the minimum of available restoration flows (after losses) and available capacity in the DMC above San Luis with a weighted average of the flows from the Restoration Flow Hydrograph for Reach 5.

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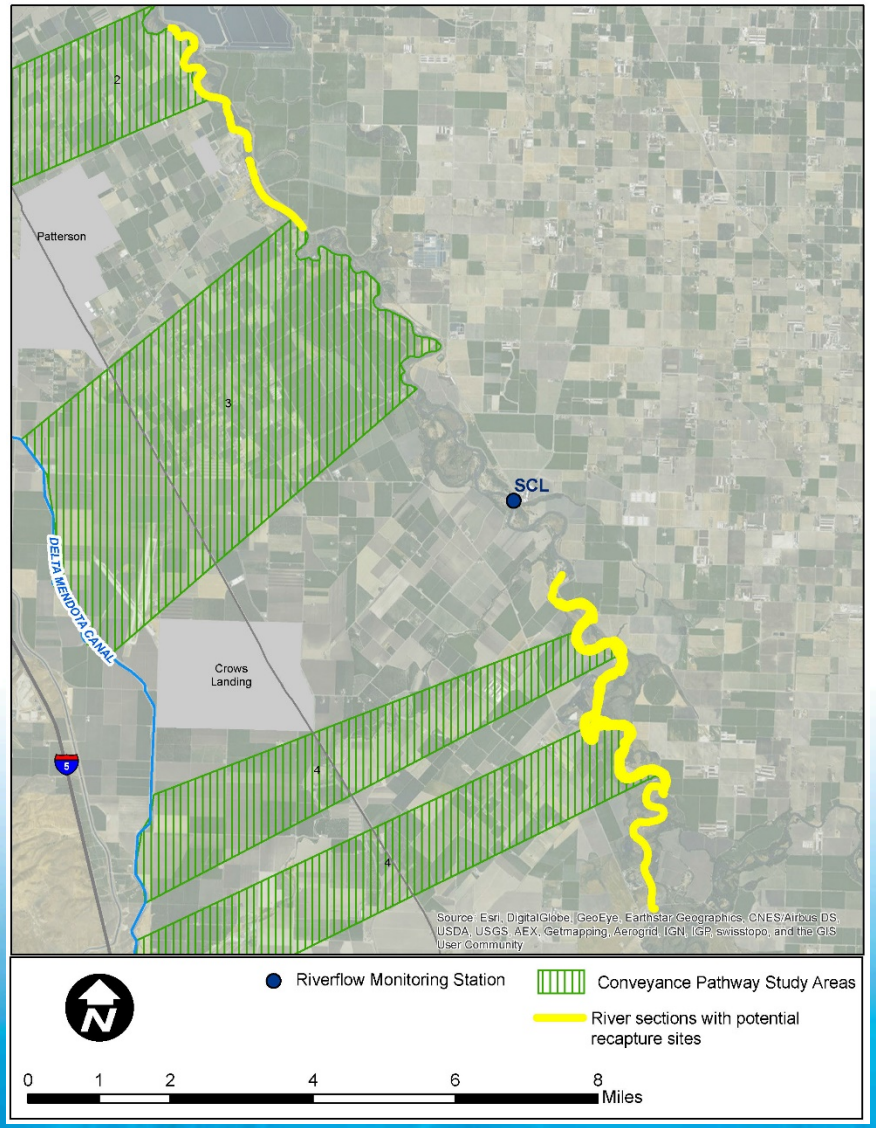
Potential Recapture Sites

Diversion as a % of Historic and Restoration Flow			
Restoration Year Type	**Maximum**	**Weighted Average**	**Minimum**
1,000 cfs Diversion			
Wet	33%	18%	2%
Normal Wet	44%	26%	9%
Normal Dry	48%	24%	10%
Dry	51%	29%	12%
Critical High	65%	16%	0%
Critical Low	0%	0%	0%
500 cfs Diversion			
Wet	33%	12%	2%
Normal Wet	40%	20%	9%
Normal Dry	41%	20%	10%
Dry	41%	26%	12%
Critical High	41%	10%	0%
Critical Low	0%	0%	0%



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Conclusions

		Facility Type		
		500 cfs	**500 cfs + Existing Facilities**	**1,000 cfs**
Average RF Recaptured	**% Restoration Flows Recaptured and Recirculated**	28%	50%	55%
	AF Per Year (Weighted Avg)	65,109 AF	116,316 AF	128,225 AF
Costs	**Construction Costs[1]**	$80 million	$80 million[2]	$160 million

1. Does not include costs for annual O&M
2. Does not include annual costs associated with conveying Restoration Flow using existing District owned facilities

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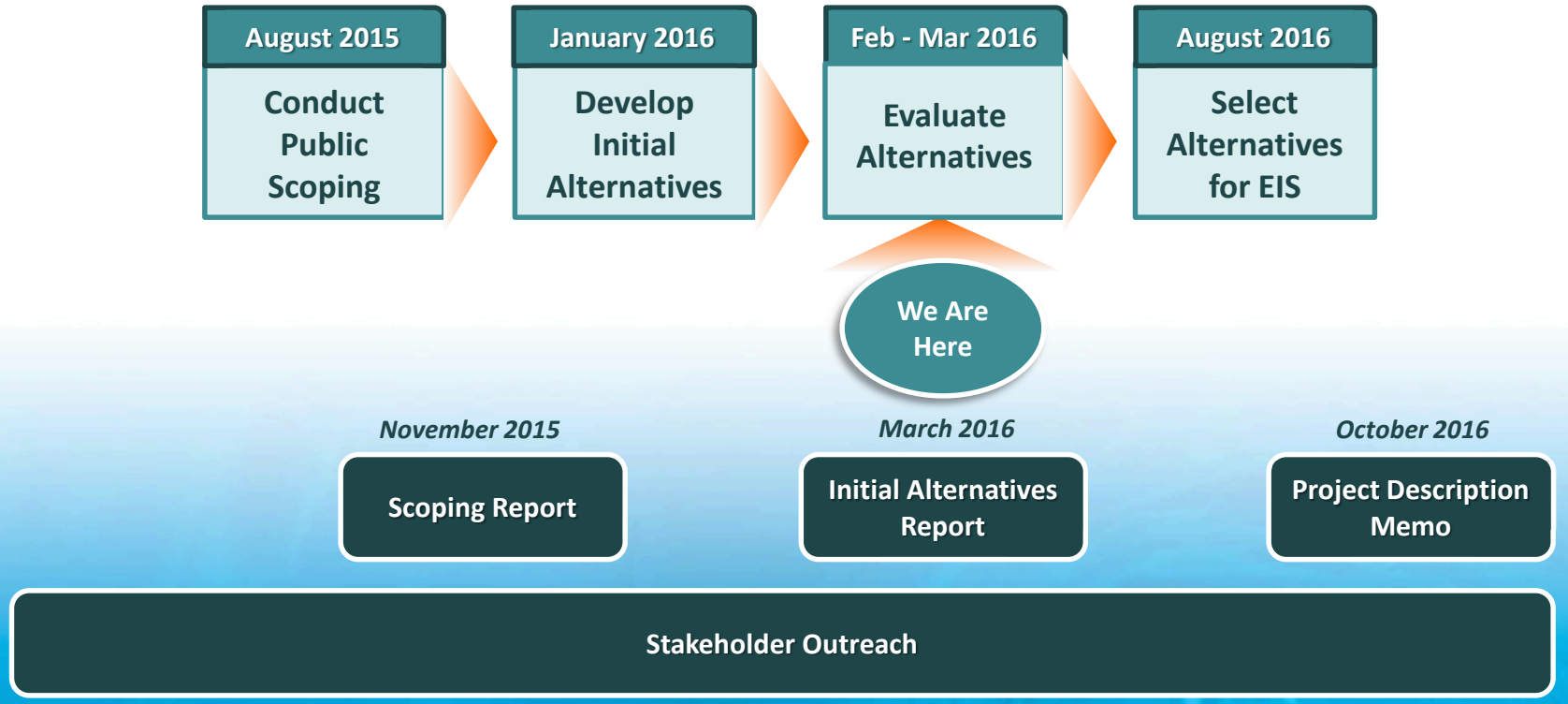
Next Steps and Schedule

- Development of the Project Description TM
- Analysis of Alternatives in the EIS



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Questions?

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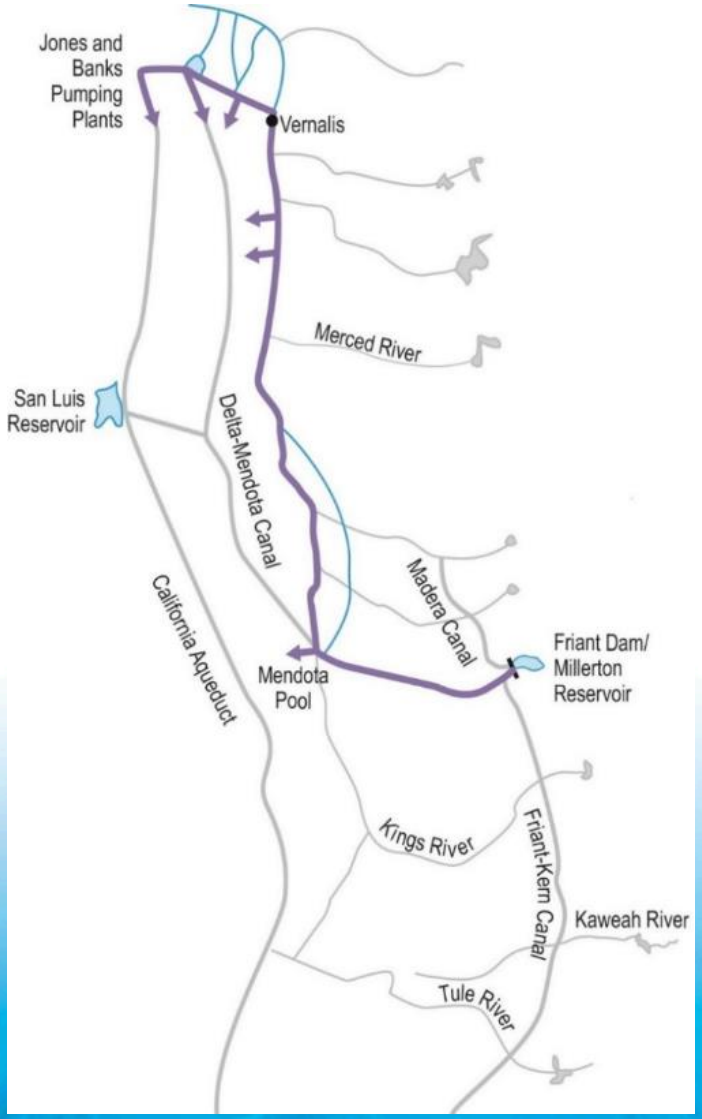
RESTORATION FLOWS OUTLOOK 2016

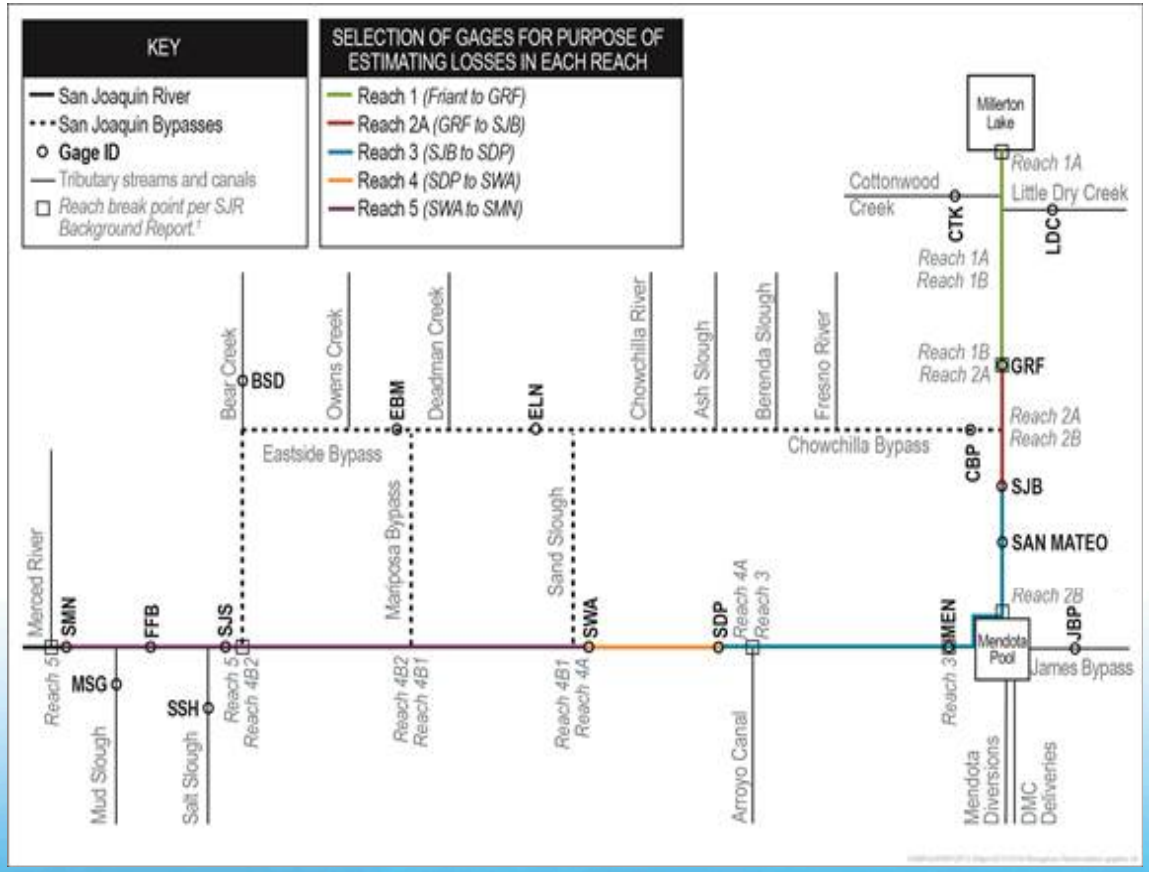
2016 Restoration Year Actions

- Restoration Year: March - February
- Restoration Flows allocation
- Measuring Restoration Flows and losses in the Restoration Area
- Managing Unreleased Restoration Flows (URFs)
- Preparing for the recapture of Restoration Flows (Paragraph 16)



Measurement of Restoration Flows

- Restoration Flow Guidelines (RFG) identifies gages to be used for measuring and monitoring Restoration Flows, and for calculating seepage and diversion losses



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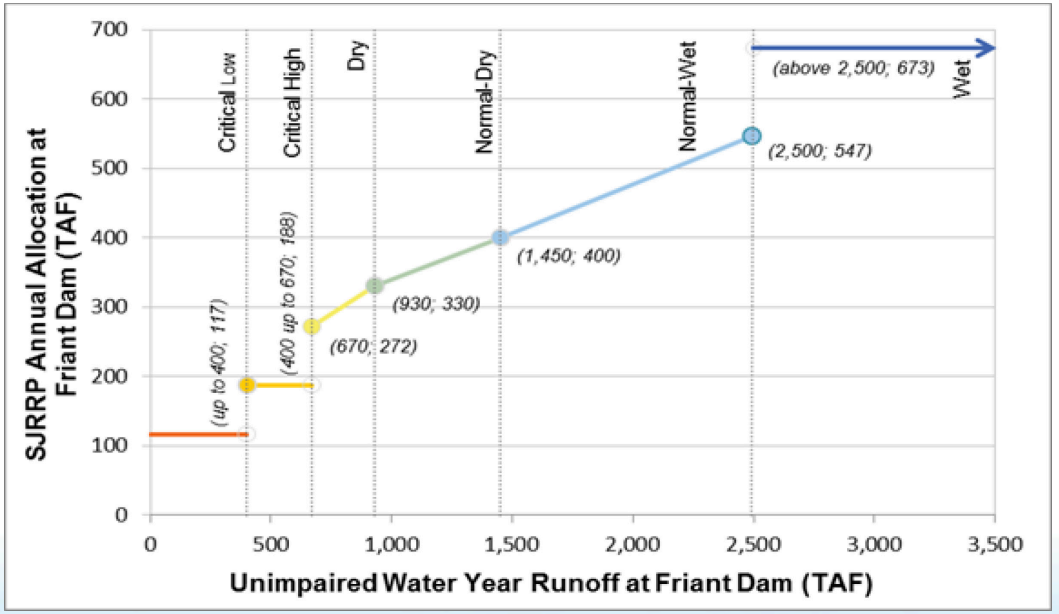
Restoration Flow Allocation*

- RFG describes processes for determining Restoration Year Type and Flow Schedules
- Reclamation provides the first default flow schedules to RA in January
- RA recommends releases at Friant Dam



Values shown for the RF Allocation in the following slides include water diverted by holding contractors in Reach 1

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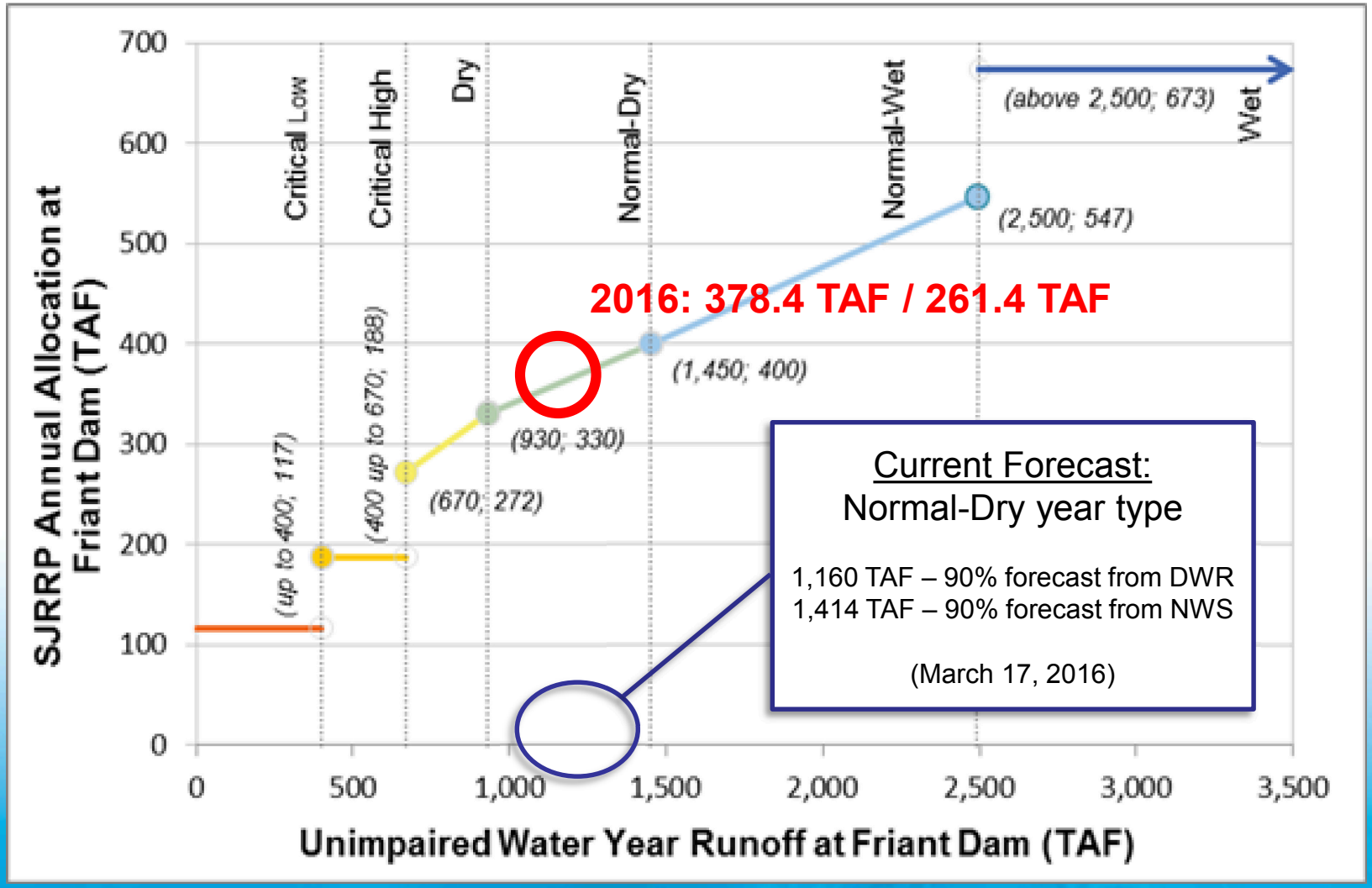
2016 Restoration Year Type



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2016 Restoration Allocation

- Allocation limitations due to potential Exchange Contractor deliveries from Friant
- Provisional Restoration Allocation 1/26/16:
  - 9,445 AF through February 29
  - RA schedule of 2,380 AF
- Provisional Restoration Allocation 2/22/16:
  - Schedule remaining balance of 9,445 AF
  - RA schedule of up to 7,000 AF
- Full Restoration Allocation planned on 3/18/16:
  - 261,400 AF
  - RA schedule TBD

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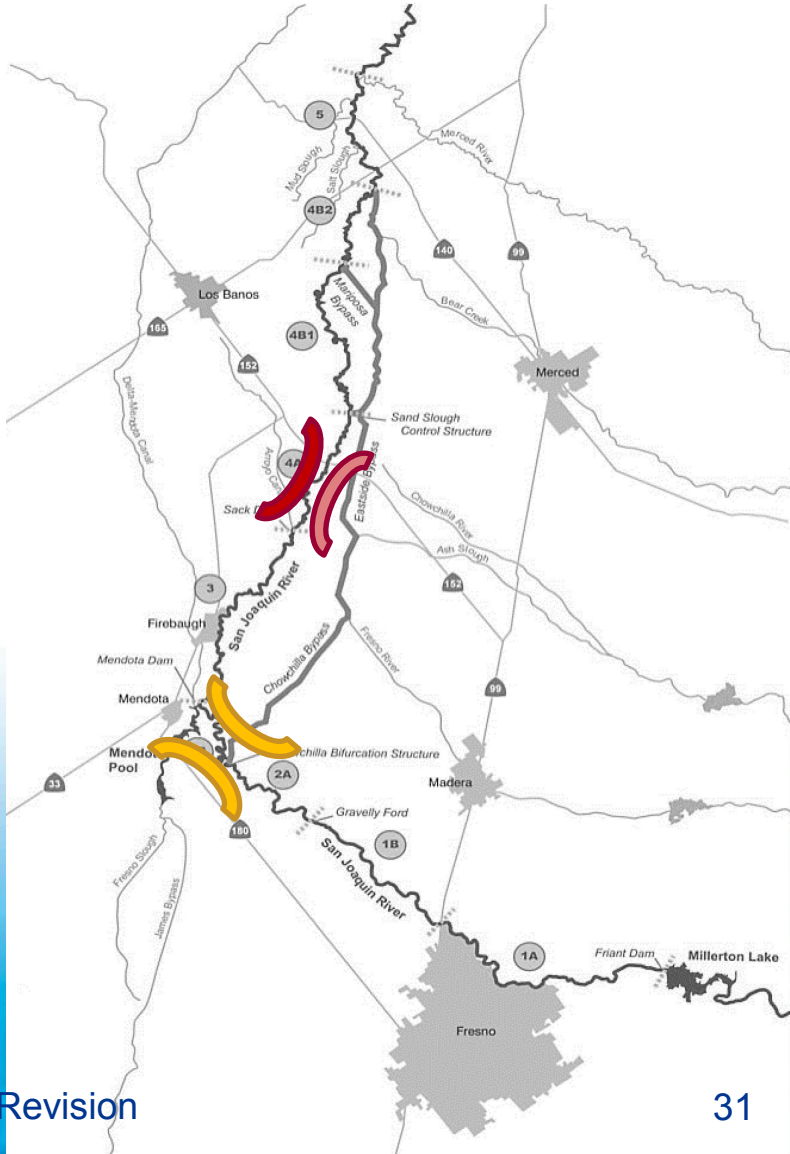
Restoration Flow Constraints

Reach 4 Constraint: up to 70 cfs

- Due to requirement (per Settlement Act) to protect adjacent lands from damage resulting from Restoration Flows
- *Kangaroo Rat surveys required due to burrow hole sighting and markings*
- *Eastside Bypass Conveyance Project to limit Restoration Flows from June - August*

Reach 2 Constraint: 1,120 cfs

- Due to seepage and levee stability challenges in Reach 2B caused by Restoration Flows
- SJRRP Reach 2B and Mendota Pool Bypass Project will allow for full conveyance of Restoration Flows



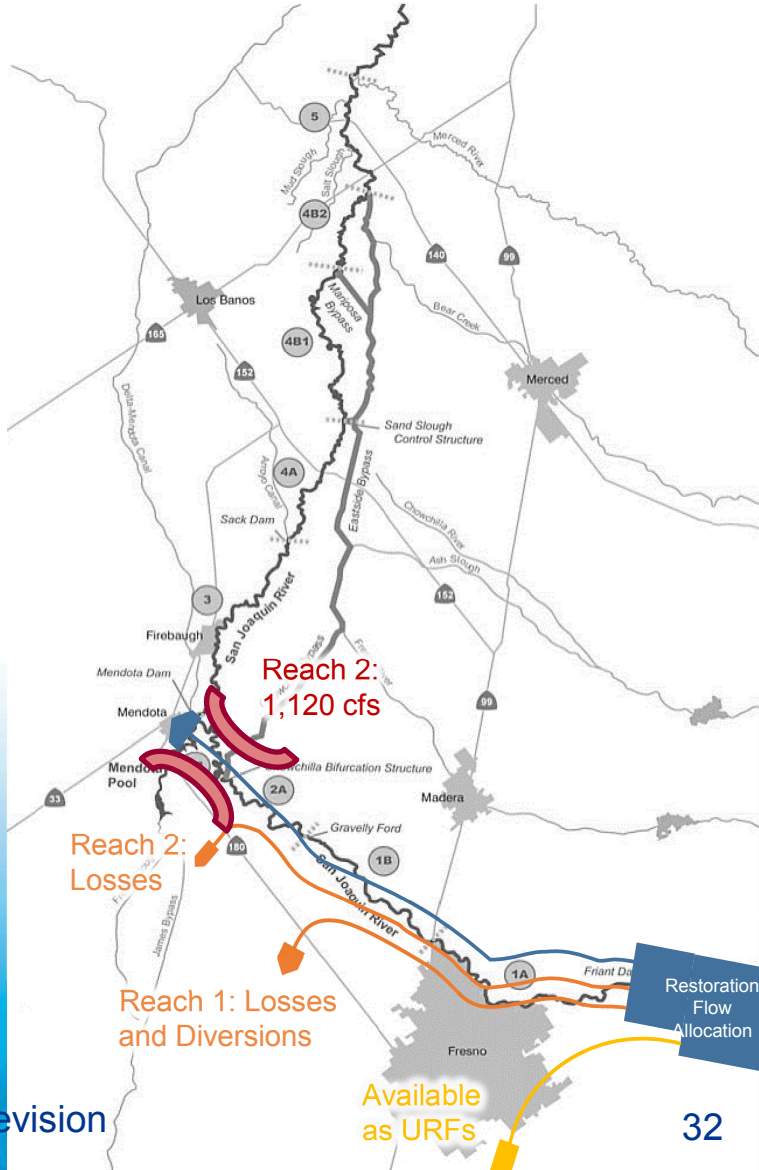
Effects of Channel Constraints

Limits full release of Restoration Flows from Friant Dam

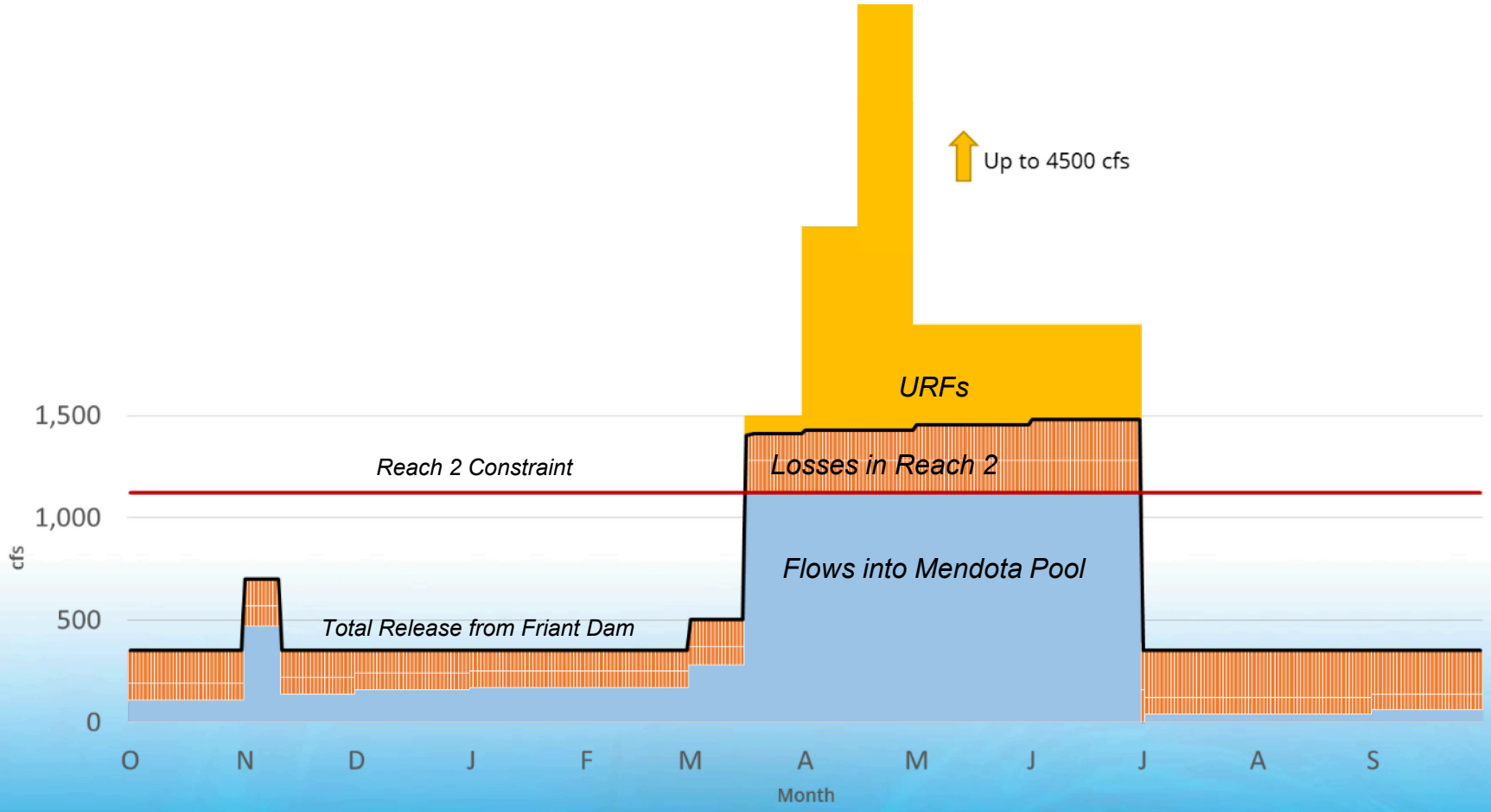
- Primarily Reach 2 channel capacity

URF Generation

- Restoration Flows that cannot be released from Friant Dam due to channel capacity constraints and without delaying completion of Phase 1 improvements
- SJRRP is preparing for URFs by:
  - Completing environmental coverage
  - Securing agreements with Friant contractors to purchase/exchange URFs
  - Coordinating with Friant Dam Operations
- Required to best achieve the Restoration Goal



Quantifying URFs



2016 URF Sales and Exchanges

- **Actual URF volume is subject to RA Recommendation**
- **Total estimated URF Volume: 134,000 to 180,000 AF**
  - **Sales Volume:**
    - Tier 1: ~80-120 TAF, starting in late March
    - Tier 2: TBD, available early May
    - Exchanges: ~10 TAF
  - **Pricing:**
    - Tier 1: $60/AF and RWA Offset
    - Tier 2: $150/AF, based on rate table, no RWA Offset
    - Exchanges: TBD
  - **Distribution:**
    - Tier 1: Based on Total C1 and C2 amounts
    - Tier 2: TBD
    - Exchanges: TBD

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Questions?

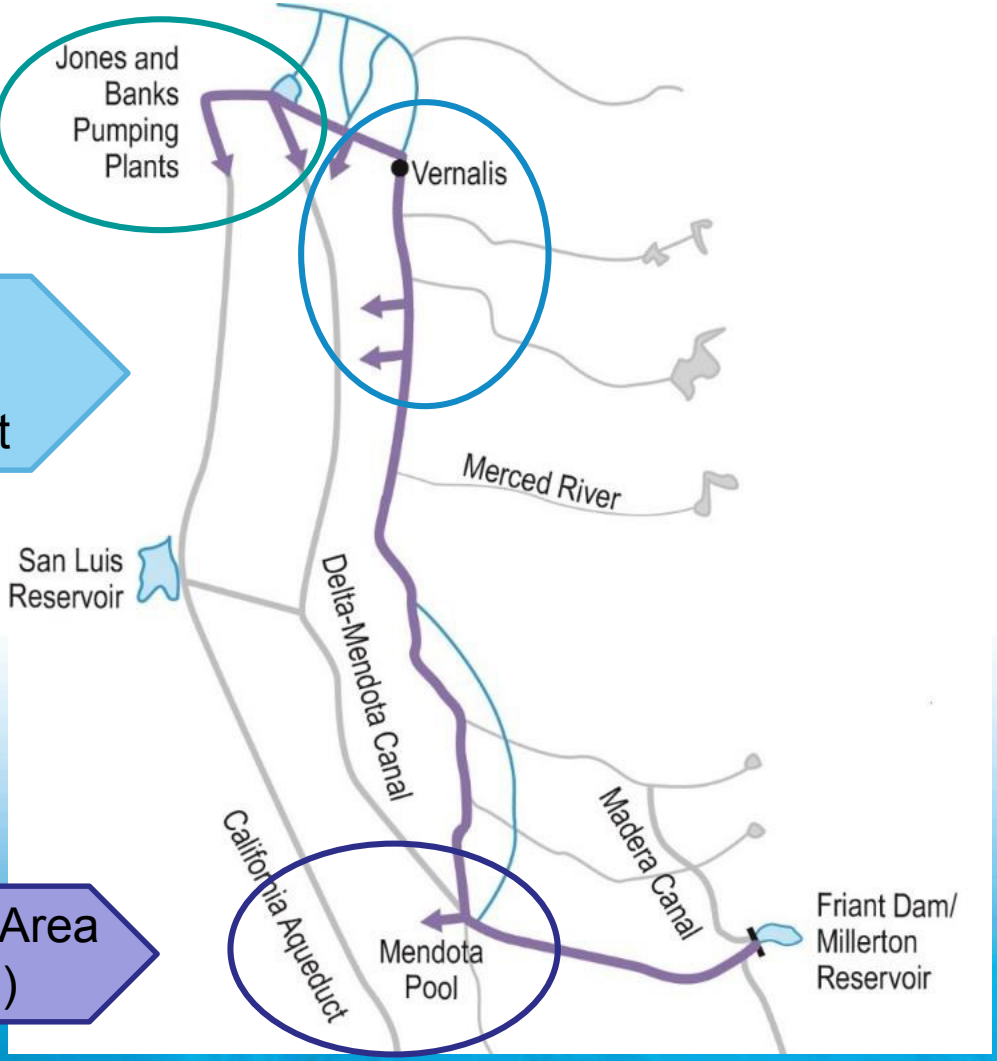
PREPARING FOR RECAPTURE

2016 Recapture Locations

South-of-Delta Facilities

Lower San Joaquin River:
- Patterson Irrigation District
- Banta-Carbona Irrigation District

In the Restoration Area (Mendota Pool)



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Mendota Pool Recapture

Restoration Flows Available

- Limited to flows originating at Friant Dam
- Less 5% operational loss
- Less flows conveyed past Sack Dam
- Less Exchange Contractor deliveries

Recapture Opportunities

- San Joaquin Exchange Contractors
- Other Water Users
  - Westlands WD
  - Mendota Pool groundwater pumpers
  - Groundwater banks

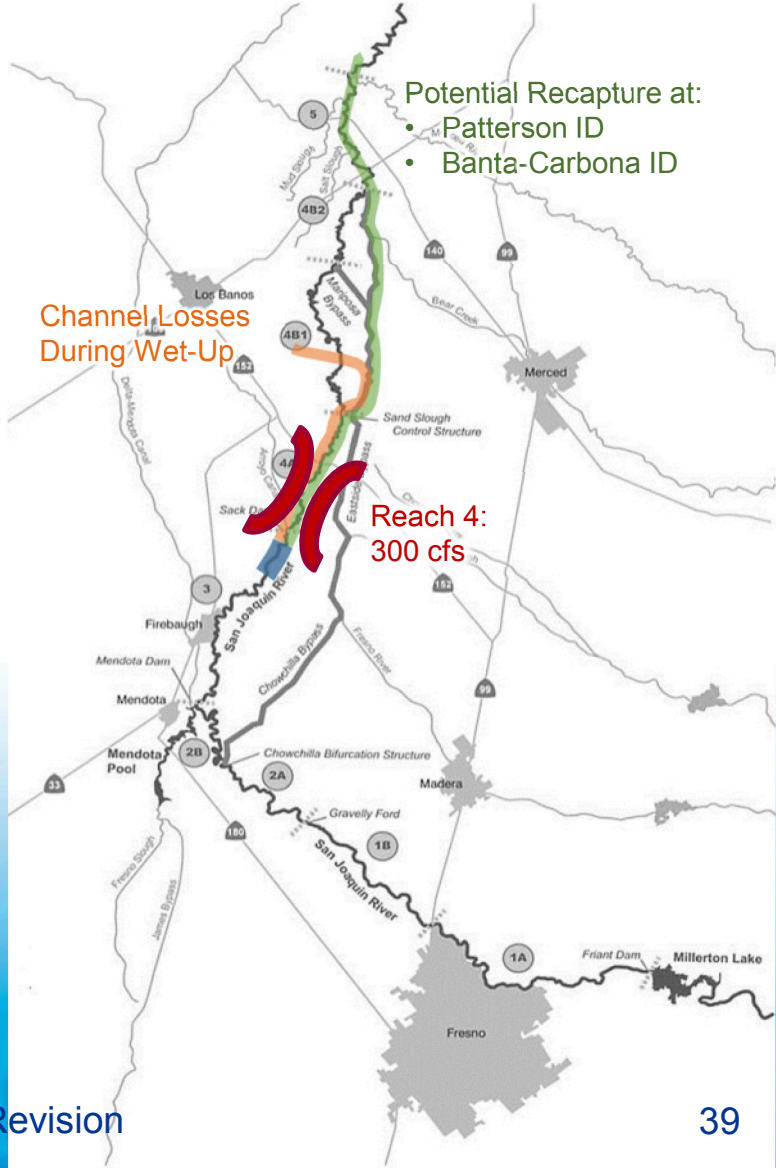
Lower San Joaquin River Recapture

Restoration Flows at Merced River Confluence

- Releases from Sack Dam minus wet-up losses in Reach 4 and Eastside Bypass
- Limited to flows originating at Friant Dam

Recapture Opportunities

- Patterson ID maximum ~40 cfs
- Banta-Carbona ID maximum ~65 cfs
- Limited by in-district use of their facilities
- SJRRP is obtaining environmental coverage and temporary point of diversion

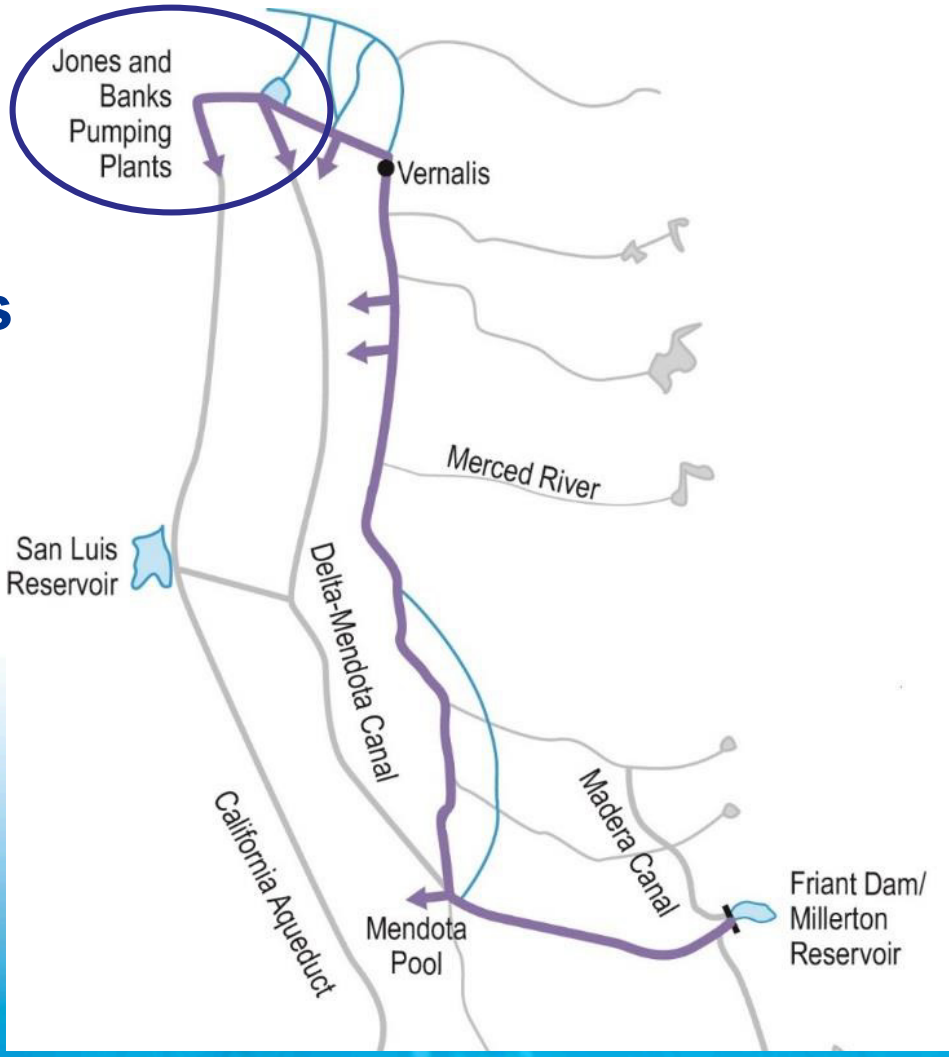


Recapture at the Delta Facilities

Restoration Flows remaining after any recapture on the lower San Joaquin River

Recapture at CVP/SWP Pumps

- Subject to use for SOD CVP (per Settlement Act)
- Subject to USBR and DWR compliance with BiOps and D-1641 objectives
- 2016 recapture limited due to pumping constraints
- SJRRP PEIS/R provides environmental coverage



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Banked 2013 Restoration Flows

Entity	Amount originally banked	Amount Available in 2016	Amount Remaining
Meyers Water Bank	588	300	288
CCID	2,860	2,860	0
James ID	2,753		2,753
Total	**6,201 AF**	**3,160 AF**	**3,041 AF**

Part III

Canal Capacity Restoration

Friant Kern Canal

- Project on hold to determine next steps

Madera Canal

- Feasibility Report and NEPA analysis underway, scheduled to be completed late Summer 2016

FKC Reverse Flow Pump-Back Project

- $2.38M in drought funding announced in February 2015
- Additional $1M additional drought funding announced in 2016
- USBR/FWA Financial Assistance Agreement in process

Groundwater Financial Assistance

Tulare ID - Cordeniz Basin Construction & Exchange Program

- 60-acre basin
- Groundbreaking: December 2015
- Complete: December 2016

Groundwater Financial Assistance

Pixley ID - Joint Groundwater Bank

- 560-acre bank with 4.5 mile pipeline to new FKC turnout
- Financial Assistance Agreement modification in process

Porterville ID - In-Lieu Project

- Area 1: 1,450 acres connected to Wood-Central Ditch
- Area 2: 720 acres connected to FKC
- Financial Assistance Agreement modification in process

Shafter-Wasco ID - Madera Avenue Intertie

- 270-acre bank to include Madera Avenue intertie at Kimberlina Avenue
- Financial Assistance Agreement modification in process

NEXT MEETINGS

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Next Meetings

Date	Location
May 20, 2016	Sacramento, CA
Sept 16, 2016	Visalia, CA