

San Joaquin River Restoration Program



Water Management Technical Feedback Meeting

Visalia, CA

February 10, 2017



Agenda

- Introductions
- Stakeholder Feedback
- Friant Water Supply Briefing
- 2016 In Review
 - Restoration Flows; RWA; R&R
- 2017 Outlook
 - Restoration allocation; Delta Recapture; Part III offset
- RFG 2.0 Debrief
- WMG Project Updates
- Adjourn

AIRBORNE SNOW OBSERVATORY

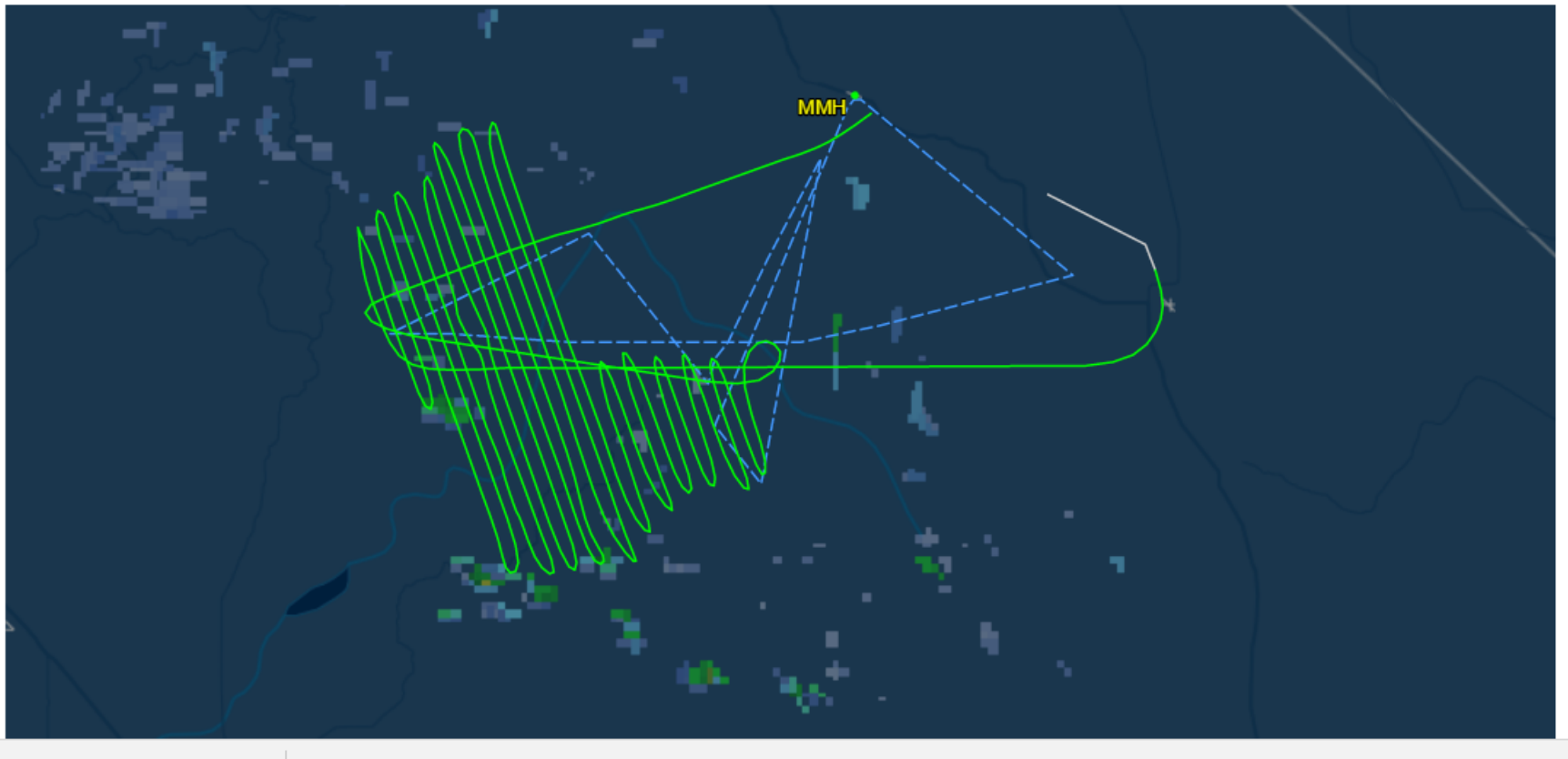
ASO

- Aerial monitoring begun this winter
- Currently has inadequate funding
- USBR funding rejected, in line for possible mid-year funding
- Forecasting component through USDA-ARS on hold pending funding
- Concept supported by SCCAO and CVO

- Integration and Operational Use
 - DWR PRMS model (future B120s)
 - Independent forecast by USDA-ARS
 - Gradual integration with NWS River Forecast Center model
 - Other “home grown” models, use 4 years of previous data provided by Tuolumne (Hetch Hetchy)
- 3-Year integration plan
- Long-term funding support would be critical
 - Sierra Nevada Wide?
 - CA government support

ASO

- Jan 30 flight trace (take 2-4 days to cover watershed)



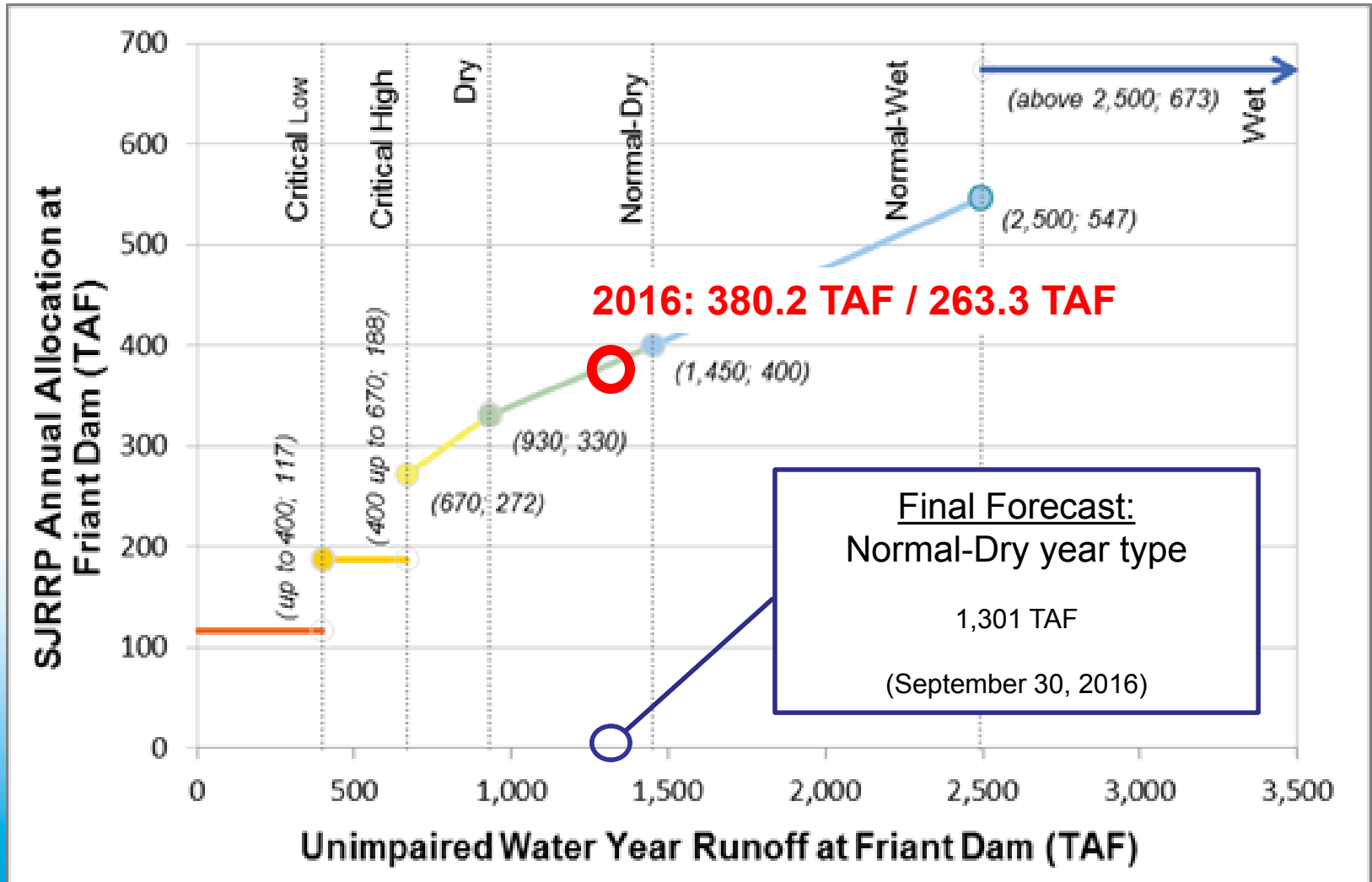


FRIANT WATER SUPPLY BRIEFING



2016 IN REVIEW

2016 Restoration Year Type



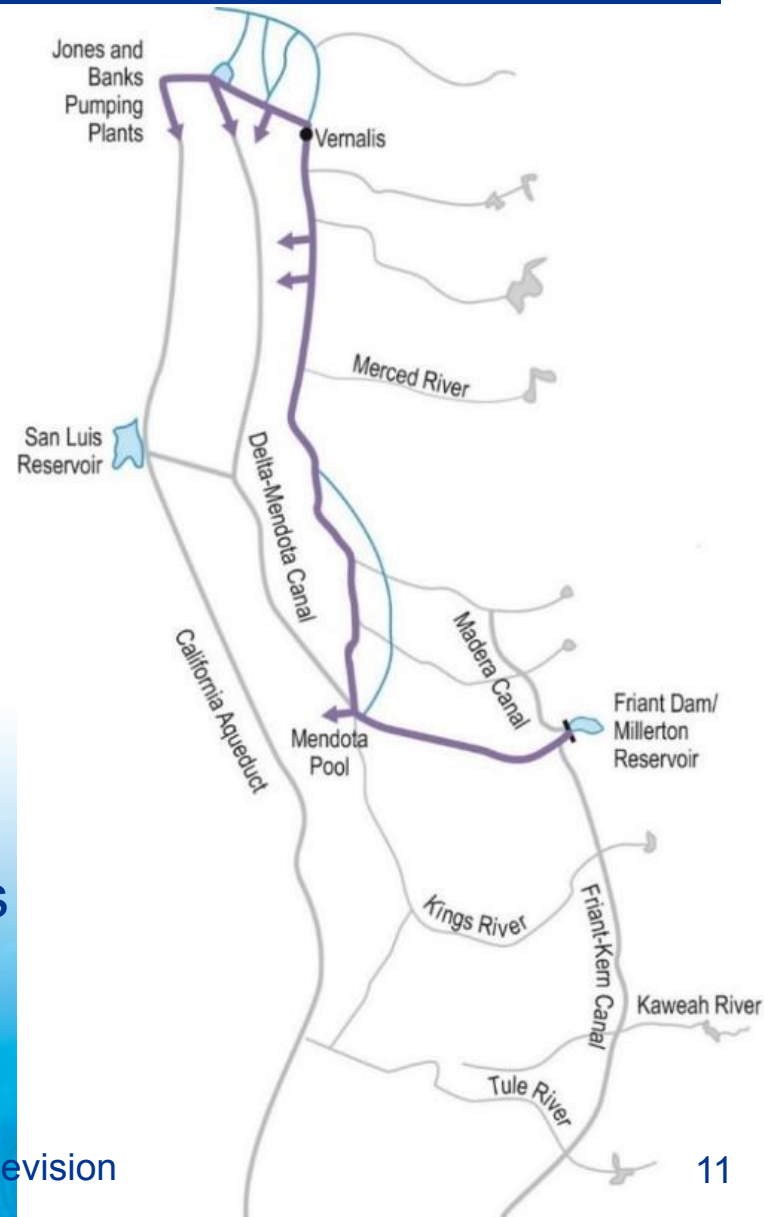


2016 Restoration Allocation

- Provisional Restoration Allocation 1/26/16:
 - 9,445 AF through February 29
- Full Restoration Allocations
 - 3/18/16: 261,400 AF RA schedule 129,000
 - 4/14/16: 276,085 AF RA schedule 144,224
 - 5/31/16: 266,932 AF RA schedule 135,071
 - 7/7/16: 270,297 AF RA schedule 131,861
- Final Restoration Allocation 9/30/2016:
 - 263,295 AF RA schedule 109,586

2016 Restoration Year Actions

- ✓ First Restoration Flows in 2+ years
- ✓ Provisional Allocation due to South-of-Delta water supply shortfall
- ✓ Pulse flows to test juvenile salmon capture and transport
- ✓ K-Rat surveys, ESB Sand Removal, LSJLD control gates rehab, Mendota Dam maintenance, Red Top pipeline construction, Arroyo Canal maintenance
- ✓ Nearly half of allocation became URFs
- ✓ First flows below Sack Dam - Aug 17
- ✓ First recapture in lower SJR





2016 Tally – Allocation & Flows

ALLOCATION & FLOWS			
Forecast Runoff/Observed Runoff	1300.986	TAF	As of: 9/30/2016
Restoration Flow Allocation	263.295	TAF	Status: Final
Scheduled Restoration Flow Releases to date	97.511	TAF	As of: 2/7/2017
Actual Restoration Flow Releases to date	79.526	TAF	As of: 2/7/2017
Restoration Flows as Flood Flows	13.875	TAF	As of: 2/7/2017
Unreleased Restoration Flows Distributed	152.240	TAF	As of: 2/7/2017
Unreleased Restoration Flows as Flood Flows	7.241	TAF	After: 2/7/2017
Scheduled Restoration Flow Releases	10.413	TAF	After: 2/7/2017 Ending: 2/28/2017
Remaining Volume or Remaining URFs	0.000	TAF	After: 2/7/2017 Ending: 2/28/2017
Restoration Total	263.295	TAF	

BUFFER FLOWS			
Allowable Buffer Flows to date	36.566	TAF	As of: 2/7/2017
Buffer Flows Released to date	0.000	TAF	As of: 2/7/2017
Remaining Buffer Flows	1.458	TAF	After: 2/7/2017 Ending: 2/28/2017
Scheduled Buffer Flows Releases	0.000	TAF	After: 2/7/2017 Ending: 2/28/2017
Remaining Summer Flexible Buffer Flows	0.000	TAF	After: – Ending: 11/30/2016
Remaining Fall Flexible Buffer Flows	0.000	TAF	After: – Ending: 1/28/2017
Buffer Flow Total	0.000	TAF	



2016 Tally – URFs Distributed

URFs DISTRIBUTED						
Exchanges						
	OCID	3.158	Gross	3.000	Net	Status: Complete
	FID	8.421	Gross	8.000	Net	Status: Complete
	AEWSD	7.368	Gross	7.000	Net	Status: Complete
	Multiple Parties (SLR-Millerton Swap, Subsequent Sale)	5.474	Gross	5.200	Net	Status: In Process
		24.421	Gross	23.200	Net	
Sales						
	Tier 1 (\$60)	89.473	Gross	84.999	Net	Status: Complete
	Tier 2, Block 1 (\$150)	4.696	Gross	4.461	Net	Status: Complete
	Tier 2, Block 2 (\$150)	19.999	Gross	18.999	Net	Status: Complete
	Tier 2, Block 3 (\$150)	6.546	Gross	6.219	Net	Status: Complete
	Tier 2, Block 4 (\$20)	7.105	Gross	6.750	Net	Status: Complete
		127.819	Gross	121.428	Net	
	Total URFs Distributed	152.240	Gross	144.628	Net	



2016 Tally – Recapture

@ Mendota Pool				
Restoration Inflow Credit	21.349	TAF	As of: 11/29/2016	
Sack Dam Restoration Flows	11.859	TAF	As of: 11/29/2016	
MP Recapture (MP Inflow minus Sack Dam Releases)	9.490	TAF		
@ Lower San Joaquin River & Delta				
Restoration Flow Potential Recapture	1.031	TAF	As of: 11/29/2016	
Actual Recapture @ PID	0.397	TAF	As of: 11/29/2016	
Actual Recapture @ BCID	0.406	TAF	As of: 11/29/2016	
Actual Recapture @ Delta	0	TAF	As of: 11/29/2016	
Actual Lower SJR Recapture	0.803	TAF		
			Lower SJR Recapture updated to 0.833 TAF	
Total Recapture to Date	10.293	TAF		
POTENTIAL FUTURE RECAPTURE				
Mendota Pool				
November	0.000	TAF	From: 11/29/2016	To: 11/30/2016
December	0.000	TAF	From: 12/1/2016	To: 12/31/2016
January	0.000	TAF	From: 1/1/2017	To: 1/31/2017
February	0.000	TAF	From: 2/1/2017	To: 2/28/2017
MP Recapture	0.000	TAF		
Lower San Joaquin River				
November	0.000	TAF	From: 11/29/2016	To: 11/30/2016
December	0.000	TAF	From: 12/1/2016	To: 12/31/2016
January	0.000	TAF	From: 1/1/2017	To: 1/31/2017
February	0.000	TAF	From: 2/1/2017	To: 2/28/2017
Lower SJR Recapture	0.000	TAF		
Total Potential Future Recapture	0.000	TAF		
Grand Total 2016 Restoration Year Recapture	10.293	TAF		

RWA True Up

- RWA workshop in August 2016
- SJRRP updated and distributed the RWA balances for Contractor review
- Updates and clarifications to RWA impact model methodology have been identified
- QA/QC of RWA balances is ongoing

RWA Balances

San Joaquin River Restoration Program Recovered Water Account Remaining Credits by Contractor - August 2, 2016

Contractor	RWA Impact (calculated)					RWA Credits Allocated					Recirculation (-)					RWA \$10 Water (-)	2014 URF Water (-)	Transfers		RWA Credits Remaining calculated impact	Credits Remaining allocated credits	
	2009	2010	2011	2012	2013	2014 & 2015	Jun-10	Dec-10	Feb-11	April 2011 Advance	2010	2011	2012	2013	2014			2015	In (+)			Out (-)
Arvin-Edis	9,063	13,386	13,386	8,966	8,528	-	18,335	17,335	13,343	84,854	9,774	1,679	5,438	1,078	2,075	15	168	474	16,408	15,421	96,071	
Chowchilla	4,653	6,872	6,872	-	11,726	-	9,412	-	-	47,920	5,017	4,791	-	-	1,076	-	-	-	-	(50,276)	(19,526)	
City of Arvin	-	-	-	8	12,792	-	-	-	-	7,590	-	-	-	-	-	-	-	-	-	1	(1,054)	
City of Lodi	-	-	-	0	533	-	-	-	-	316	-	-	-	-	257	-	-	-	-	-	(1,227)	
City of Colusa	-	-	-	4	298	-	-	-	-	177	-	-	-	-	-	-	-	-	-	-	(900)	
County of Fresno	-	-	-	5	43	-	-	-	-	25	-	-	-	-	-	-	-	-	-	-	23	
Delano-Burrell	2,166	3,200	3,200	7	23,196	-	4,383	-	9	32,836	2,830	1,915	1,915	-	8,790	-	-	4,383	(14)	(5,203)		
Exeter II	553	816	816	8	2,367	-	1,118	-	-	6,319	760	22	-	-	128	-	-	870	(2)	(532)		
Fresno County	-	-	-	4	32	-	-	-	-	19	-	-	-	-	-	-	-	-	-	-	(66)	
Fresno II	2,181	3,221	3,221	-	-	-	4,412	-	1	19,201	3,000	1,928	-	-	-	-	-	-	-	-	1,483	
Garfield	-	-	-	4	746	-	-	-	-	443	-	-	-	-	356	-	-	-	-	-	(411)	
Gravelly	407	601	601	-	-	-	-	824	-	3,584	590	360	-	-	-	-	-	-	-	(5)	1,229	
Hills Valley	-	-	-	-	267	-	-	-	-	-	-	-	-	-	127	-	-	-	-	-	(142)	
International	-	-	-	-	-	-	-	-	-	52	-	-	-	-	-	-	-	-	-	-	(9)	
Ivanhoe	-	-	-	-	-	-	-	-	-	1,070	-	-	-	-	-	-	-	-	-	-	1,607	
Kaweah	-	-	-	-	-	-	-	-	-	1,294	-	-	-	-	-	-	-	3,200	-	(1)	(751)	
Kern-Tulare	-	-	-	-	-	-	-	-	-	3,407	69	565	-	-	-	-	-	-	-	-	-	
Lewis County	-	-	-	-	-	-	-	-	-	3,479	-	-	-	-	-	-	-	-	-	-	(142)	
Linderoth	-	-	-	-	-	-	-	-	-	1,294	-	-	-	-	-	-	-	-	-	(1)	5,623	
Lindsay	-	-	-	4	5,863	-	-	-	-	3,479	-	-	-	-	-	-	-	-	-	4	4,165	
Lower Tule	6,921	10,222	10,222	7	13,048	-	14,001	-	9	68,674	9,131	9,942	-	-	2,594	-	-	48,131	900	(41)	4,424	
Madera	5,409	7,989	7,989	2	18,122	-	10,942	-	3	58,372	7,440	4,782	-	-	3,236	32	-	6,400	900	(50)	8,884	
Orange	-	-	-	6	8,358	-	-	-	-	4,959	-	-	-	-	1,923	-	-	-	-	3	8,604	
Porterville	872	1,288	1,288	6	3,198	-	1,765	-	4	9,704	201	3,339	-	-	1,388	-	-	-	-	(4)	(92)	
Saucelito	954	1,409	1,409	2	4,520	-	1,929	-	4	11,079	1,230	38	-	-	2,479	-	-	-	-	(13)	9,117	
Shafter-V	1,152	1,701	1,701	7	10,660	-	2,330	-	5	16,463	1,600	3,018	-	-	2,659	-	-	2,659	-	(3)	5,736	
So San Joaquin	1,454	2,147	2,147	2	20,681	-	2,941	-	1	25,071	2,000	-	-	-	4,777	-	-	996	(10)	(5,676)		
Stone County	-	-	-	1	2,132	-	-	-	-	1,265	-	-	-	-	122	-	-	-	-	2	(857)	
Teap	-	-	-	1	1,599	-	-	-	-	949	-	-	-	-	-	-	-	-	-	1	(817)	
Terra Bella	-	-	-	0	6,183	-	-	-	-	3,669	-	-	-	-	2,104	-	-	-	-	-	(98)	
Tri-Valley	-	-	-	-	85	-	-	-	-	-	-	-	-	-	41	-	-	-	-	-	(46)	
Tulare ID	4,100	6,056	6,056	6,724	6,396	-	8,294	7,844	6,036	39,893	5,410	3,361	3,854	3,113	-	-	-	-	-	(48,522)	(15,738)	
TOTALS	40,755	60,192	59,732	179,313	170,563	-	82,445	77,999	59,997	460,000	49,963	35,740	100,016	44,445	41,664	47	431,086	11,101	70,274	70,274	(203,507)	(33,621)

Calculated Impact

Allocated Credits

Recirculation

RWA \$10 Water

2014 URF Water

Credit Transfers

Credits Remaining

Contractors

total calculated impacts = 510,555 total allocated credits = 680,441 total recirculated = 271,875



Friant-Wide Impacts & Offsets (AF)

	2009	2010	2011	2012	2013	2014
Impacts	40,755	60,192	59,732	179,313	170,561	-
Recirc	-	49,963	35,740	100,016	44,445	41,664
RWA	-	-	431,086	-	-	-
URFs	-	-	-	-	-	11,101



Stored 2013 Restoration Flows

Entity	Amount Available in 2016*	Amount Remaining
Meyers Water Bank	768	0
CCID	2,860	0
James ID	0	2,753
Total	3,628 AF	2,753 AF

* Allocated pro rata to Class 1 contractors



Recaptured 2016 Flows

Month	Mendota Pool	PID/BCID
July	1,089	0
August	3,019	0
September	2,923	0
October	1,616	0
November	843	833
Total	9,490*	833**

* Allocated pro rata to Class 1 contractors

** Allocated to participating Class 1 contractors



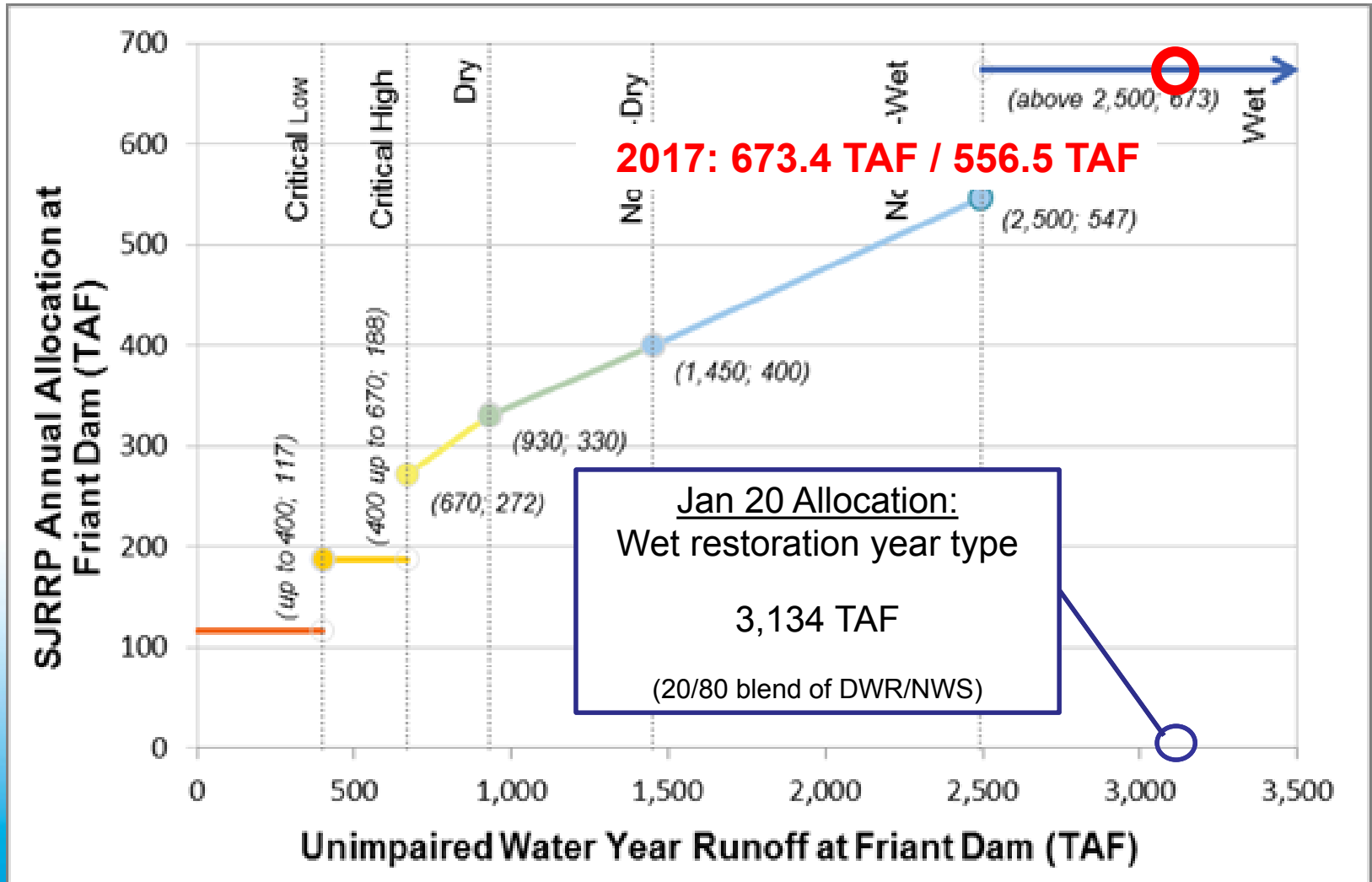
What we learned in 2016

- In river coordination is essential; progress on improving relationships
- Frequent collaboration with SCCAO benefits the Program
- Some unresolved sections of Restoration Flow Guidelines; parties willing to address
- Come a long way, but still a lot to learn

- Input from Stakeholders?

2017 OUTLOOK

2017 Restoration Year Type





2017 Restoration Year

- January 20 Initial RF Allocation
 - Wet restoration year type
 - 673 TAF Friant Dam release / 557 TAF @ GRF
- January 31 RA Recommendation
 - 300 cfs limit below Sack Dam in Spring & Summer
 - Changeover to RFs at end of flood flows
 - 197 TAF scheduled / 359 TAF Unreleased Restoration Flows (URFs)



2017 URF Outlook

- 359 TAF Expected with Current RA Flow Schedule
 - Program needs to Allocate URFs quickly to avoid being lost to spill
 - Recipients need to delivery URFs prior to the end of Uncontrolled Season, if not, Water Supply Test will be applied to determine if URFs are still available for delivery
 - All sales in 2017 / no Exchanges

2017 URF Outlook

- Tier 1 (\$20 – no refunds)
 - Block 1 of 237,500 AF
 - Offered to Class 2 contractors first
 - Early delivery option, but must schedule after all of a contractors 2016 URF supply
 - Subsequent blocks likely
- Tier 2 (Variable Price ~ \$35)
 - Only utilized if Millerton Reservoir is under control
 - Fully schedulable / no risk of spill
 - Price = $(275,000 / \text{Runoff in TAF}) - 40$

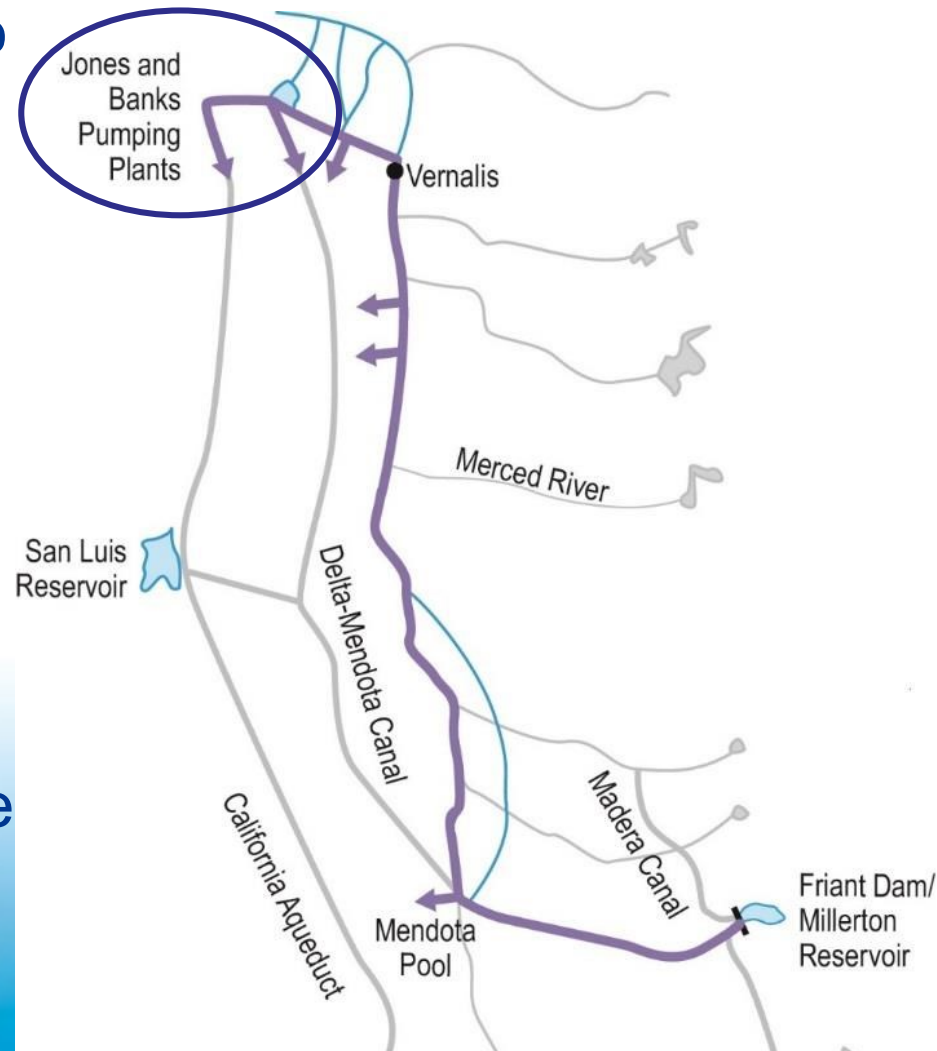
How URFs Spill

- 2017 URFs can be delivered throughout UcS
- At end of UcS:
URF deliveries + RF @ GRF \geq Exhibit B hydrograph
 - If not, difference subtracted from undelivered URF volume
 - URFs that have not been allocated (i.e. still held by RA) would likewise be reduced

Date	Default Hydrograph at GRF	2017 RA Schedule at GRF	Volume of URFs that would need to be delivered to avoid spill if UcS ends (GROSS)	Volume of URFs that would need to be delivered to avoid spill if UcS ends (NET)
Cumulative Volume in TAF				
March 1	0	0	0	0
March 16	11.1	12.2	0	0
April 1	54.5	25.2	29.3	27.8
April 16	124.4	37.4	87.0	82.7
May 1	238.9	49.6	189.3	179.8
May 16	292.8	61.8	231.0	219.5
June 1	350.2	74.8	275.4	261.6
June 16	404.1	87.0	317.1	301.2
July 1	457.9	99.2	358.7	340.8

Pilot Recapture at Delta Facilities

- First year Restoration Flows to reach the Delta
- Challenges:
 - Tracking Restoration Flows
 - Consistency with Coordinated Operations Agreement
 - Delta Operational Constraints
- SJRRP and CVO will meet regularly to communicate Restoration Flows and Delta controlling factors to determine amount recaptured



Factors Affecting Delta Recapture

Condition	Factors	Notes	SJRRP Recapture
Facility constraints	Export pumps, San Luis storage, or canal conveyance capacity; maintenance outages	Restoration Flows junior to project water and transfers to CVP SOD	None
Delta Salinity	Managed by reducing exports	Additional inflow not much help	None
Delta Outflow	Net Delta Outflow Index (NDOI)		Recapture opportunity consistent with incremental improvement in NDOI
Delta E/I	D-1641; Export linked to Delta inflow and reservoir storage withdrawal	Consider Restoration Flows as a reservoir storage withdrawal	Recapture percentage consistent with D-1641 (if export capacity available)
OMR	NMFS BiOp RPA; determined by gage readings, but may move to an OMR index	Typically controls under COA excess conditions SJRRP inflows would improve OMR	recapture consistent with incremental improvement, as calculated by OMR Index
ESA take	BiOp RPA; exports may be constrained by take limits	Concern export of SJRRP water could affect take	Credit SJRRP to the extent that Restoration Flows can be diverted within constraints

Delta Factors (cont.)

Condition	Factors	Notes	SJRRP Recapture
D-1641: Vernalis base flow and salinity objectives	New Melones releases made as necessary to meet objective	Restoration Flows improve New Melones operations when Vernalis flow objective is controlling; Restoration Flows not obligated to meet Vernalis standards, per SJR water rights. May change with future SWRCB decisions.	Delta recapture subject to compliance with objectives of D-1641 currently required of Reclamation and DWR
SJR I/E	NMFS BiOp; exports linked to flow at Vernalis for 60 days in April and May based on the San Joaquin Valley Classification (60-20-20 Index)	Potential to export transfers from the SJR basin when this controls; Restoration Flows junior to transfers to CVP SOD; pursuant to the SJRRS Act	Recapture percentage consistent with NMFS BiOp (if export capacity available)

RESTORATION FLOWS GUIDELINES v2.0

RFG 2.0 Debrief

- ✓ Kickoff Meeting Aug 23 recommended topics for revision and prioritized tasks
- ✓ Small Workgroup met and drafted specific revisions
- Version 2.0 will be approved in February 2017
- Remaining revision topics planned for 2017 and 2018

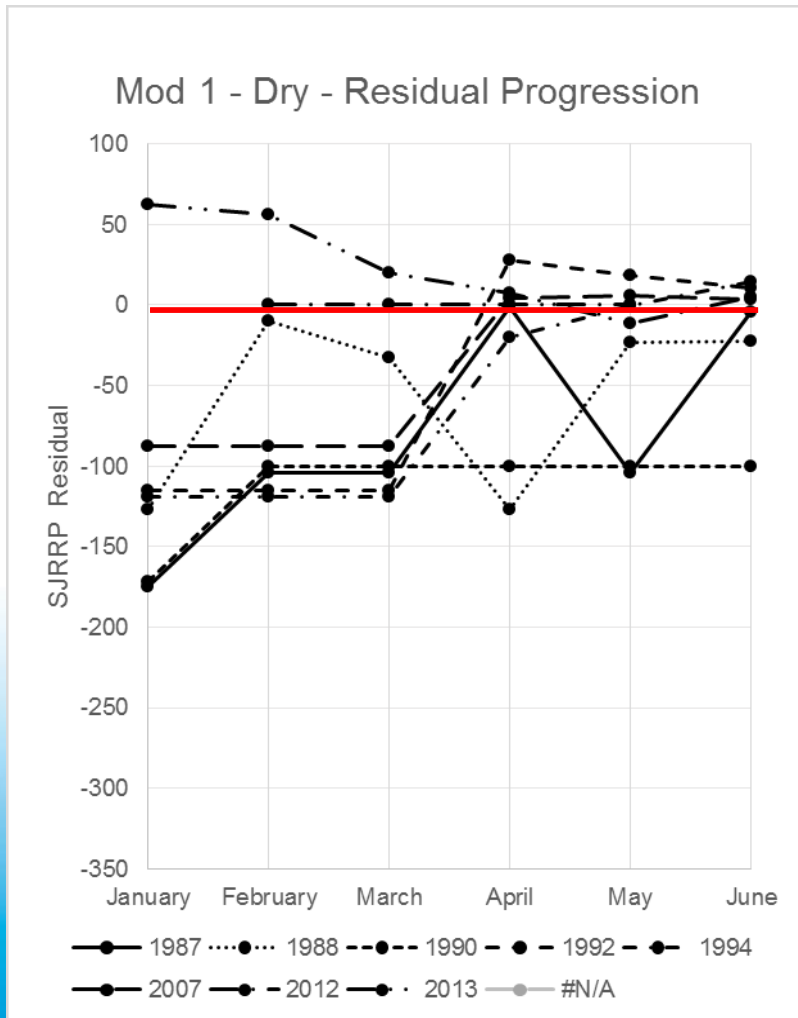
RFG 2.0: New Exceedance Forecast

	Value (TAF)	Date of Allocation Issuance					
		January	February	March	April	May	June ²
If the 50% forecast is ¹ :	Above 2200	50	50	50	50	50	50
	1100 to 2200	75	75	50	50	50	50
	900 to 1099	75	75	75	50	50	50
	700 to 899	90	90	75	50	50	50
	500 to 699	90	90	75	50	50	50
	Below 500	90	90	90	90	75	50

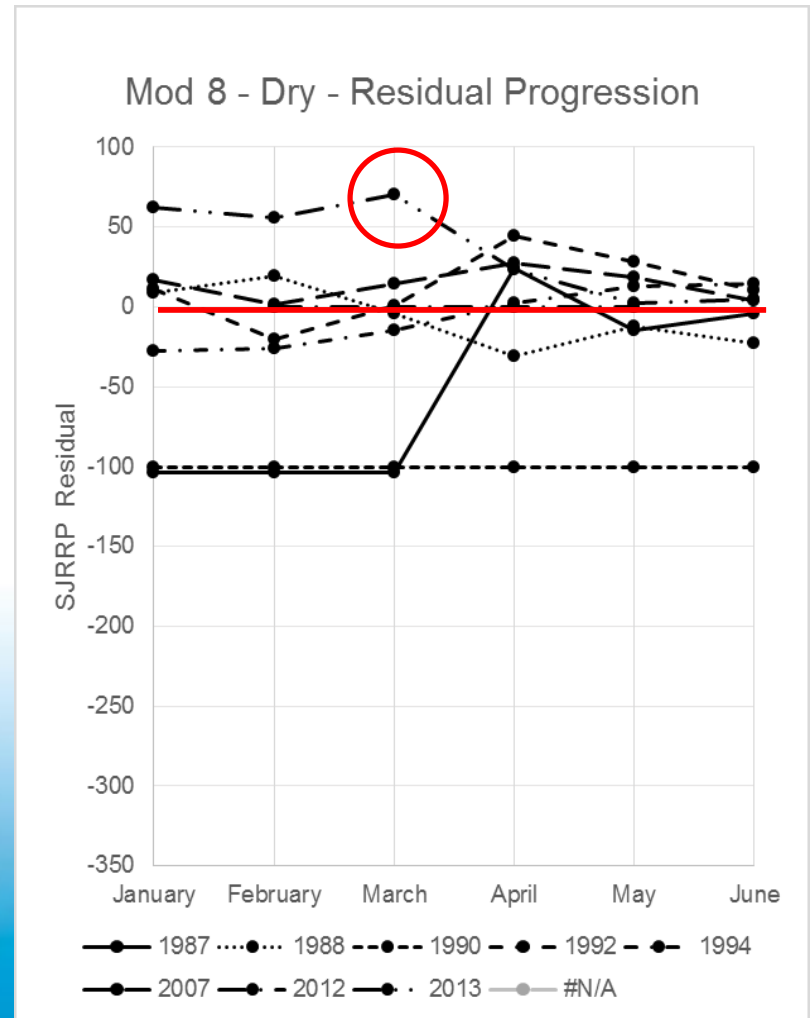
- Earlier certainty of supply in Wet years, thus earlier release and less flood impacts
- Water provided to the RA when it is most useful
- Avoids forcing a shift of water from Spring to Summer because allocation was too conservative
- Extensive modeling using DWR and NWS forecast history

RFG 2.0 Revisions – Dry

Old Forecast Progression

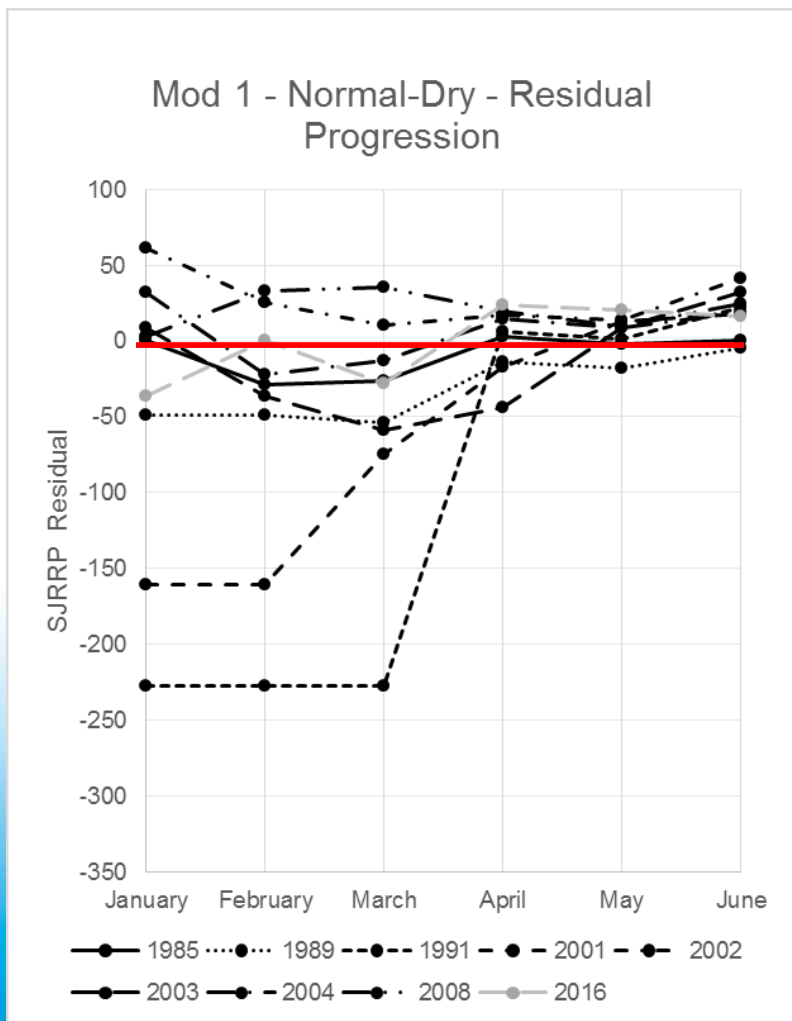


New Forecast Progression

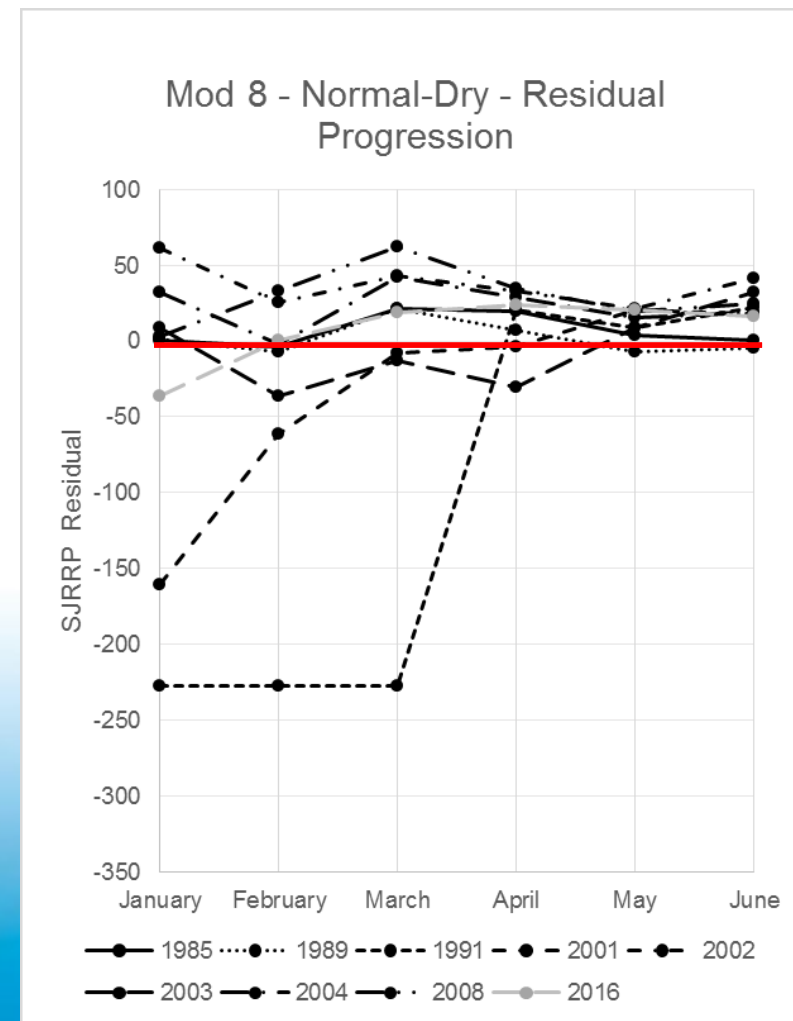


RFG 2.0 Revisions – Normal-Dry

Old Forecast Progression

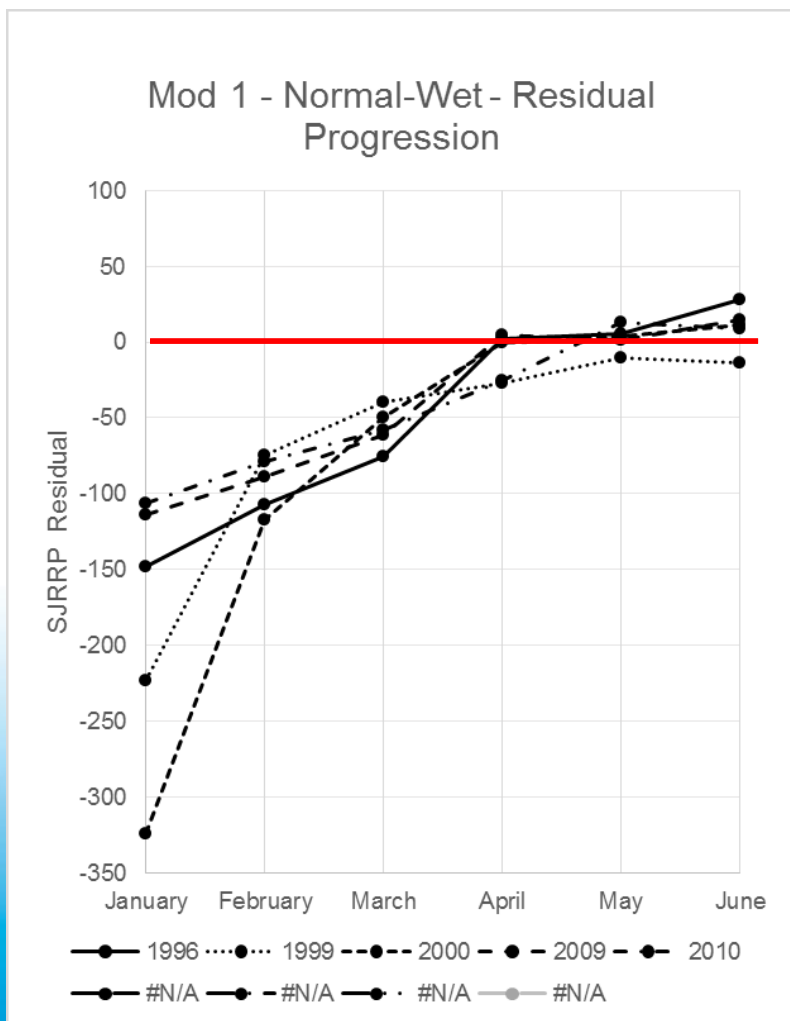


New Forecast Progression

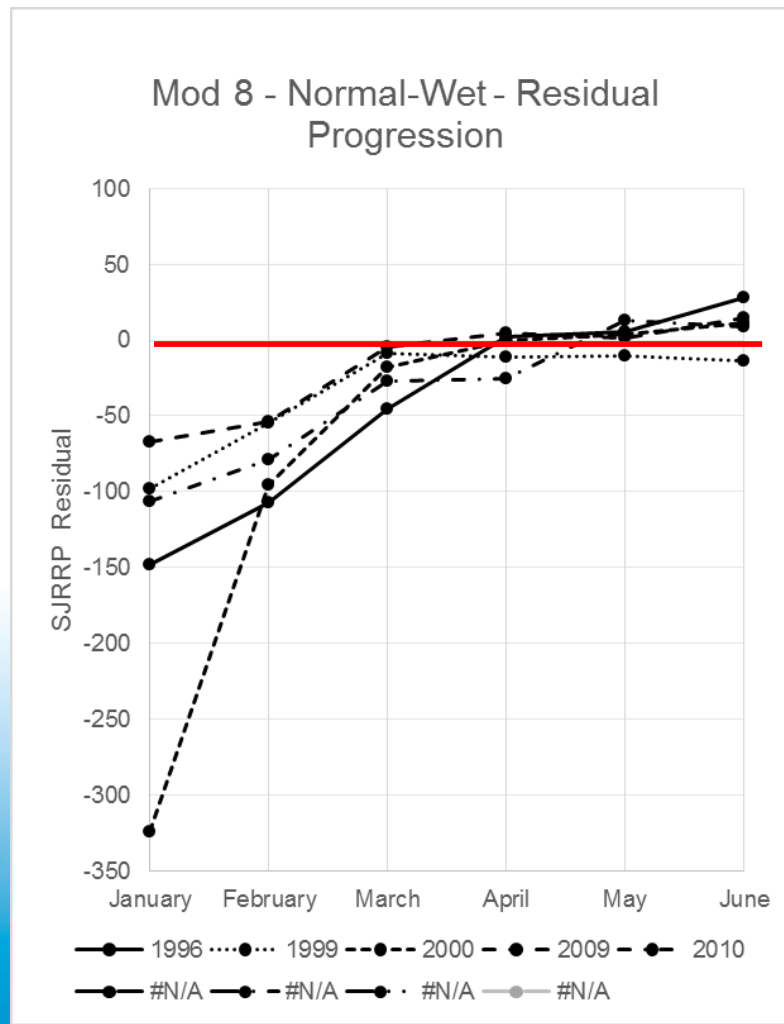


RFG 2.0 Revisions – Normal-Wet

Old Forecast Progression

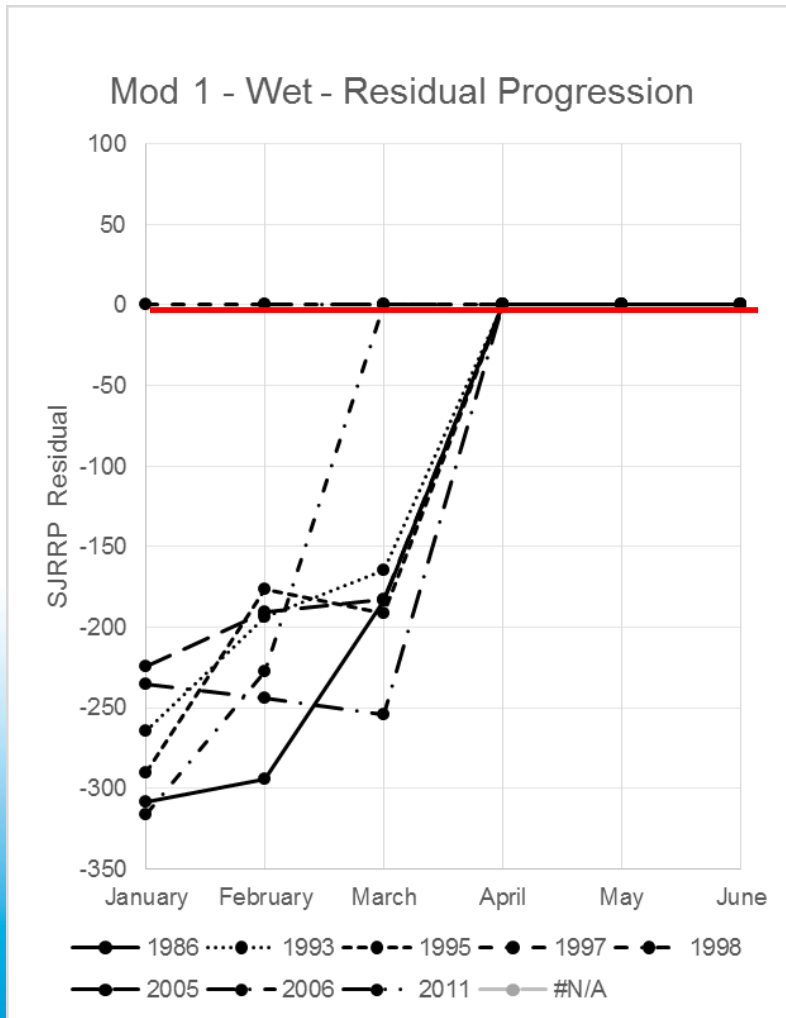


New Forecast Progression

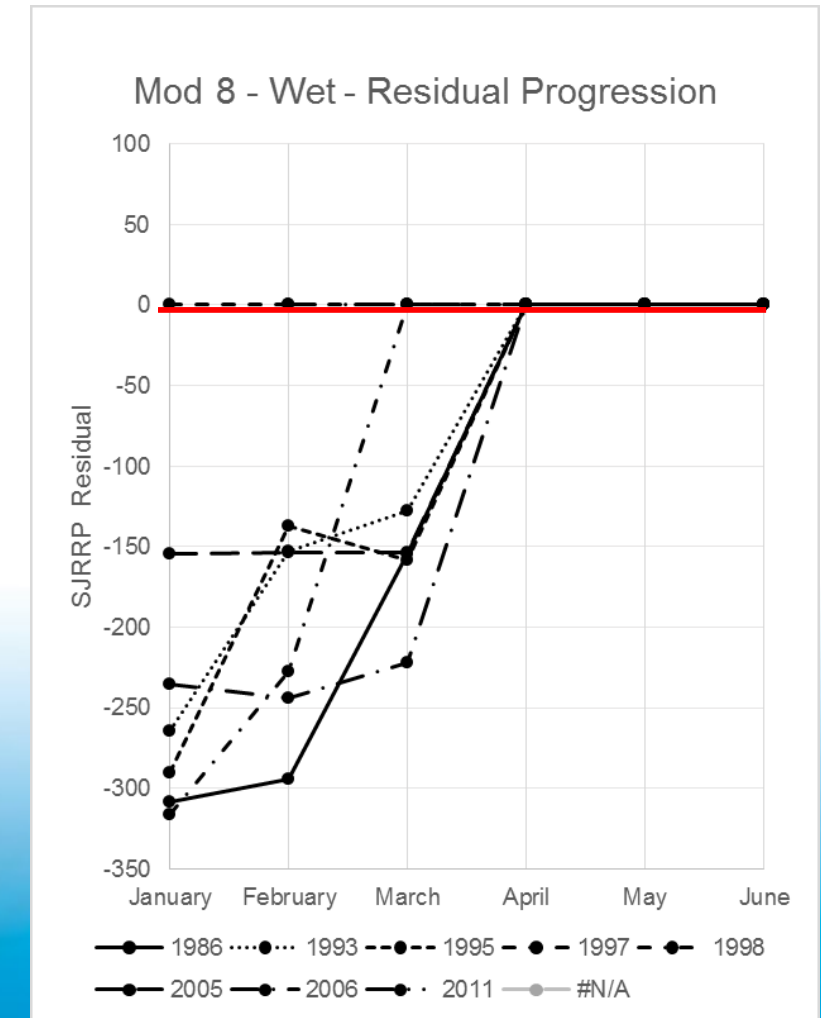


RFG 2.0 Revisions - Wet

Old Forecast Progression



New Forecast Progression



RFG 2.0: Collaborative Forecasting

- Joint decisions on blending DWR and NWS forecasts
 - Same logic applied to Friant Water Supply as Restoration Allocation
 - SJRRP Exceedance Forecast Progression set by RFGs
 - SCCAO can choose a different Exceedance Forecast (e.g. 75% vs 50% vs 90%)
- SCCAO and SJRRP have been meeting weekly to go over data in detail and set the blending (e.g. 20%/80%)

RFG 2.0: Operational Adjustments

- Increased or decreased allocations may be scheduled accordingly
 - This does not constitute a flow shift that requires a Water Supply Test
- Flexibility for RA to make daily adjustments without full recommendation
- Final Allocation now made June 30
 - Greater certainty for Friant contractors (supply, URFs)
 - Water after July 1 is of lower value for Restoration Goal
 - Deviation from WY total will be tracked
- Clarity and clean up of Allocation/
Recommendation Process

RFG 2.0: Water Supply Test

- Basic Water Supply Test logic
 - Proposed RA schedule compared to default schedule
 - Increase or advance of flood releases or advance of dead pool would constitute impact
 - Would be applied to shifts within Summer and Winter flow periods
 - Would be applied to shifting water out of Spring and Fall periods beyond the 4 week flexibility already provided for in the Settlement; or shifting water into the Spring and Fall period.
- Sections 6.3 and 6.4 are provisional – expire February 28, 2018

RFG Issues for 2017

- Recovered Water Account (Appendix H)
 - Adjust impact calculation to include URFs
 - Clarify offsets
 - 16(b) water distribution and management
- Forecasting Best Practices (Appendix I)
- Flexible Flow Provisions
 - Moving flows within and between seasons (transfers within the hydrograph)
 - Test for non-impact to Friant water supply
- URFs
- Monitoring

WATER MANAGEMENT GOAL PROJECTS



Long Term R&R EIS

- Project Description Technical Memorandum
 - Summarizes the alternative formulation process
 - Documents the alternatives evaluation methods and results
 - Describes the alternatives to be evaluated in the LTRRRF EIS, including the No Action Alternative
 - Serve as the basis for the project description that will appear in the LTRRRF EIS
- TM Available to the Public in March 2017



Friant-Kern Canal Projects

FKC Reverse Flow Pump-Back

- \$3.3M Financial Assistance Agreement awarded to FWA in August 2016
- RFQ Status

FKC Capacity Restoration

- Starting work with Friant Contractors to determine next steps



Madera Canal Projects

Madera Canal Capacity Restoration

- Feasibility Report and NEPA analysis
 - Settling Party draft - Spring 2017
 - Public Draft EA – Summer 2017

Low Flow Valve

- Contractor has submitted the Design for the new Valve. Minor concession made on the design specifications but will not affect flow in the Canal overall.
- Construction slated to begin Early to Mid summer 2017 following the completion of the Hatchery Water Supply project. Same contractor.



Agriculture Recharge Project

- U.C. Davis has acquired and installed the necessary monitoring equipment.
- Study is underway



Groundwater Financial Assistance

Tulare ID - Cordeniz Basin

- 80-acre basin
- Groundbreaking: December 2015
- Complete: Summer 2017

Shafter-Wasco ID - Madera Avenue Intertie

- 270-acre recharge basin at Kimberlina Rd.
- Environmental work completed and funding awarded
- Three basins are currently constructed and flood water turned out into them



Groundwater Financial Assistance

Pixley ID - Joint Groundwater Bank

- 560-acre bank; 4.5 mile pipeline to new FKC turnout
- Financial Assistance approved; Revised Draft EA - early 2017

Porterville ID - In-Lieu Project

- Area 1: 1,450 acres connected to Wood-Central Ditch
- Area 2: 720 acres connected to FKC
- Financial Assistance awarded, Enviro. Complete
- Construction anticipated to start February/March



Part III Workshop – May 17

- Future FOA
- Calculating RWA offsets



Questions?



NEXT MEETINGS

Next Meetings

Date	Location
April 21, 2017	Visalia
May 17/18 – Part III Workshop	Fresno/Visalia
September 15, 2017	Sacramento