What's controlling Delta Outflow?

Bay Delta Office

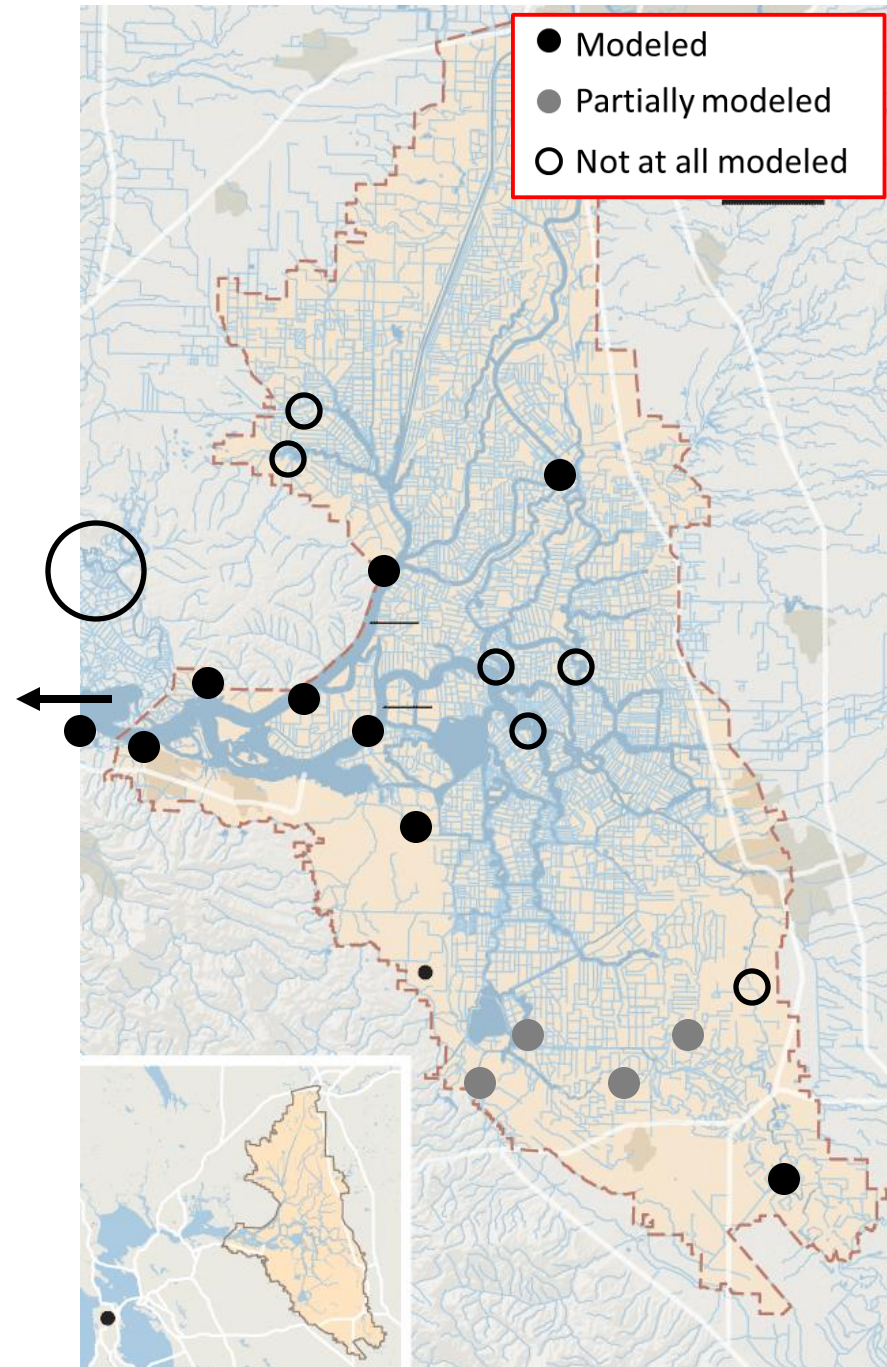Department of Water Resources

CWEFM 2016 (April 11, 2016)

Purpose

- Amount of Delta Outflow used to meet Fish & Wildlife needs vs. Ag/M&I Water Quality needs
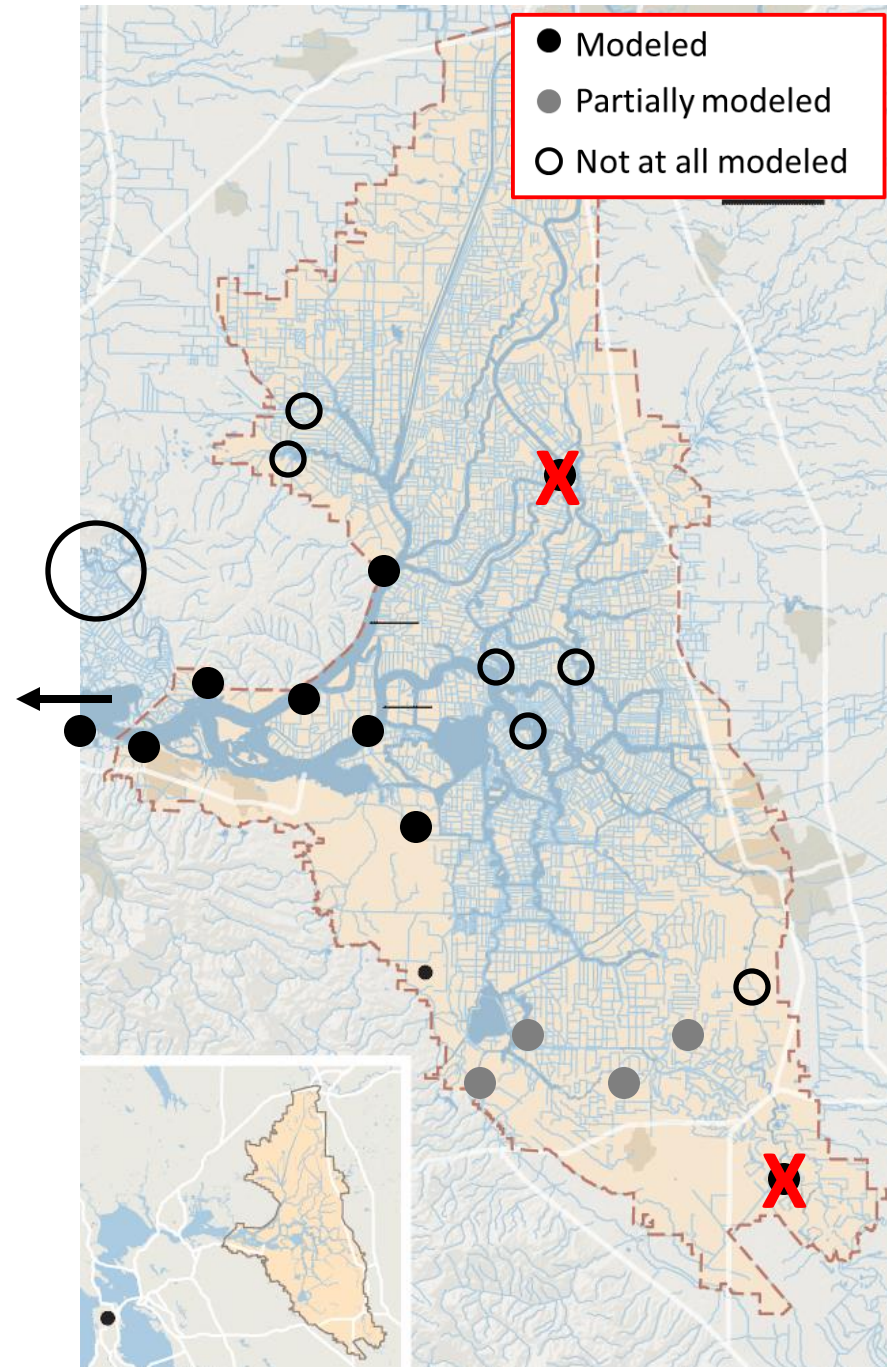
- Factors controlling Delta Outflow

Scope

- Only a subset of compliance points are modeled in CalSim II

Legend:
- ● Modeled
- ● Partially modeled
- ○ Not at all modeled

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Scope

- Only a subset of compliance points are modeled in CalSim II

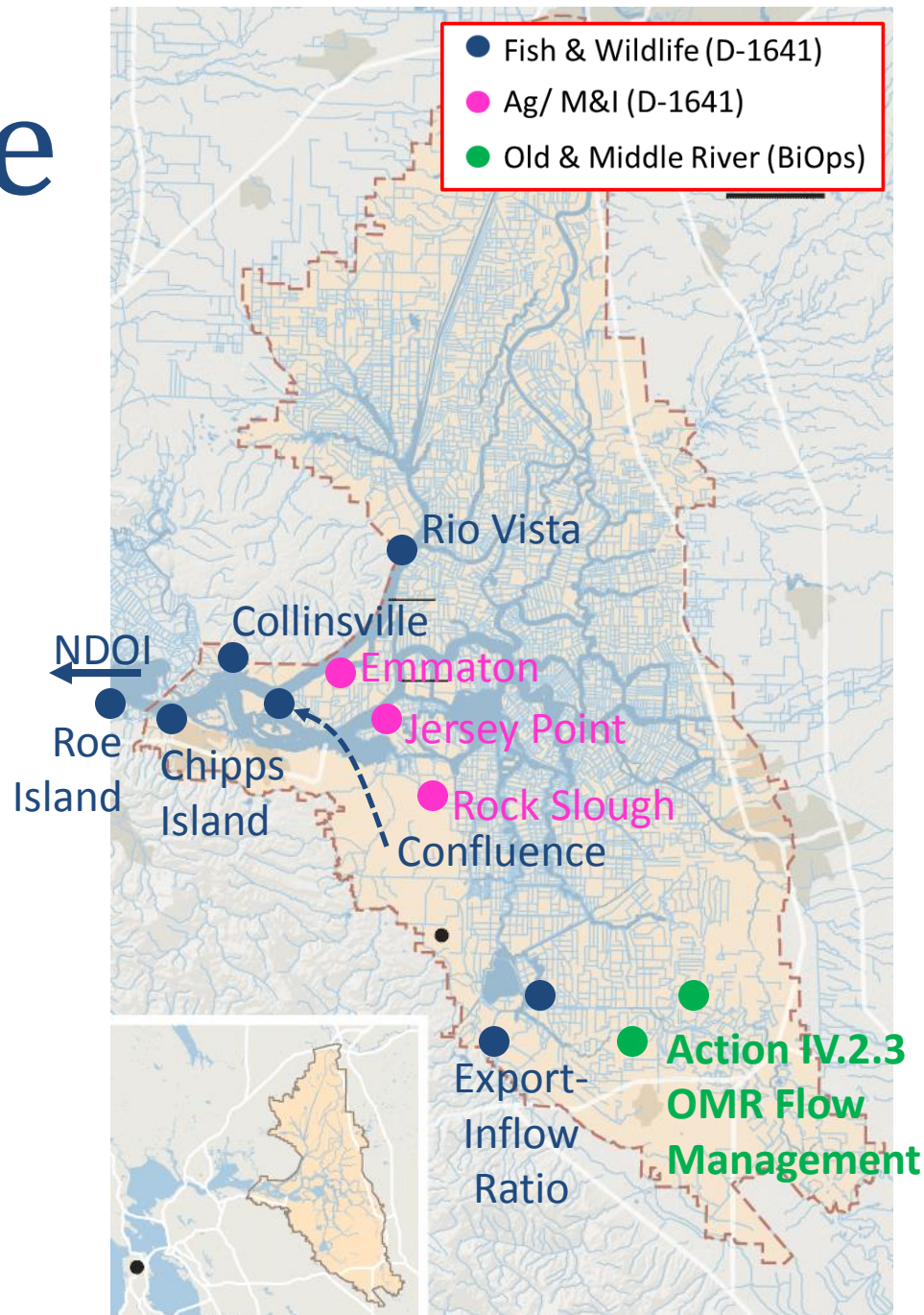- Not all the modeled compliance points are included in the analysis (**X**)

Legend:
- ● Modeled
- ● Partially modeled
- ○ Not at all modeled

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Scope

- Limited to Delta regulations

Shasta	Folsom	Oroville	CVP San Luis	SWP San Luis	CVP Exports	SWP Exports	COA	Delta
Flood (Shasta Flood Conservation Release)	Flood (Folsom Flood Conservation Release)	Flood (Oroville Flood Conservation Release).	Storage (CVP San Luis is full)	Storage (SWP San Luis is full)	Tracy (Exports at maximum)	Banks (Exports at maximum)	UWFE (Unstored Water for Export)	RS (Ag WQ at Rock Slough)
Keswick (Minimum Flow at C5)	Nimbus (Minimum Flow at C9)	Therm. (Minimum Flow at C203)	>RC (CVP San Luis is greater than rule-curve)	>RC (SWP San Luis is greater than rule-curve)	T. Min (Minimum export level at Tracy PP)	B. Min (Minimum export level at Banks PP)	IBU (In-Basin Use)	JP (Ag WQ at Jersey Point)
NCP (Minimum Flow at C129)	H. St (Minimum Flow at C303)	F. Min (Minimum Flow at C223)	@RC (CVP San Luis is equal to rule-curve)	@RC (SWP San Luis is equal to rule-curve)	PulseCap1 (Exports are limited by April 15 - May 15 pulse period limit for Tracy Max)	PulseCap1 (Exports are limited by April 15 - May 15 pulse period limit for Banks Max)		EM (Ag WQ at Emmaton)
T.Min (Minimum export level at Tracy PP)	T.Min (Minimum export level at Tracy PP)	B.Min (Minimum export level at Banks PP)	<RC (CVP San Luis is less than rule-curve)	<RC (SWP San Luis is less than rule-curve)	PulseCap2 (Exports are limited by April 15 - May 15 pulse period limit for half total limit)	PulseCap2 (Exports are limited by April 15 - May 15 pulse period limit for half total limit)		CO (FWS WQ at Collinsville)
					PulseCap3 (Exports are limited by April 15 - May 15 pulse period limit for half total limit plus COA-Unused portion of other project)	PulseCap3 (Exports are limited by April 15 - May 15 pulse period limit for half total limit plus COA-Unused portion of other project)		EI (Export/Inflow Ratio)
					EI Split (Exports are limited to half of total EI allowable exports)	EI Split (Exports are limited to half of total EI allowable exports)		X2 (Salinity barrier for fish habitat protection)
					Storage (CVP San Luis is full [indicated only if no other controls on exports])	Storage (SWP San Luis is full [indicated only if no other controls on exports])		RV (Minimum Flow at C400)
								NDOI (Net Delta Outflow Index)
								OMR (Reverse Flows at Old and Middle River)

Scope

Legend:
- Fish & Wildlife (D-1641)
- Ag/ M&I (D-1641)
- Old & Middle River (BiOps)

Map labels: Rio Vista, Collinsville, NDOI, Emmaton, Jersey Point, Roe Island, Chipps Island, Rock Slough, Confluence, Export-Inflow Ratio, Action IV.2.3 OMR Flow Management

Delta

RS (Ag WQ at Rock Slough)

JP (Ag WQ at Jersey Point)

EM (Ag WQ at Emmaton)

CO (FWS WQ at Collinsville)

EI (Export/Inflow Ratio)

X2 (Salinity barrier for fish habitat protection)

RV (Minimum Flow at C400)

NDOI (Net Delta Outflow Index)

OMR (Reverse Flows at Old and Middle River)

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Last Drop Method: April 1924

Binding constraint = Constraint that yields the least amount of Surplus Delta Outflow.

Ag/ M&I		Total DO	Req DO	Surplus DO
SALINITY CONTROL	Jersey Point		-	-
	Emmaton	6,510	395	6,115
	Rock Slough		-	-

Last Drop Method: April 1924

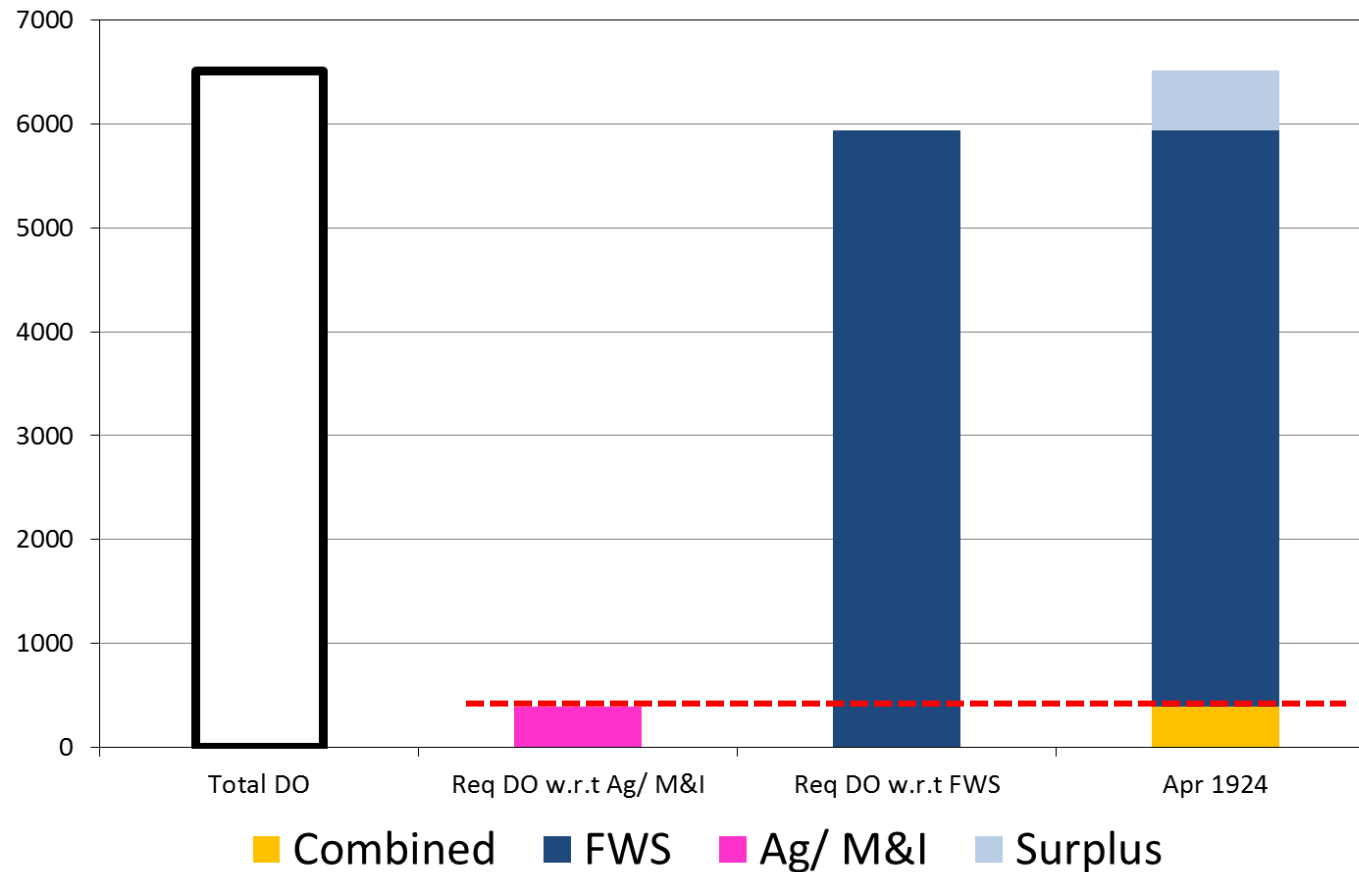| Fish & Wildlife		Total DO	Req DO	Surplus DO
SALINITY CONTROL	Collinsville		-	-
	Confluence		5,938	573
	Chipps Island	6,510	-	-
	Roe Island/ Port Chicago		-	-
FLOW/ OPERATIONAL	NDOI		4,000	2,510
	Rio Vista		-	-
	Export-Inflow Ratio*		---	5,381

Controlling when south of the Delta exports are limited by EI criteria.

Last Drop Method: April 1924
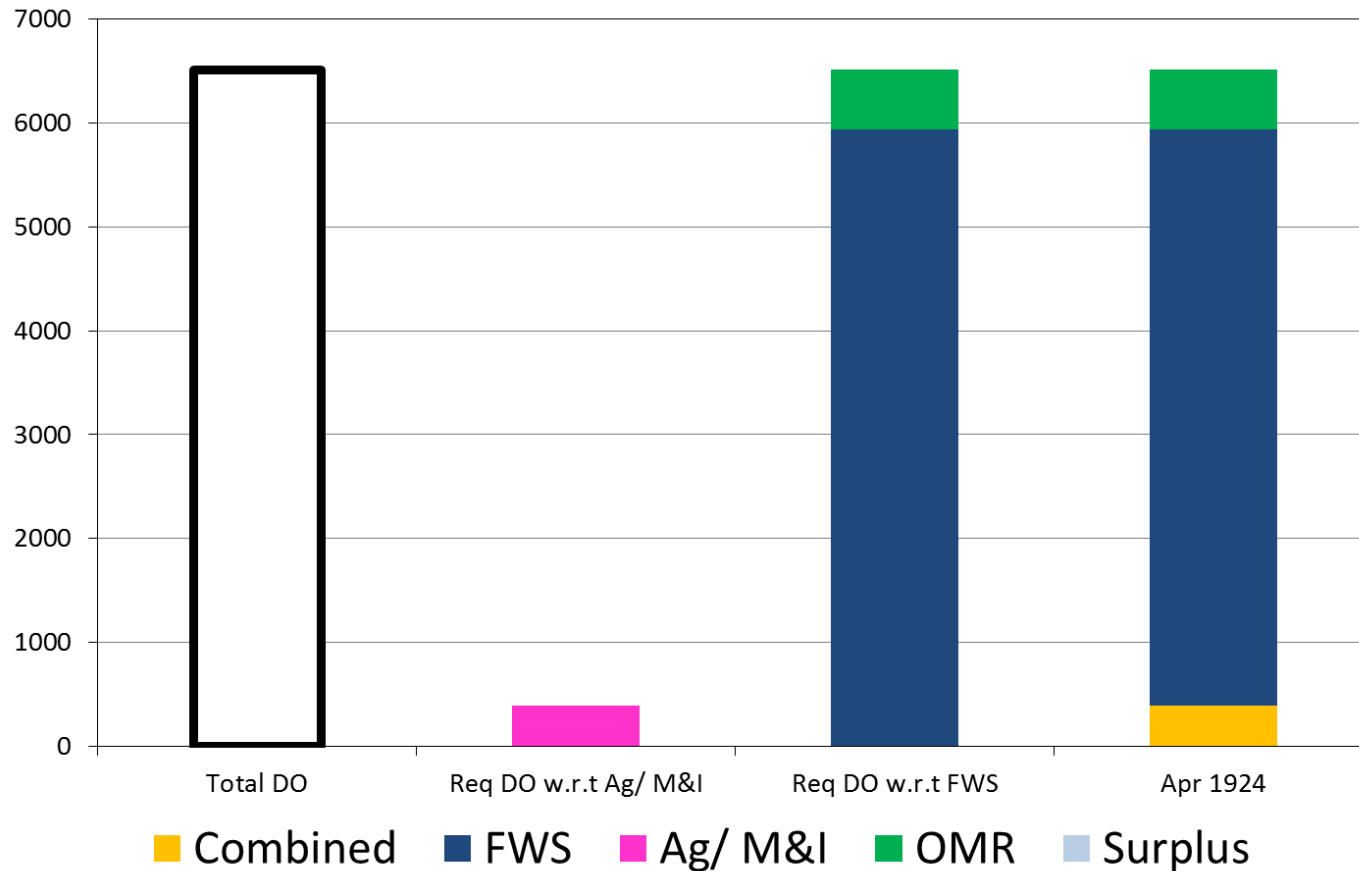

Delta Outflow (cfs)

Legend: Combined, FWS, Ag/ M&I, Surplus

Categories: Total DO, Req DO w.r.t Ag/ M&I, Req DO w.r.t FWS, Apr 1924

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Last Drop Method: April 1924

Delta Outflow (cfs)

OMR Flow Management contributes towards additional Delta Outflow if…

Surplus DO > 0

Actual Exports = OMR Exports

Legend: Combined, FWS, Ag/ M&I, Surplus

X-axis categories: Total DO, Req DO w.r.t Ag/ M&I, Req DO w.r.t FWS, Apr 1924

Last Drop Method: April 1924

Delta Outflow (cfs)

Legend: Combined, FWS, Ag/ M&I, OMR, Surplus

X-axis: Total DO, Req DO w.r.t Ag/ M&I, Req DO w.r.t FWS, Apr 1924

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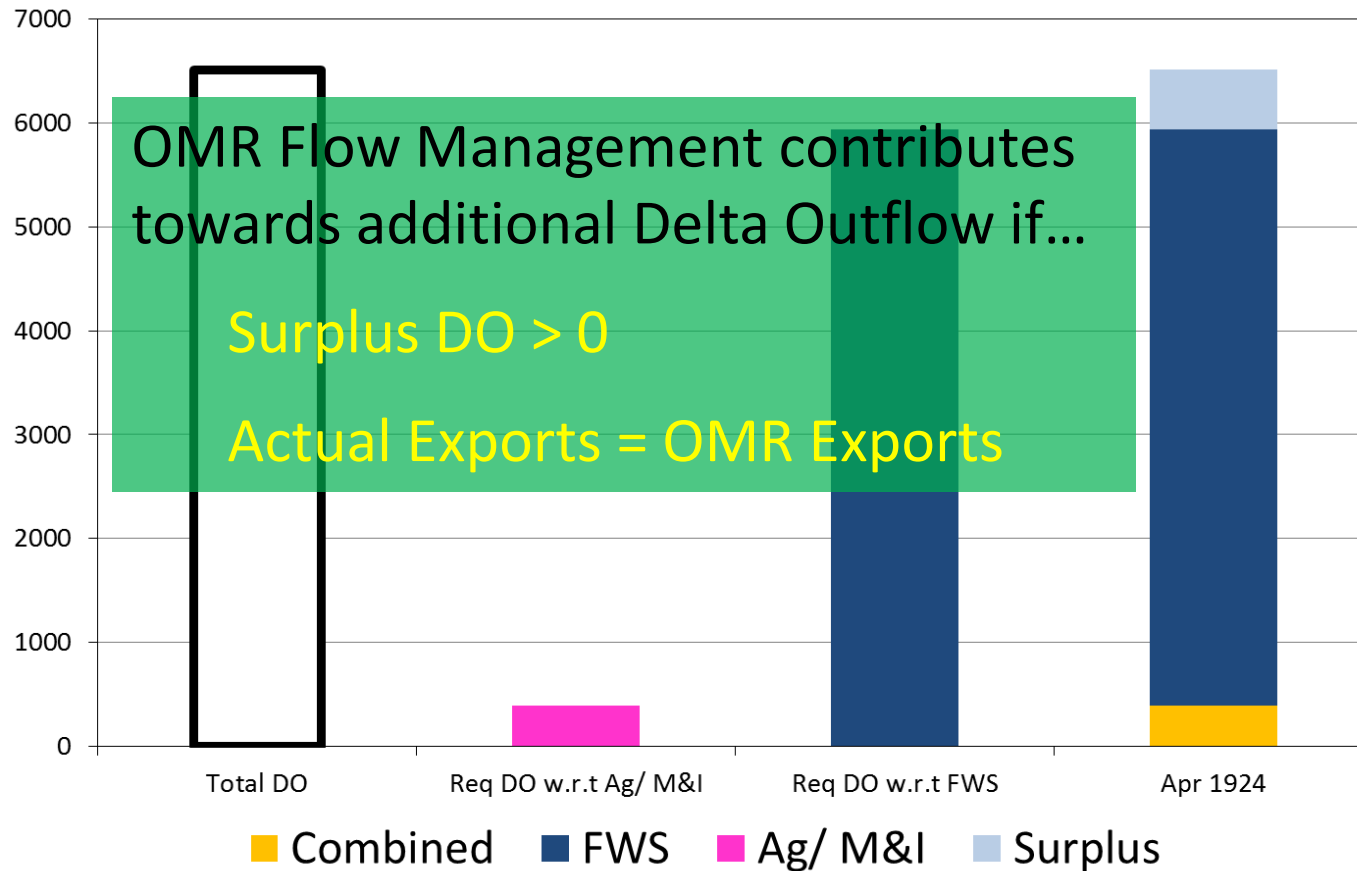
Last Drop Method: April 1924

Required Delta Outflow by Source (TAF)

Legend: Combined Use, Ag/ M&I Only, FWS Only, Increased DO due to OMR Flow Restrictions, Surplus DO

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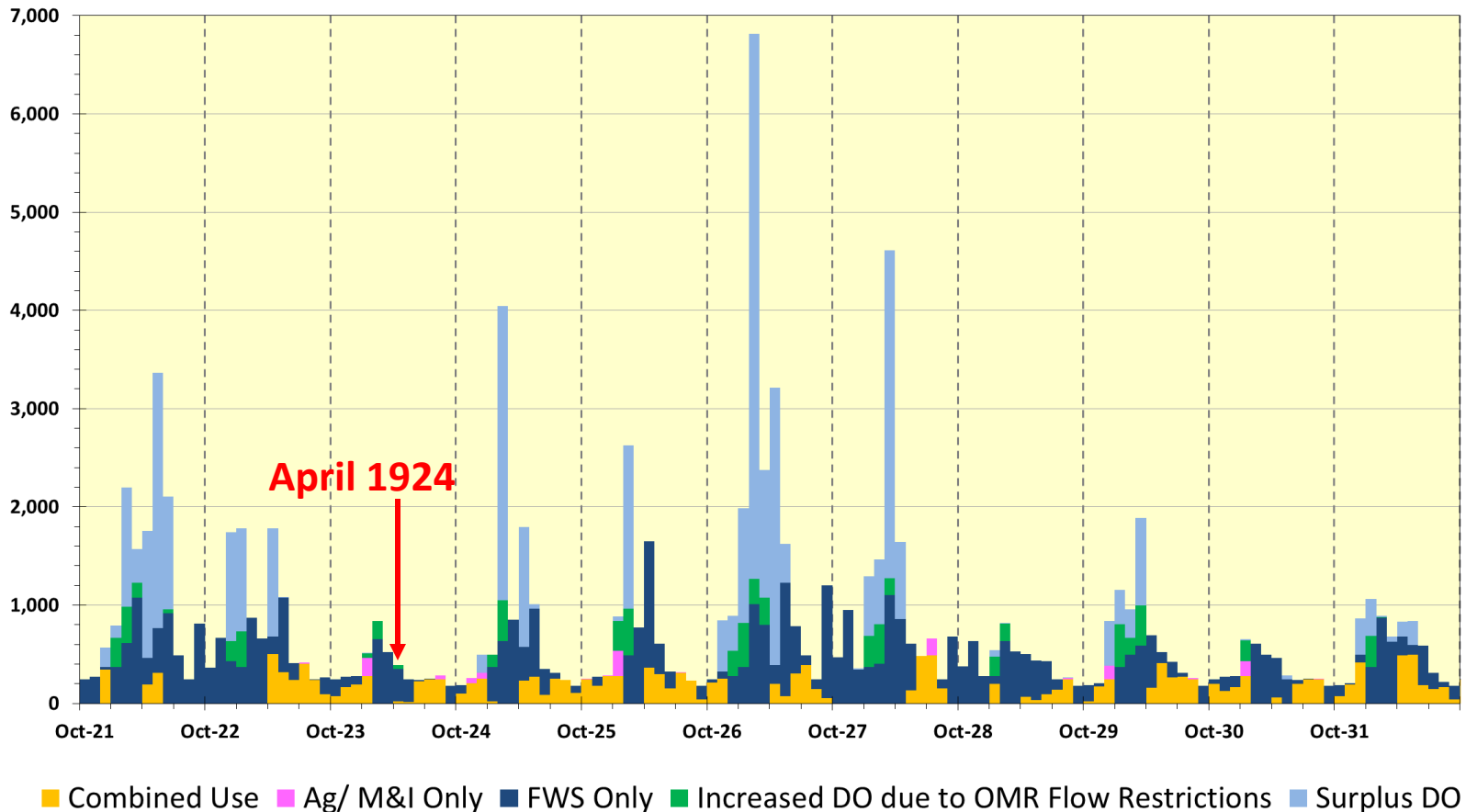
Who is responsible?

Delta Outflow (%)
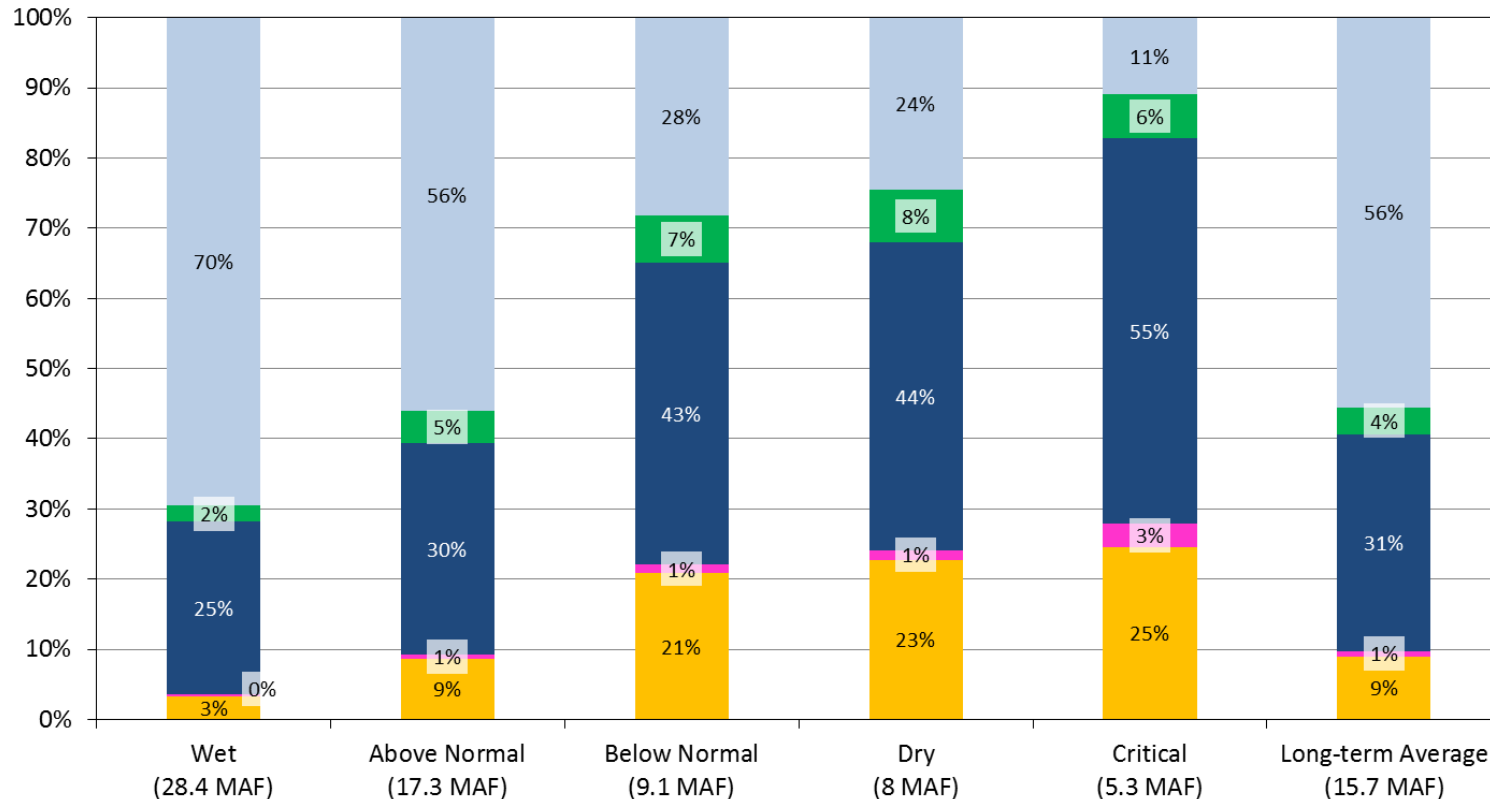
Legend:
- Combined Use
- FWS Only
- Surplus DO
- Ag/ M&I Only
- Increased DO due to OMR Flow Restrictions

Categories: Wet (28.4 MAF), Above Normal (17.3 MAF), Below Normal (9.1 MAF), Dry (8 MAF), Critical (5.3 MAF), Long-term Average (15.7 MAF)

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What's controlling?

Balanced Condition = Surplus Delta Outflow equals zero.

Delta Outflow Control under __Balanced Conditions__

Legend:
- Wet (28.4 MAF)
- Above Normal (17.3 MAF)
- Below Normal (9.1 MAF)
- Dry (8 MAF)
- Critical (5.3 MAF)
- Long-term Average (15.7 MAF)
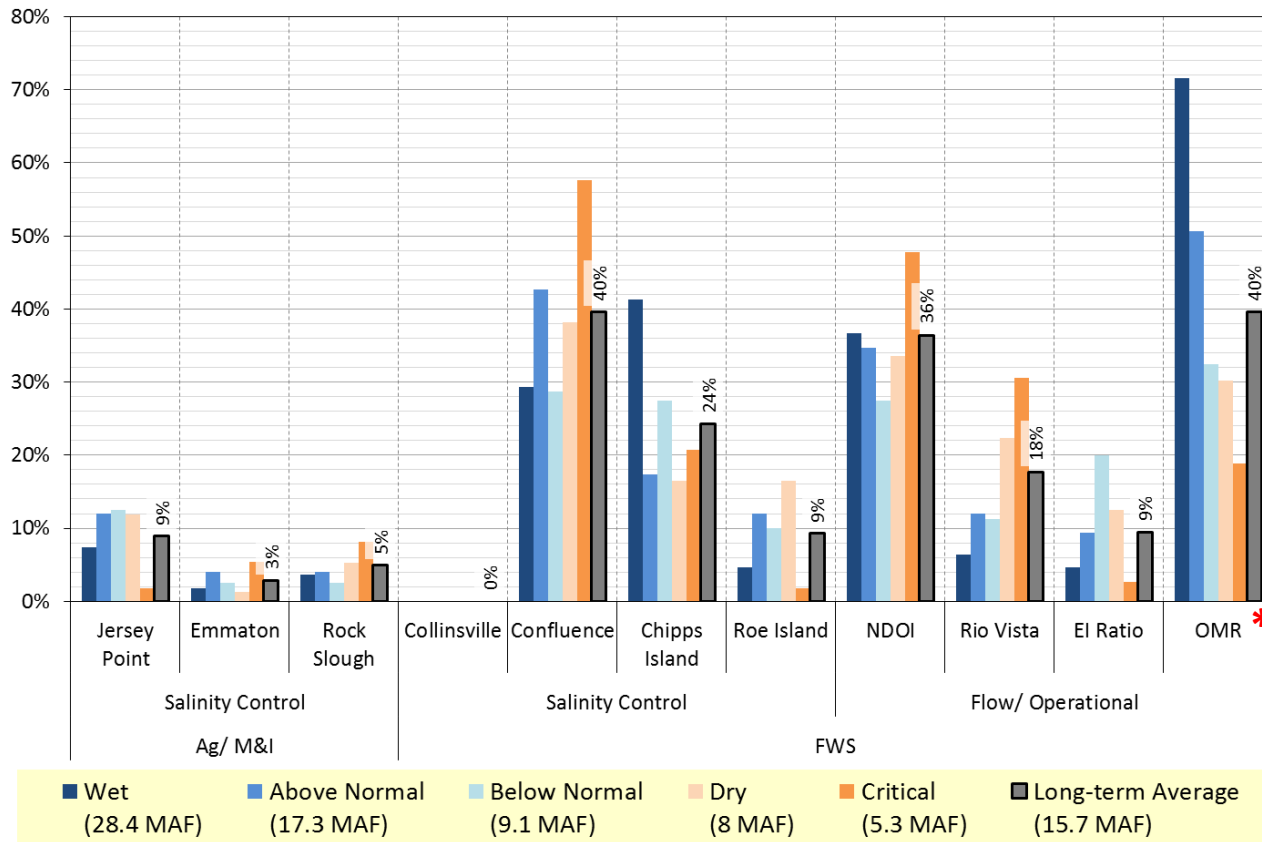
* OMR criteria is controlling when south of the Delta exports are limited due to OMR criteria __regardless__ of Balanced Conditions.

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Summary

- Combined use increases with drier hydrology

- Fish & Wildlife use is responsible for significant portion of Delta Outflow

- Salinity control and OMR export restrictions are two primary factors controlling Delta Outflow

- Last Drop is one of the many ways to determine the source of Delta Outflow; alternative methods need to be explored

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