

STATE WATER PROJECT OPERATIONS CHALLENGES FOR 2016



John Leahigh

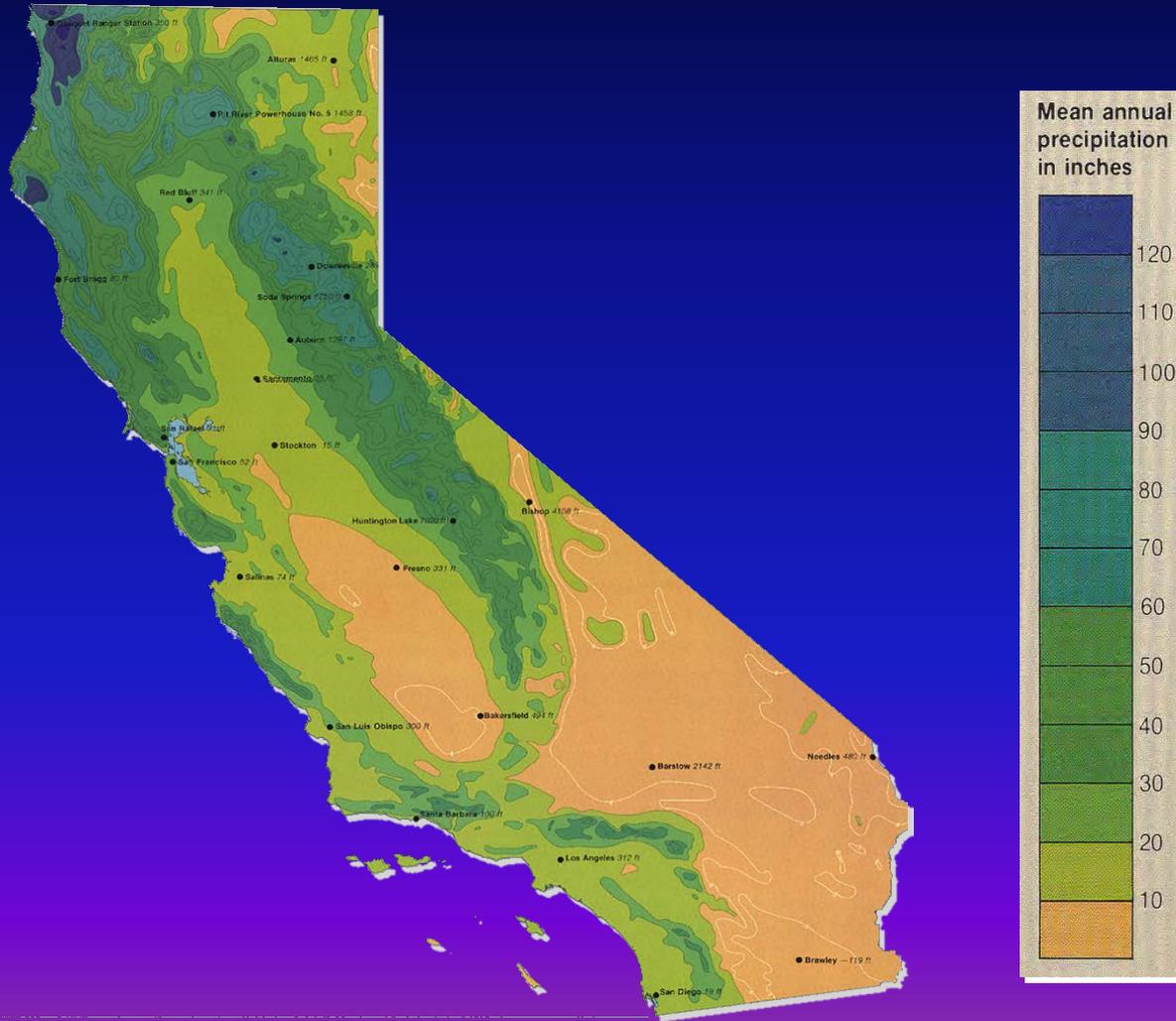
Department of Water Resources

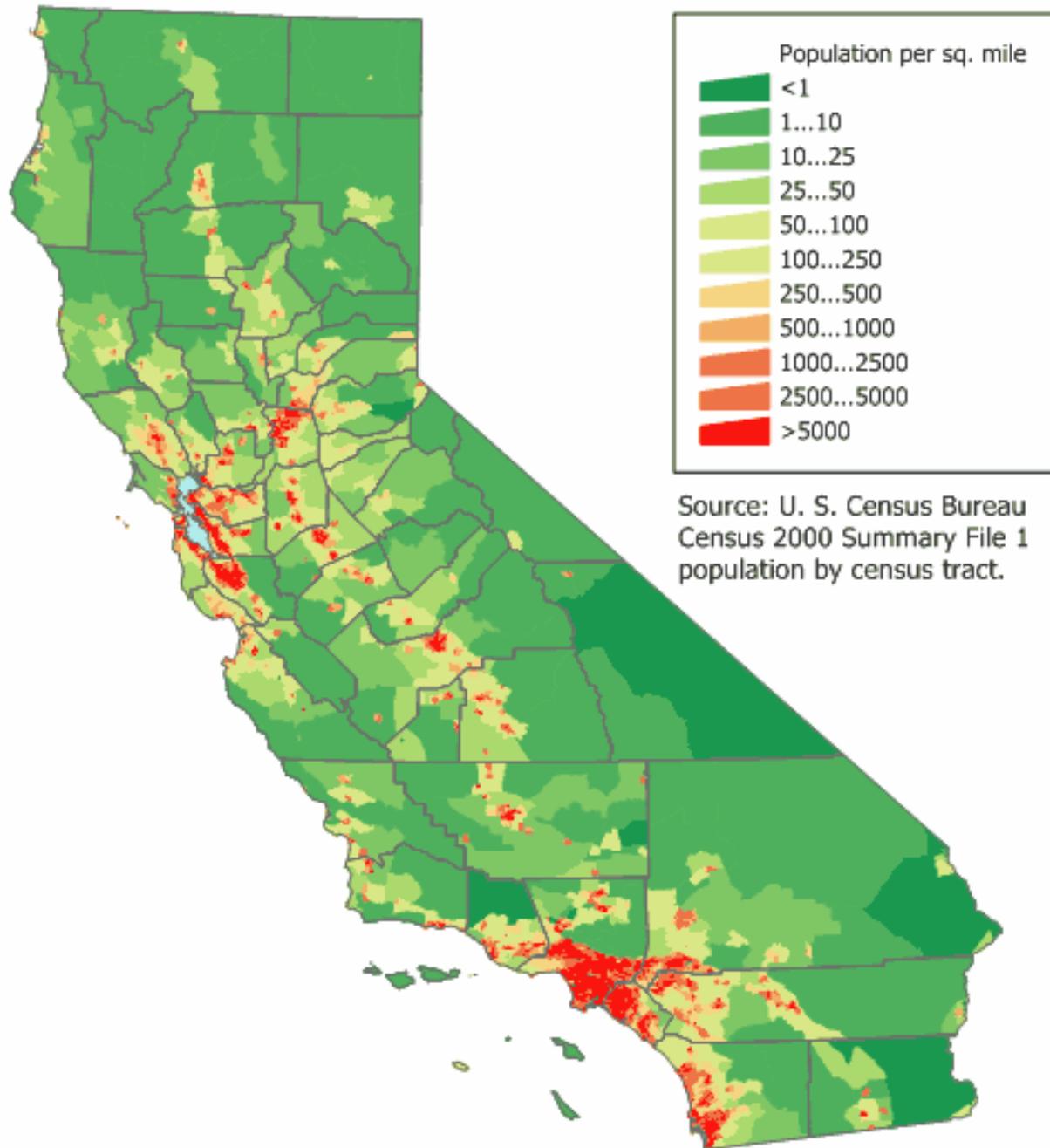
February 23, 2016

- ◎ California Water Systems
- ◎ State Water Project Overview
- ◎ Water Management Challenges
- ◎ 2016 Operations



Average Annual Precipitation in California

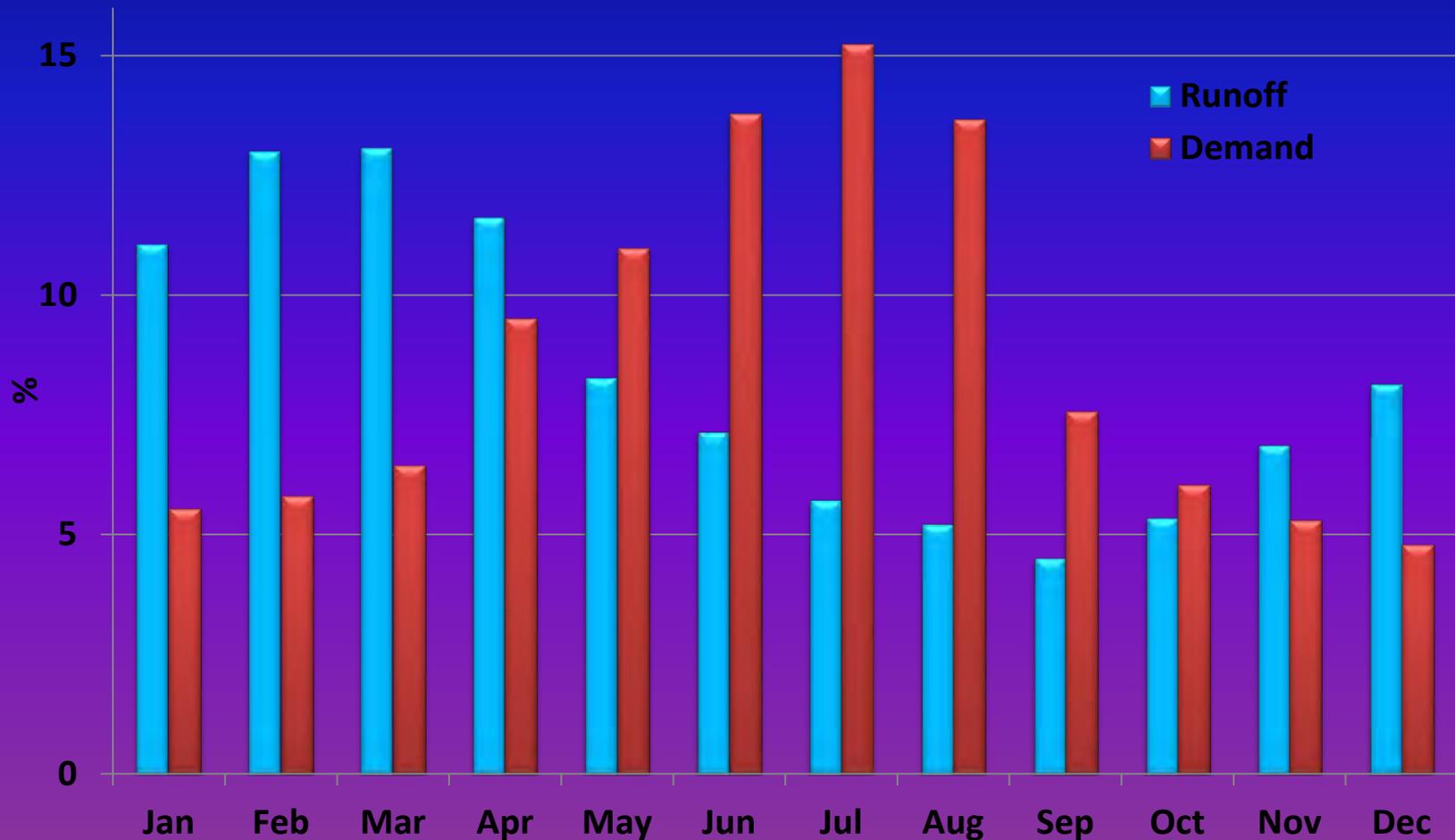




Pumps and Canals Remedy Geographic Imbalance



Seasonal Variability Between Supply and Demand



Reservoirs Remedy Temporal Imbalance



California Water Systems



State Water Project Water Supply Contractors

- 29 water contractors
- 70% urban / 30% agricultural
- 750,000 acres of crops
- 25 million people (2/3 of State's population)

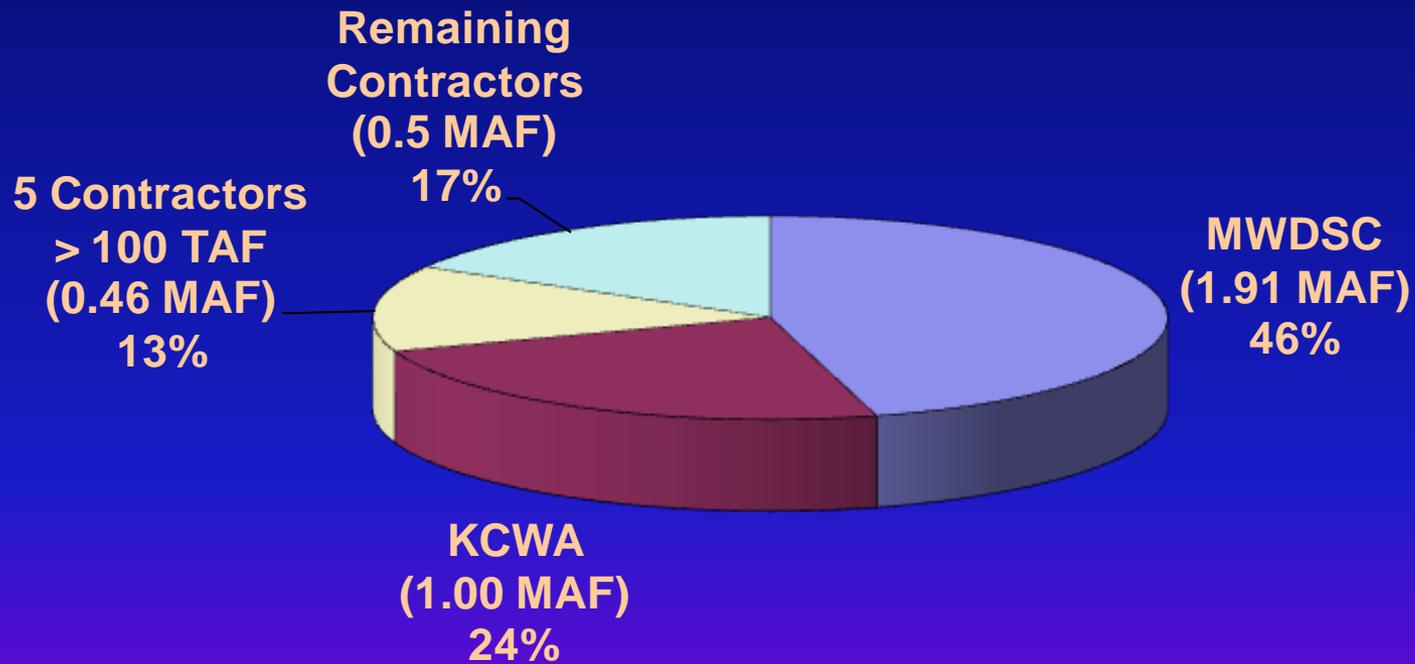




State Water Project Contractors Service Areas

- 1 Plumas County Flood Control and Water Conservation District
- 2 County of Butte
- 3 City of Yuba City
- 4 Napa County Flood Control and Water Conservation District
- 5 Solano County Water Agency
- 6 Alameda County Flood Control and Water Conservation District - Zone 7
- 7 Alameda County Water District
- 8 Santa Clara Valley Water District
- 9 Oak Flat Water District
- 10 County of Kings
- 11 Empire West Side Irrigation District
- 12 Tulare Lake Basin Water Storage District
- 13 Dudley Ridge Water District
- 14 San Luis Obispo County Flood Control and Water Conservation District
- 15 Kern County Water Agency
- 16 Mojave Water Agency
- 17 Antelope Valley-East Kern Water Agency
- 18 Santa Barbara County Flood Control and Water Conservation District
- 19 Ventura County Watershed Protection District
- 20 Castaic Lake Water Agency
- 21 Littlerock Creek Irrigation District
- 22 Palmdale Water District
- 23 Crestline-Lake Arrowhead Water Agency
- 24 San Bernardino Valley Municipal Water District
- 25 San Gabriel Valley Municipal Water District
- 26 San Geronio Pass Water Agency
- 27 Desert Water Agency
- 28 Coachella Valley Water District
- 29 Metropolitan Water District of Southern California

SWP Contract Amount "Table A" (4.18 MAF)



Challenges to SWP Deliveries

- Variable Hydrology



- Delta Constraints

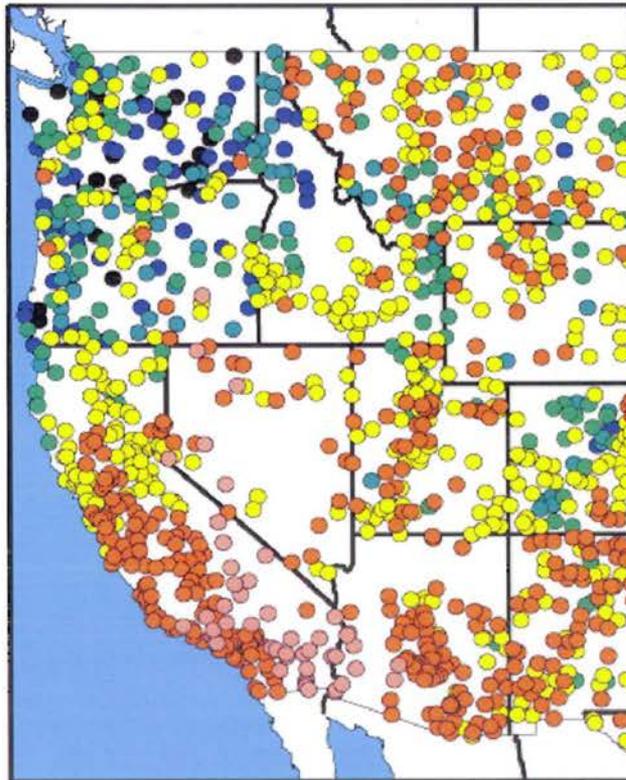


- Increasing Demand



Storms and California Water Supply

■ AVERAGE NUMBER OF DAYS/YR TO OBTAIN HALF OF TOTAL PRECIPITATION, WY 1951-2008



days/year

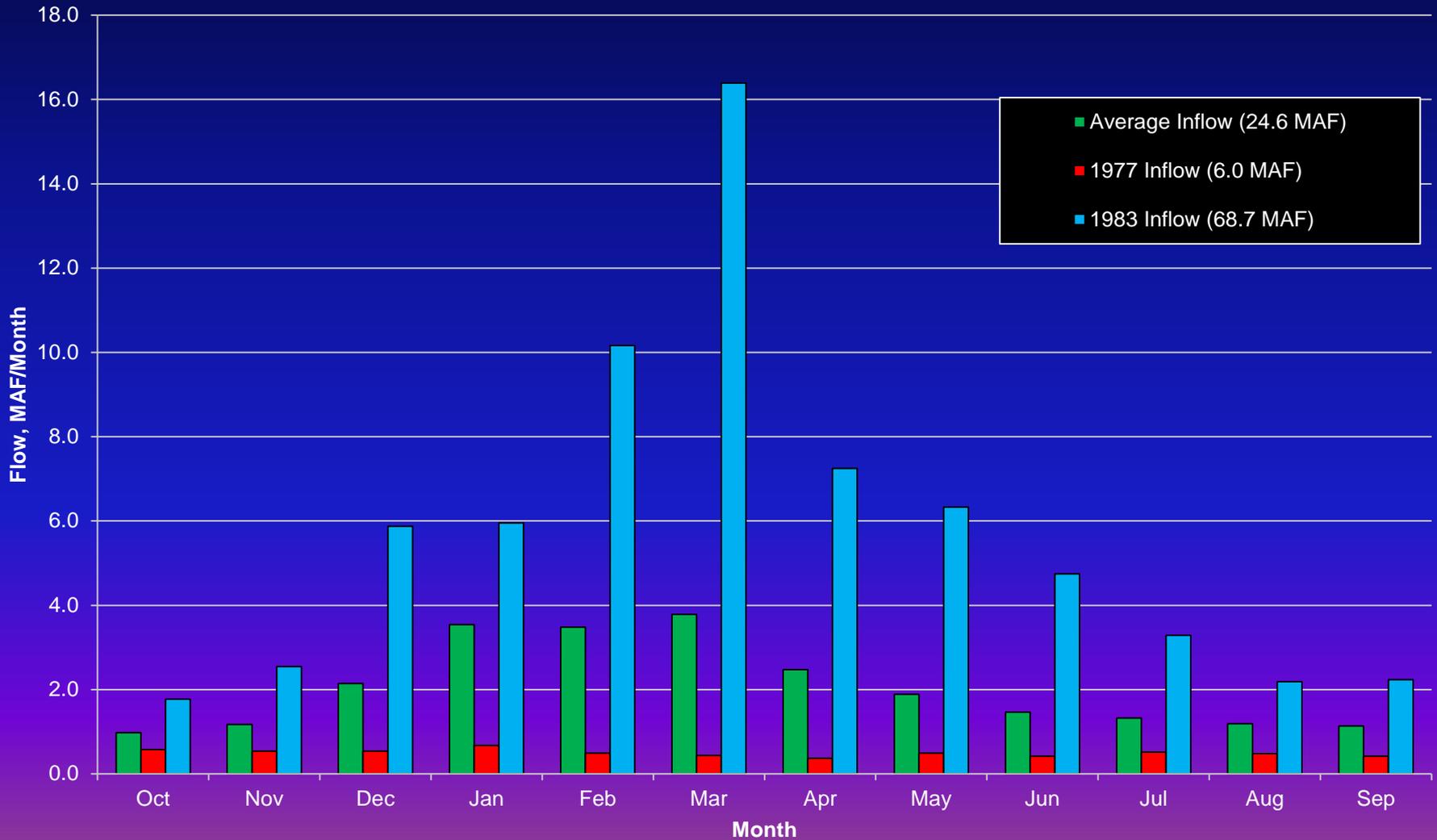


Just a few storms each year are the core of California's water supplies

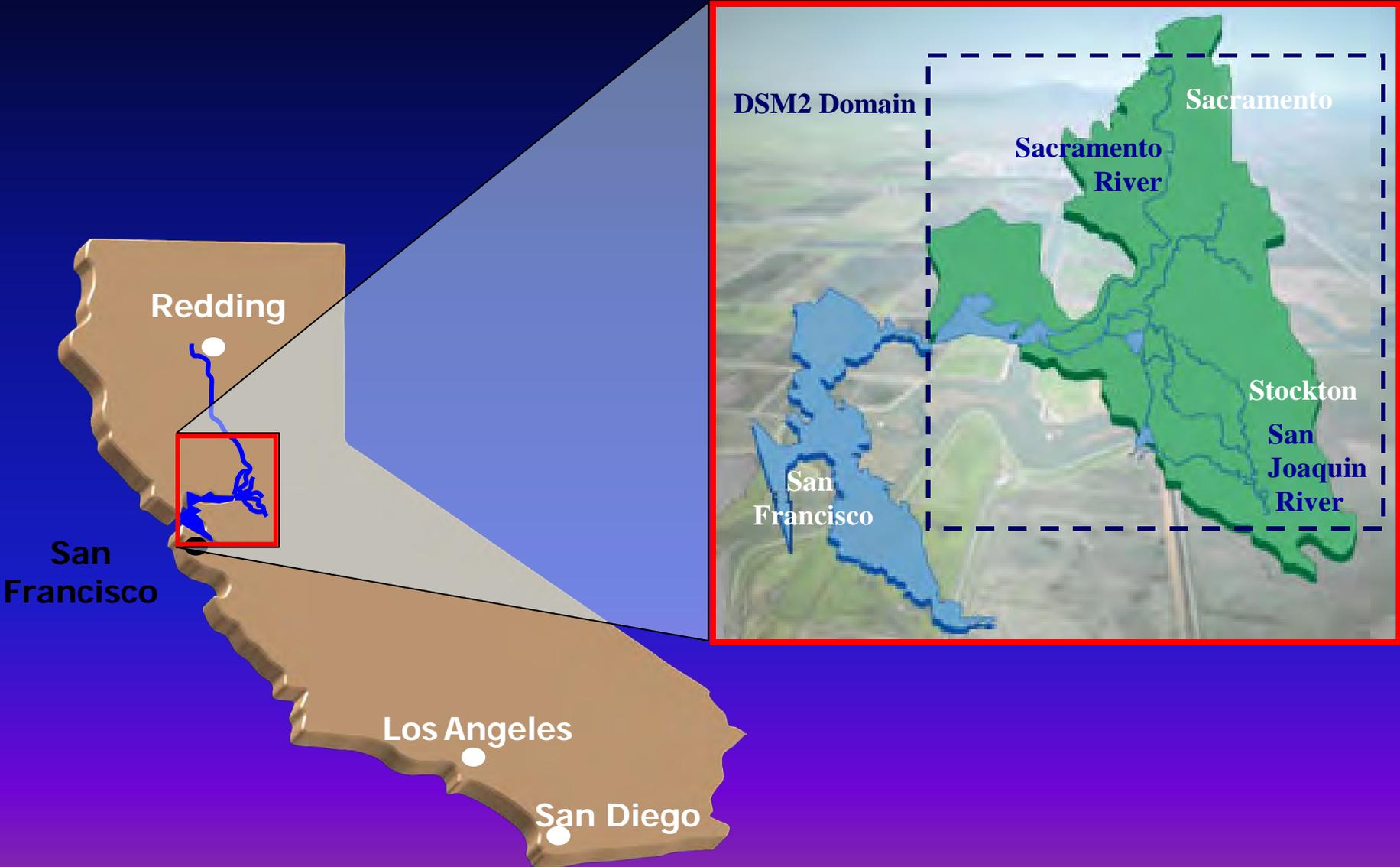
Dettinger et al, 2011

Variability of Runoff

Delta Inflow (WY 1970-2011)



Sacramento – San Joaquin Delta



Delta Regulations

- ◎ State Board Salinity and Flow Objectives
 - Municipal and Industrial
 - Agricultural
 - Fish and Wildlife

- ◎ Federal Environmental Protections
 - Protections for endangered fish species:
 - Ecological Triggers
 - Range of Flow Targets (Real-Time Observations)

Bay-Delta Standards

Contained in D-1641

CRITERIA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
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FLOW/OPERATIONAL

<ul style="list-style-type: none"> Fish and Wildlife <ul style="list-style-type: none"> SWP/CVP Export Limits Export/Inflow Ratio ^[2] Minimum Delta Outflow Habitat Protection Outflow Salinity Starting Condition ^[6] River Flows: <ul style="list-style-type: none"> @ Rio Vista @ Vernalis - Base - Pulse Delta Cross Channel Gates 					1,500cfs ^[1]							
	65%	35% of Delta Inflow ^[3]					65% of Delta Inflow					
	^[4]							3,000 - 8,000 cfs ^[4]				
			7,100 - 29,200 cfs ^[5]									
		^[6]										
			710 - 3,420 cfs ^[8]				^[8]					
					^[9]					+28TAF		
	^[10]	Closed				^[11]						Conditional ^[10]

WATER QUALITY STANDARDS

<ul style="list-style-type: none"> Municipal and Industrial <ul style="list-style-type: none"> All Export Locations Contra Costa Canal Agriculture <ul style="list-style-type: none"> Western/Interior Delta Southern Delta ^[14] Fish and Wildlife - <ul style="list-style-type: none"> San Joaquin River Salinity ^[15] Suisun Marsh Salinity ^[16] 												
	≤ 250 mg/l Cl											
	150 mg/l Cl for the required number of days ^[12]											
				Max. 14-day average EC mmhos/cm ^[13]								
	1.0 mS		30 day running avg EC 0.7 mS				1.0 mS					
				14-day avg: 0.44 EC								
	12.5 EC	8.0 EC	11.0 EC							19.0 EC	^[17]	15.5 EC

^[#] See Footnotes

NMFS & FWS Biological Opinions

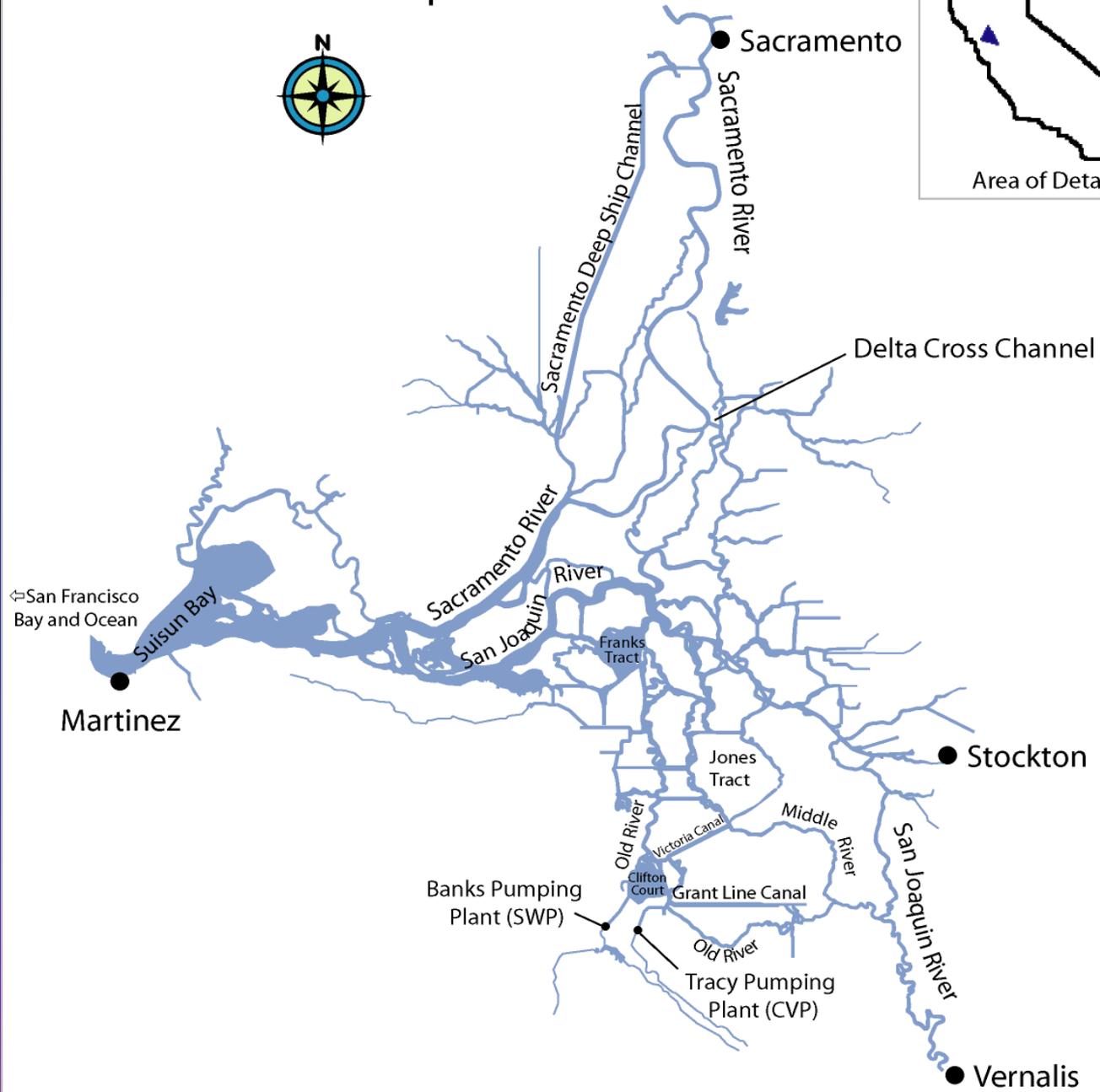
Reasonable and Prudent Alternatives

CRITERIA	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
National Marine Fisheries Service												
<u>Action IV. 12</u> DCC Gate Operation	Oct 1 - Nov 30 <small>Gates Are Closed if Fish Are Present</small>		Dec 1 - 14	Dec 15 - Jan 31 <small>Gates Are Closed</small>		Feb 1 - May 15 <small>Gates Are Closed per D1641</small>			May 16 - Jun 15 <small>up to 14 Days Closed per D1641</small>			
<u>Action IV. 2.1</u> San Joaquin River Inflow/Export Ratio			Gates Are Closed except for Experiments/WQ				Apr 1 - May 31 <small>Maintain Vernalis I/E Ratio</small>		Interim - Based on IOP Water Supply Long Term - Based on WY Type			
<u>Action IV. 2.2</u> Six-Year Acoustic Tag Experiment						Mar 1 - Jun 15						
<u>Action IV. 2.3</u> Old & Middle River Flow Management				Jan 1 - Jun 15 <small>OMR (-5000 to -2500 cfs) until after Jun 1 Water Temperature @ Mossdale ≥ 72°F for 7 Days</small>								
<u>Action IV. 3</u> Reduce Likelihood of Entrainment or Salvage		Nov 1 - Dec 31										
Fish & Wildlife Service												
<u>Action 1</u> Adult Migration & Entrainment (1st Flush)			Dec 1 - 20	After Dec 20 Triggers: Turbidity or Salvage Off Ramps: Water Temperature or Biological								
<u>Action 2</u> Adult Migration & Entrainment			Begins Immediately After Action 1. Suspension of Action: Flow Off Ramps: Water Temperature or Biological									
<u>Action 3</u> Entrainment Protection of Larval Smelt						Triggers: Water Temperature or Biological Off Ramps: Water Temperature or June 30						
<u>Action 4</u> Estuarine Habitat During Fall (X2)	Oct 1 - Nov 30											Sep 1 - 30
<u>Action 5</u> Temporary Spring HORB & the TBP						Apr 1 - May 15						

Sacramento San Joaquin Delta

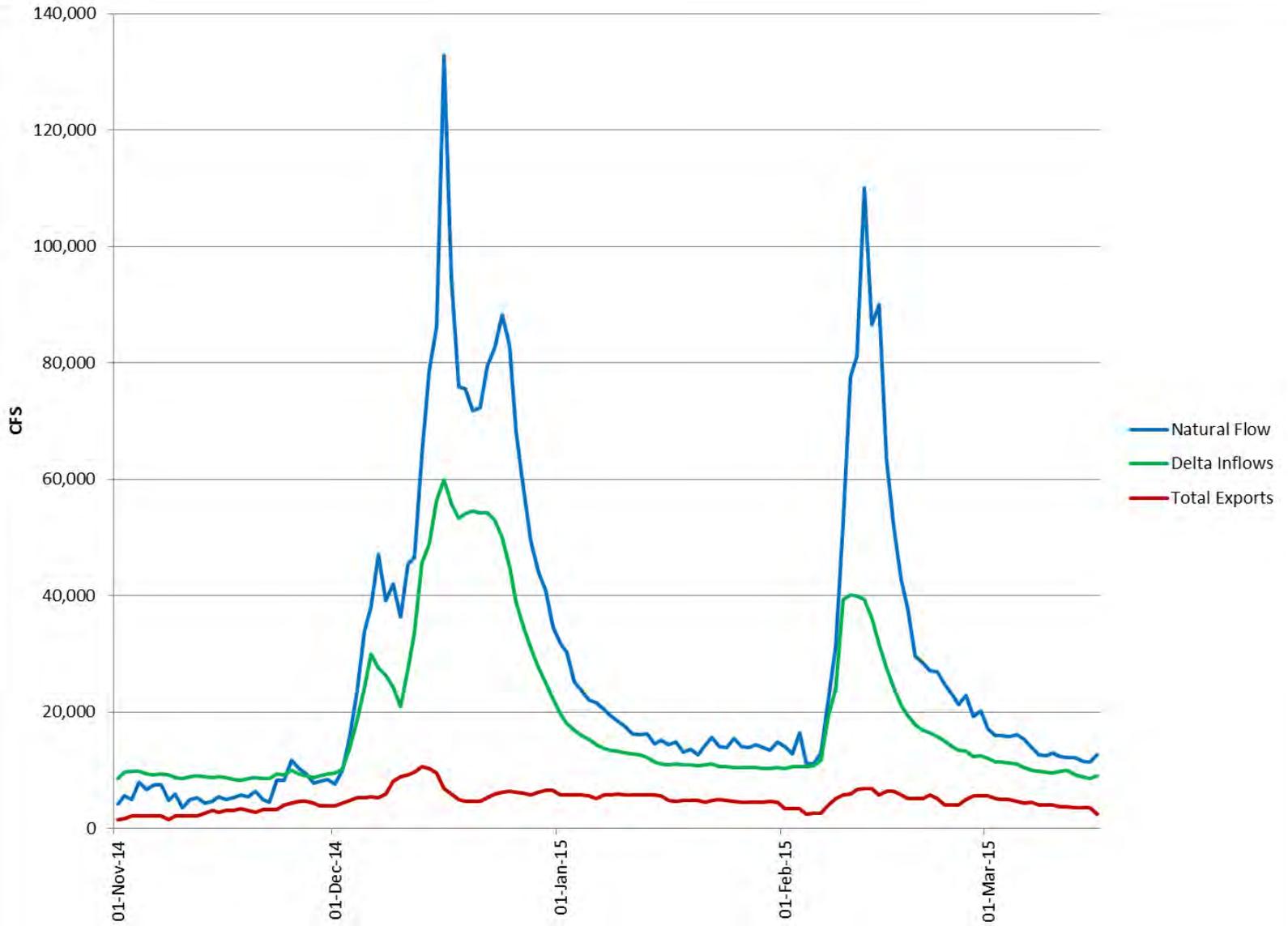


Area of Detail



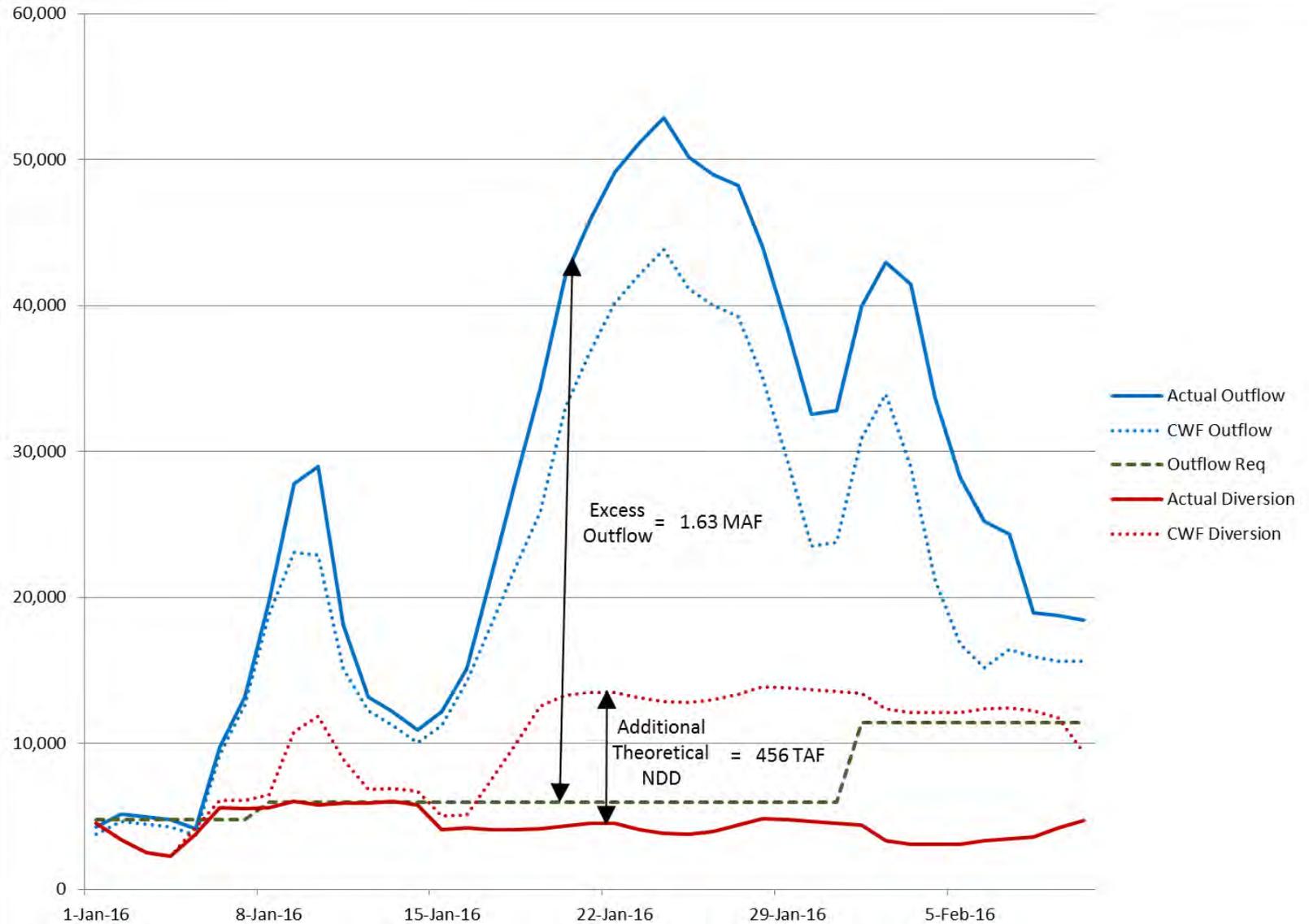
Winter Flows 2014/15

CFS

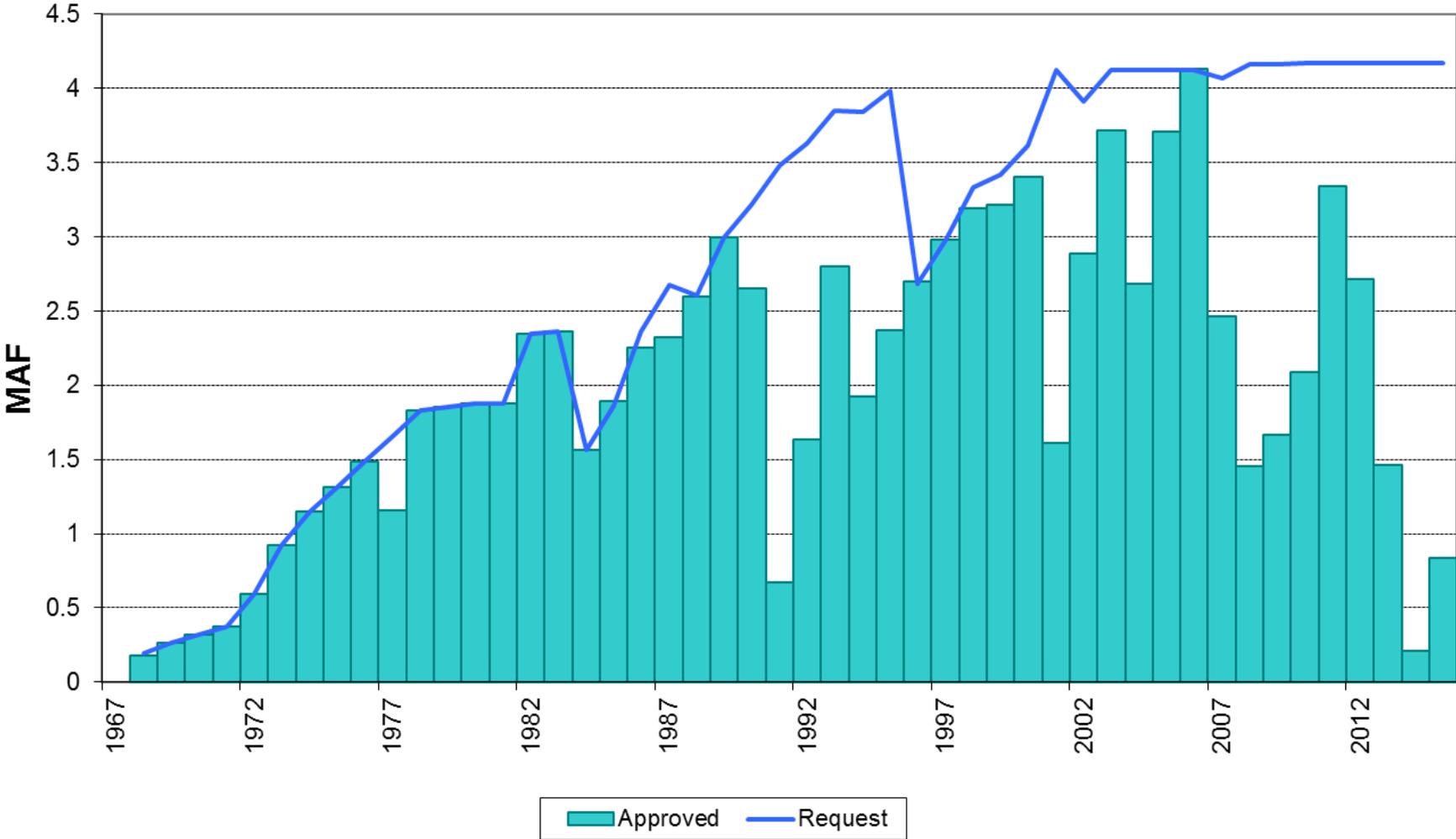


Theoretical CWF Operation (1/5/16 – 2/10/16)

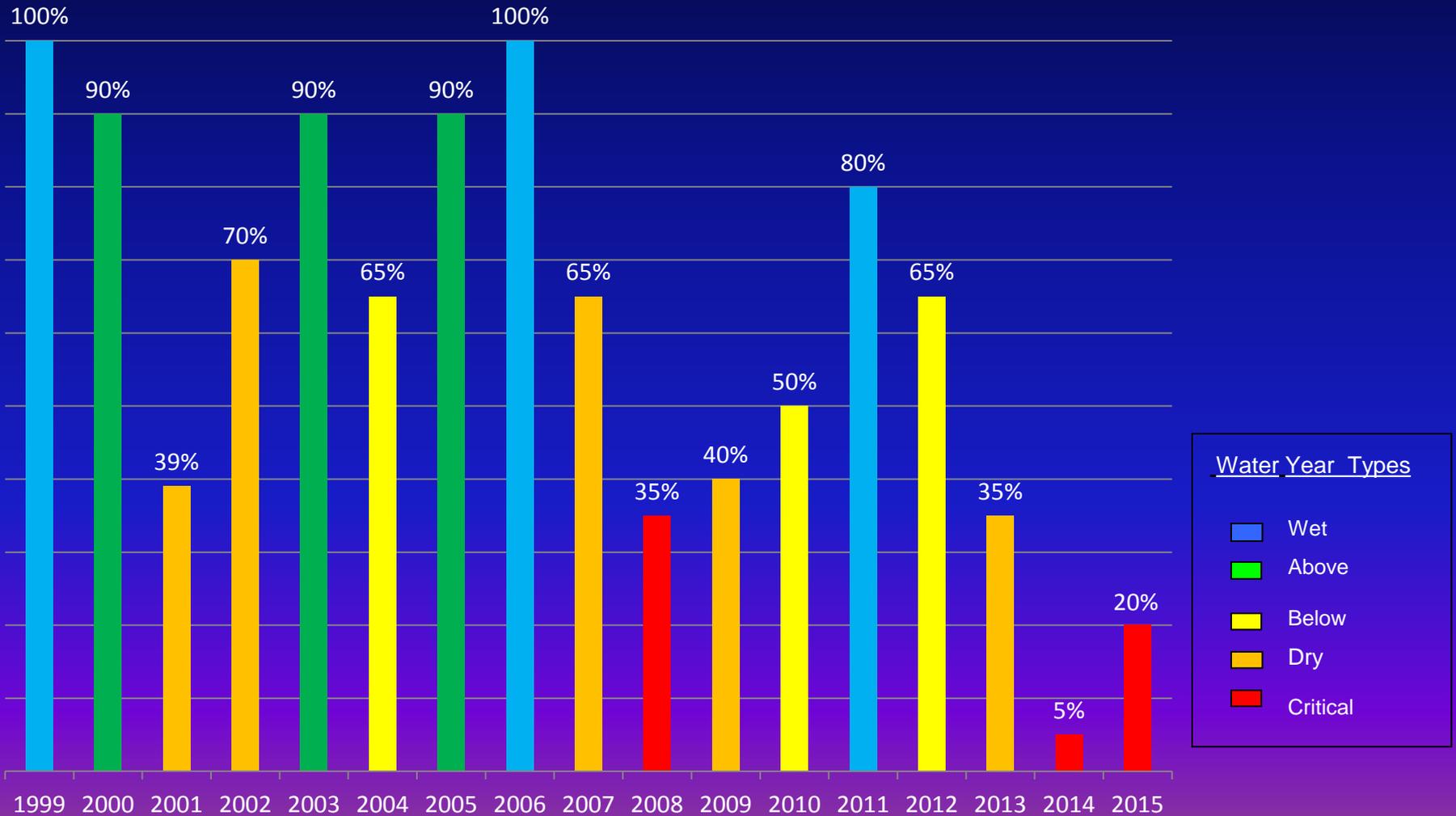
CFS



SWP Table A Allocation



SWP Allocation of Recent Years

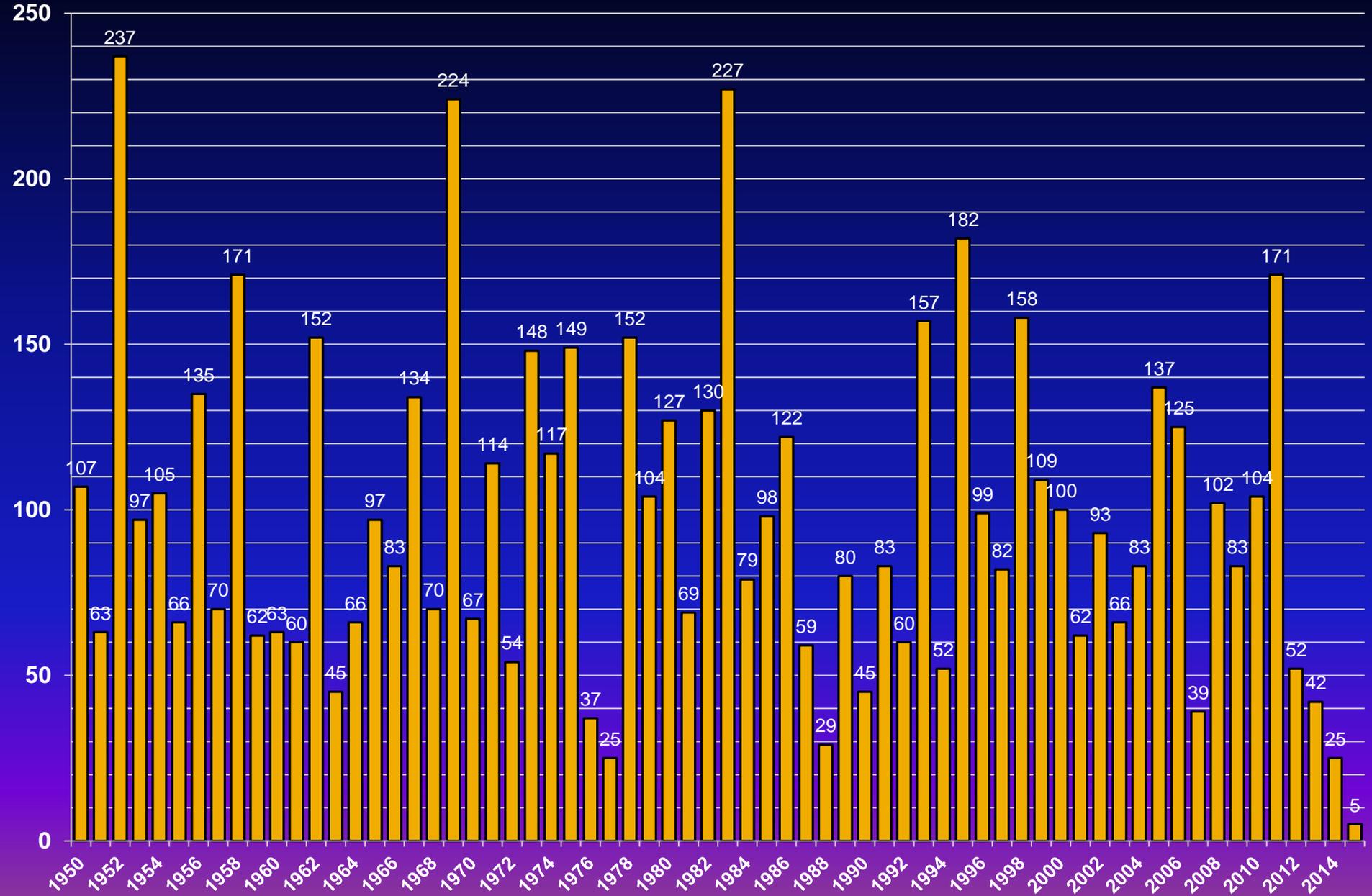


Recent Drought Actions



April 1 Snowpack Water Content

Statewide Percent of Average



DWR Drought Management Actions 2014/2015

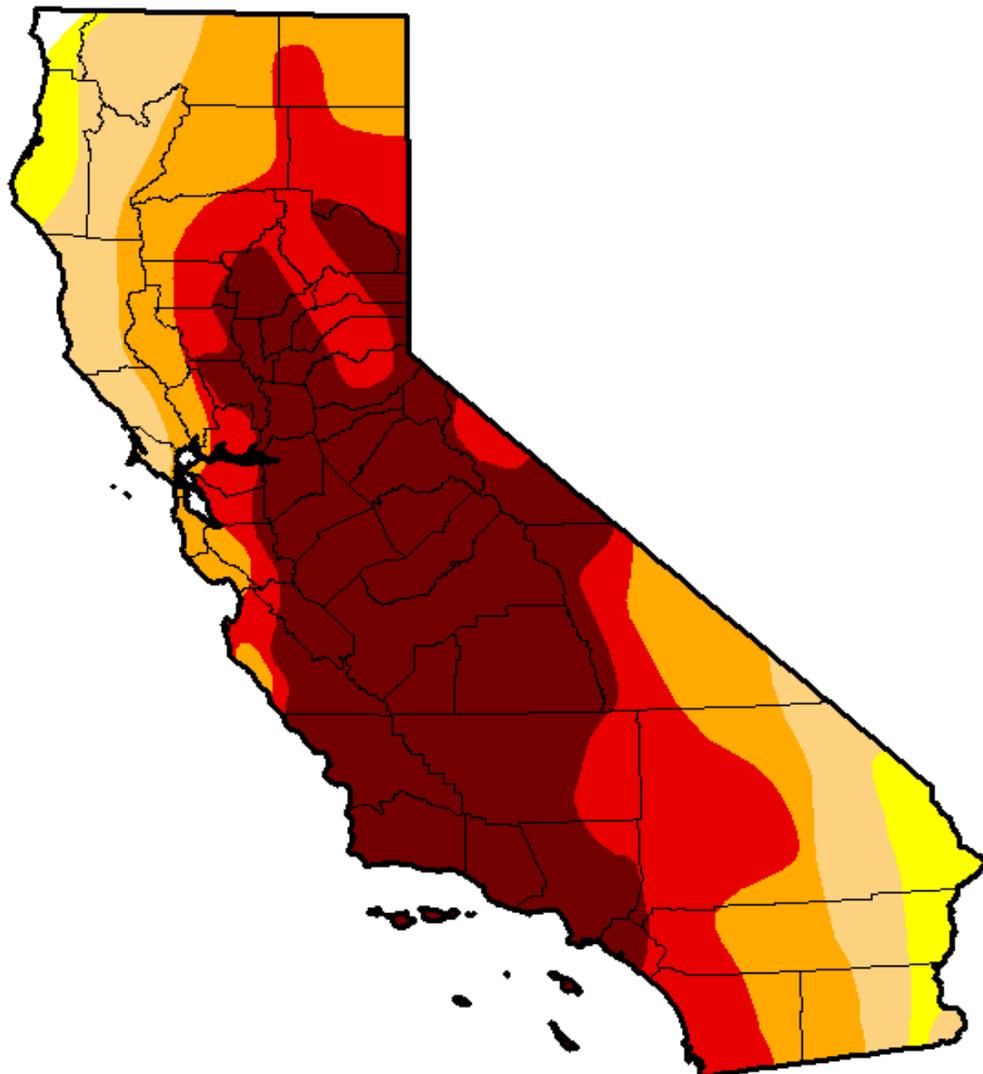
- ⦿ Greatly Reduced SWP Supply
- ⦿ Petitioned for Modified Bay-Delta Standards
- ⦿ Drought Salinity Barrier Installation (2015)

2016 Hydrology



U.S. Drought Monitor California

February 16, 2016
(Released Thursday, Feb. 18, 2016)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0	D1	D2	D3	D4
Current	0.29	5.01	12.87	20.42	22.93	38.48
Last Week <i>2/9/2016</i>	0.22	5.01	12.95	20.42	22.93	38.48
3 Months Ago <i>11/17/2015</i>	0.14	2.53	5.07	21.71	25.71	44.84
Start of Calendar Year <i>12/29/2015</i>	0.00	2.67	9.78	18.49	24.22	44.84
Start of Water Year <i>9/29/2015</i>	0.14	2.53	4.97	21.29	25.08	46.00
One Year Ago <i>2/17/2015</i>	0.16	1.75	4.66	25.98	26.26	41.20

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

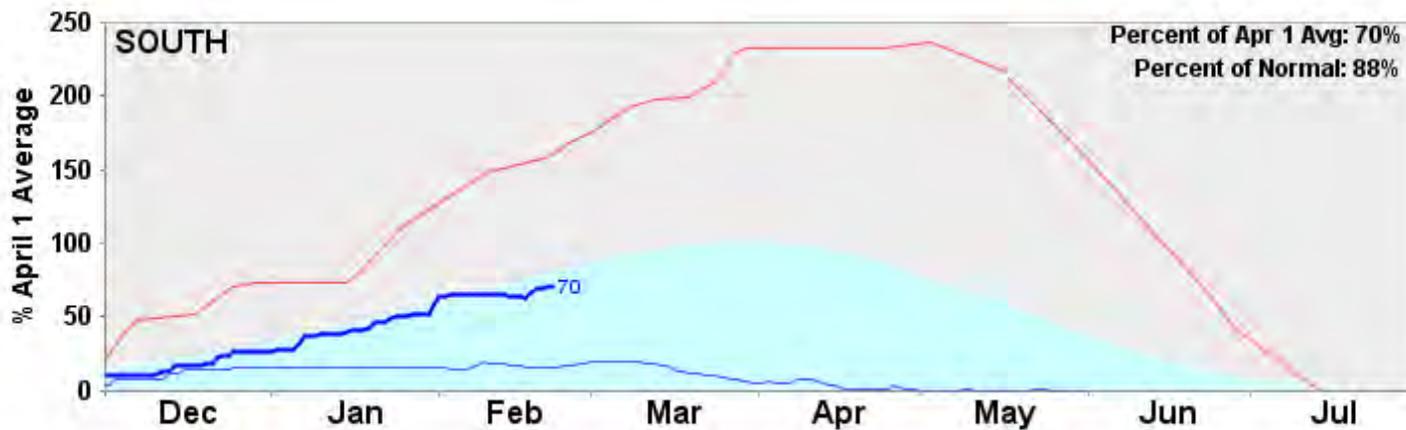
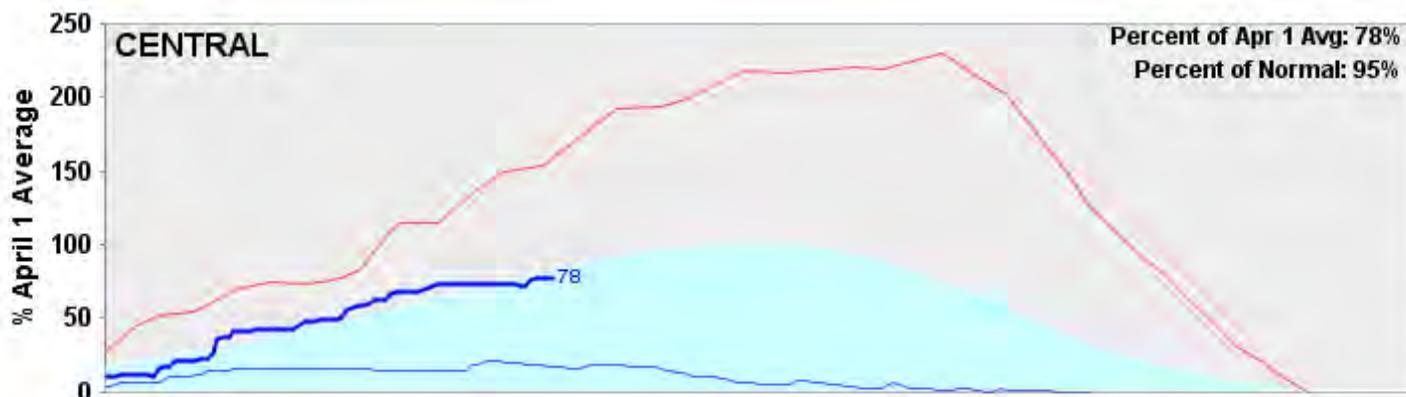
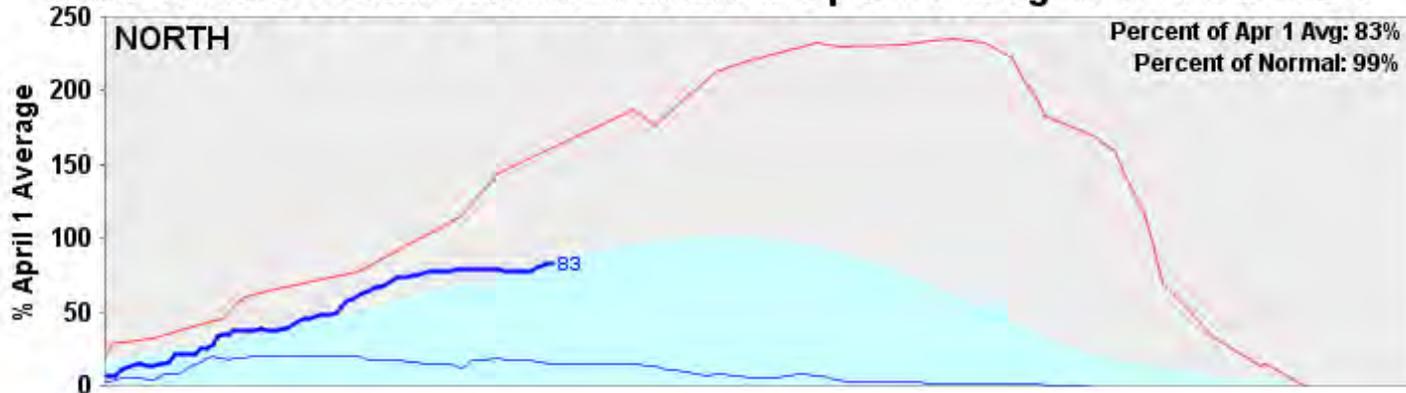
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U.S. Department of Agriculture*



Some Improvements

California Snow Water Content - Percent of April 1 Average For: 22-Feb-2016



Average — 1982-1983 (max) — 2014-2015 — 2015-2016 (current)

Where art thou El Nino?



Questions?



State Water Project
Operations Control Office
<http://www.woco.water.ca.gov>