

# STATE WATER PROJECT OPERATIONS CHALLENGES FOR 2016



John Leahigh

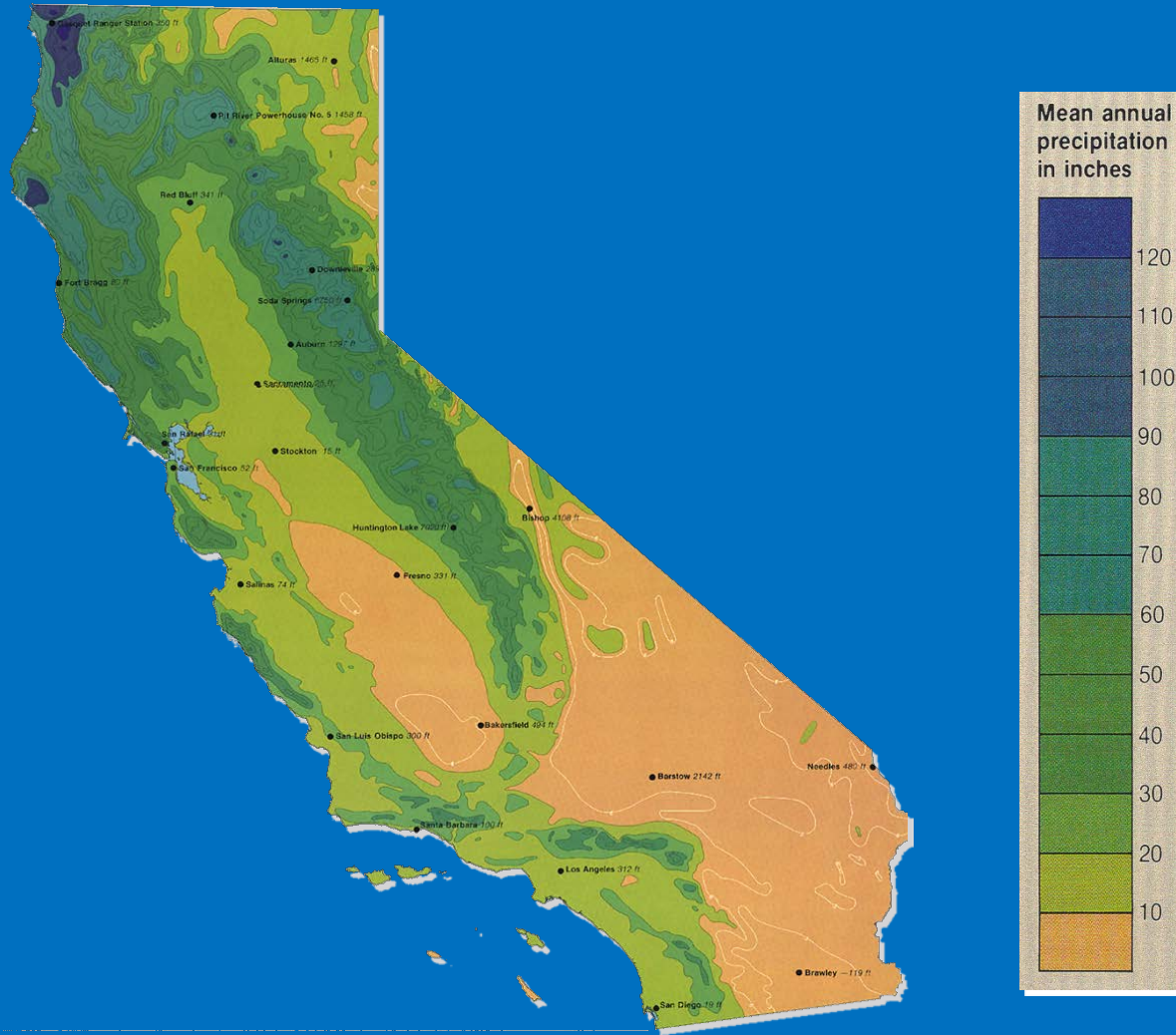
Department of Water Resources

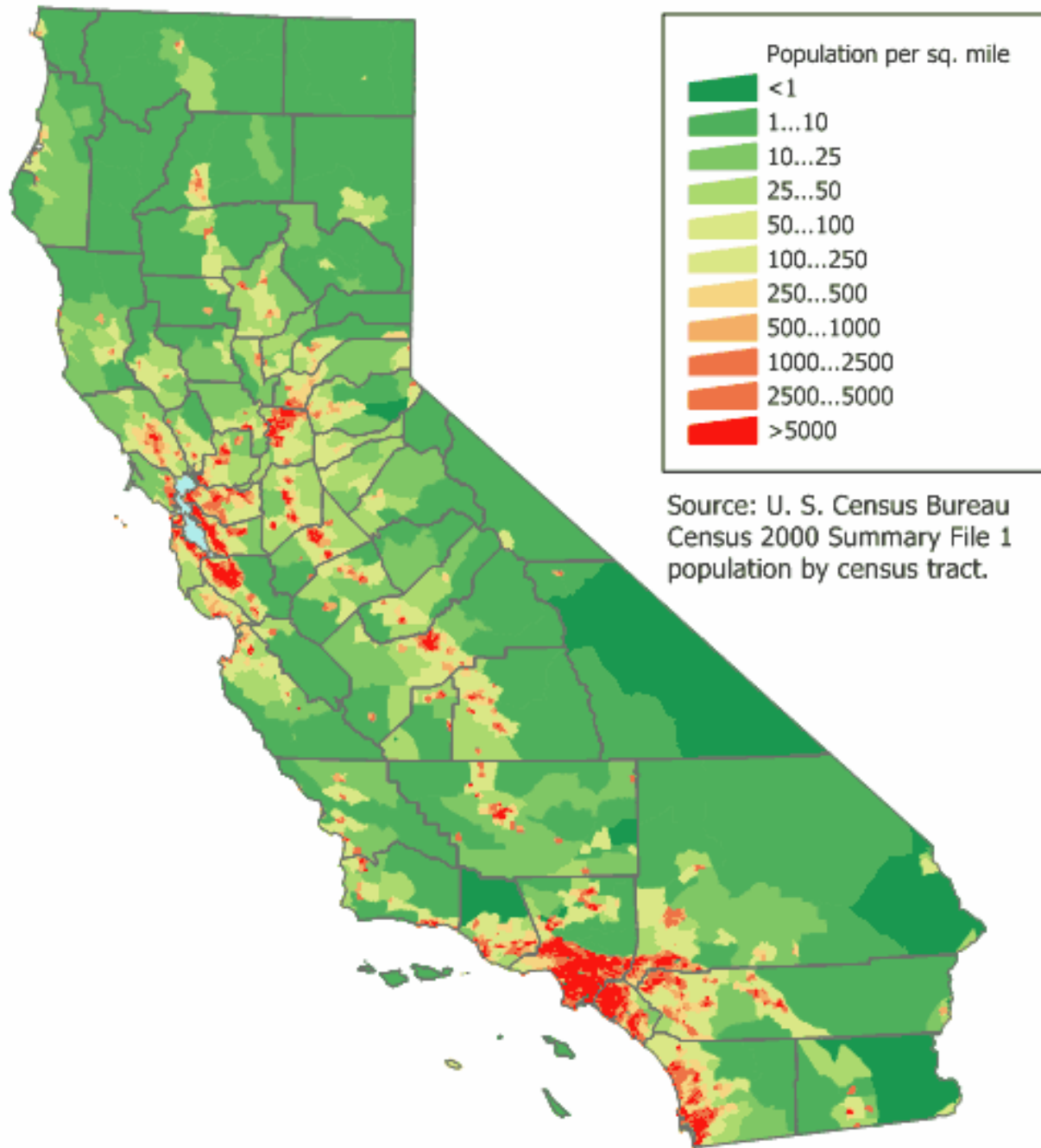
April 26, 2016

- California Water System Overview
- State Water Project Overview
- Water Management Challenges in 2016



# Average Annual Precipitation in California

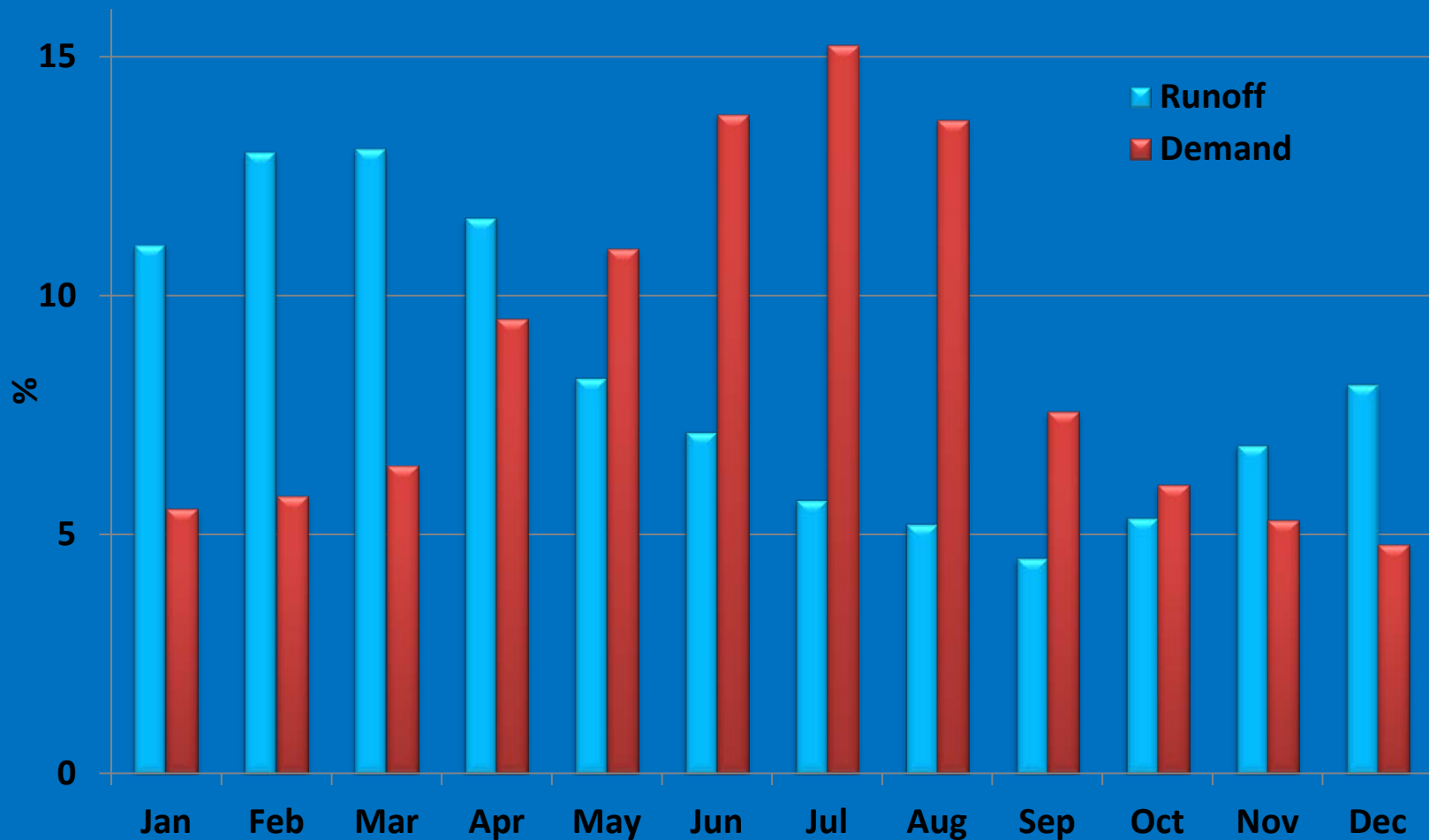




# Pumps and Canals Remedy Geographic Imbalance



# Seasonal Variability Between Supply and Demand



# Reservoirs Remedy Temporal Imbalance







# 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)

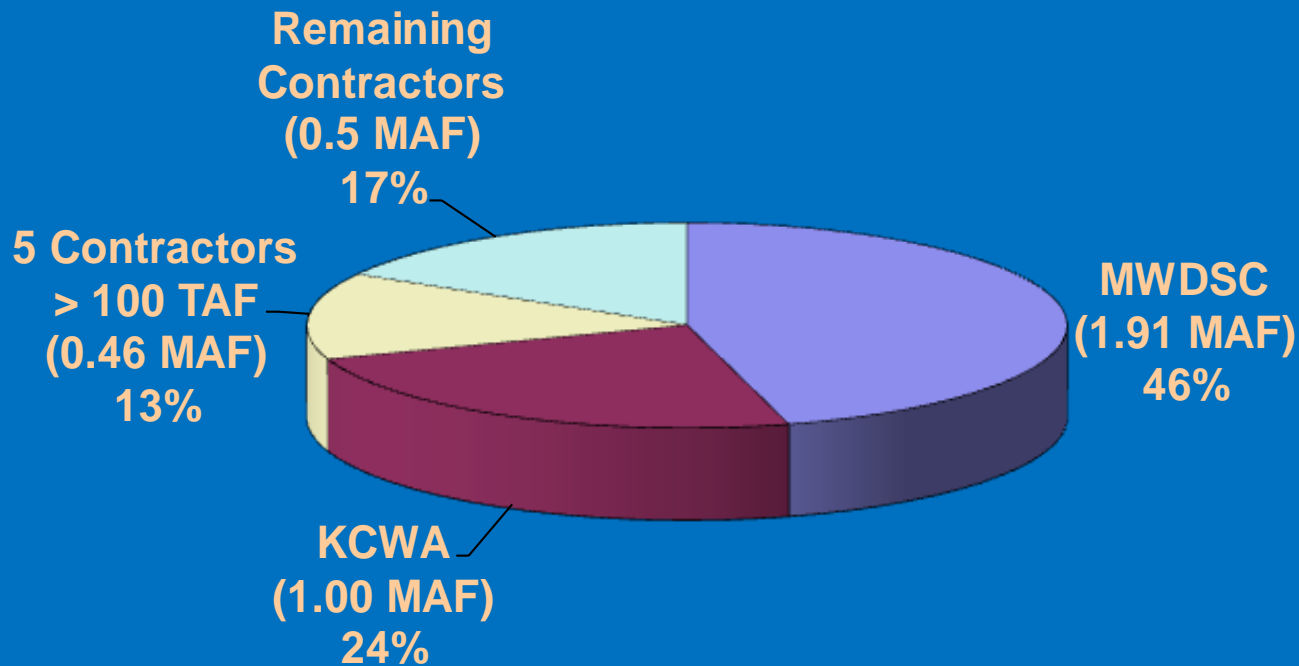




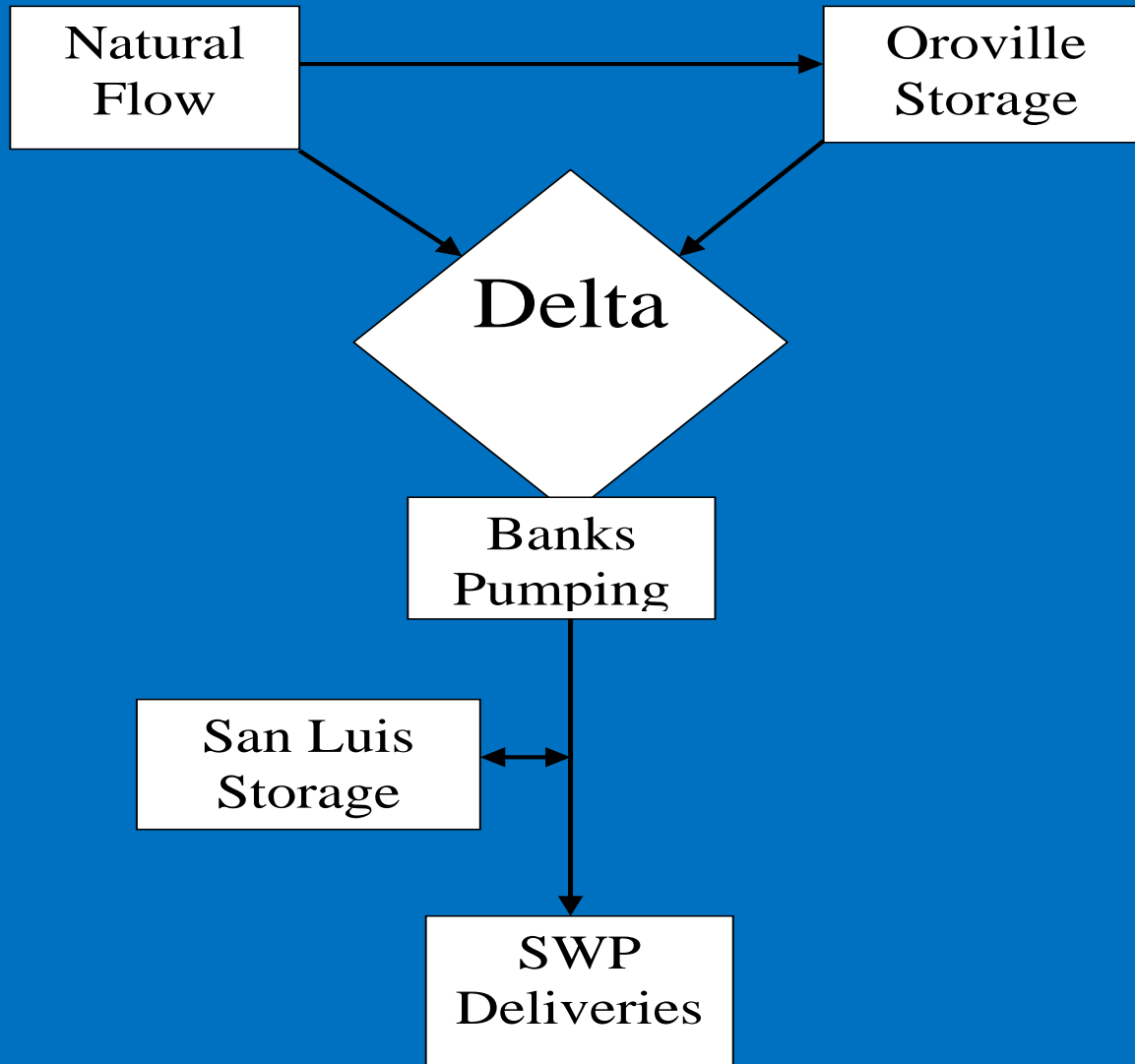
**State Water Project Contractors Service Areas**

- 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)



# SWP Supply and Deliveries



# Challenges to SWP Deliveries

- Variable Hydrology

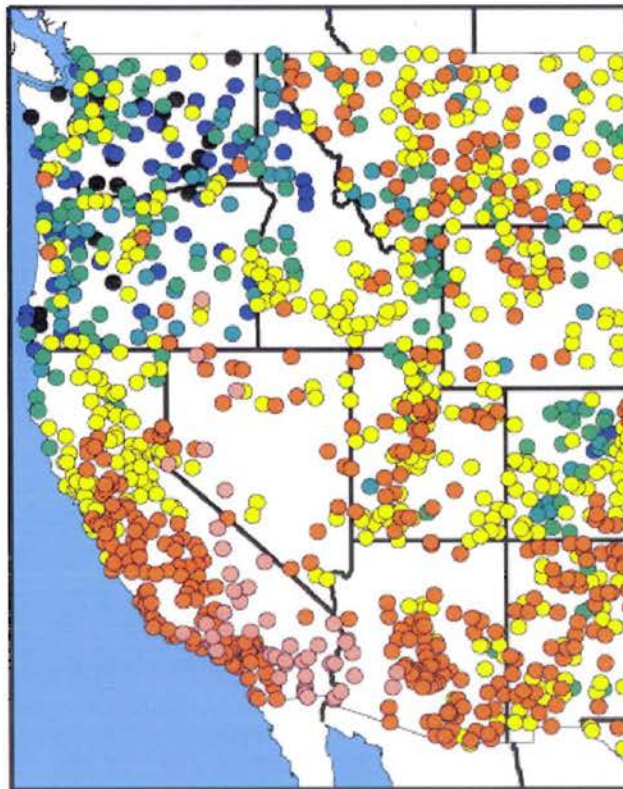


- Delta Constraints

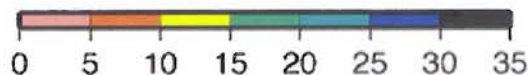


# Storms and California Water Supply

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



days/year

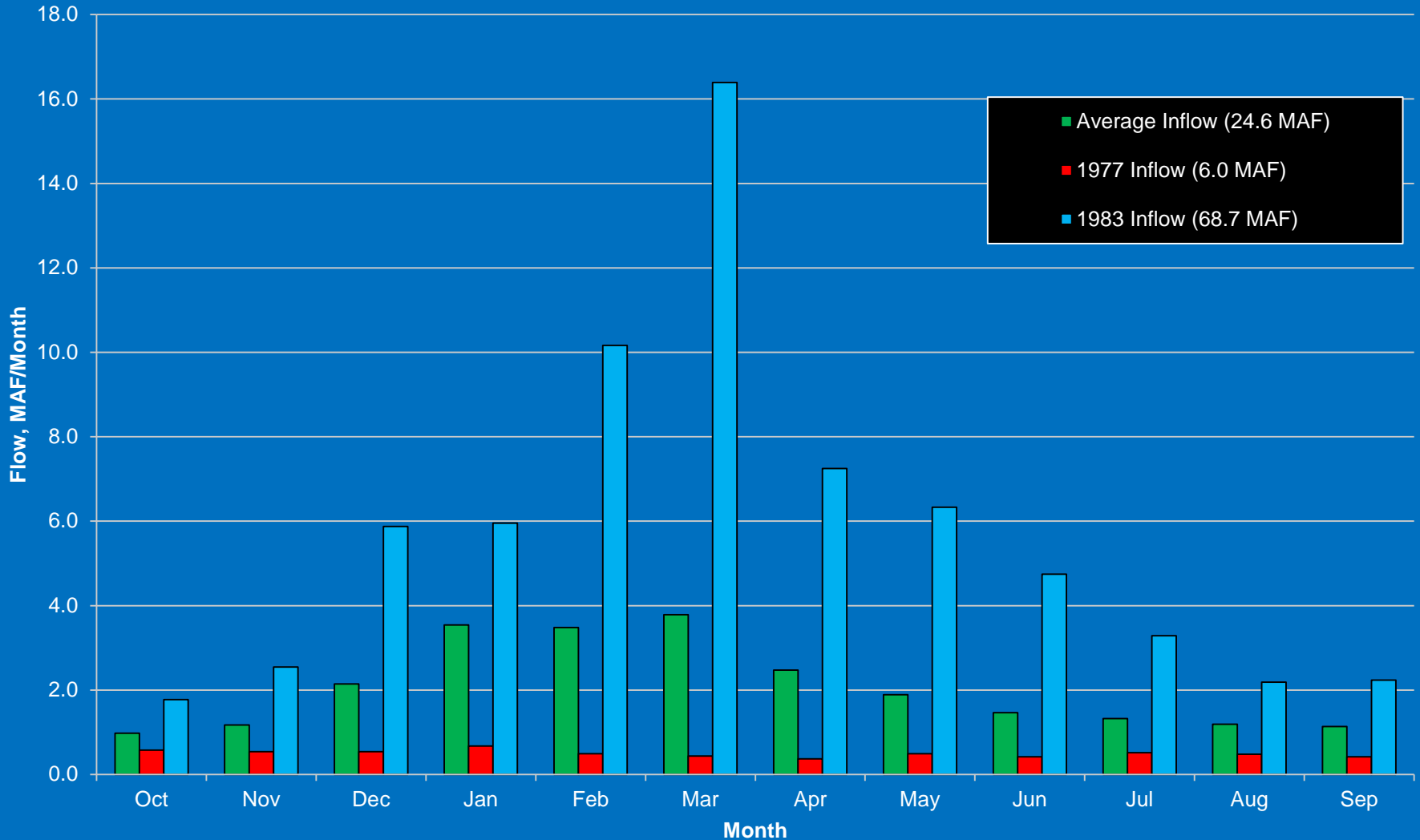


Just a few storms each year are the core of California's water supplies

Dettinger et al, 2011

# Variability of Runoff

## Delta Inflow (WY 1970-2011)

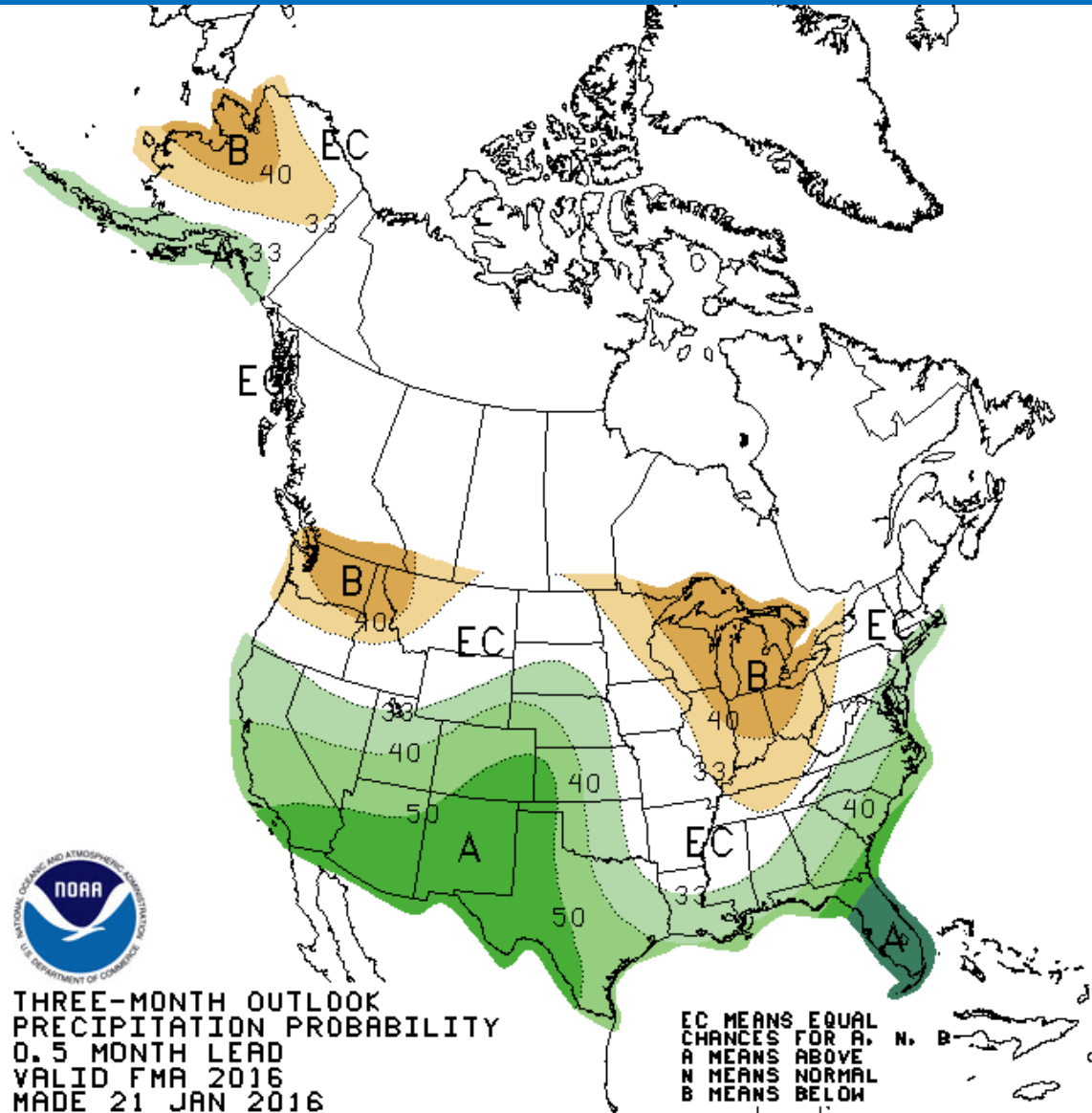


# 2016 Hydrology



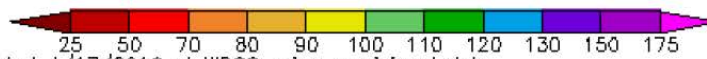
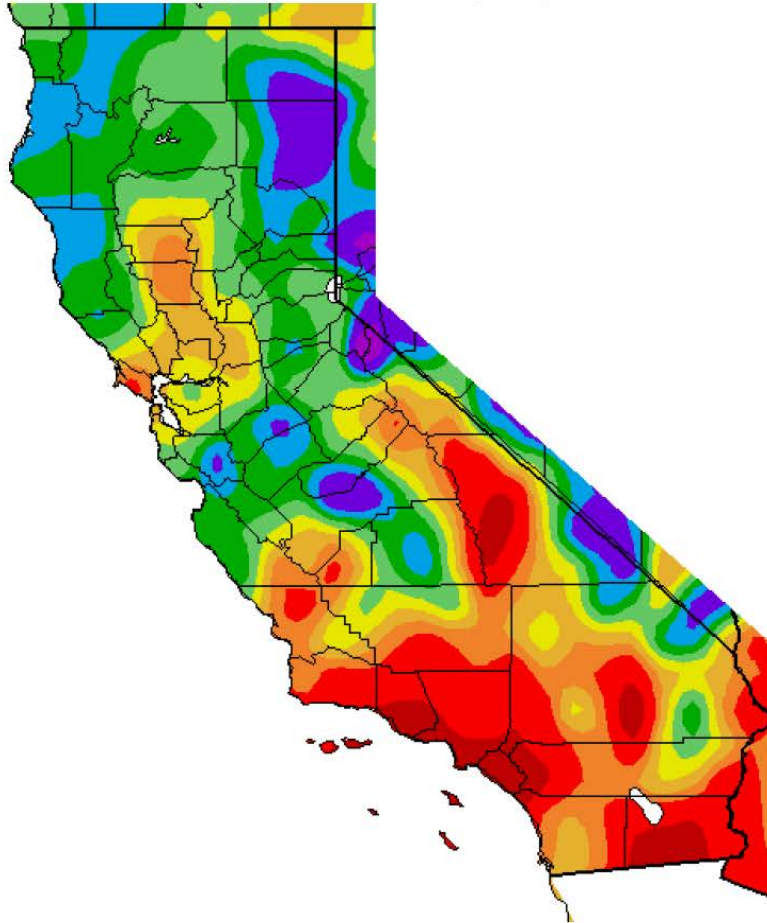


# El Niño Expectations



# Observations

Percent of Average Precipitation (%)  
10/1/2015 - 4/16/2016

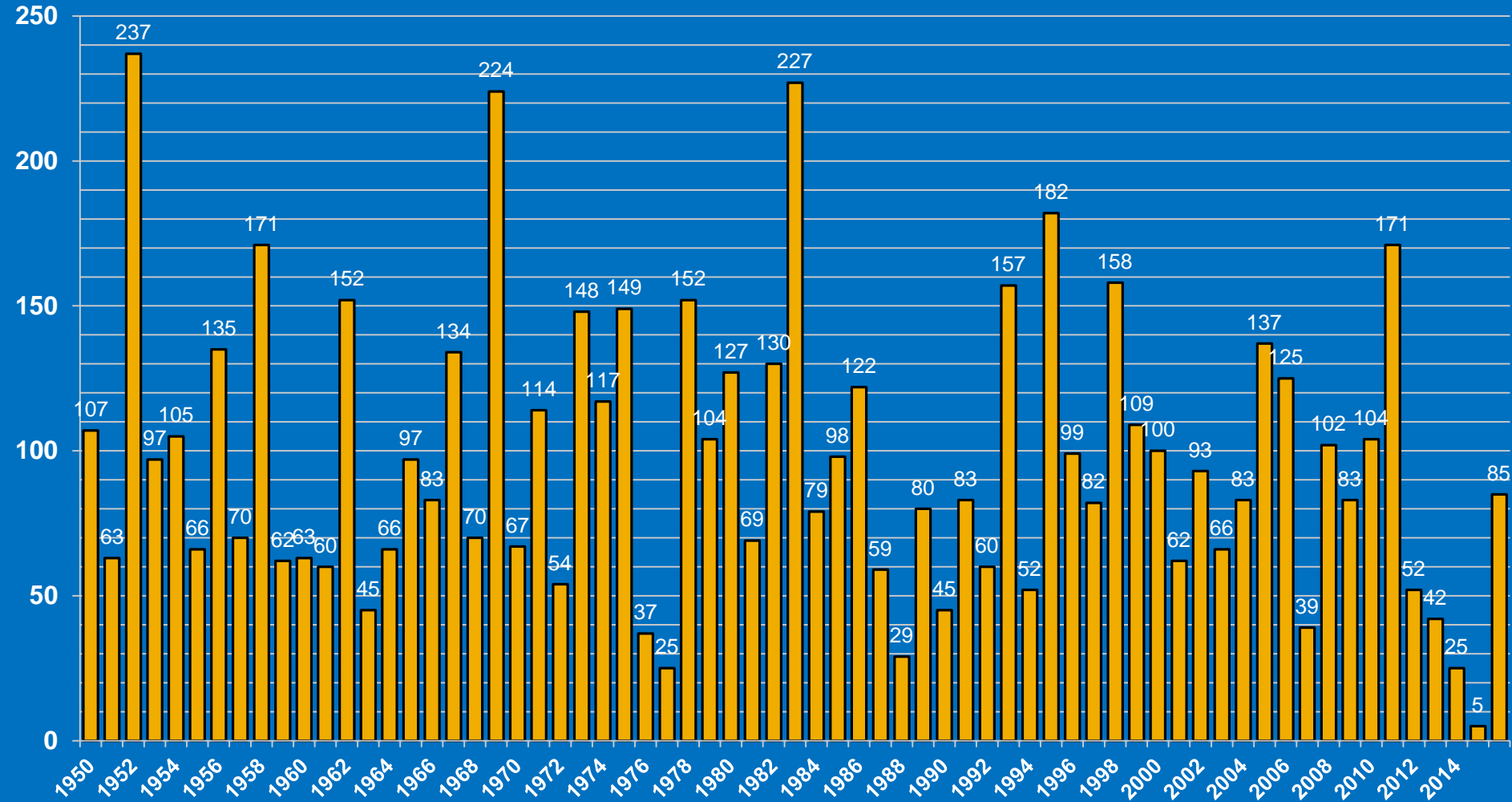


Generated 4/17/2016 at WRCC using provisional data.  
NOAA Regional Climate Centers

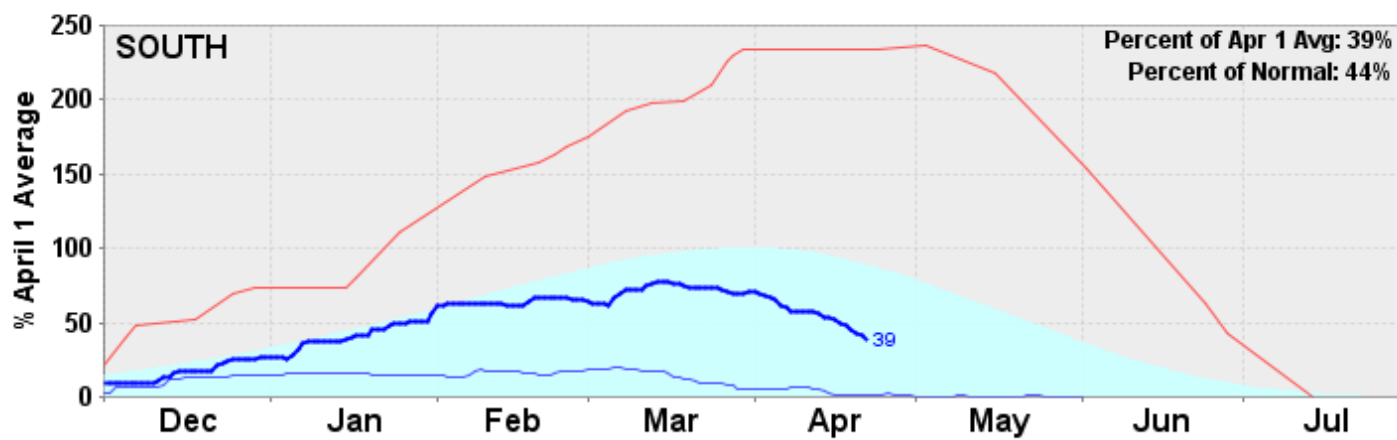
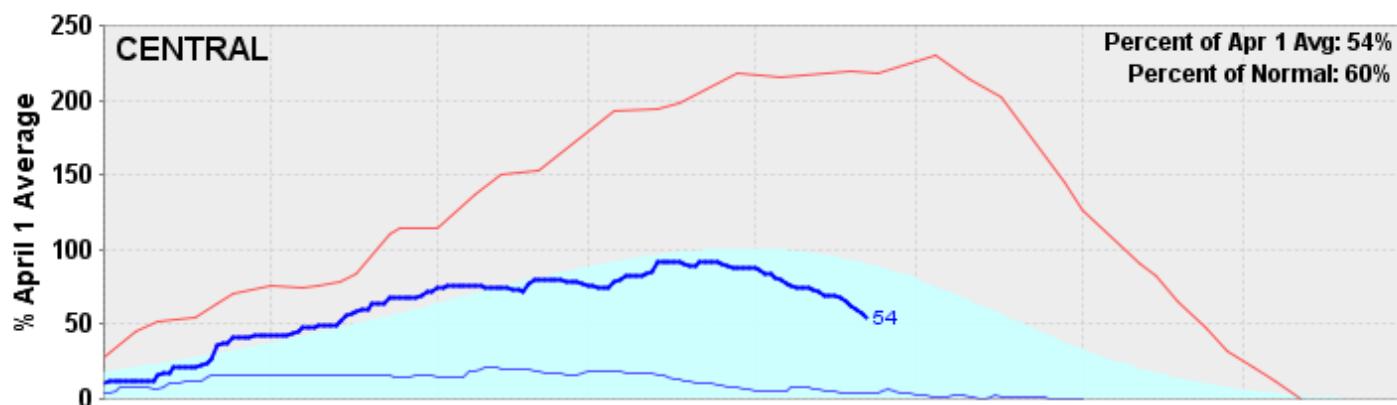
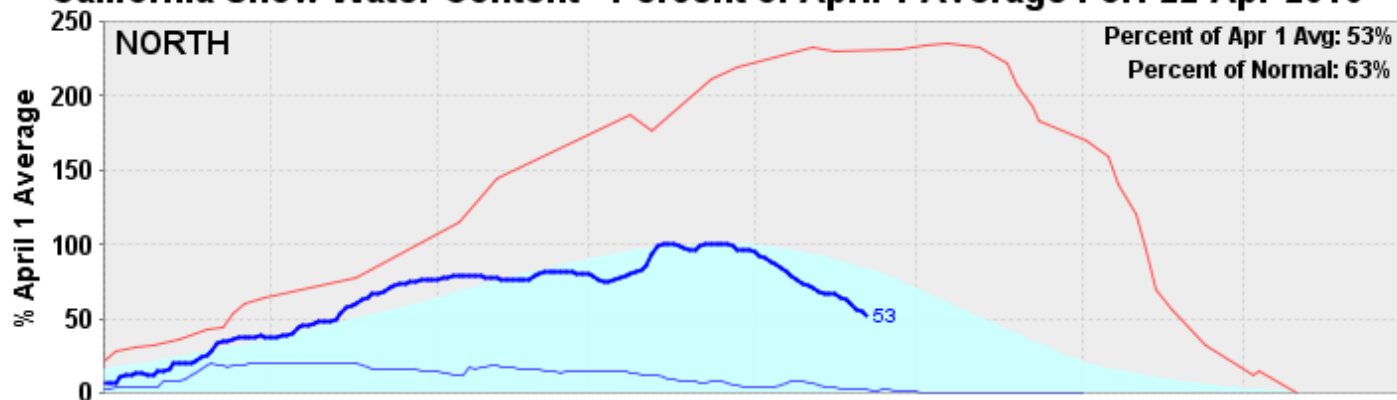
<http://www.wrcc.dri.edu/cgi-bin/anomimage.pl?calOctPpct.gif>

# April 1 Snowpack Water Content

## Statewide Percent of Average



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



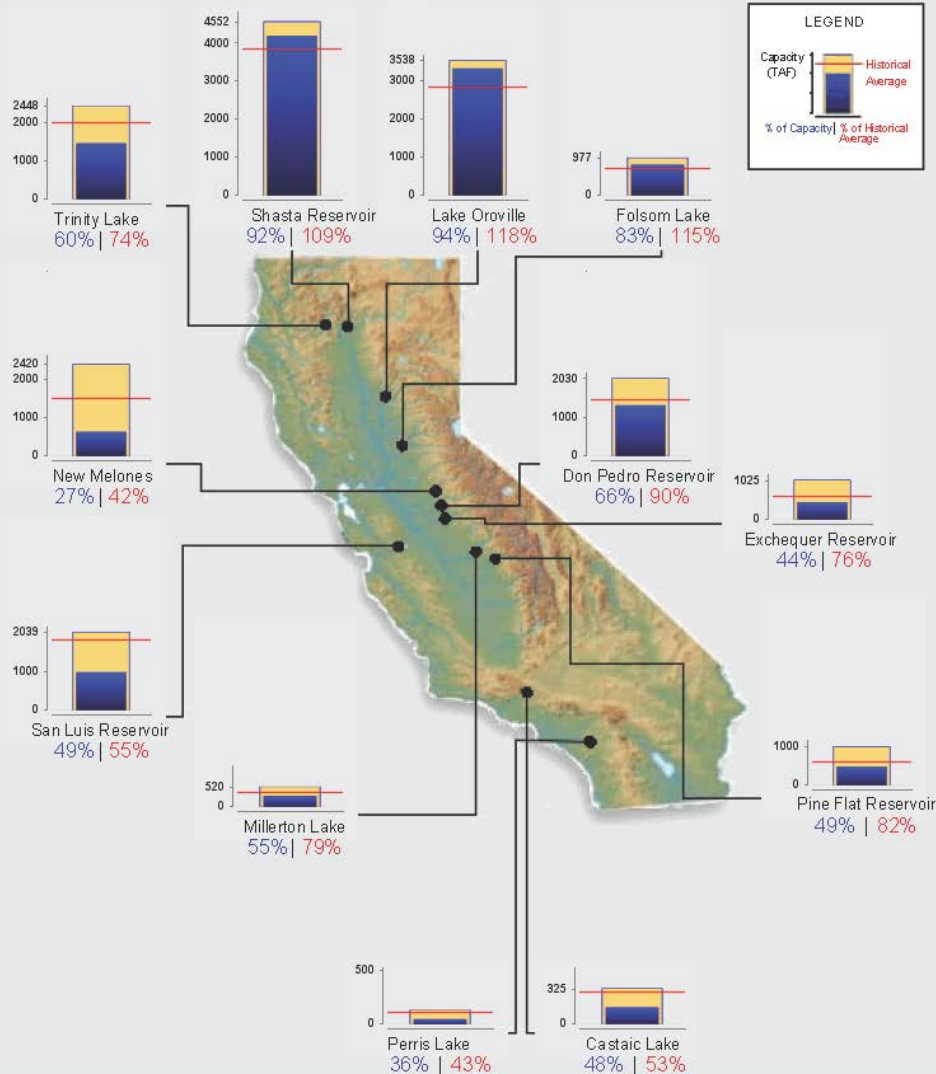
Average — 1982-1983 (max) — 2014-2015 (min) — 2015-2016 (current)



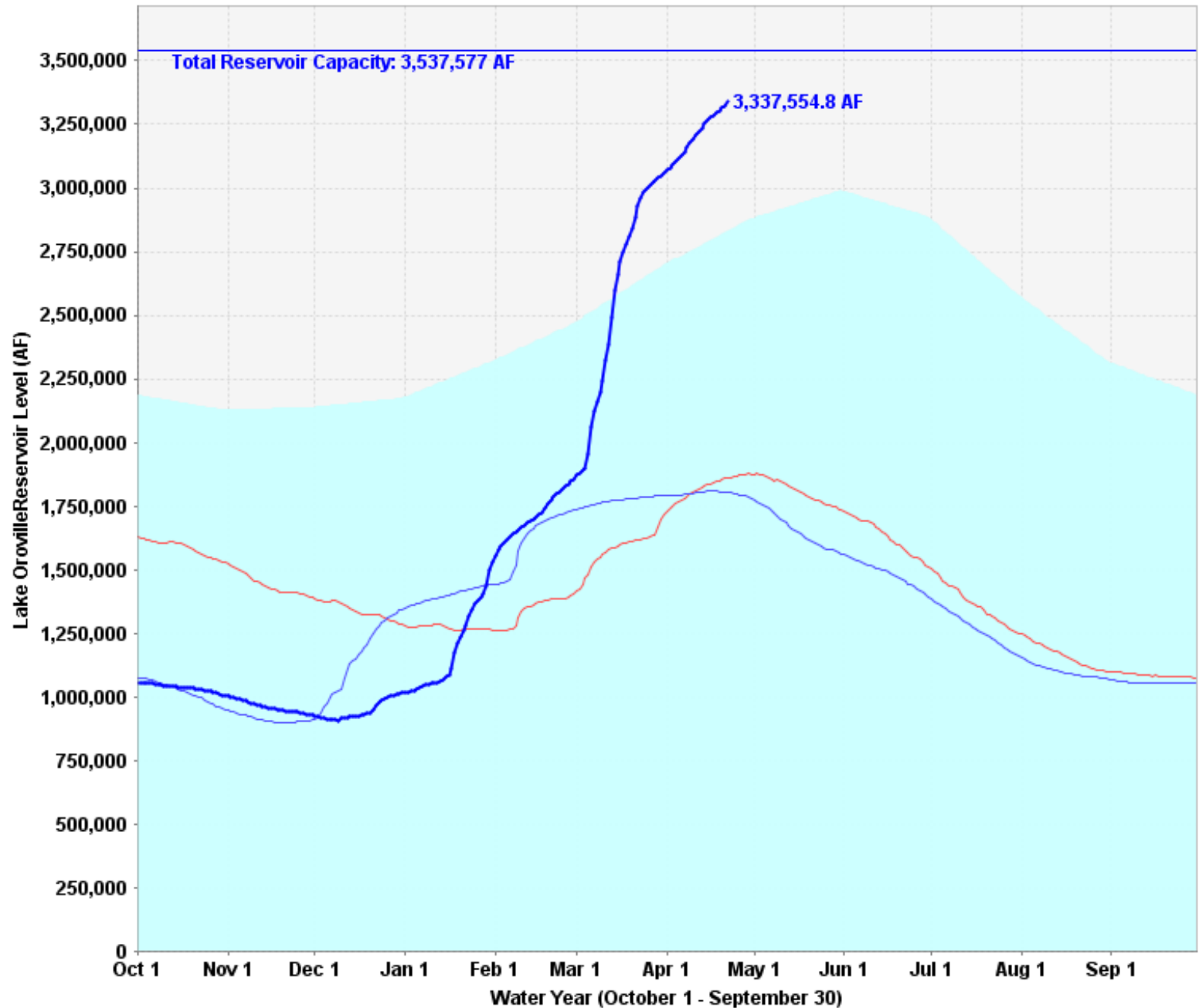
# Reservoir Conditions

Ending At Midnight - April 22, 2016

## CURRENT RESERVOIR CONDITIONS

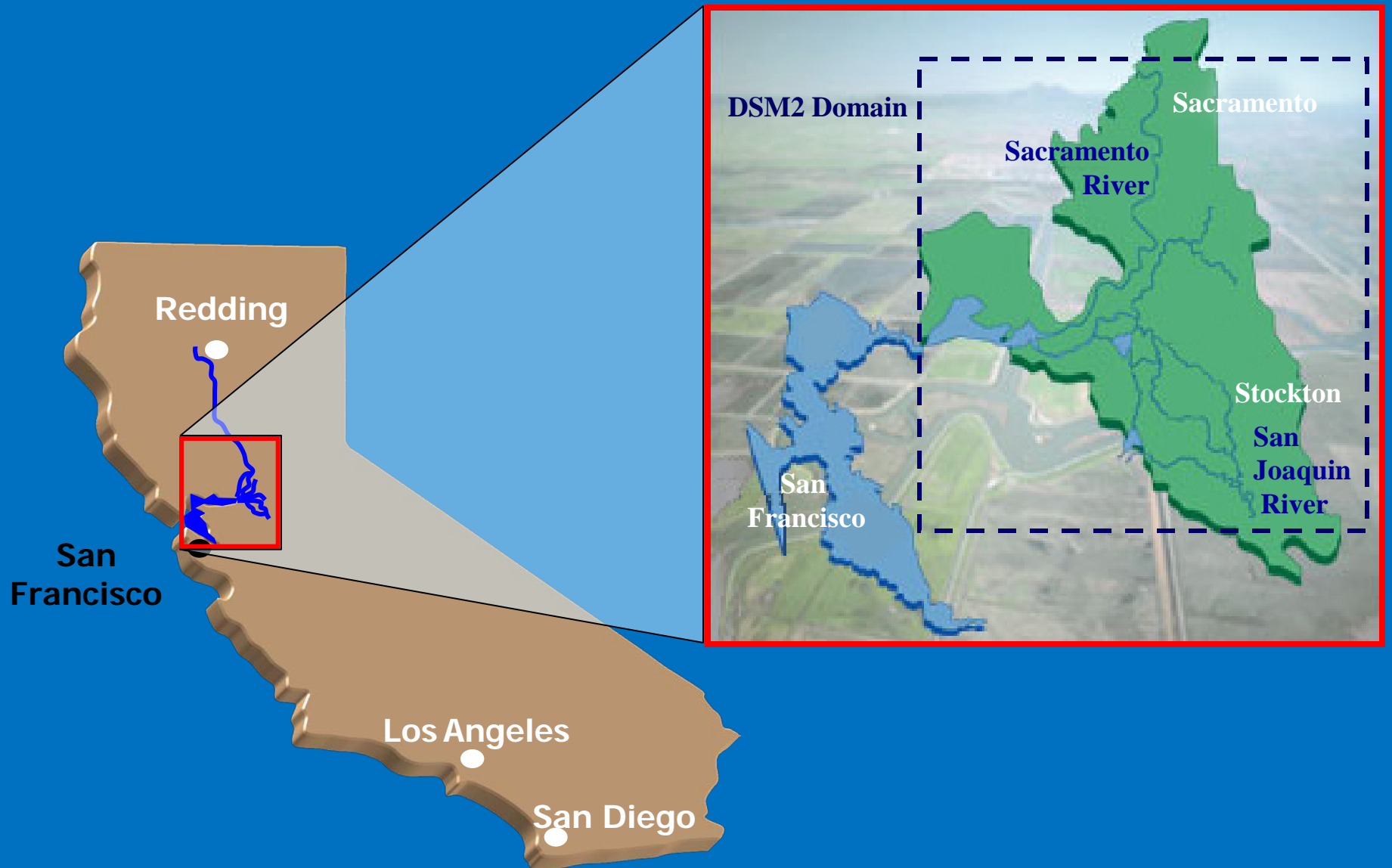


# Lake Oroville Storage Levels



Historical Average — Total Reservoir Capacity — 2013-2014 — 2014-2015 — 2015-2016(current)

# Delta Restrictions



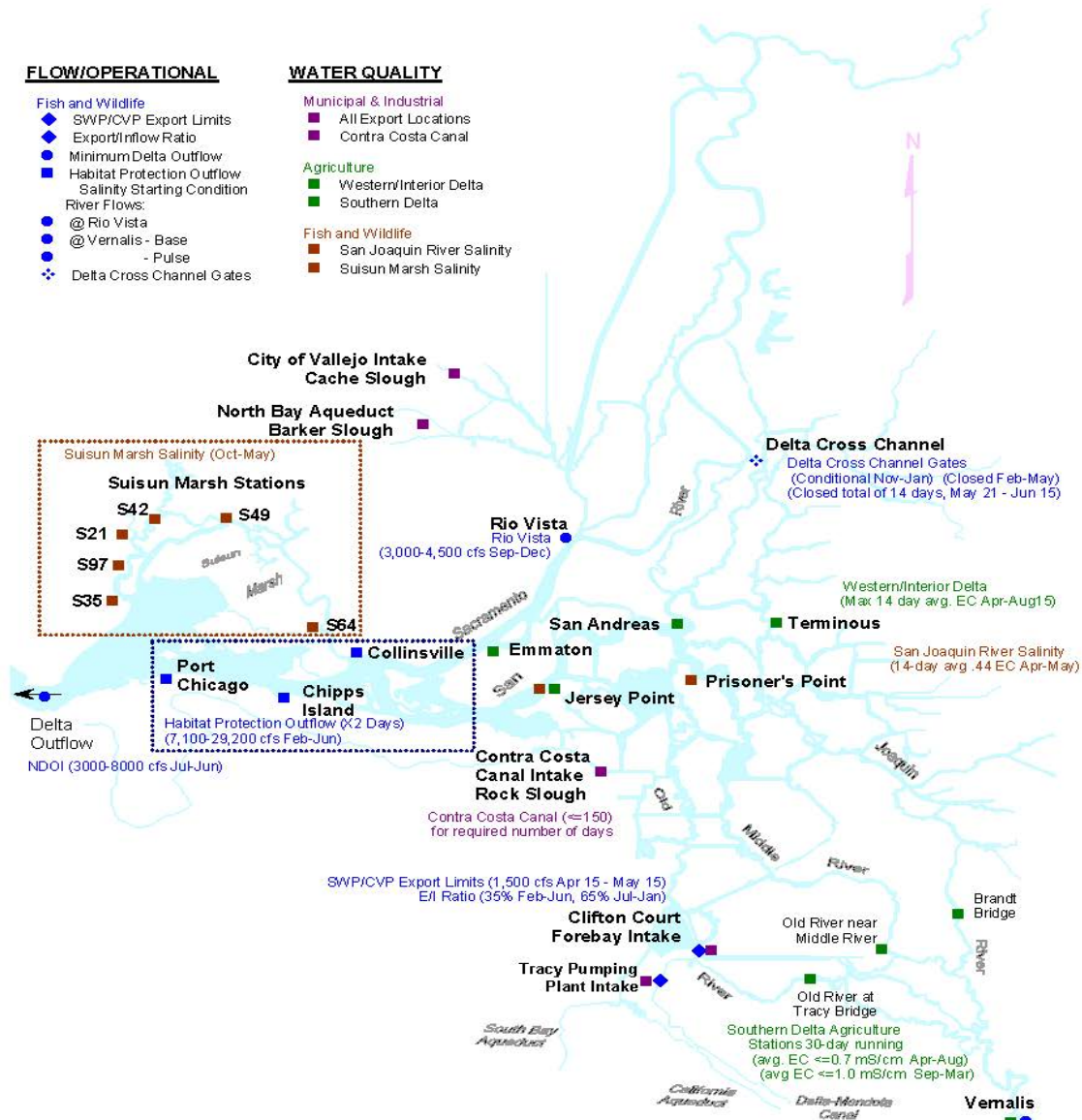
# D-1641 BAY-DELTA STANDARDS STATIONS

## FLOW/OPERATIONAL

- Fish and Wildlife
- ◆ SWP/CVP Export Limits
- ◆ Export/Inflow Ratio
- Minimum Delta Outflow
- Habitat Protection Outflow
- Salinity Starting Condition
- River Flows:
- @ Rio Vista
- @ Vernalis - Base
- - Pulse
- ◆ Delta Cross Channel Gates

## WATER QUALITY

- Municipal & Industrial
- All Export Locations
- Contra Costa Canal
- Agriculture
- Western/Interior Delta
- Southern Delta
- Fish and Wildlife
- San Joaquin River Salinity
- Suisun Marsh Salinity





# 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



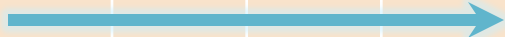
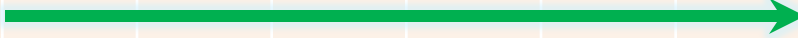


<b>Fish and Wildlife</b>												
SWP/CVP Export Limits					1,500cfs [1]							
Export/Inflow Ratio [2]	65%		35% of Delta Inflow [3]					65% of Delta Inflow				
Minimum Delta Outflow	[4]							3,000 - 8,000 cfs [4]				
Habitat Protection Outflow			7,100 - 29,200 cfs [5]									
Salinity Starting Condition [6]		[6]										
River Flows:												
@ Rio Vista									3,000 - 4,500 cfs [7]			
@ Vernalis - Base			710 - 3,420 cfs [8]			[8]						
- Pulse					[9]				+28TAF			
Delta Cross Channel Gates	[10]		Closed			[11]					Conditional [10]	

## WATER QUALITY STANDARDS

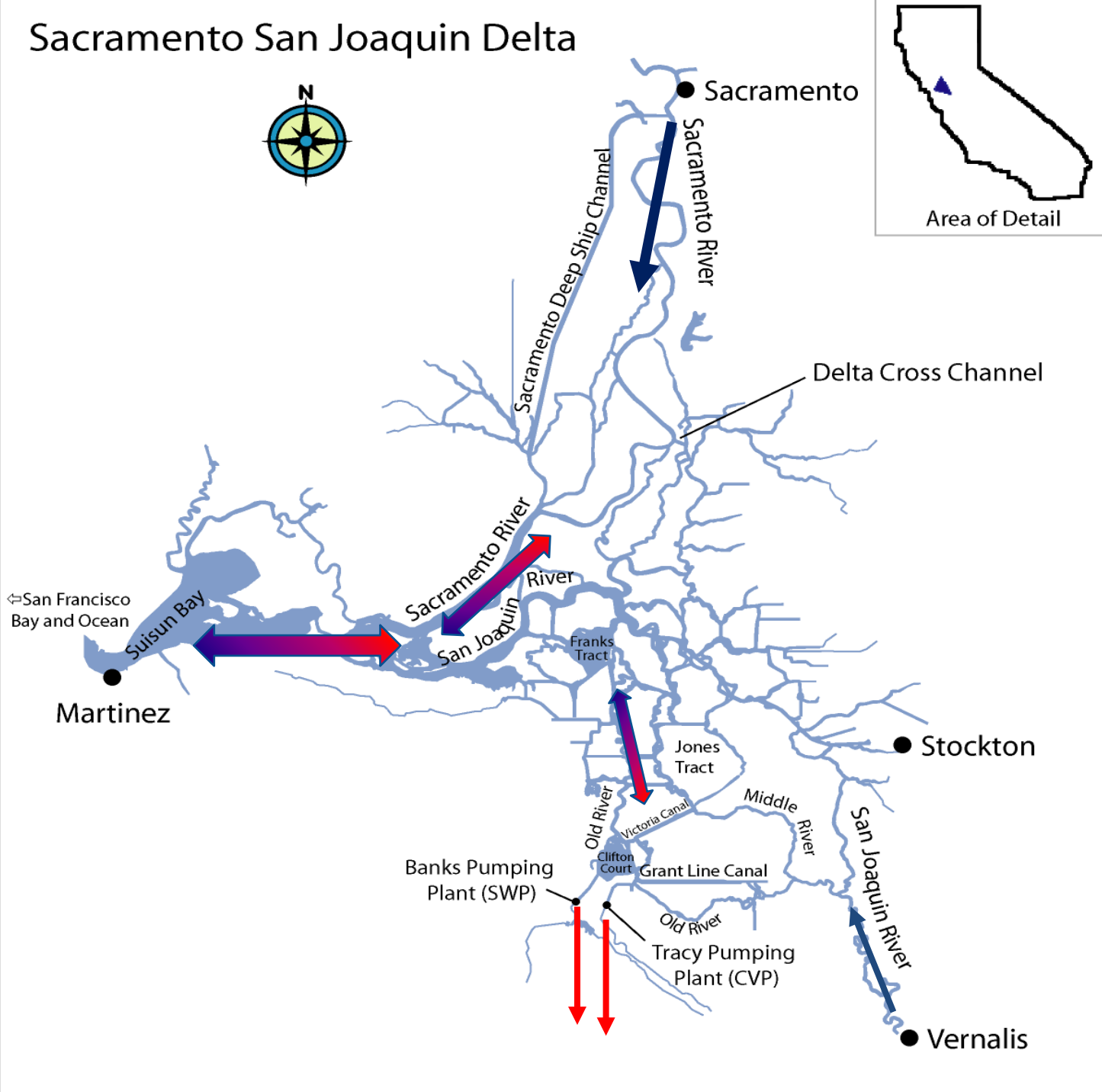
<b>Municipal and Industrial</b>												
All Export Locations									≤ 250 mg/l Cl			
Contra Costa Canal									150 mg/l Cl for the required number of days [12]			
<b>Agriculture</b>												
Western/Interior Delta									Max. 14-day average EC mmhos/cm [13]			
Southern Delta [14]		1.0 mS				30 day running avg EC 0.7 mS				1.0 mS		
<b>Fish and Wildlife -</b>												
San Joaquin River Salinity [15]						14-day avg: 0.44 EC						
Suisun Marsh Salinity [16]	12.5 EC	8.0 EC			11.0 EC					19.0 EC	[17]	15.5 EC

[#] See Footnotes

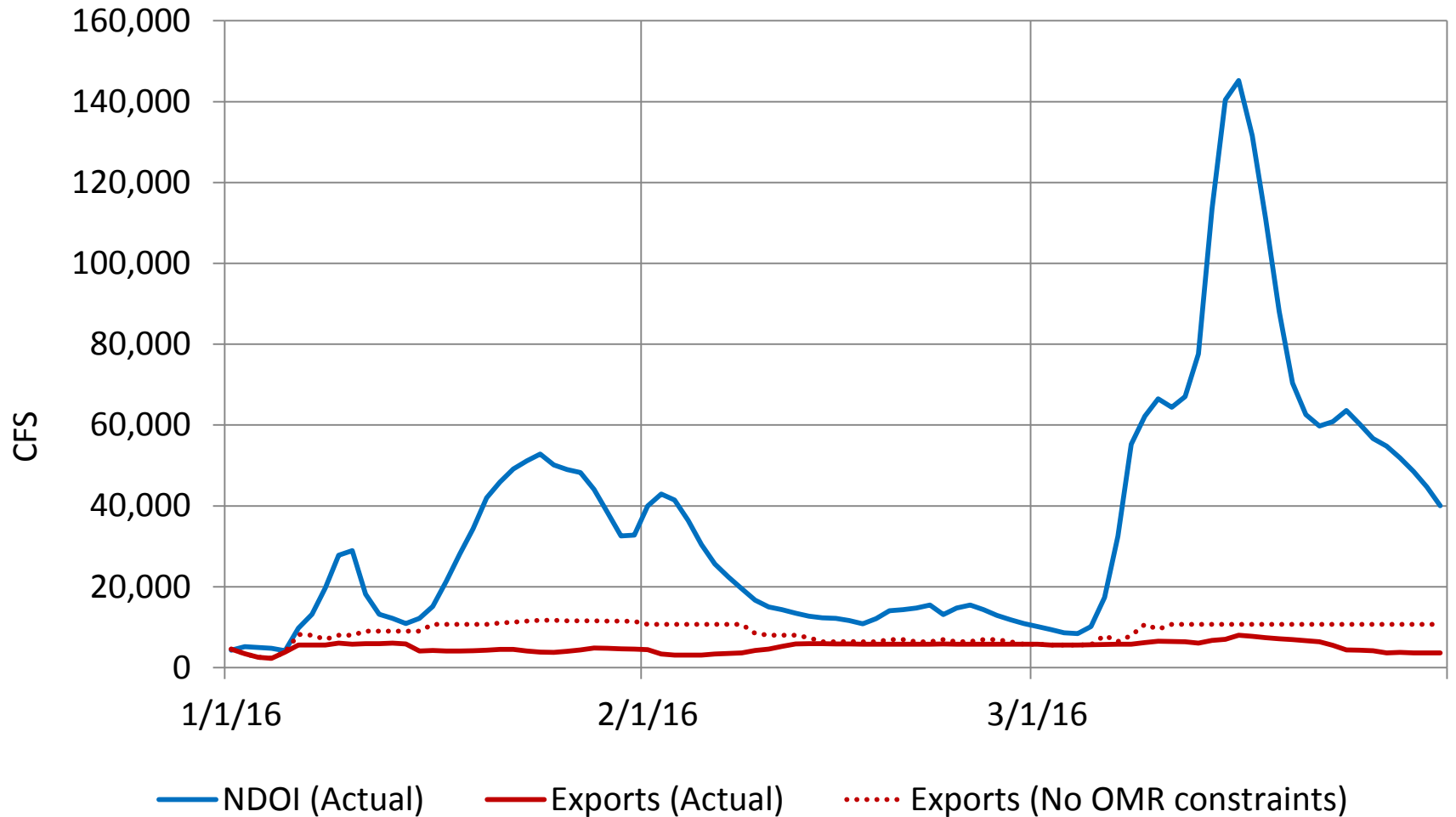
# Biological Opinion Actions

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
FWS A-1												
			<i>delta smelt first flush - OMR</i>									
FWS A-2												
			<i>delta smelt adults - OMR</i>									
FWS A-3												
						<i>delta smelt juveniles - OMR</i>						
NMF S IV.1.2												
			<i>salmon DCC gate closure</i>									
NMF S IV.2.3												
			<i>salmon out-migration - OMR</i>									
NMF S IV.2.1												
						<i>steelhead out-migration - SJR I/E</i>						

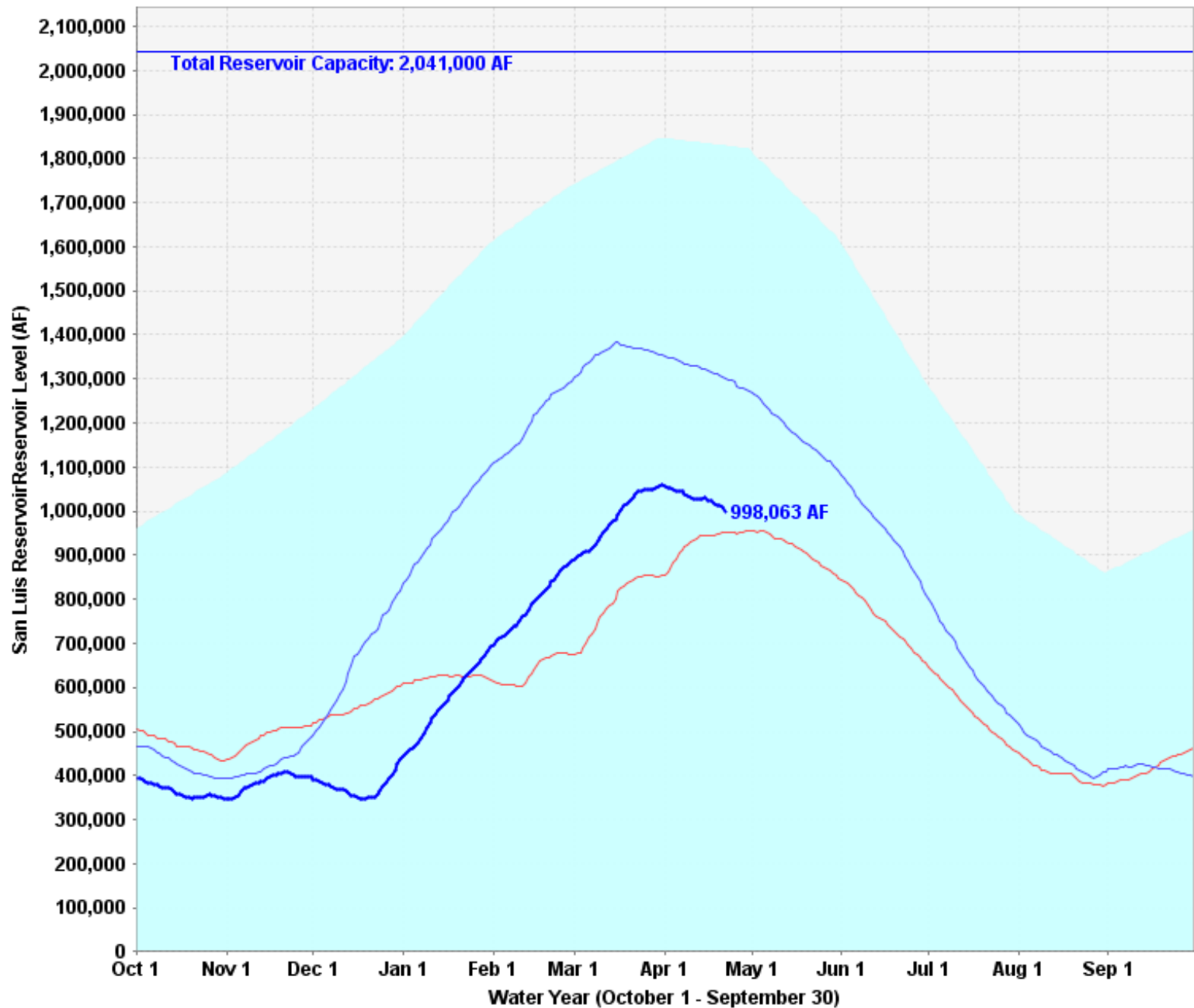
# Sacramento San Joaquin Delta



# OMR Flow Regulation Effect on Exports

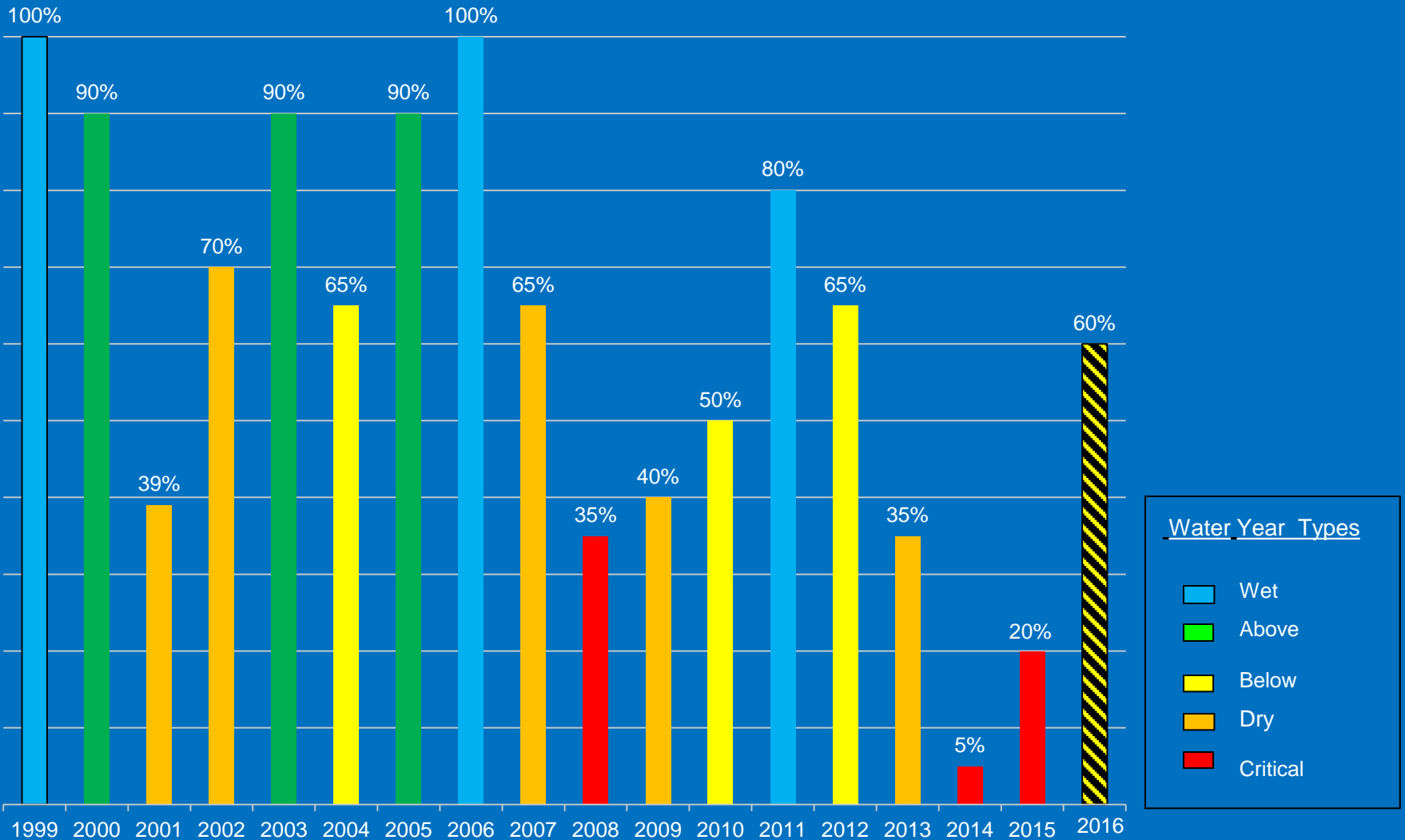


# San Luis Reservoir Storage Levels



Historical Average — Total Reservoir Capacity — 2013-2014 — 2014-2015 — 2015-2016(current)

# SWP Allocation of Recent Years



# Questions?



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