

# CVP and SWP Operations Drought Update State Water Resource Control Board

*DROUGHT RESPONSE ACTIVITIES*



April 19, 2016

# Hydrologic Conditions Update

*(as of April 18, 2016)*

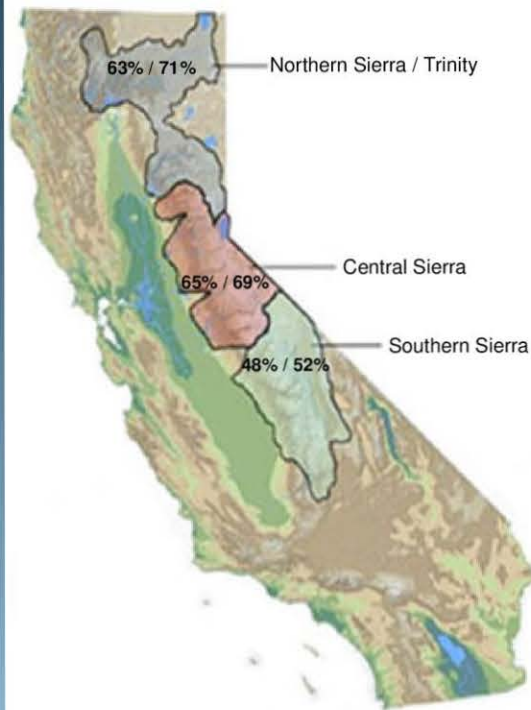
**Arthur Hinojosa, Chief**  
**Division of Integrated Water Management**  
**Department of Water Resources**  
**916-653-4736 or [hinojosa@water.ca.gov](mailto:hinojosa@water.ca.gov)**



# Statewide Summary of Snow Water Content

## Current Regional Snowpack from Automated Snow Sensors

% of April 1 Average / % of Normal for This Date



NORTH	
Data as of April 18, 2016	
Number of Stations Reporting	26
Average snow water equivalent (Inches)	18.0
Percent of April 1 Average (%)	63
Percent of normal for this date (%)	71

CENTRAL	
Data as of April 18, 2016	
Number of Stations Reporting	40
Average snow water equivalent (Inches)	18.8
Percent of April 1 Average (%)	65
Percent of normal for this date (%)	69

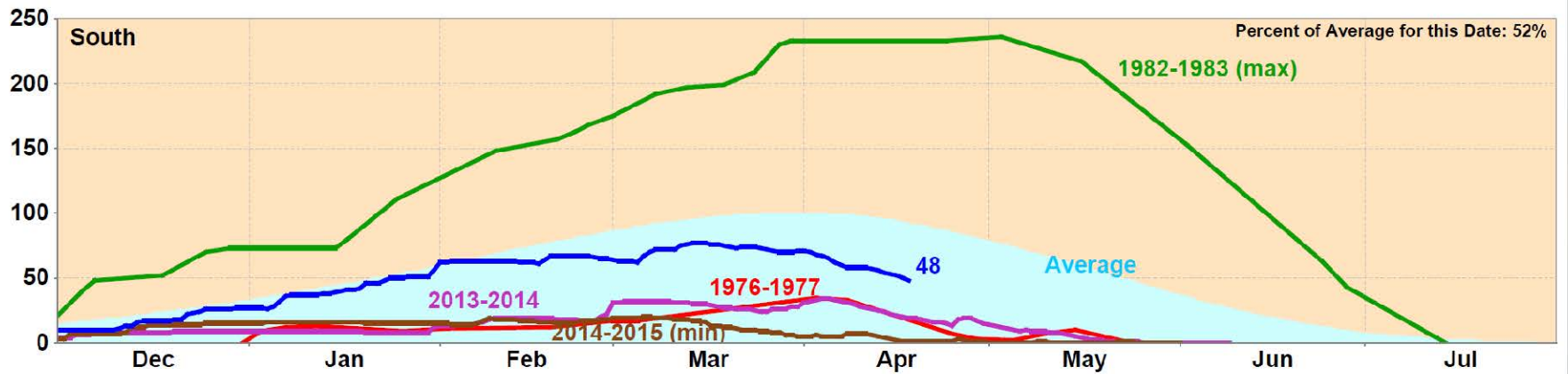
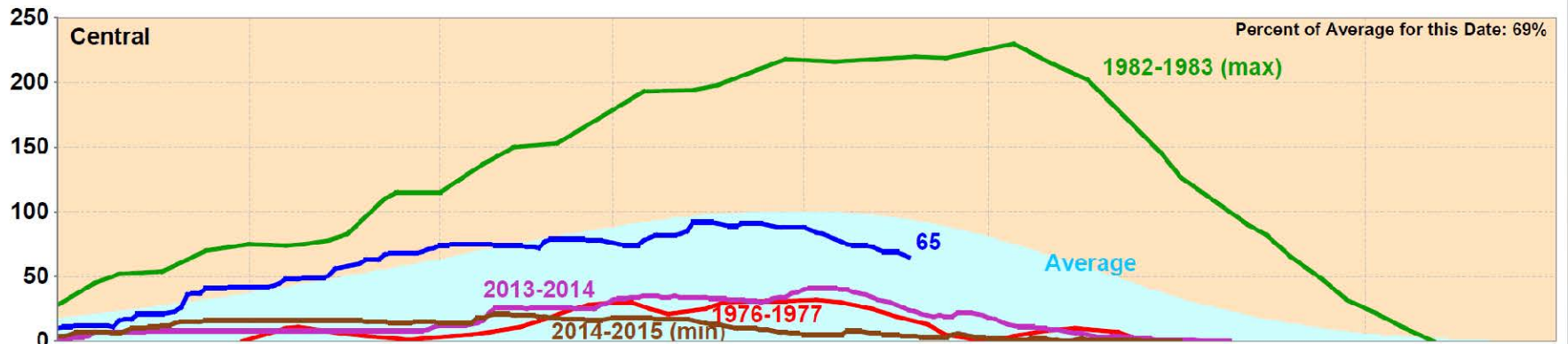
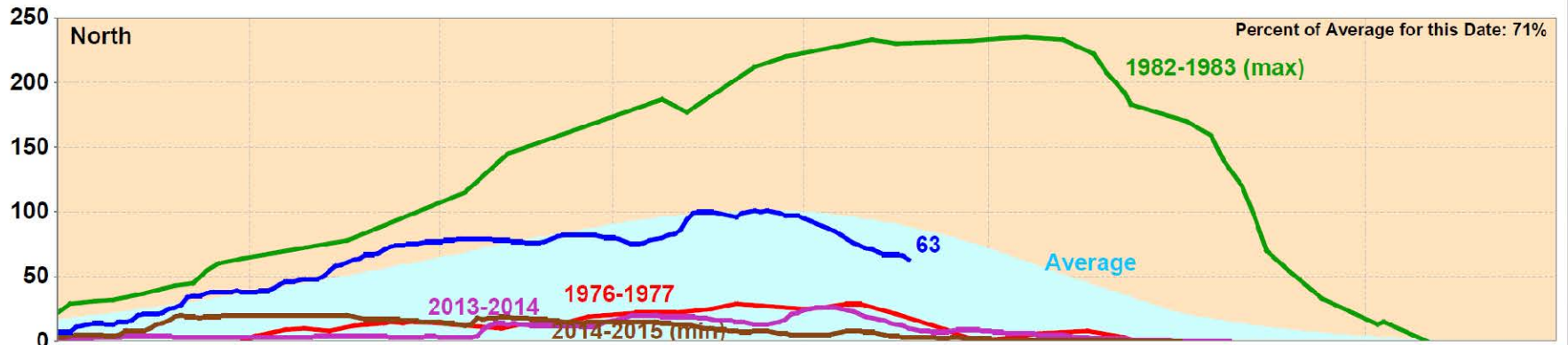
SOUTH	
Data as of April 18, 2016	
Number of Stations Reporting	28
Average snow water equivalent (Inches)	13.0
Percent of April 1 Average (%)	48
Percent of normal for this date (%)	52

STATE	
Data as of April 18, 2016	
Number of Stations Reporting	94
Average snow water equivalent (Inches)	16.9
Percent of April 1 Average (%)	60
Percent of normal for this date (%)	65

**Statewide Average: 60% / 65%**

Data as of April 18, 2016

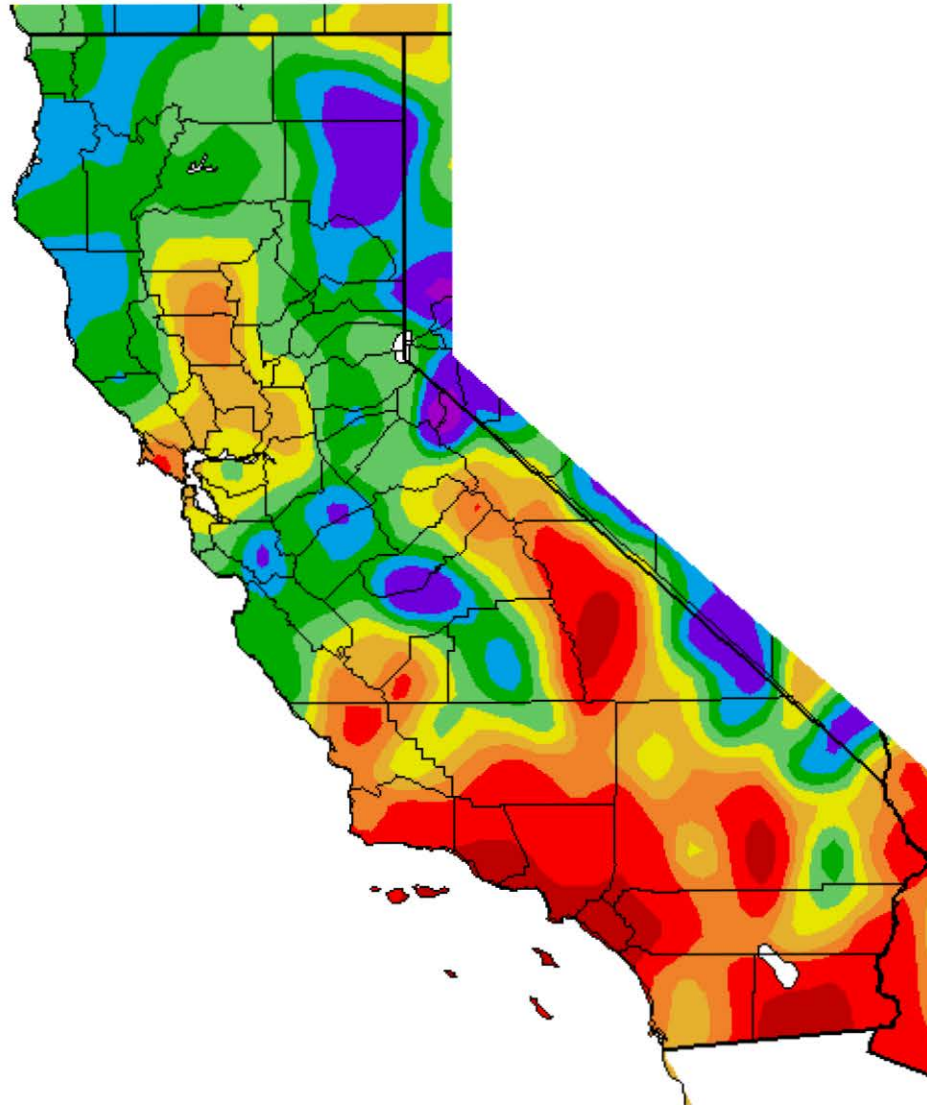
# California Snow Water Content, April 18, 2016, Percent of April 1 Average



Statewide Percent of April 1: 60%

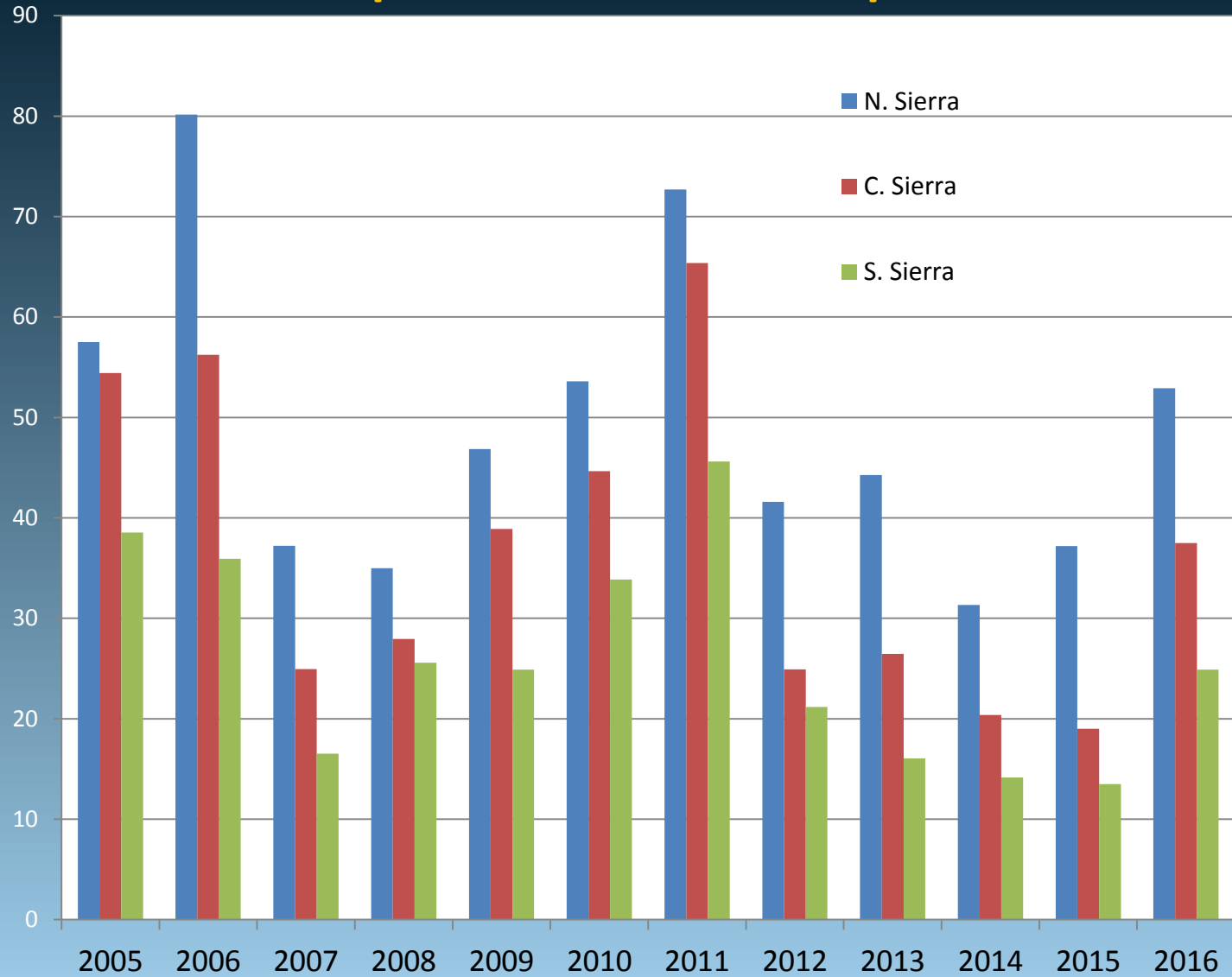
Statewide Percent of Average for Date: 65%

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

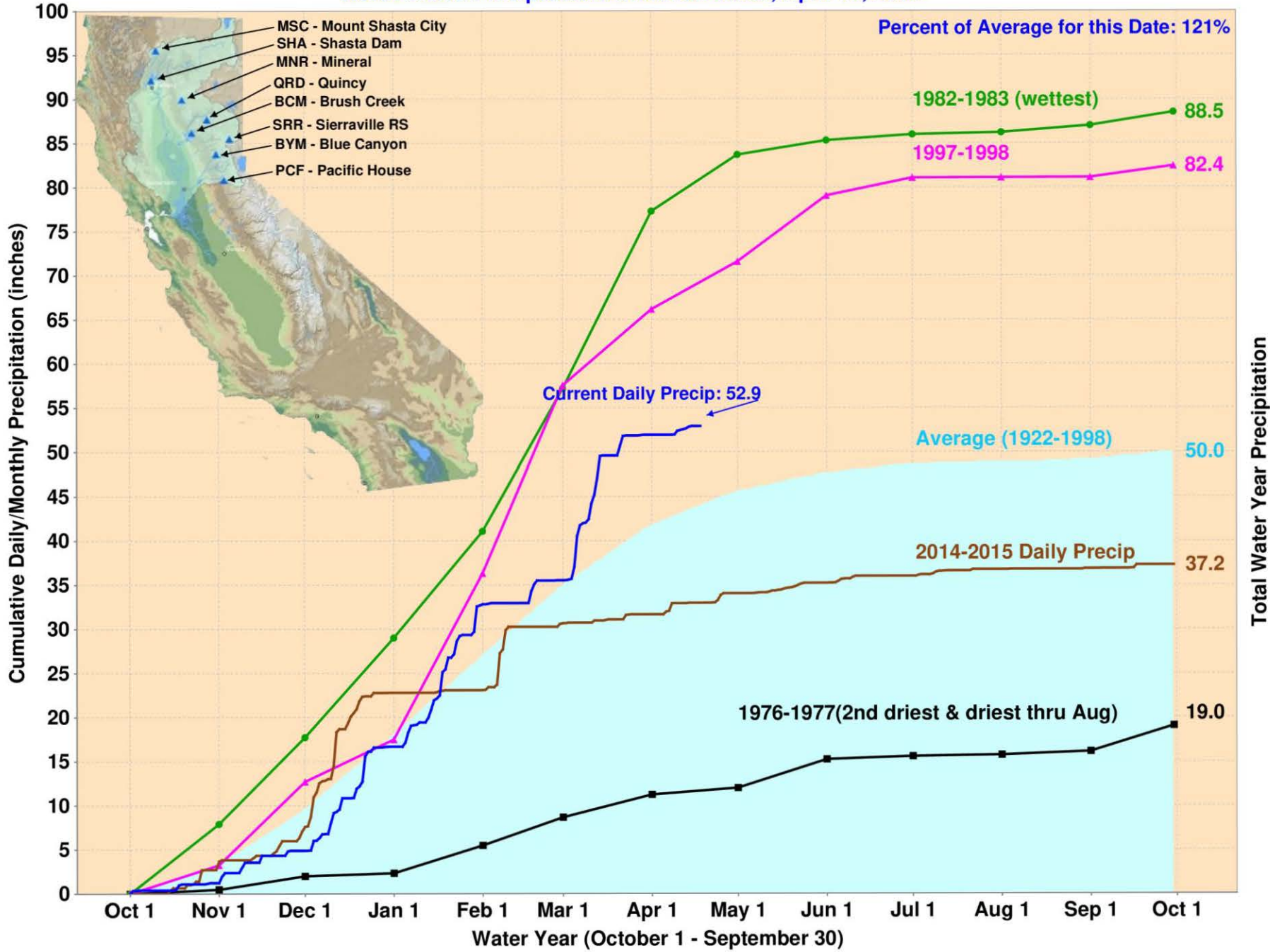


Generated 4/17/2016 at WRCC using provisional data.  
NOAA Regional Climate Centers

# Precipitation Indices 2005-present



# North Sierra Precipitation: 8-Station Index, April 18, 2016



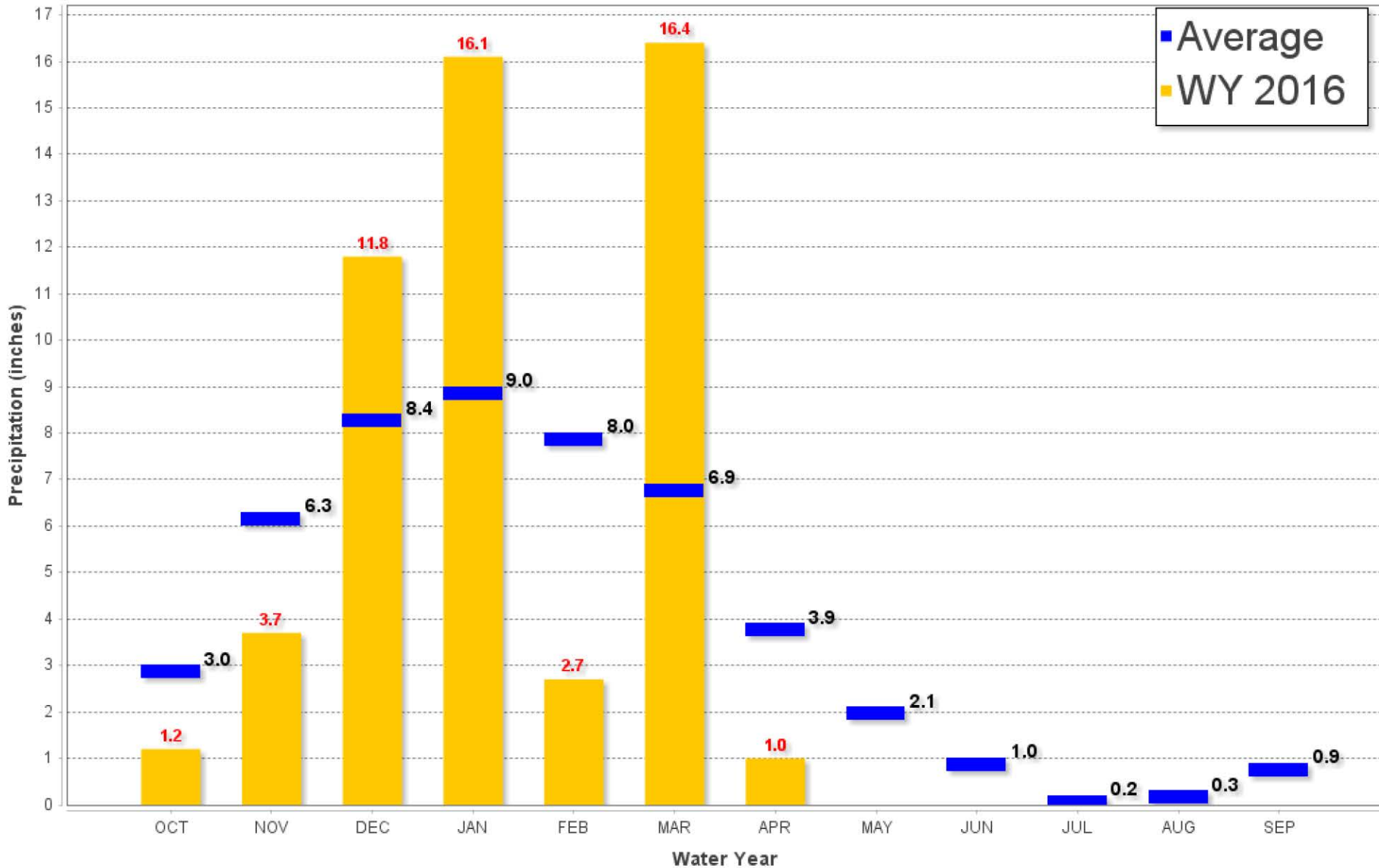


# Northern Sierra 8-Station

## Precipitation Index for Water Year 2016 - Updated on April 18, 2016 08:45 AM

Note: Monthly totals may not add up to seasonal total because of rounding

Water Year Monthly totals are calculated based on Daily precipitation data from 12am to 12am PST

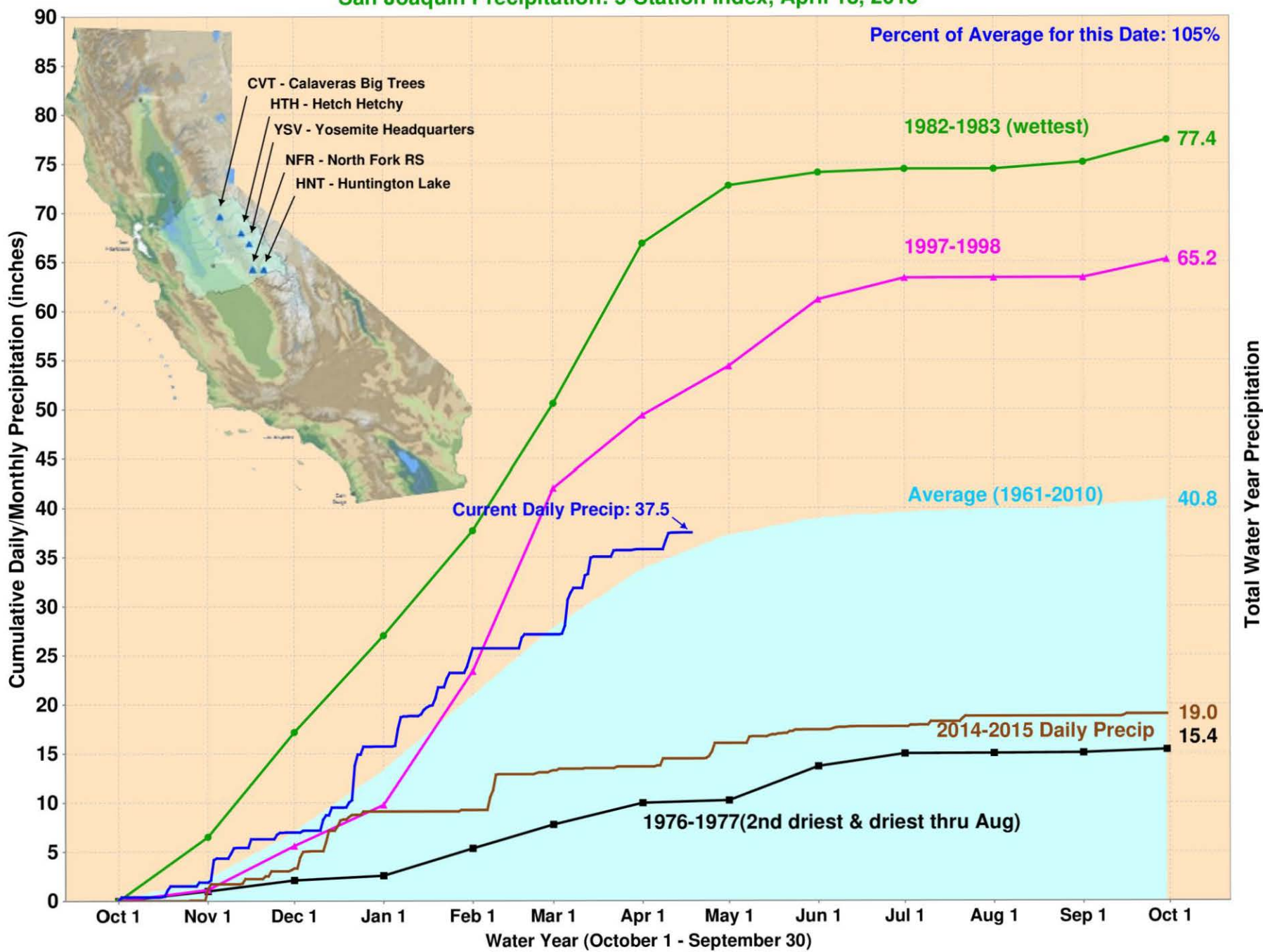




# San Joaquin Precipitation: 5-Station Index, April 18, 2016

Percent of Average for this Date: 105%

- CVT - Calaveras Big Trees
- HTH - Hetch Hetchy
- YSV - Yosemite Headquarters
- NFR - North Fork RS
- HNT - Huntington Lake



Total Water Year Precipitation

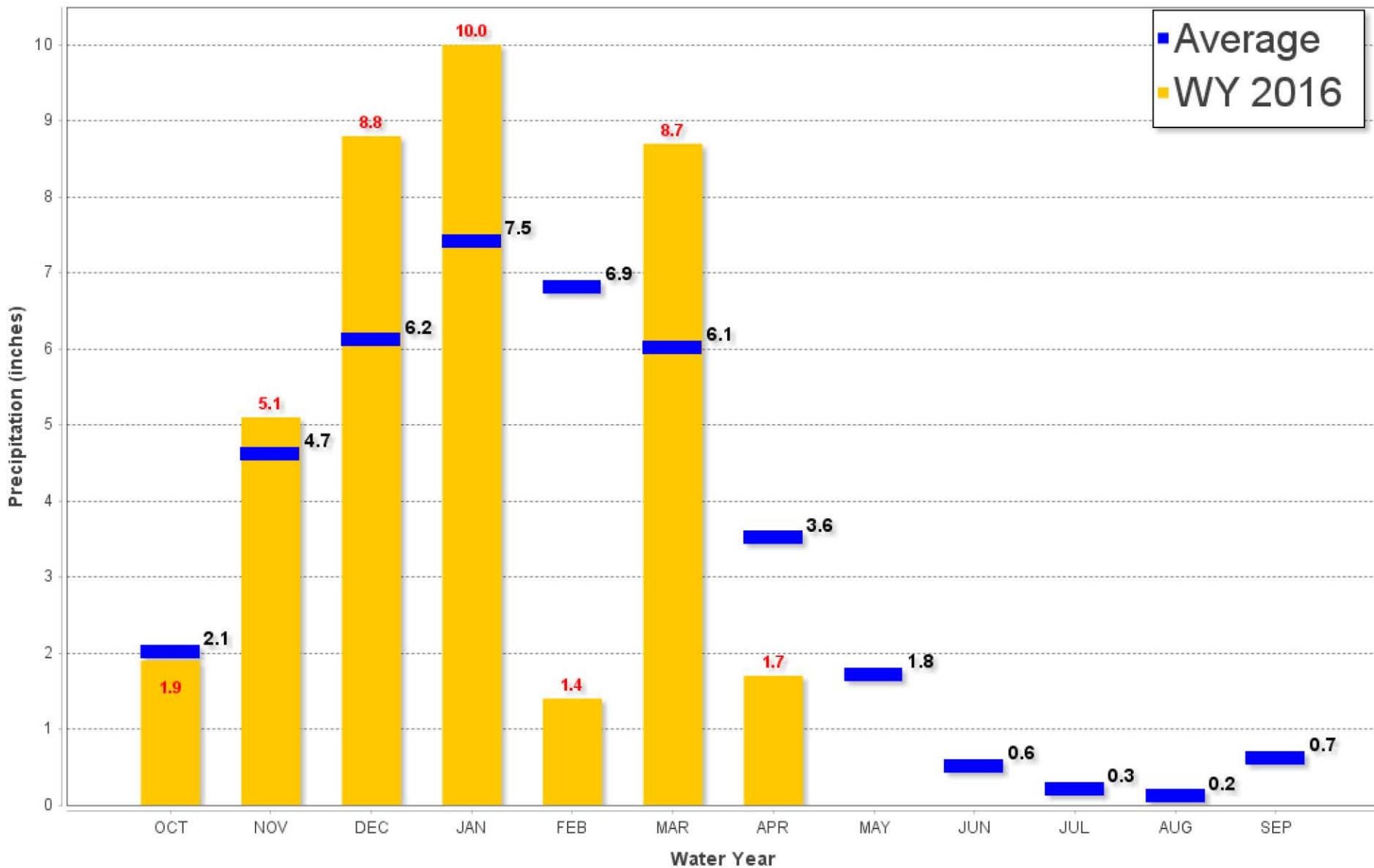


# San Joaquin 5-Station

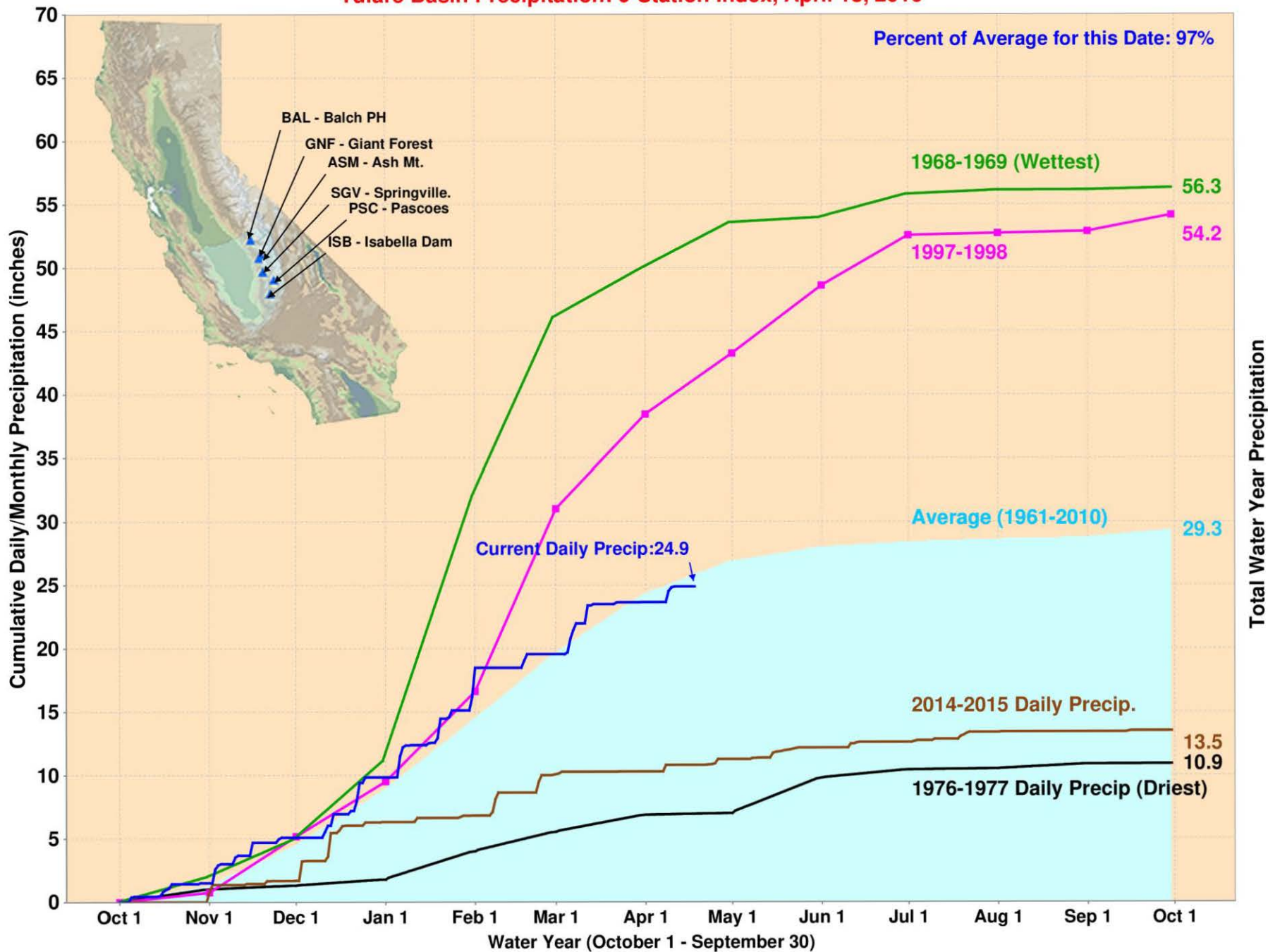
## Precipitation Index for Water Year 2016 - Updated on April 18, 2016 08:45 AM

Note: Monthly totals may not add up to seasonal total because of rounding

Water Year Monthly totals are calculated based on Daily precipitation data from 12am to 12am PST



# Tulare Basin Precipitation: 6-Station Index, April 18, 2016



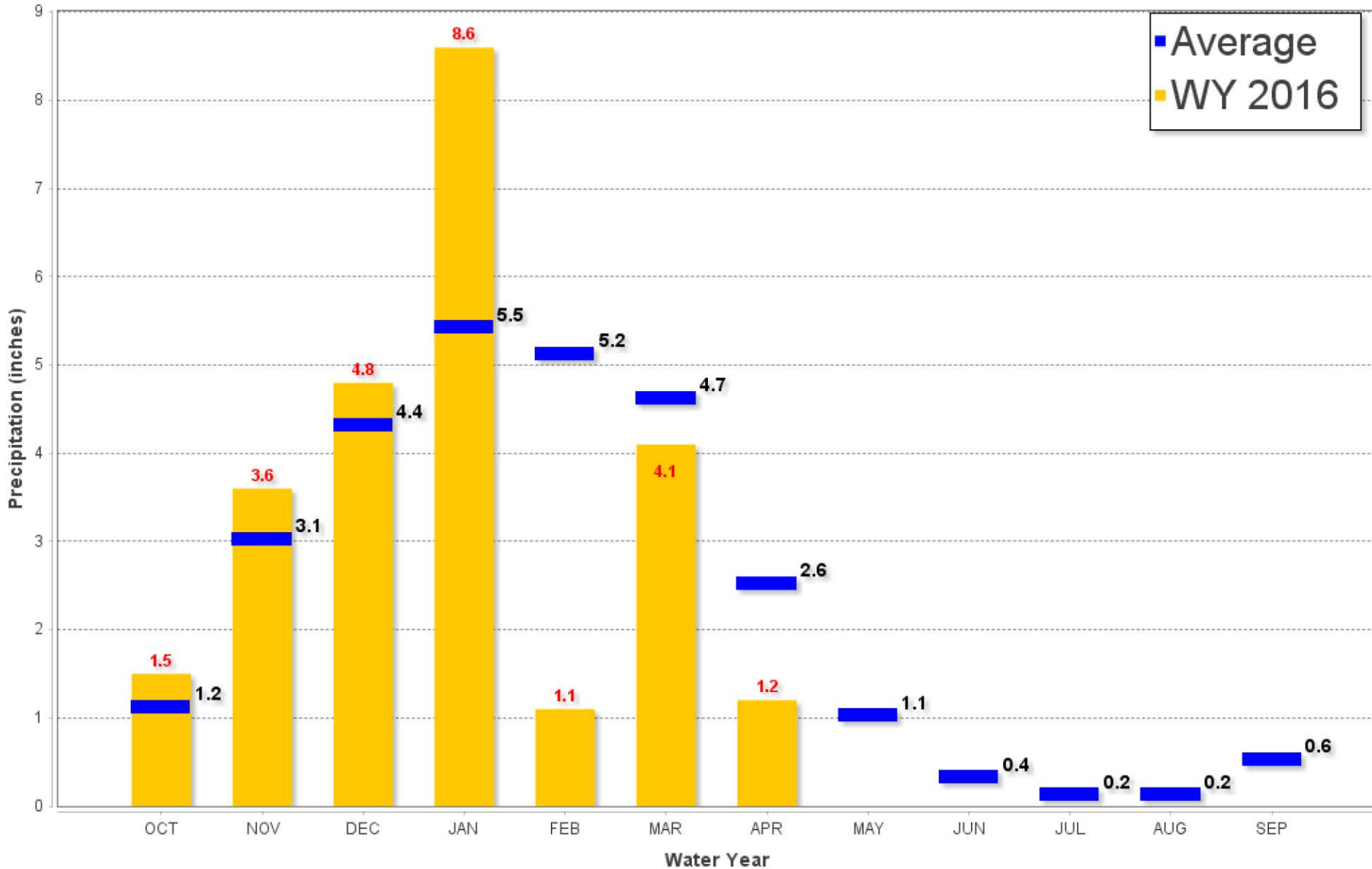


# Tulare Basin 6-Station

## Precipitation Index for Water Year 2016 - Updated on April 18, 2016 08:45 AM

Note: Monthly totals may not add up to seasonal total because of rounding

Water Year Monthly totals are calculated based on Daily precipitation data from 12am to 12am PST

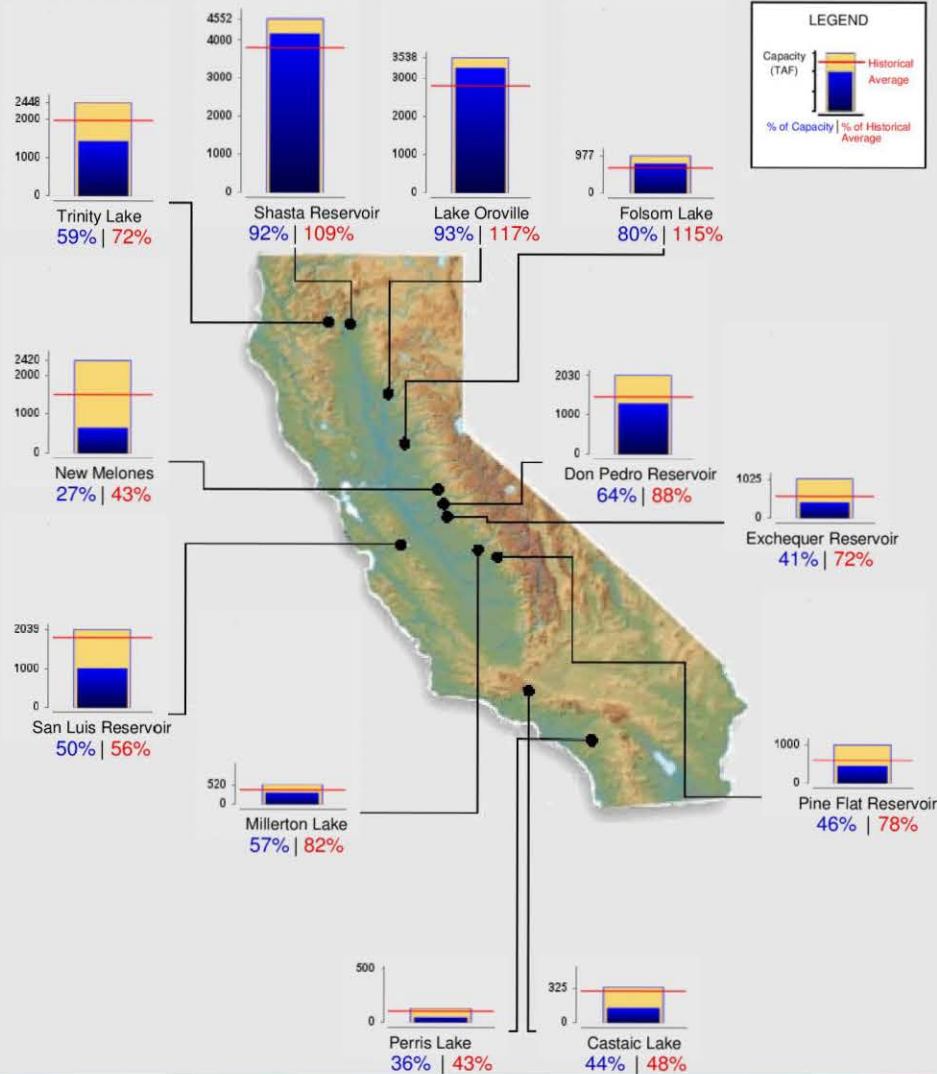




# Reservoir Conditions

Ending At Midnight - April 17, 2016

## CURRENT RESERVOIR CONDITIONS



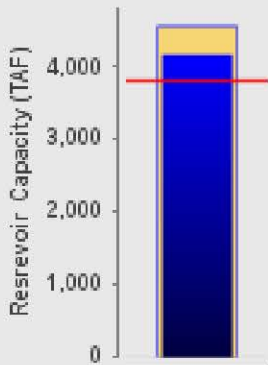


# Reservoir Conditions - Shasta Reservoir



## Lake Shasta Conditions

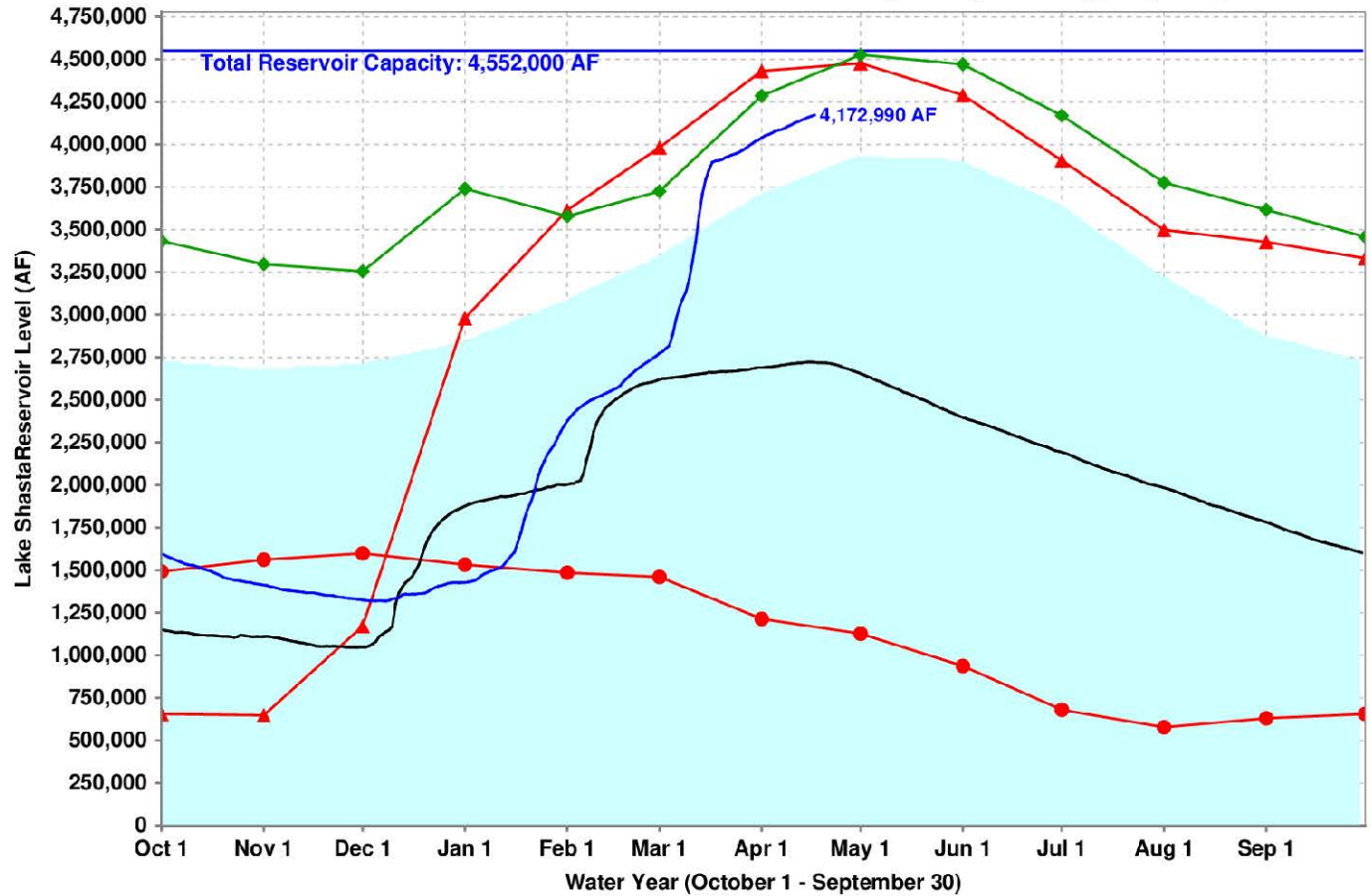
(as of Midnight - April 17, 2016)



Current Level: 4,172,990 AF

92% (Total Capacity) | 109% (Historical Avg.)

Lake Shasta Levels: Various Past Water Years and Current Water Year, Ending At Midnight April 17, 2016



■ Historical Average 
 — Total Reservoir Capacity 
 ● 1976-1977 (Driest) 
 ▲ 1977-1978 
 ◆ 1982-1983 (Wettest) 
 — 2014-2015 
 — Current: 2015-2016

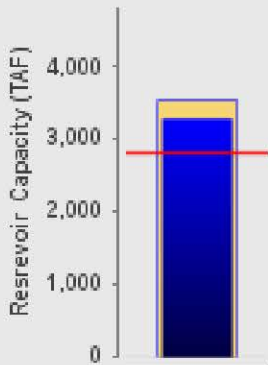


# Reservoir Conditions - Lake Oroville



## Lake Oroville Conditions

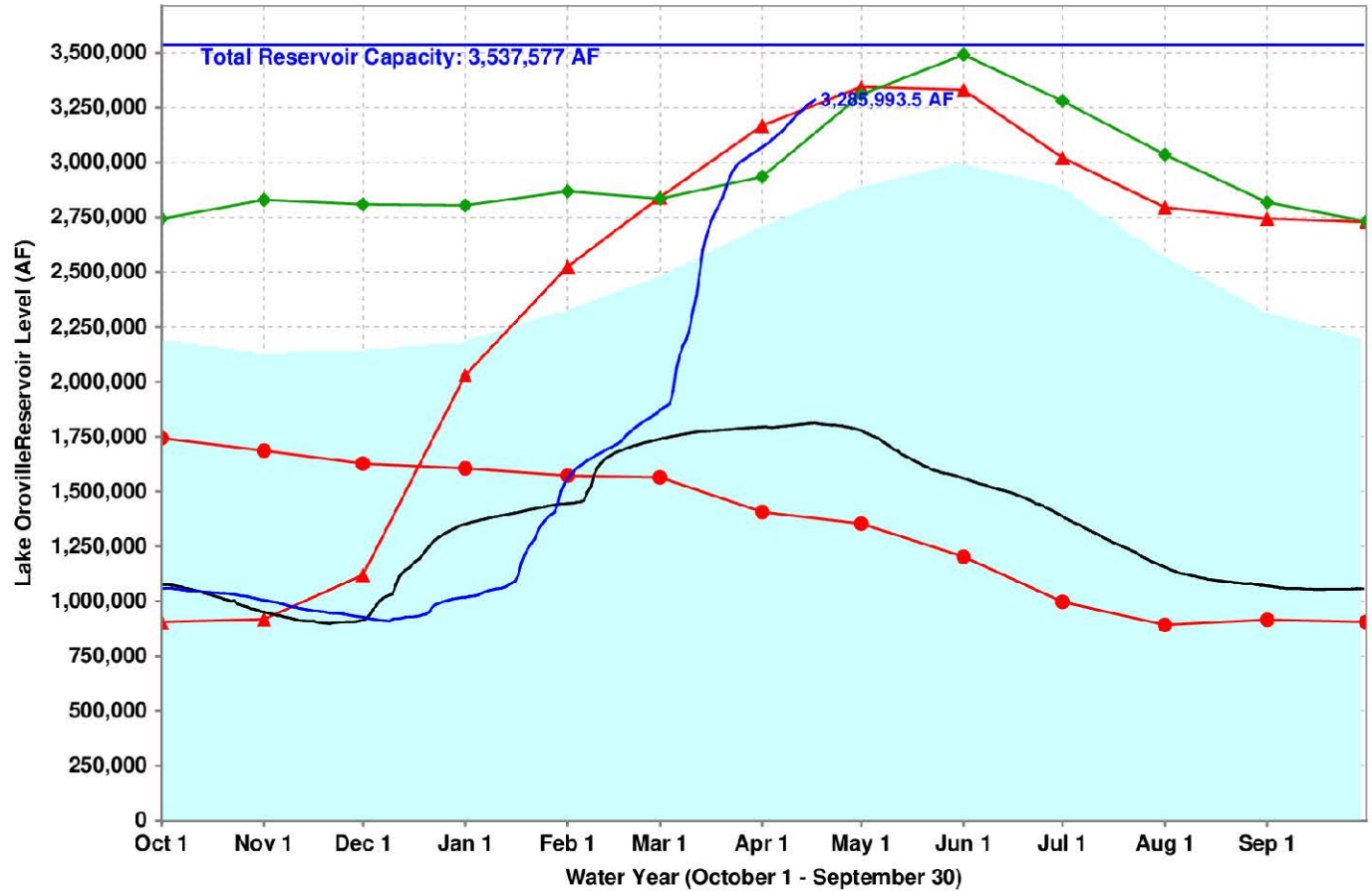
(as of Midnight - April 17, 2016)



Current Level: 3,285,993.5 AF

93% (Total Capacity) | 117% (Historical Avg.)

Lake Oroville Levels: Various Past Water Years and Current Water Year, Ending At Midnight April 17, 2016



■ Historical Average 
 — Total Reservoir Capacity 
 ● 1976-1977 (Driest) 
 ▲ 1977-1978 
 ◆ 1982-1983 (Wettest) 
 — 2014-2015 
 — Current: 2015-2016

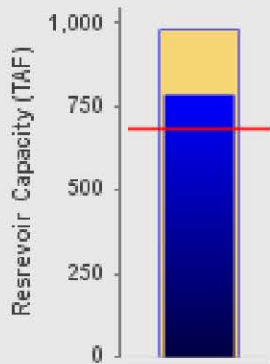


# Reservoir Conditions - Folsom Lake



## Folsom Lake Conditions

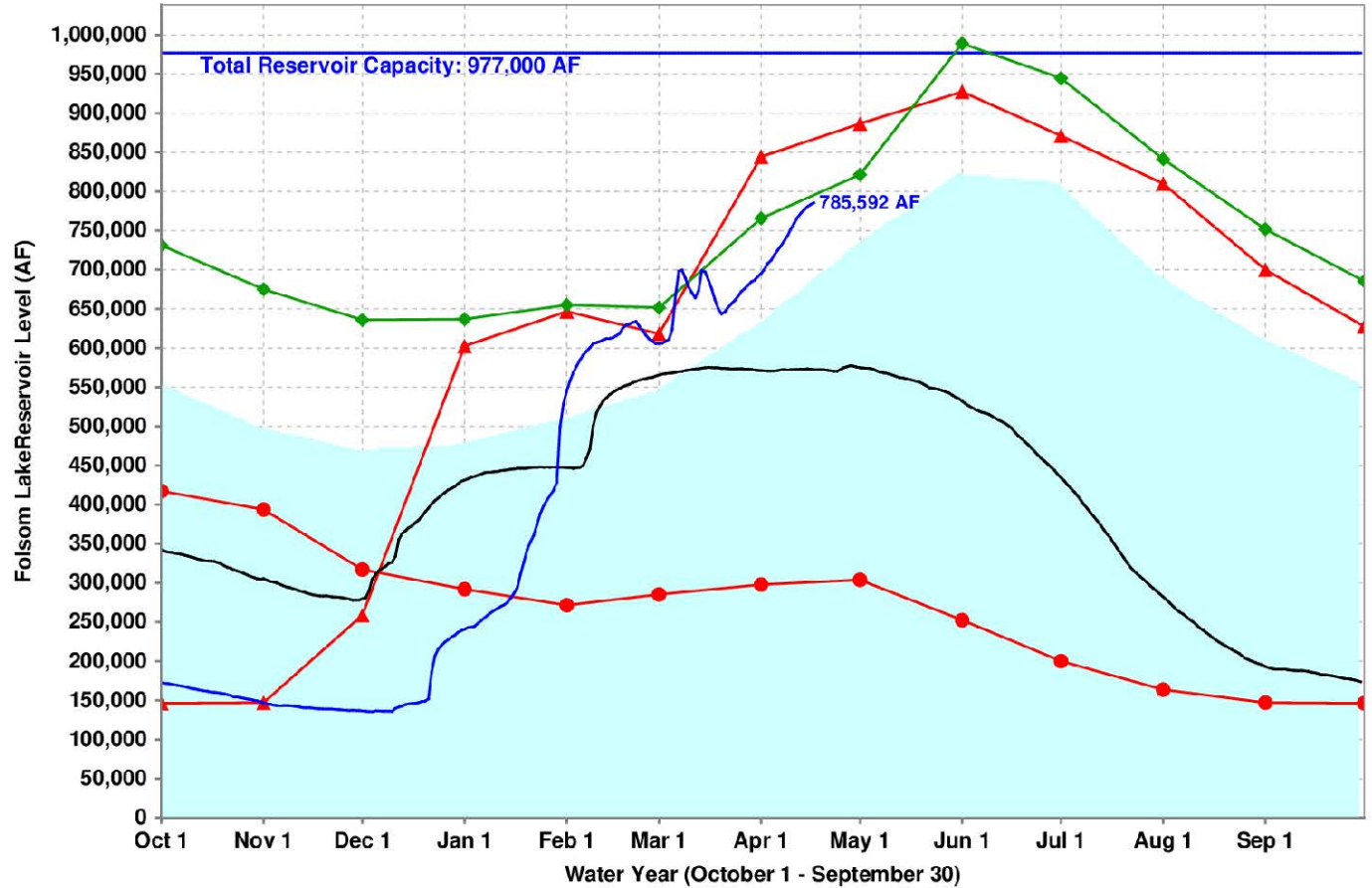
(as of Midnight - April 17, 2016)



Current Level: 785,592 AF

80% (Total Capacity) | 115% (Historical Avg.)

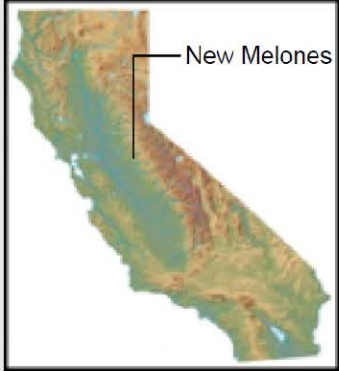
Folsom Lake Levels: Various Past Water Years and Current Water Year, Ending At Midnight April 17, 2016





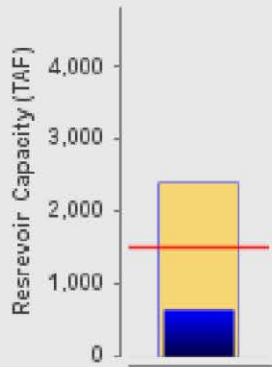


# Reservoir Conditions - New Melones



## New Melones Conditions

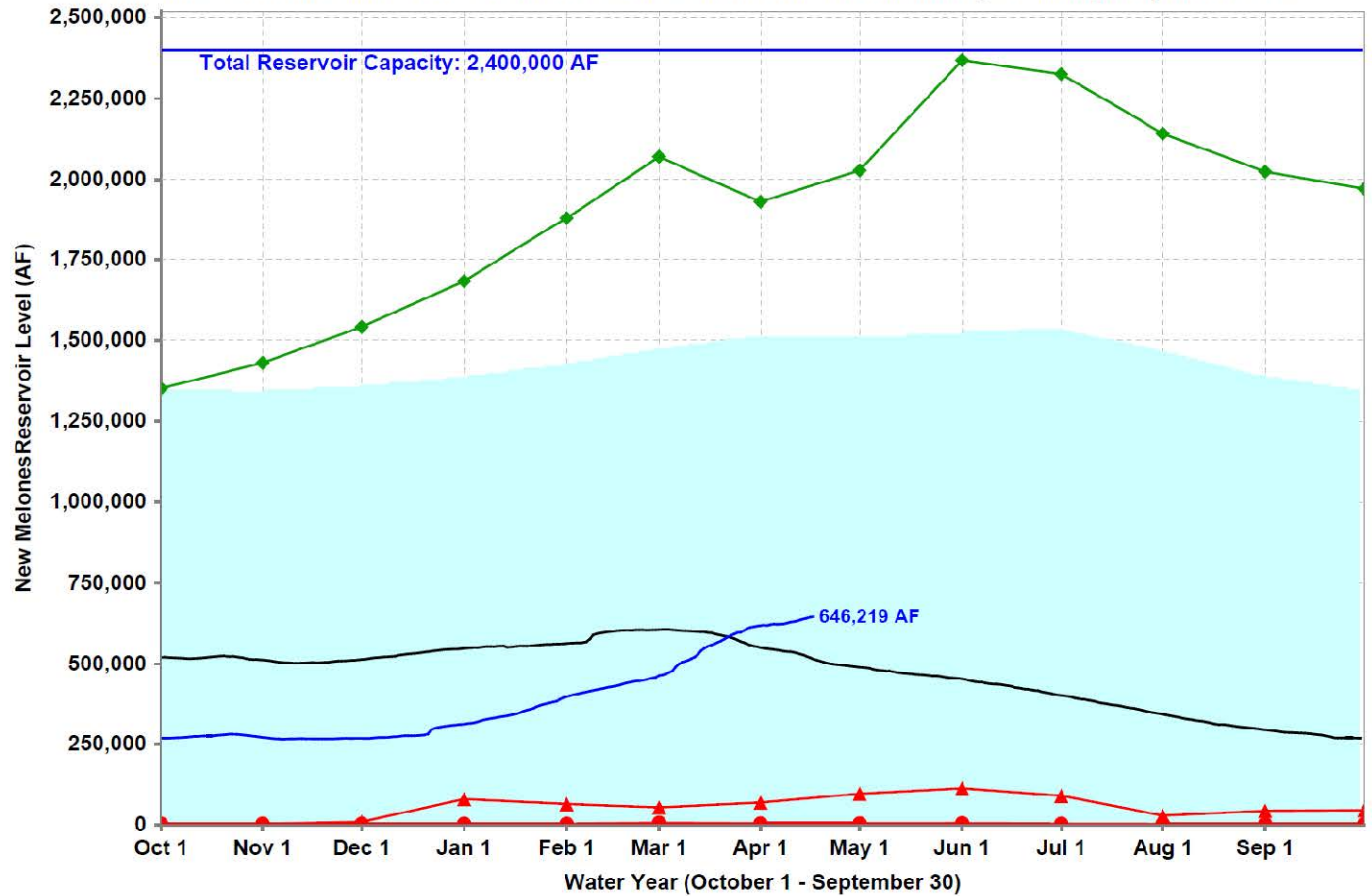
(as of Midnight - April 17, 2016)



Current Level: 646,219 AF

27% (Total Capacity) | 43% (Historical Avg.)

New Melones Levels: Various Past Water Years and Current Water Year, Ending At Midnight April 17, 2016



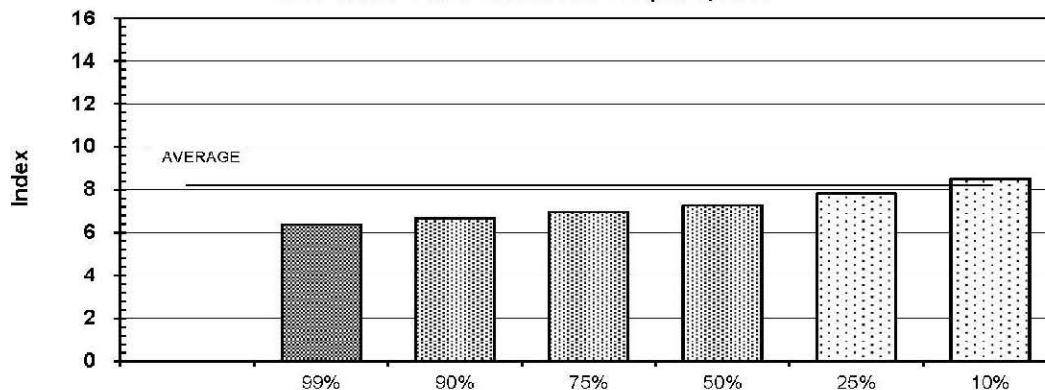
■ Historical Average 
 — Total Reservoir Capacity 
 ● 1976-1977 (Driest) 
 ▲ 1977-1978 
 ◆ 1982-1983 (Wettest) 
 — 2014-2015 
 — Current: 2015-2016

# CVP and SWP Operations Update

**John Leahigh**  
**State Water Project**  
**Department of Water Resources**

**Ron Milligan**  
**Central Valley Project**  
**US Bureau of Reclamation**

**SACRAMENTO VALLEY  
WATER YEAR TYPE INDEX (40-30-30)  
2016 Water Year Forecast as of April 1, 2016**



Date of Forecast	Probability of Exceedance					
	99%	90%	75%	50%	25%	10%
December 1, 2015	2.4	3.3	4.0	5.3	6.8	8.5
January 1, 2016	3.4	4.1	4.8	5.8	7.2	8.6
February 1, 2016	4.5	5.1	5.8	6.5	8.0	9.5
March 1, 2016	4.5	5.0	5.6	6.1	7.2	8.4
<b>April 1, 2016</b>	<b>6.4</b>	<b>6.7</b>	<b>7.0</b>	<b>7.3</b>	<b>7.8</b>	<b>8.5</b>

Water Year Index based on flow in million acre feet

$$\text{Index} = 0.4 * \text{Current Apr-Jul Runoff}^{(1)} + 0.3 * \text{Current Oct-Mar Runoff}^{(2)} + 0.3 * \text{Previous Year's Index}^{(2)}$$

Notes:

- (1) Runoff is the sum of unimpaired flow in million acre-feet at:  
 Sacramento River above Bend Bridge  
 Feather River at Oroville (aka inflow to Lake Oroville)  
 Yuba River near Smartville  
 American River below Folsom Lake
- (2) Maximum 10.0 for previous year index term

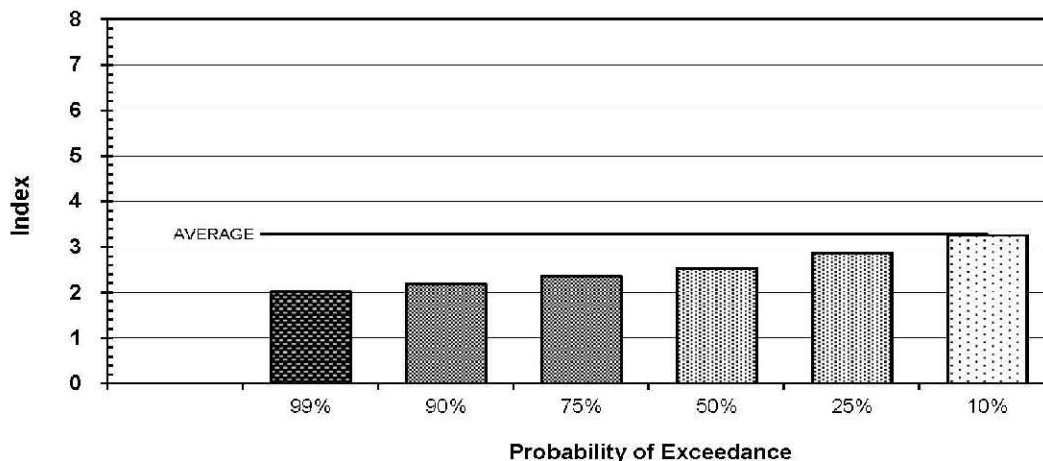
**Previous Water Year Indices:**

2015 =	4.0	49% of avg.
1977 (Min) =	3.1	38% of avg.
1983 (Max) =	15.3	186% of avg.
1961-2010 average =	8.2	

**Year Classification**

TYPE	INDEX
Wet	
Above Normal	9.2
Normal	7.8
Below Normal	6.5
Dry	5.4
Critical	

**SAN JOAQUIN VALLEY  
WATER YEAR TYPE INDEX (60-20-20)  
2016 Water Year Forecast as of April 1, 2016**



Date of Forecast	99%	90%	75%	50%	25%	10%
December 1, 2015	0.6	1.1	1.5	2.2	3.0	4.0
January 1, 2016	1.0	1.4	1.9	2.4	3.1	3.9
February 1, 2016	1.7	2.0	2.4	2.8	3.7	4.5
March 1, 2016	1.6	1.9	2.1	2.4	2.9	3.6
April 1, 2016	2.0	2.2	2.4	2.5	2.9	3.3

Water Year Index based on flow in million acre feet

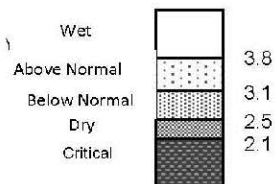
$$\text{Index} = 0.6 * \text{Current Apr-Jul Runoff}^{(1)} + 0.2 * \text{Current Oct-Mar Runoff}^{(1)} + 0.2 * \text{Previous Year's Index}^{(2)}$$

**Year Classification**  
TYPE INDEX

Notes:

- (1) Runoff is the sum of unimpaired flow in million acre-feet at:  
 Stanislaus River below Goodwin Reservoir (aka inflow to New Melones Res.)  
 Tuolumne River below La Grange (aka inflow to New Don Pedro Reservoir)  
 Merced River below Merced Falls (aka inflow to Lake McClure)  
 San Joaquin River inflow to Millerton Lake

- (2) Maximum 4.5 for previous year index term



**Previous Water Year Indices:**

2015 =	0.8	25% of avg.
2015 (Min) =	0.8	25% of avg.
1983 (Max) =	7.1	212% of avg.
1961-2010 average =	3.3	

# Old and Middle Rivers

Old and Middle Rivers



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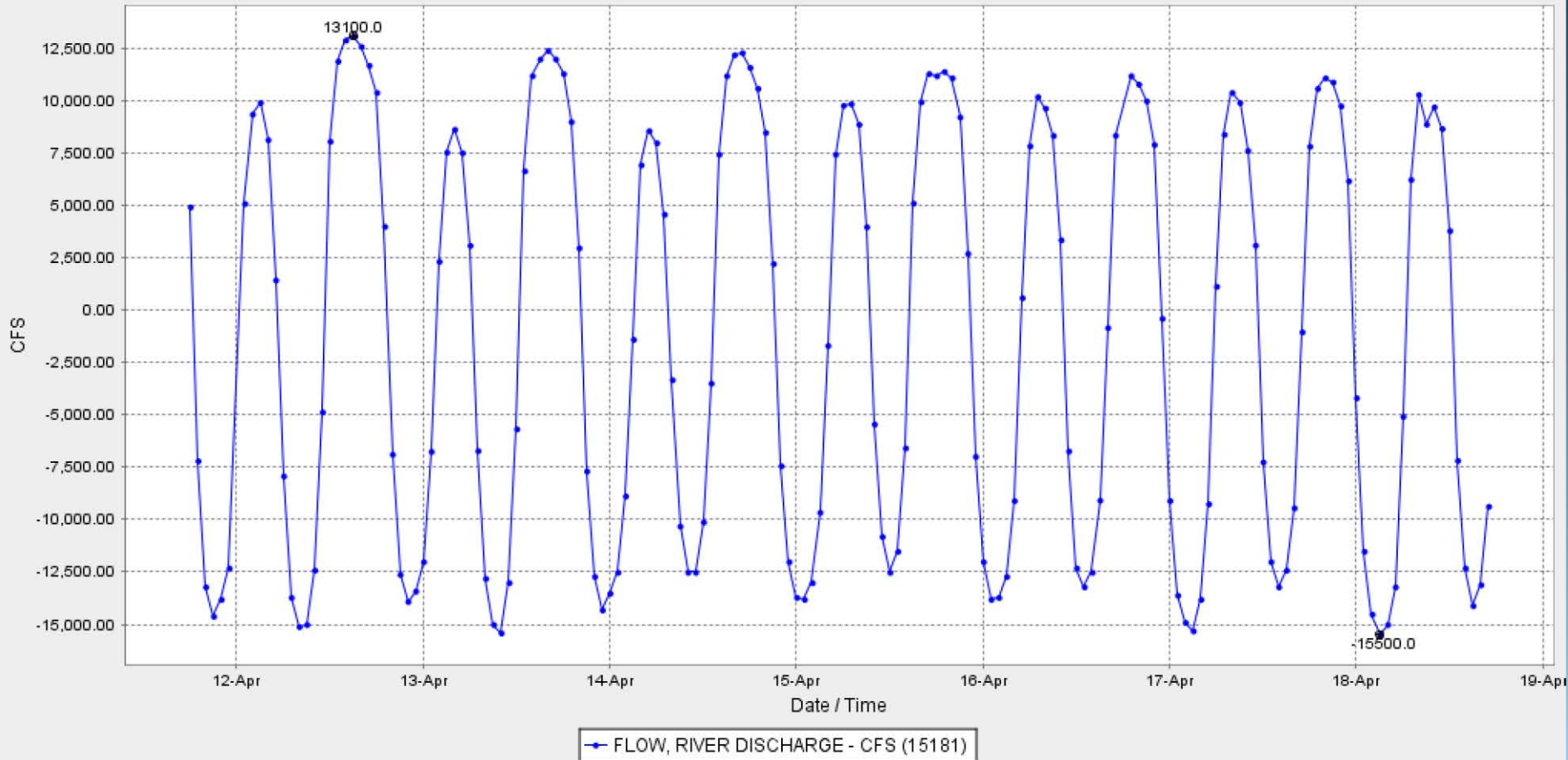
*DROUGHT & FLOOD PREPAREDNESS & RESPONSE*

# Hourly Flow Data

## MIDDLE RIVER AT MIDDLE RIVER ( MDM )

Date from 04/11/2016 17:40 through 04/18/2016 17:40 Duration : 7 days

Max of period : (04/12/2016 15:00, 13100.0) Min of period : (04/18/2016 03:00, -15500.0)

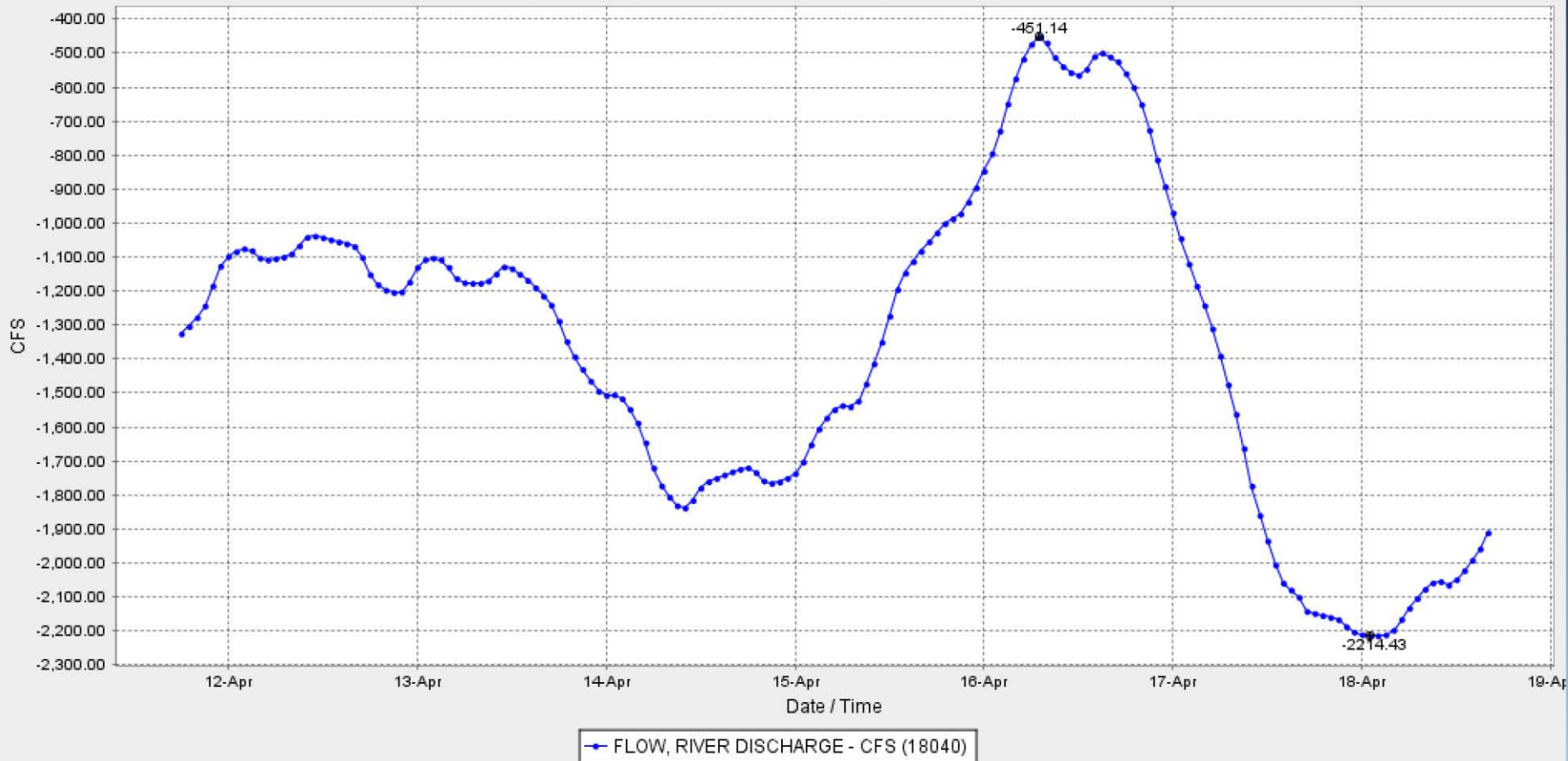


# Hourly Tidally Filtered OMR

## OLD & MIDDLE RVRS TIDALLY FILTERED EST ( OMR )

Date from 04/11/2016 17:42 through 04/18/2016 17:42 Duration : 7 days

Max of period : (04/16/2016 07:00, -451.14) Min of period : (04/18/2016 01:00, -2214.43)

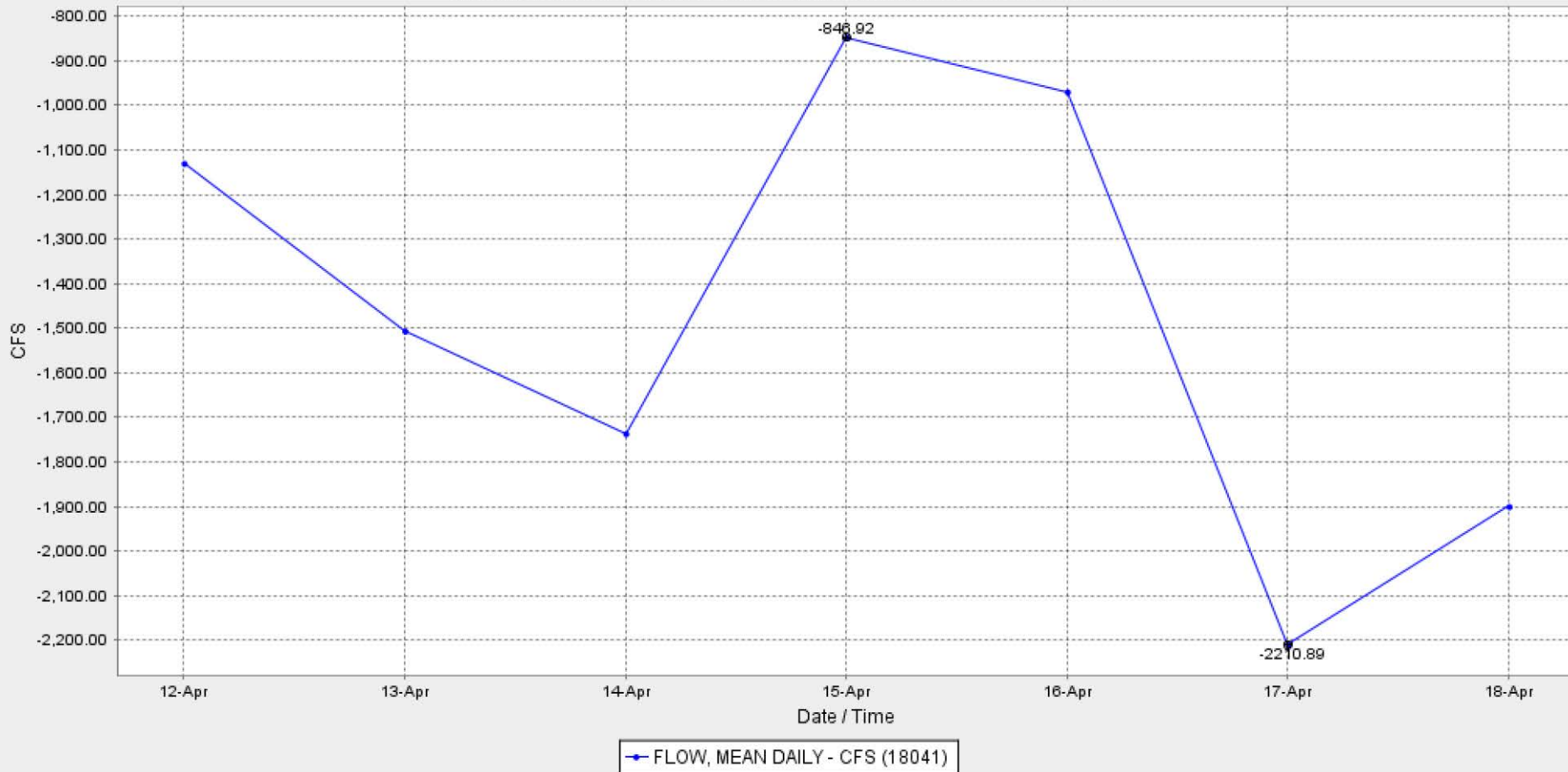


# Daily Average OMR

## OLD & MIDDLE RVRS TIDALLY FILTERED EST ( OMR )

Date from 04/11/2016 06:40 through 04/18/2016 06:40 Duration : 7 days

Max of period : (04/15/2016 00:00, -846.92) Min of period: (04/17/2016 00:00, -2210.89)



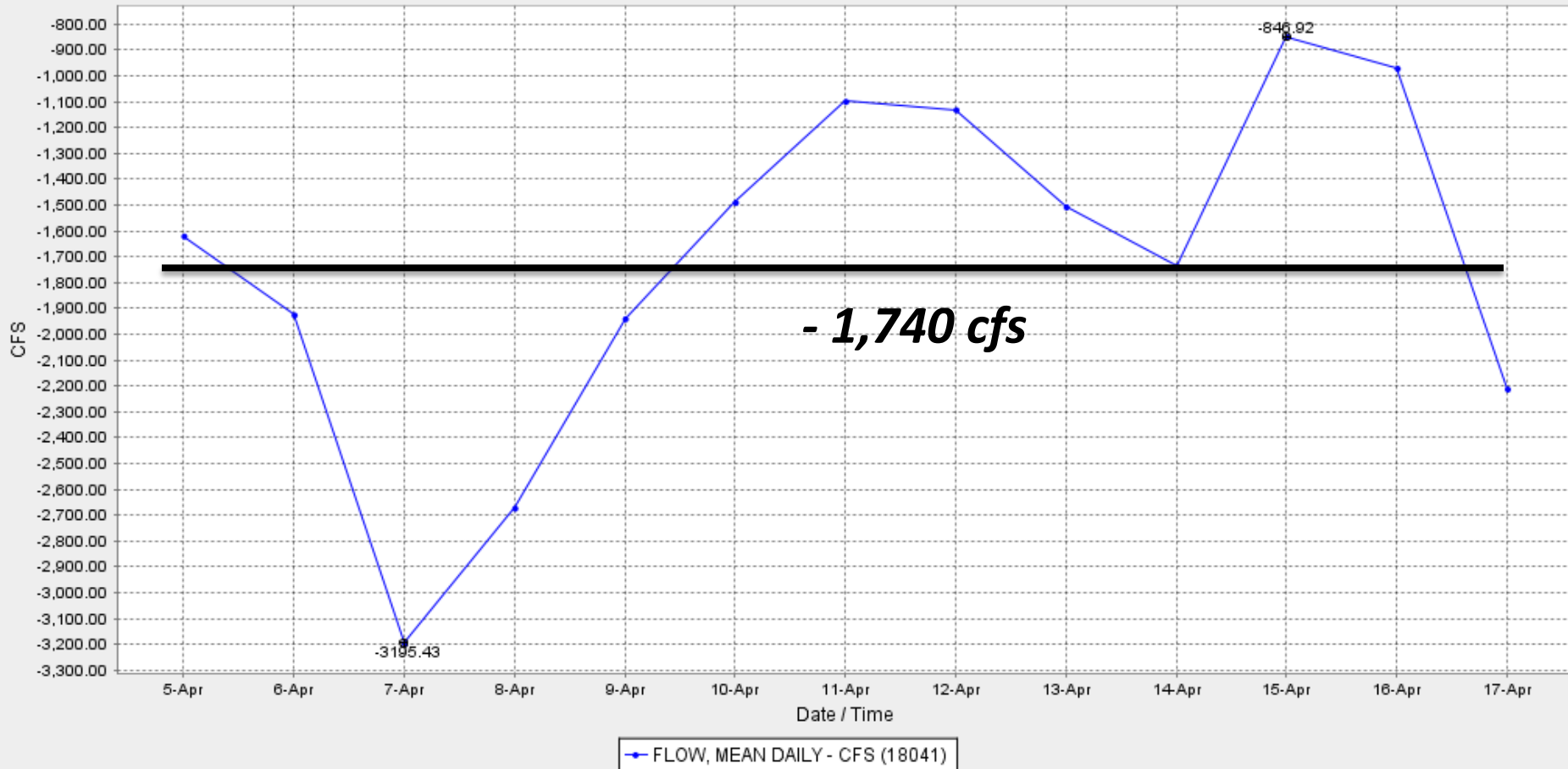


# 14-day Average OMR Flow

OLD & MIDDLE RVRS TIDALLY FILTERED EST ( OMR )

Date from 04/04/2016 17:44 through 04/18/2016 17:44 Duration : 14 days

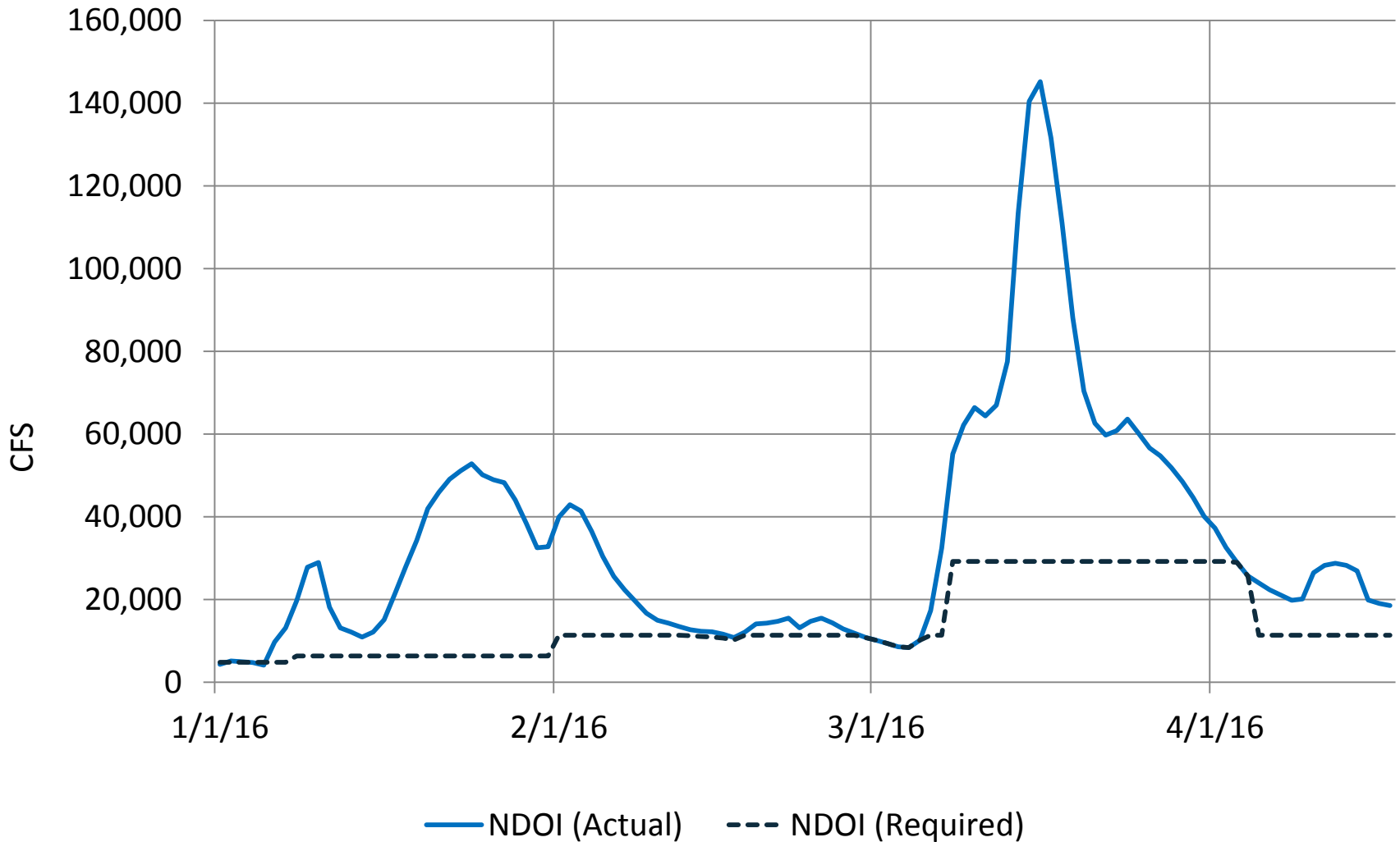
Max of period : (04/15/2016 00:00, -846.92) Min of period: (04/07/2016 00:00, -3195.43)



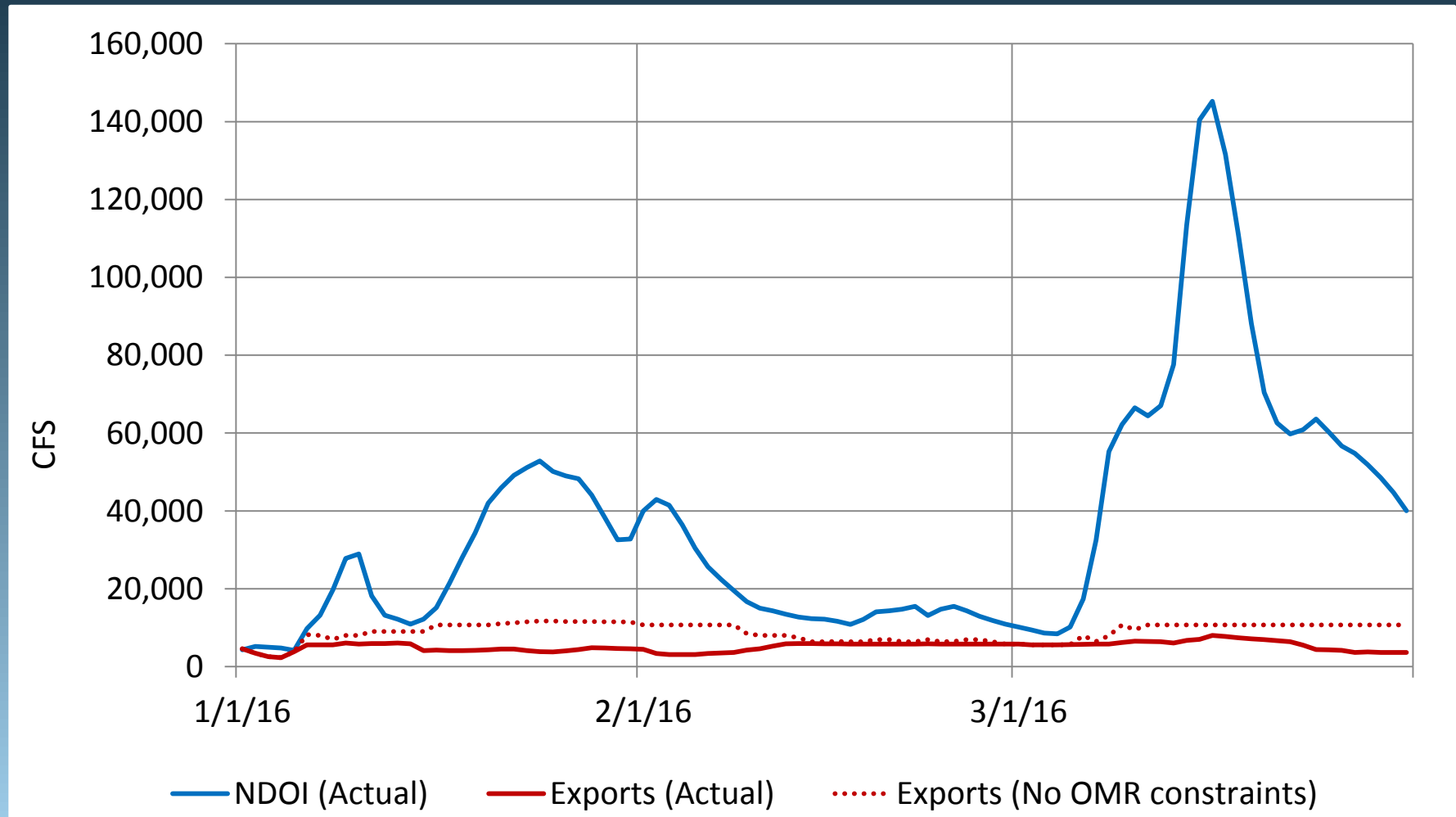
# Biological Opinion Actions

	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>						
NMFS IV.1.2			→ <i>salmon DCC gate closure</i>									
NMFS IV.2.3			→ <i>salmon out-migration - OMR</i>									
NMFS IV.2.1						→ <i>steelhead out-migration - SJR I/E</i>						

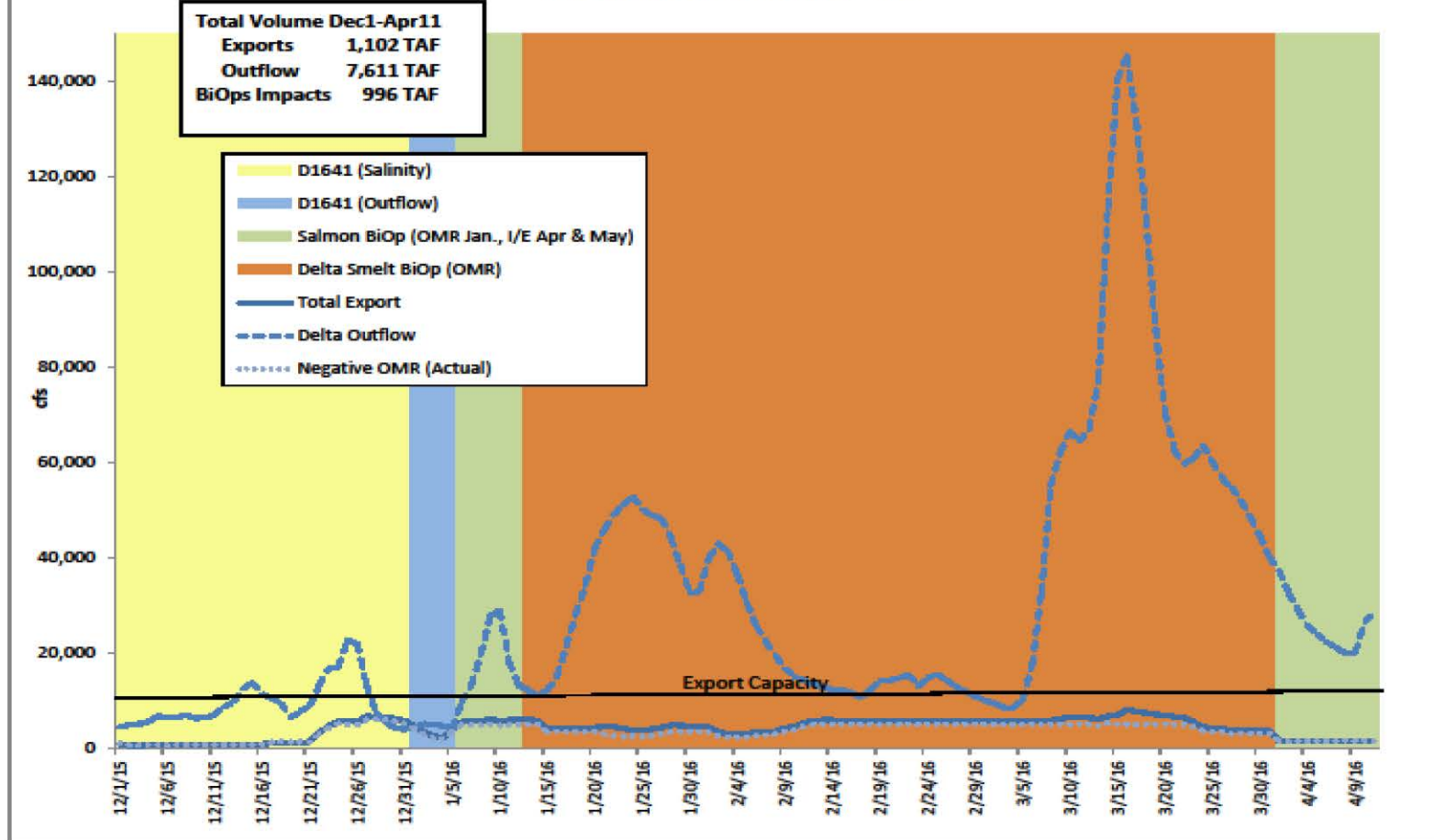
# Net Delta Outflow Index



# OMR Flow Regulation Effect on Exports



## 2016 Export Constraints



T. Boardman, SLDMWA  
 4/12/2016