

CVP and SWP Operations Update

State Water Resource Control Board

DROUGHT RESPONSE ACTIVITIES

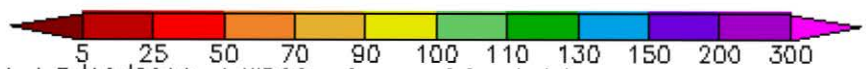
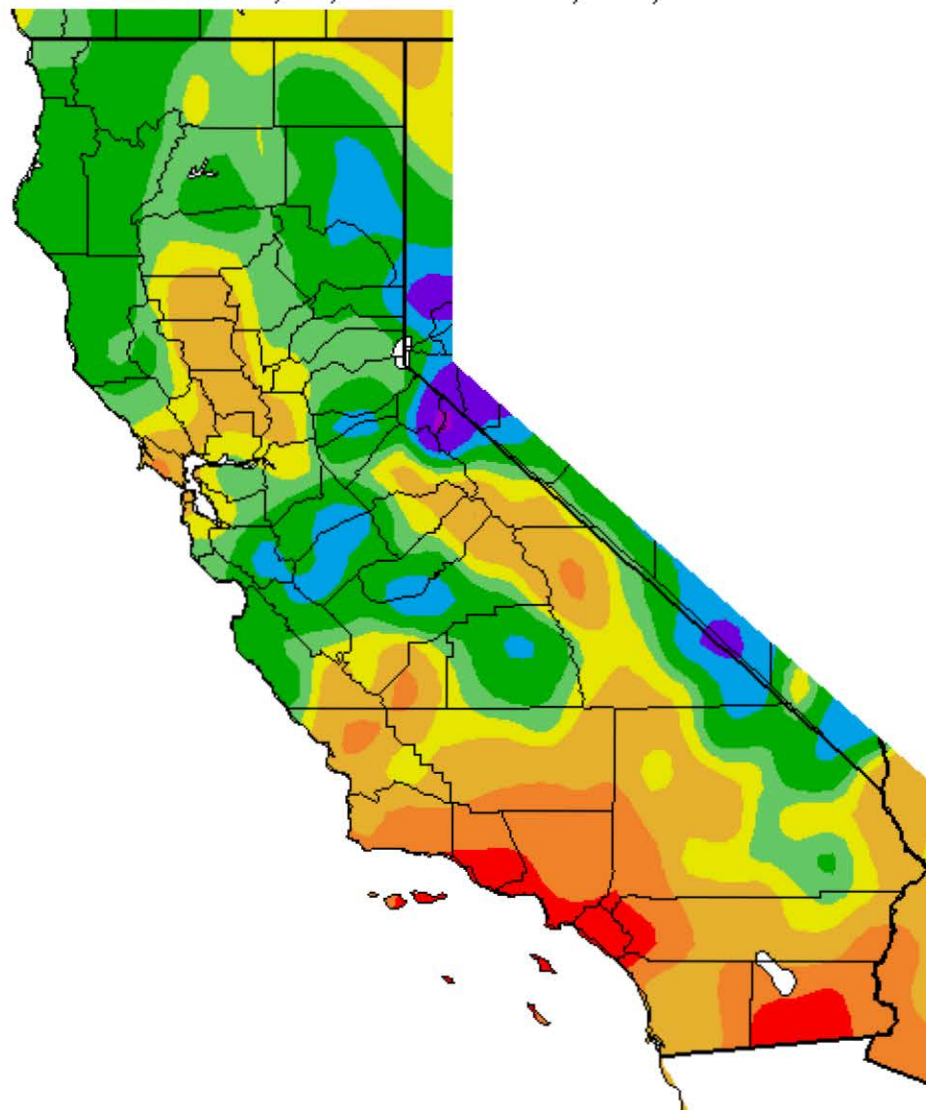
May 18, 2016



John Leahigh
CA Department of Water Resources

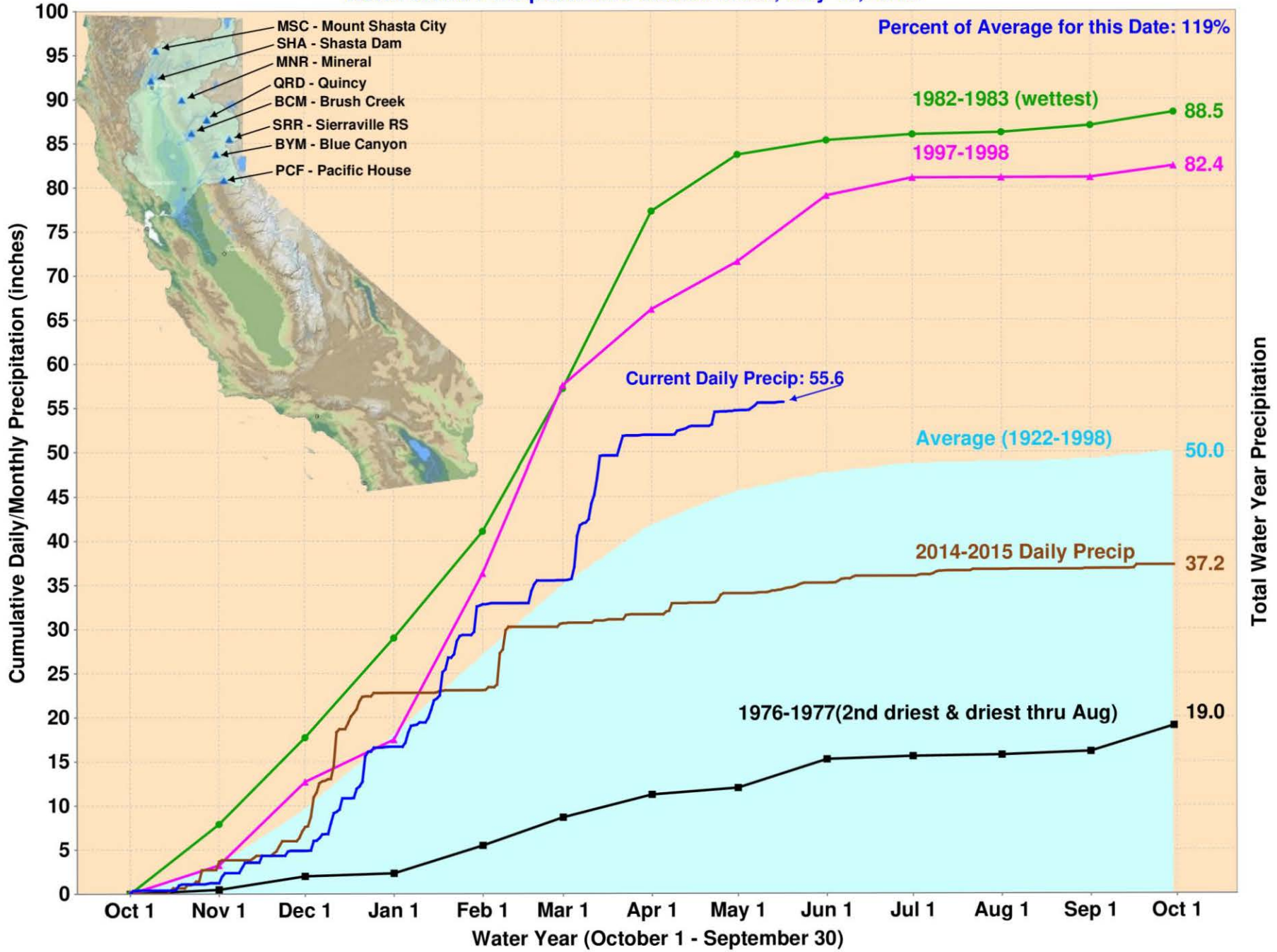
Ron Milligan
US Bureau of Reclamation

Percent of Average Precipitation (%)
10/1/2015 - 5/15/2016



Generated 5/16/2016 at WRCC using provisional data.
NOAA Regional Climate Centers

North Sierra Precipitation: 8-Station Index, May 17, 2016



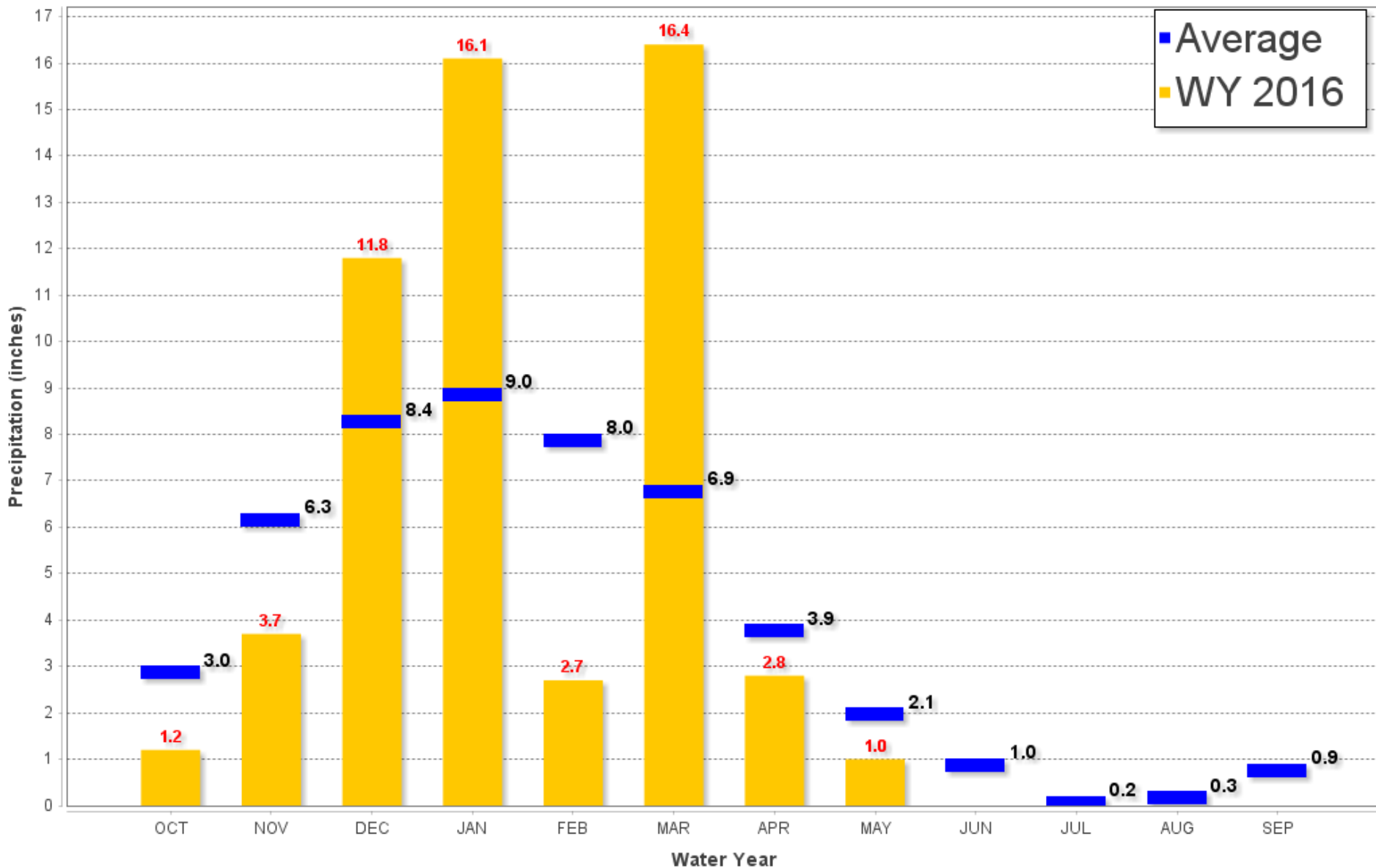


Northern Sierra 8-Station

Precipitation Index for Water Year 2016 - Updated on May 17, 2016 08:45 AM

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

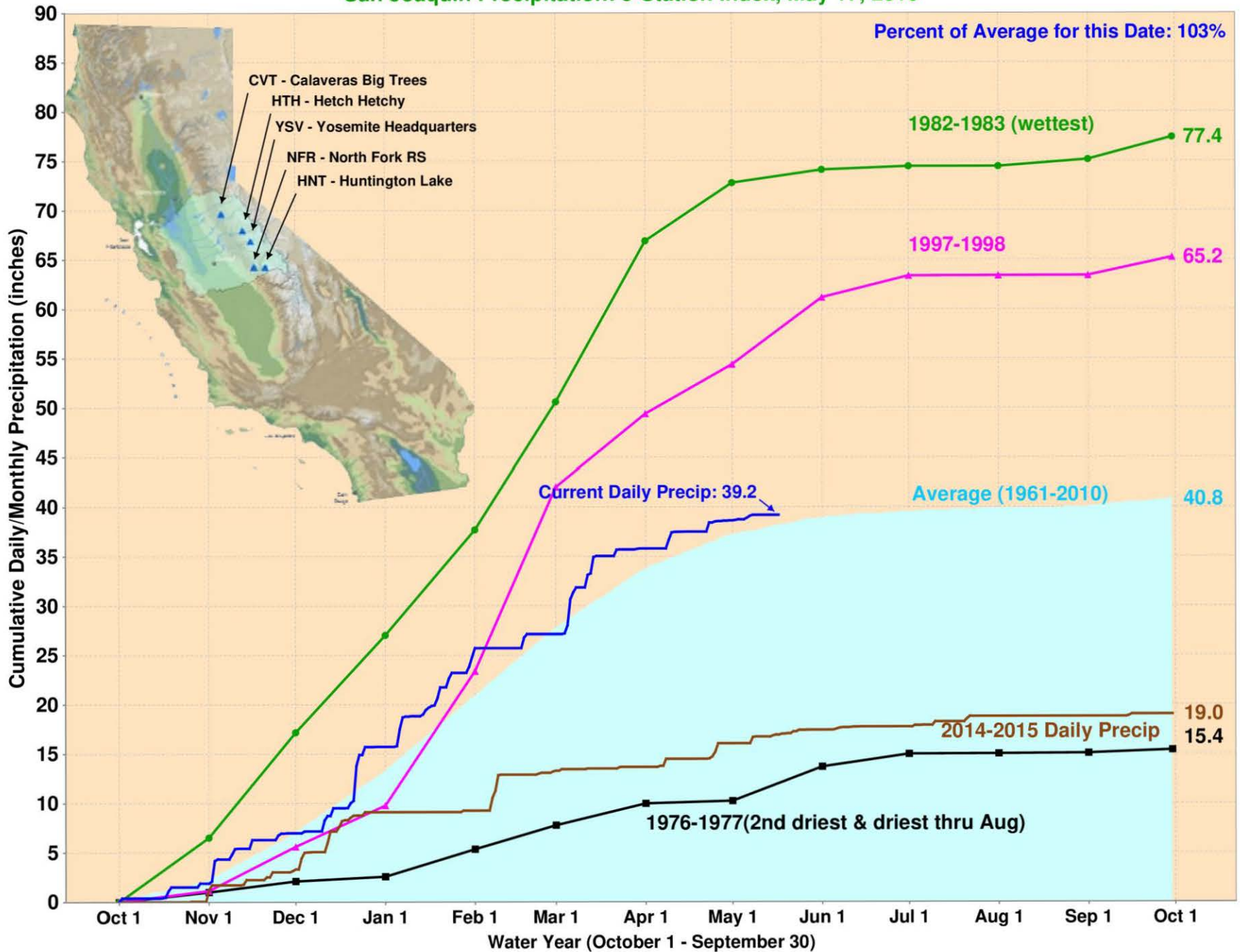
Water Year Monthly totals are calculated based on Daily precipitation data from 12am to 12am PST



San Joaquin Precipitation: 5-Station Index, May 17, 2016

Percent of Average for this Date: 103%

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



Total Water Year Precipitation

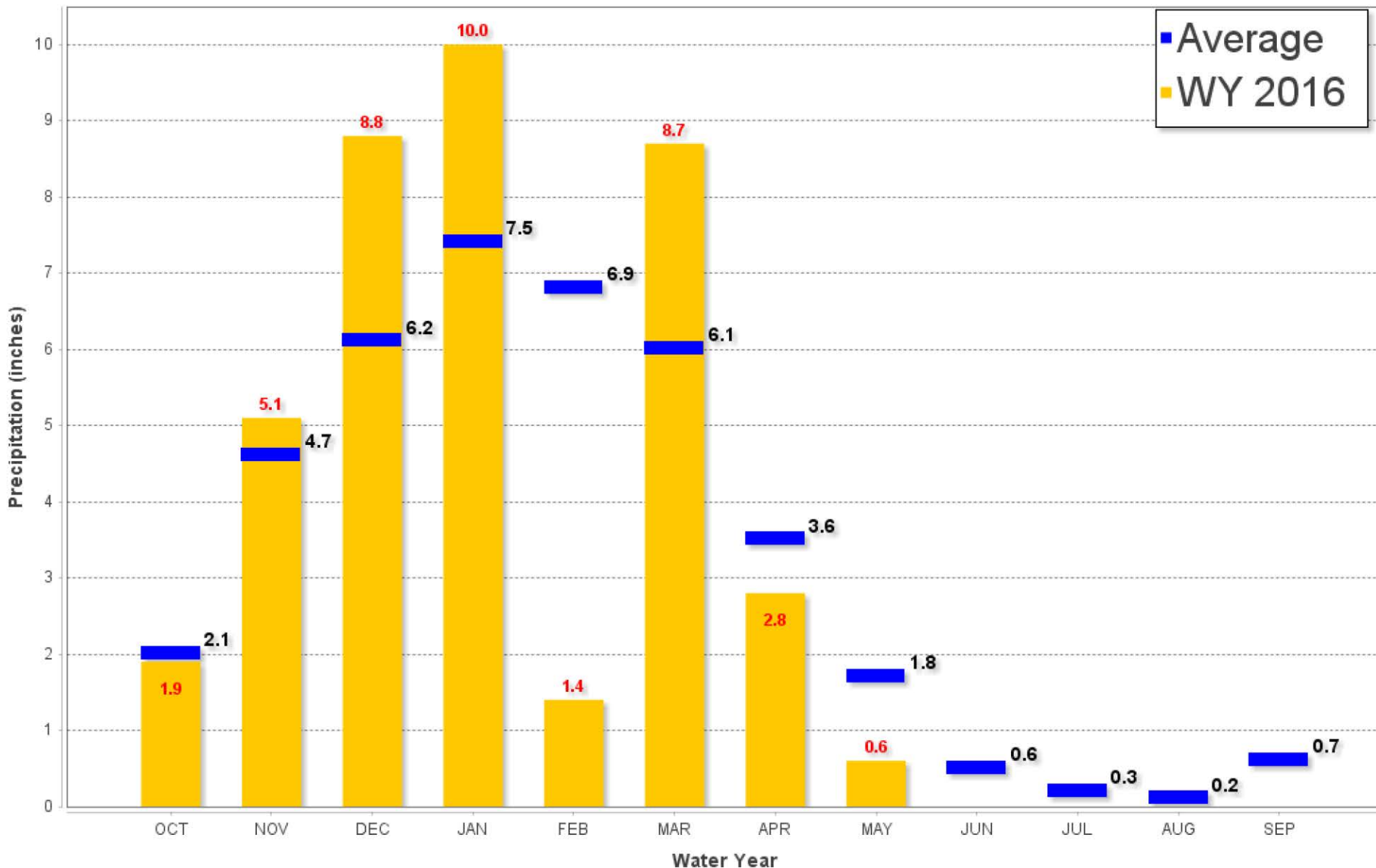


San Joaquin 5-Station

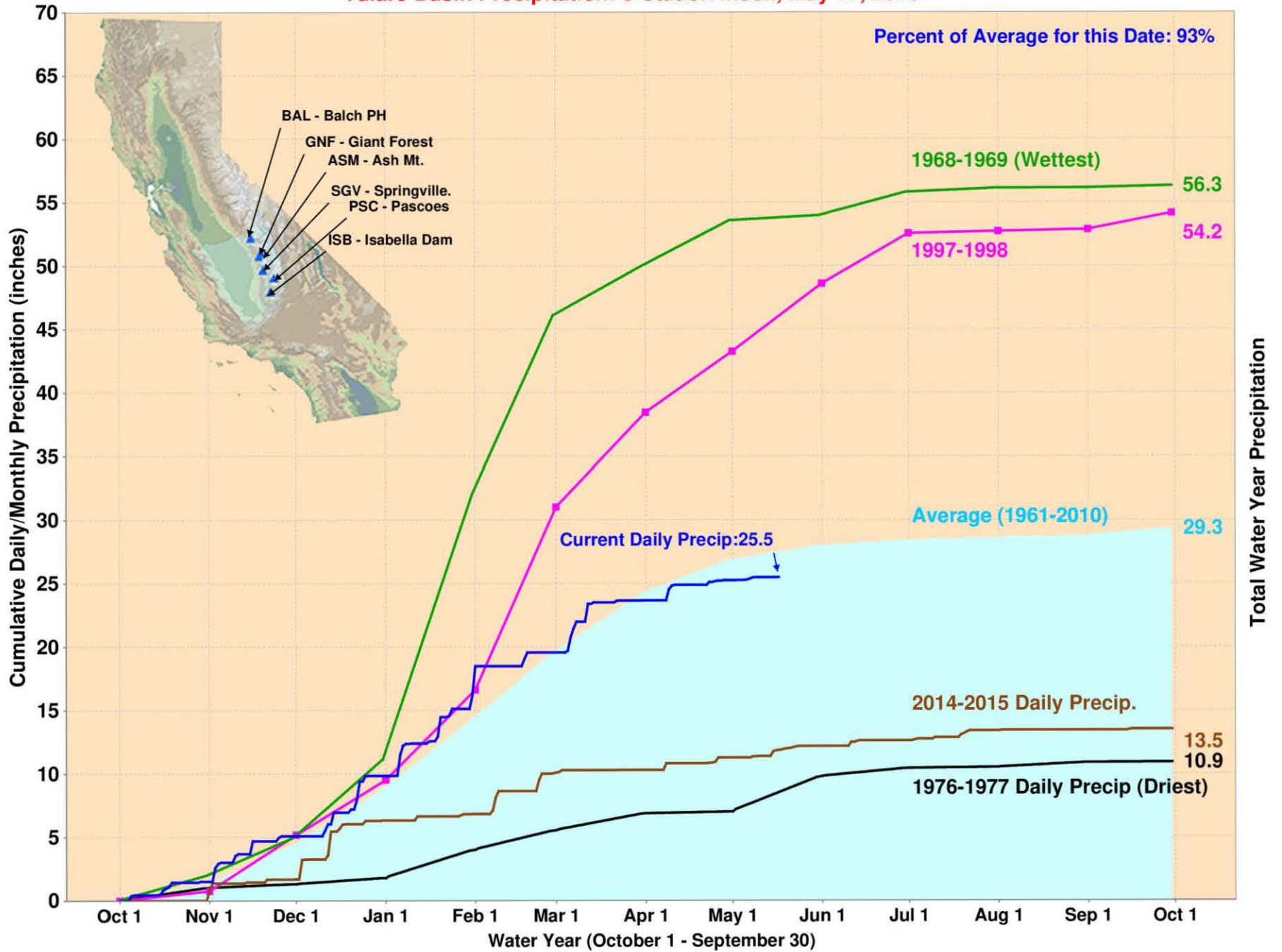
Precipitation Index for Water Year 2016 - Updated on May 17, 2016 08:45 AM

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, May 17, 2016



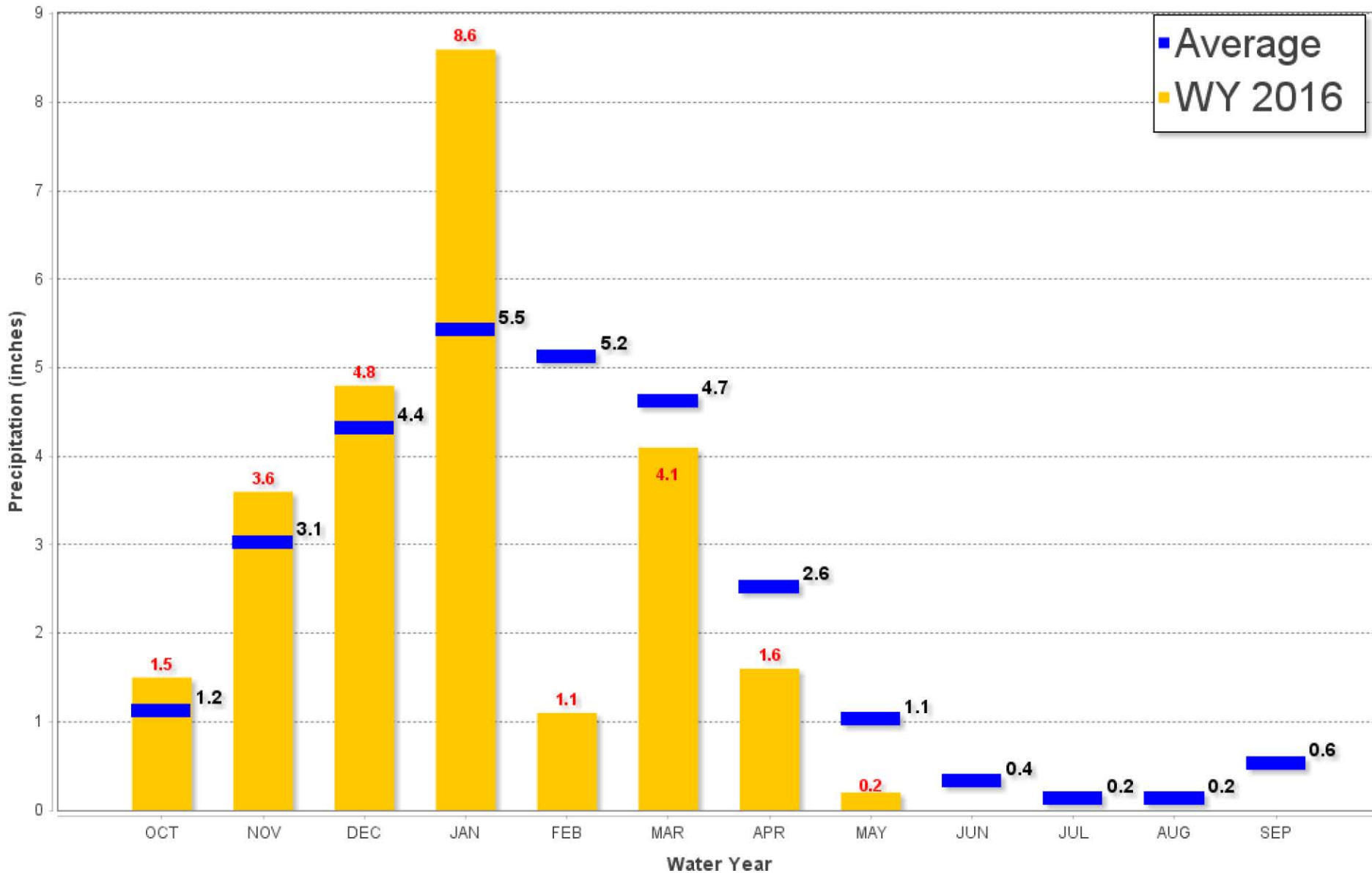


Tulare Basin 6-Station

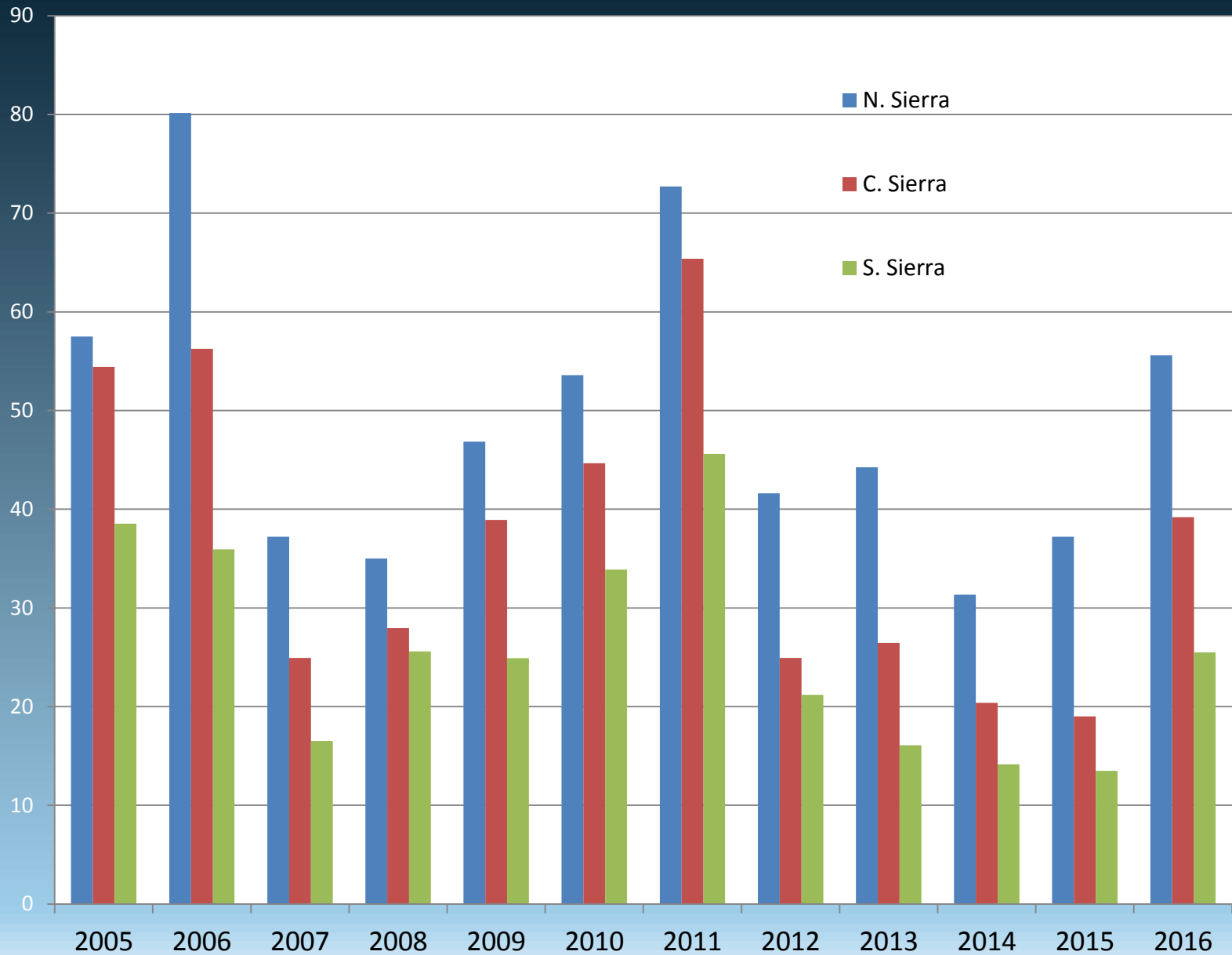
Precipitation Index for Water Year 2016 - Updated on May 17, 2016 08:45 AM

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



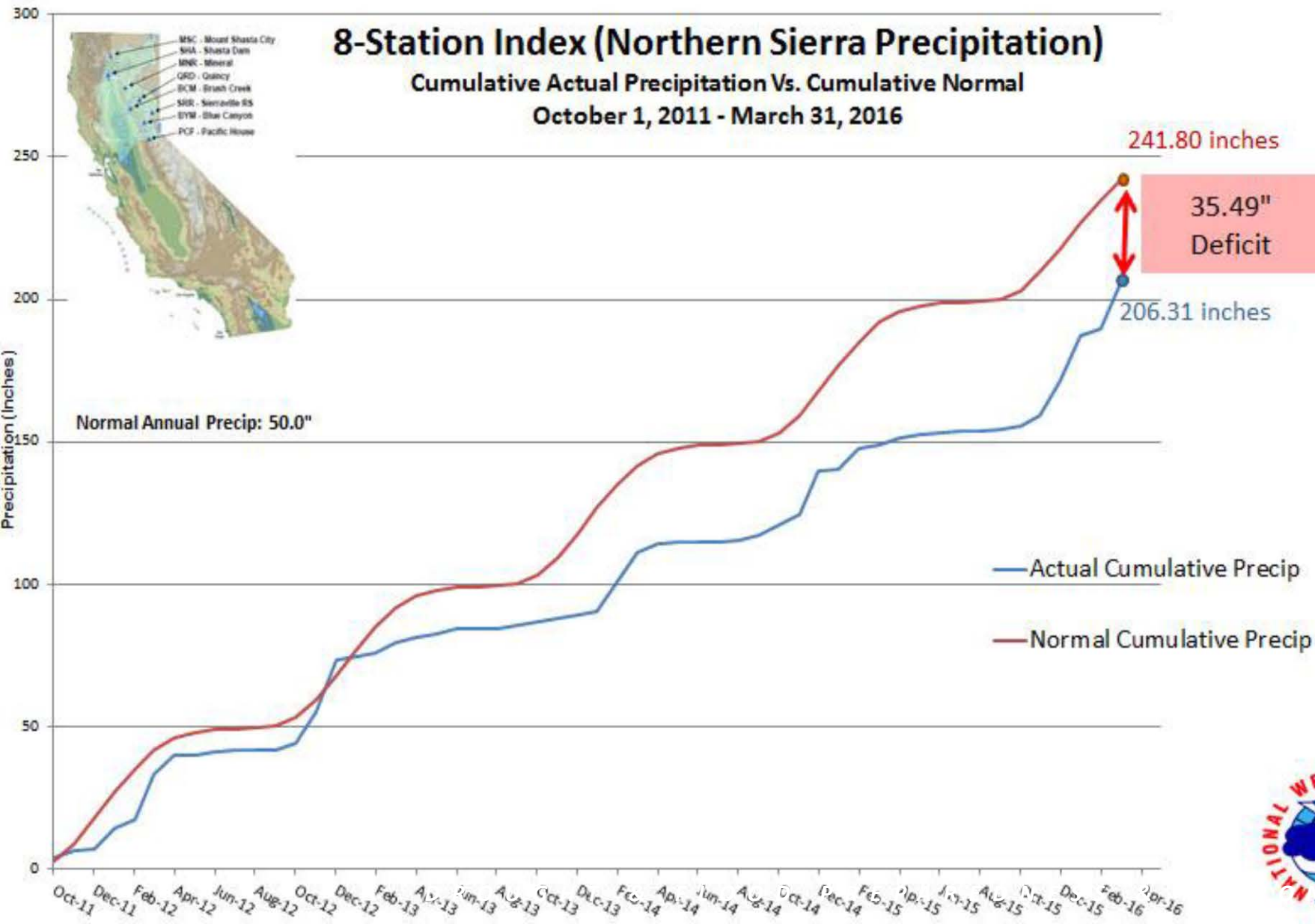
Precipitation Indices 2005-Present



8-Station Index (Northern Sierra Precipitation)

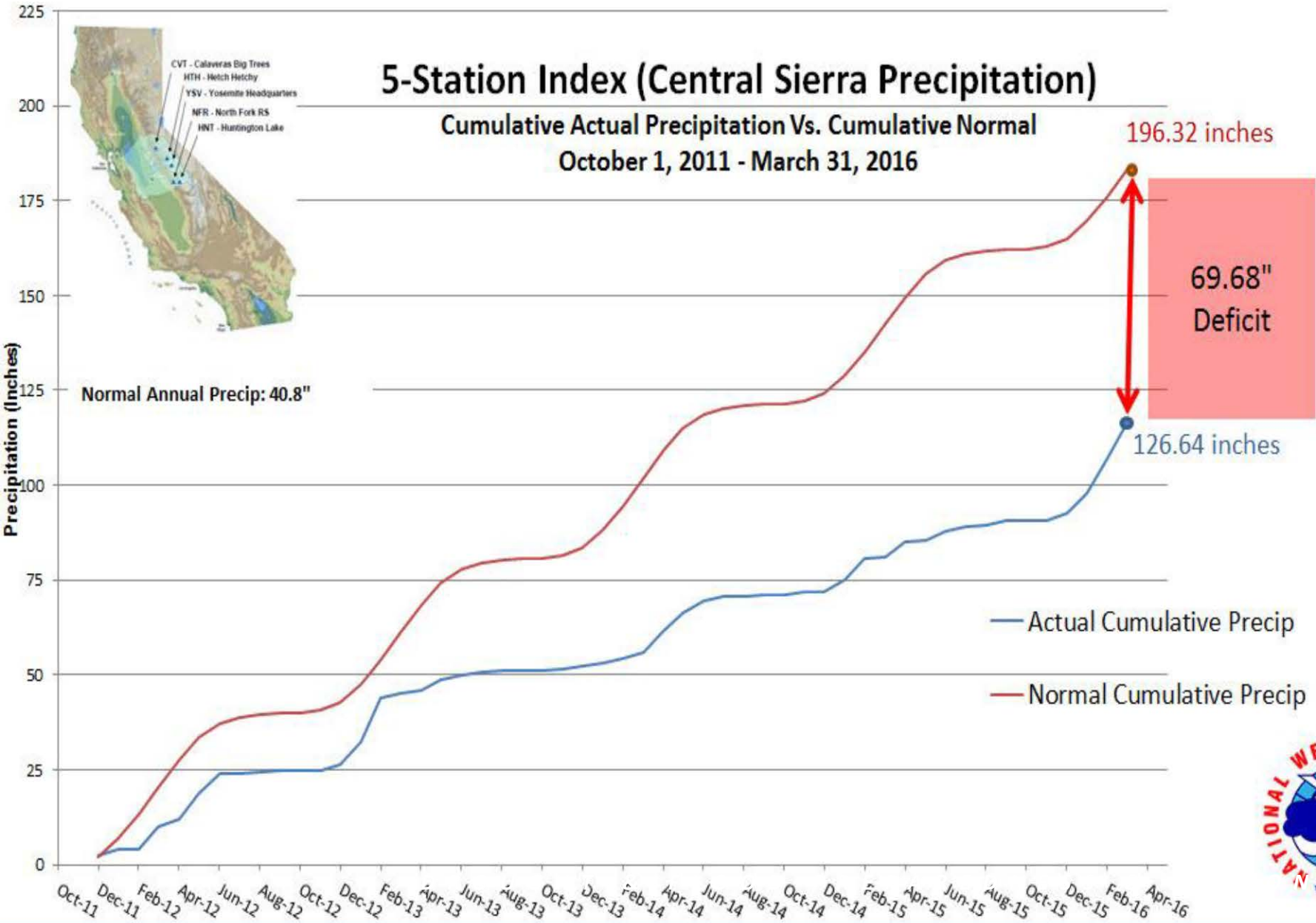
Cumulative Actual Precipitation Vs. Cumulative Normal

October 1, 2011 - March 31, 2016



5-Station Index (Central Sierra Precipitation)

Cumulative Actual Precipitation Vs. Cumulative Normal
October 1, 2011 - March 31, 2016

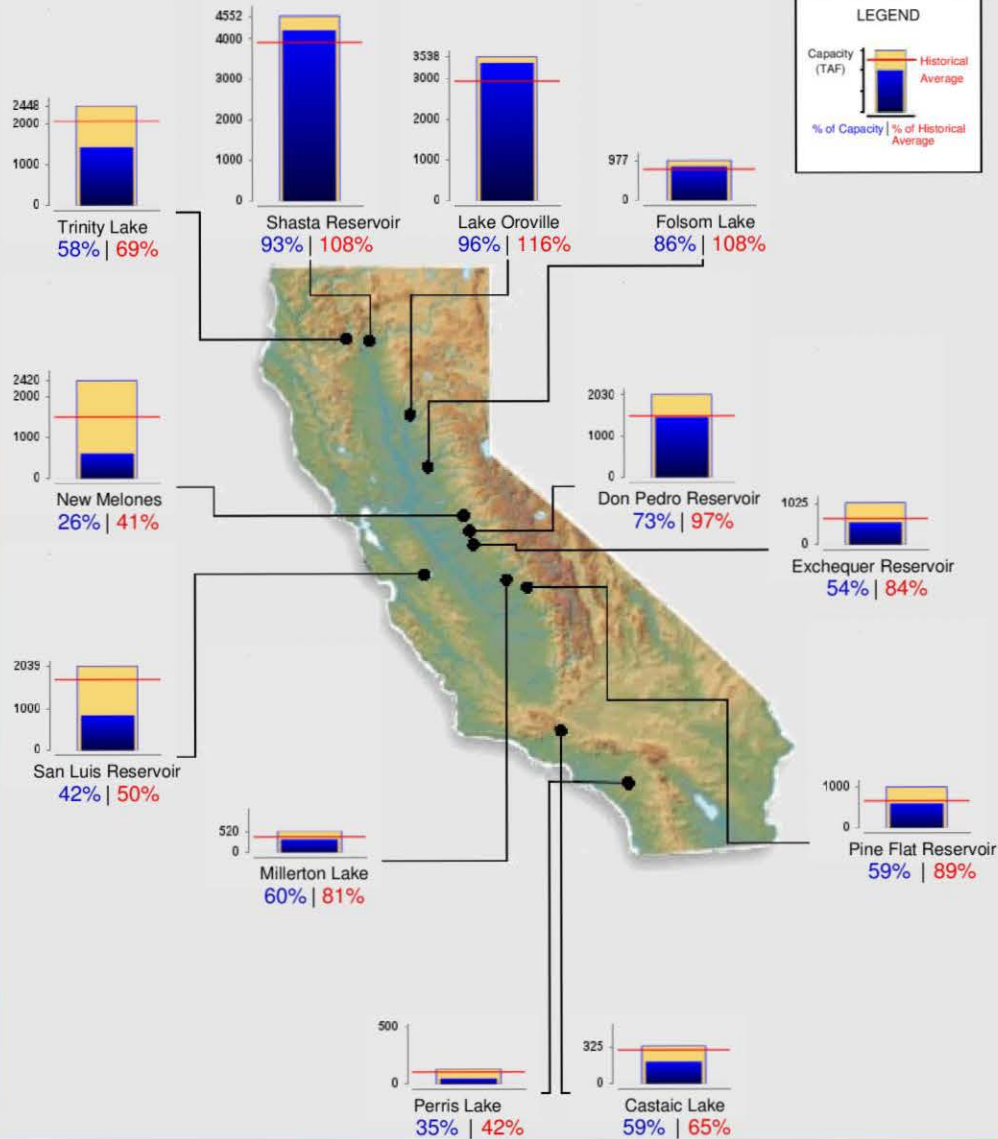




Reservoir Conditions

Ending At Midnight - May 16, 2016

CURRENT RESERVOIR CONDITIONS



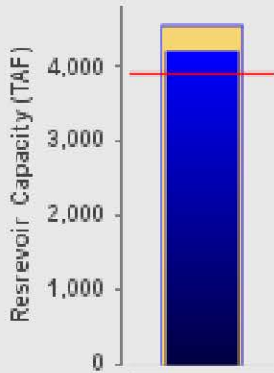


Reservoir Conditions - Shasta Reservoir



Lake Shasta Conditions

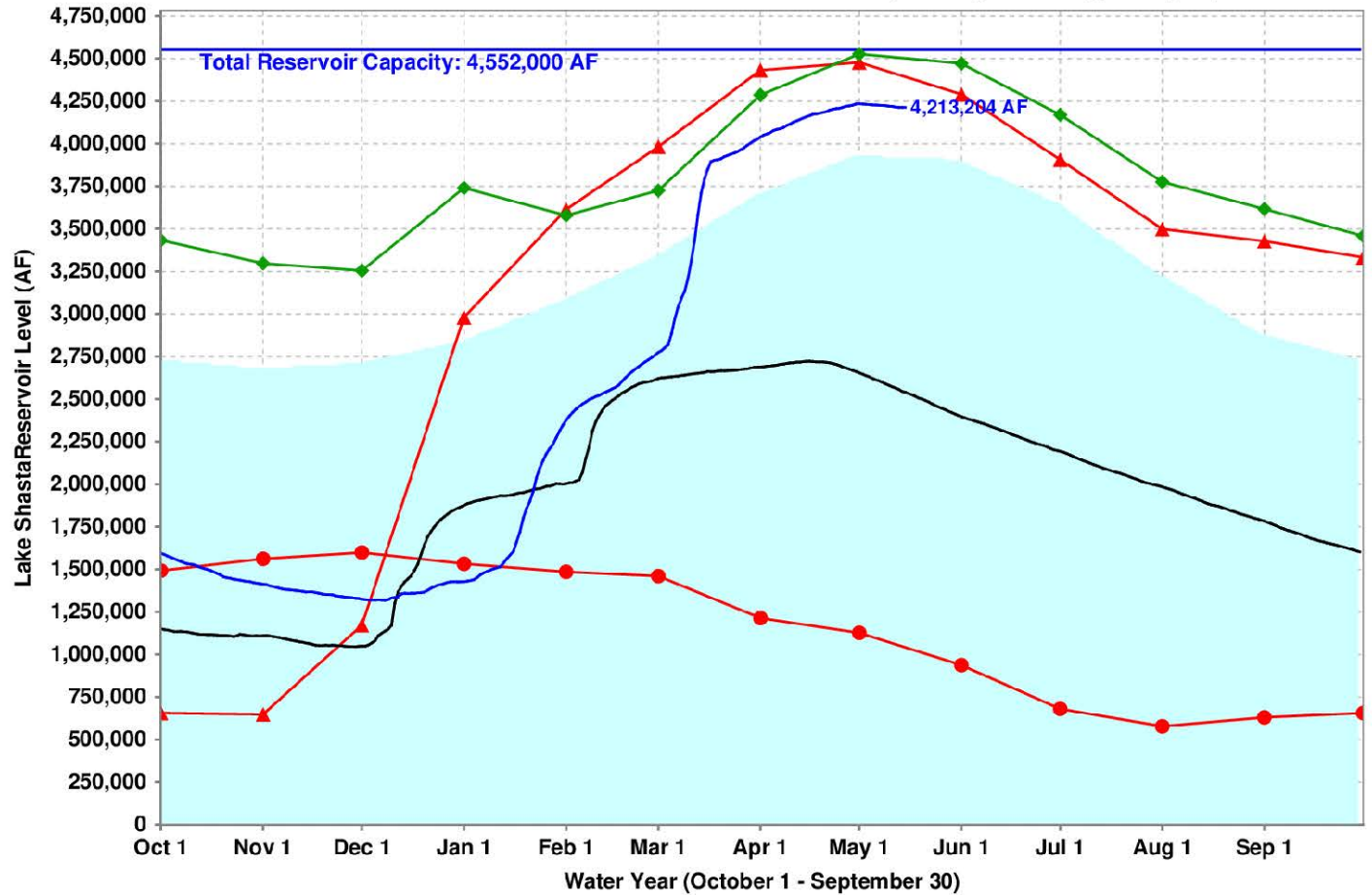
(as of Midnight - May 15, 2016)



Current Level: 4,213,204 AF

93% (Total Capacity) | 108% (Historical Avg.)

Lake Shasta Levels: Various Past Water Years and Current Water Year, Ending At Midnight May 15, 2016



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



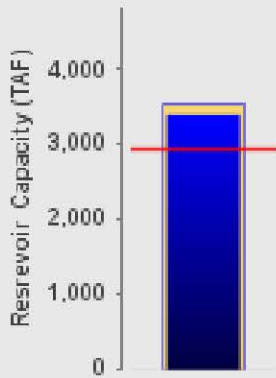
Reservoir Conditions - Lake Oroville



Lake Oroville

Lake Oroville Conditions

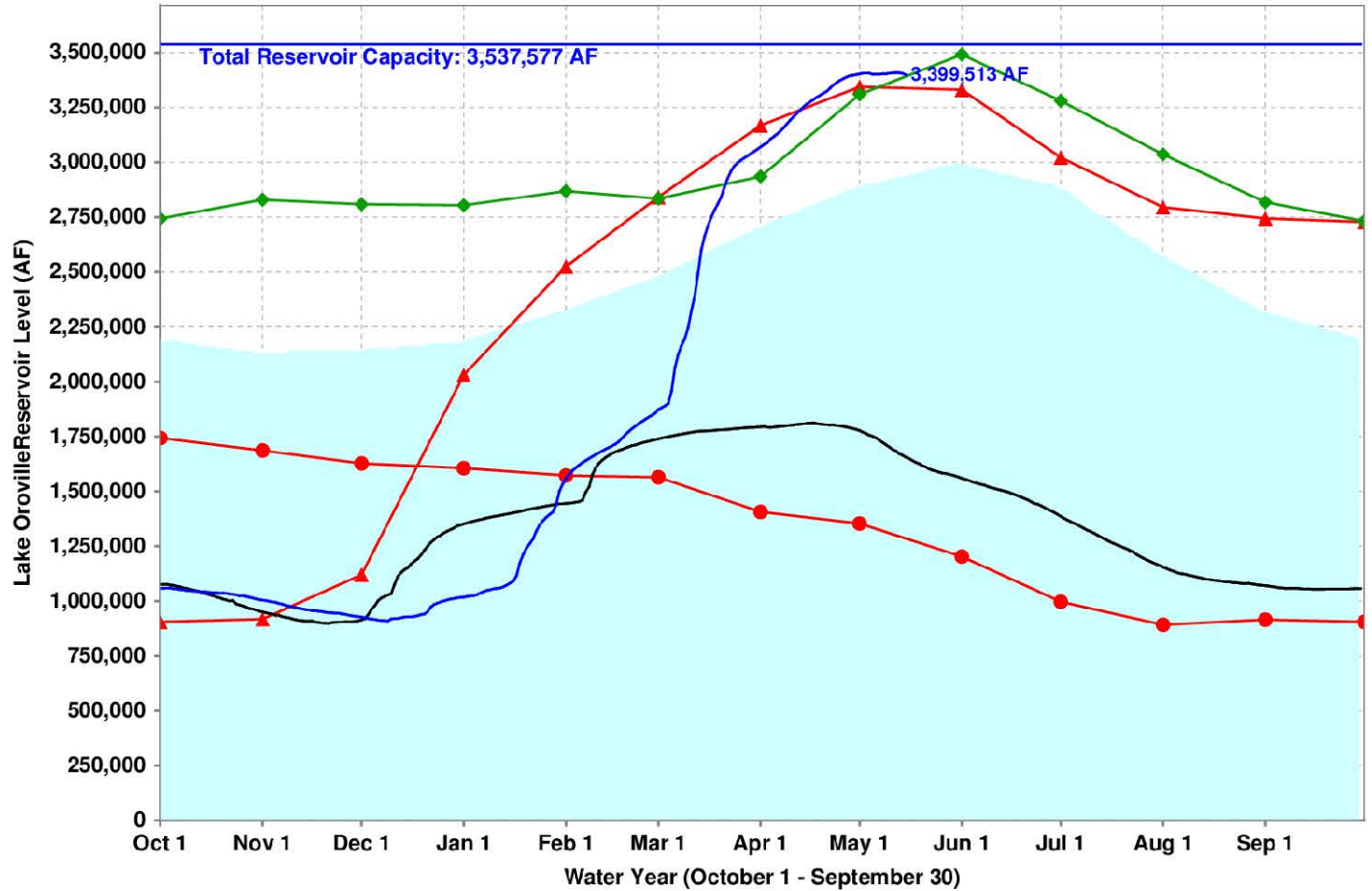
(as of Midnight - May 15, 2016)



Current Level: 3,399,513 AF

96% (Total Capacity) | 116% (Historical Avg.)

Lake Oroville Levels: Various Past Water Years and Current Water Year, Ending At Midnight May 15, 2016



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

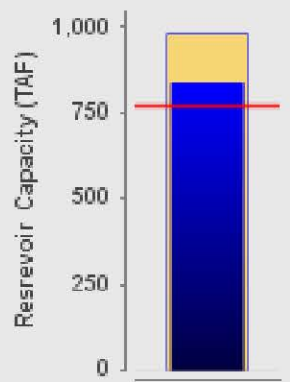


Reservoir Conditions - Folsom Lake



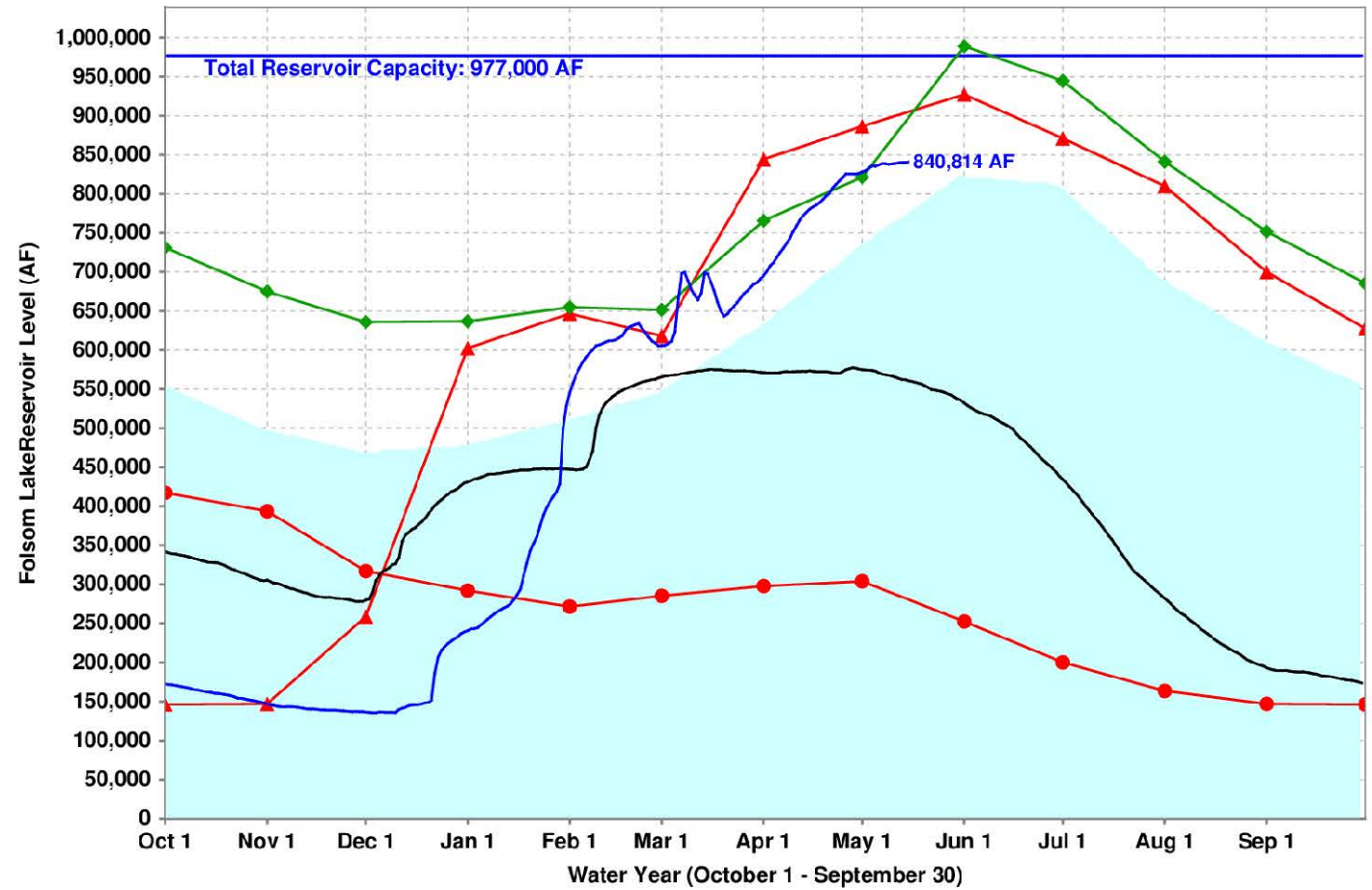
Folsom Lake Conditions

(as of Midnight - May 15, 2016)



Current Level: 840,814 AF
 86% (Total Capacity) | 109% (Historical Avg.)

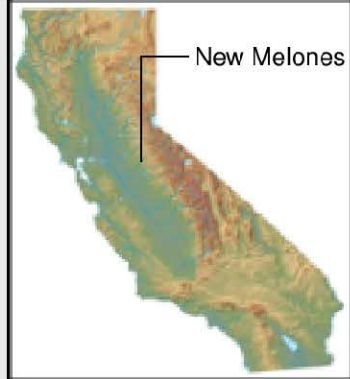
Folsom Lake Levels: Various Past Water Years and Current Water Year, Ending At Midnight May 15, 2016



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

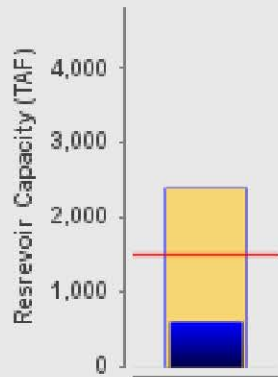


Reservoir Conditions - New Melones



New Melones Conditions

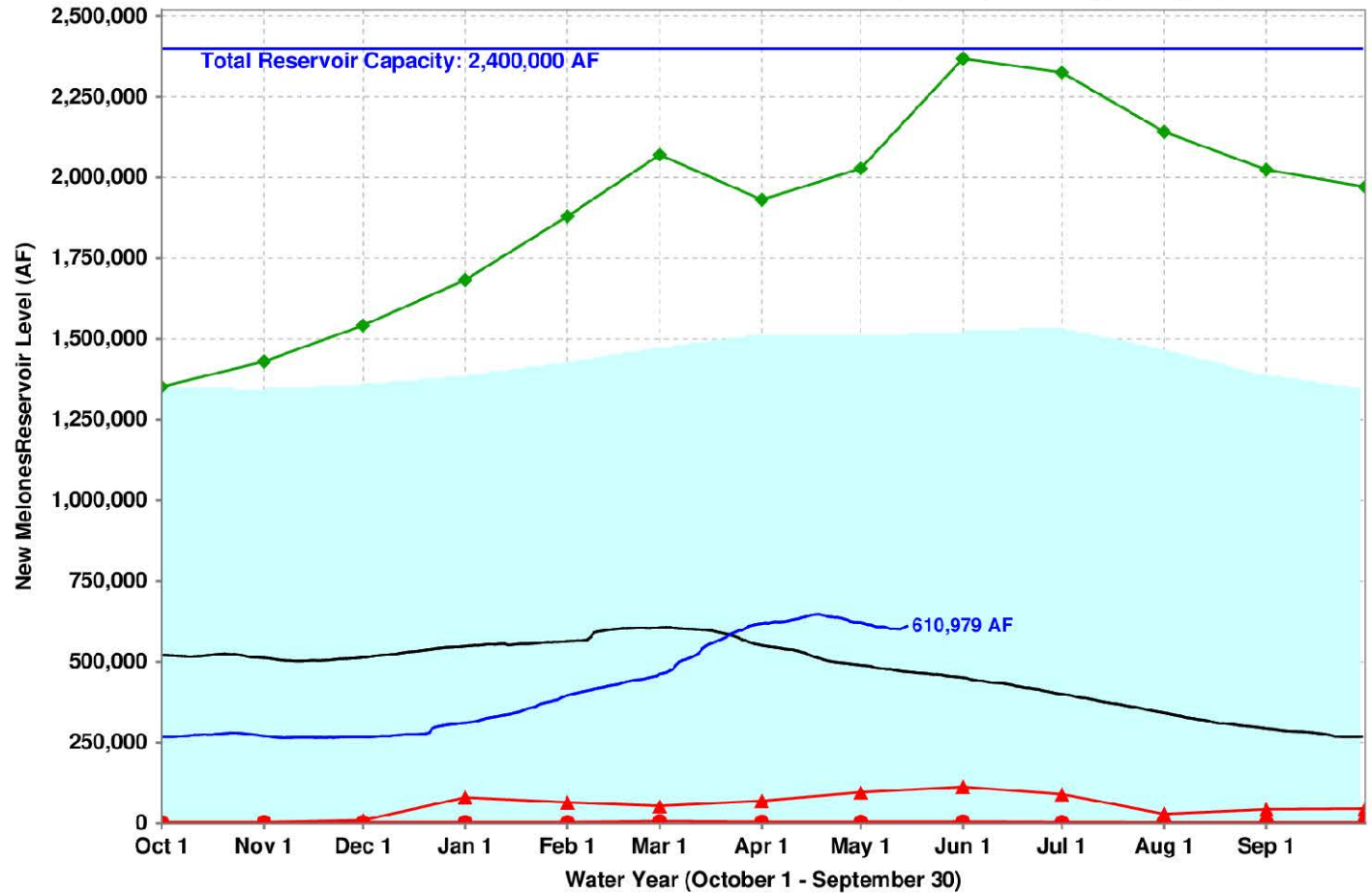
(as of Midnight - May 15, 2016)



Current Level: 610,979 AF

25% (Total Capacity) | 40% (Historical Avg.)

New Melones Levels: Various Past Water Years and Current Water Year, Ending At Midnight May 15, 2016



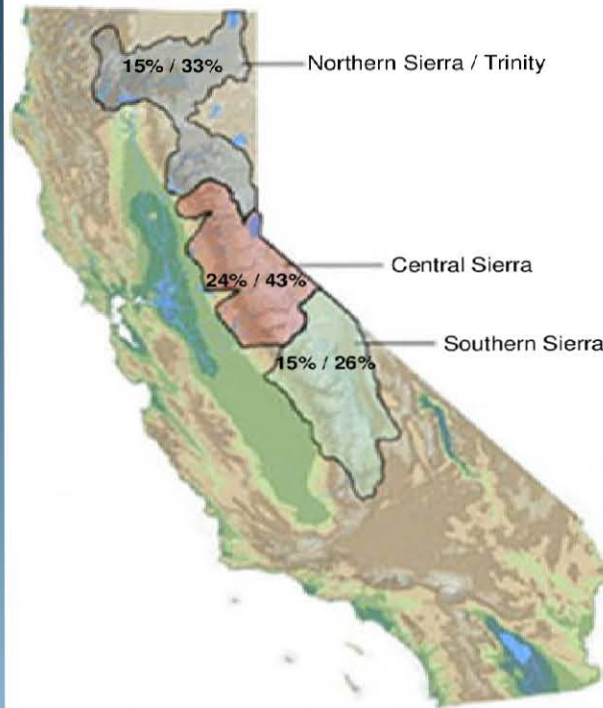
■ Historical Average
 — Total Reservoir Capacity
 ● 1976-1977 (Driest)
 ▲ 1977-1978
 ◆ 1982-1983 (Wettest)
 — 2014-2015
 — Current: 2015-2016



Statewide Summary of Snow Water Content

Current Regional Snowpack from Automated Snow Sensors

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



Statewide Average: 19% / 35%

NORTH	
Data as of May 17, 2016	
Number of Stations Reporting	29
Average snow water equivalent (Inches)	4.3
Percent of April 1 Average (%)	15
Percent of normal for this date (%)	33

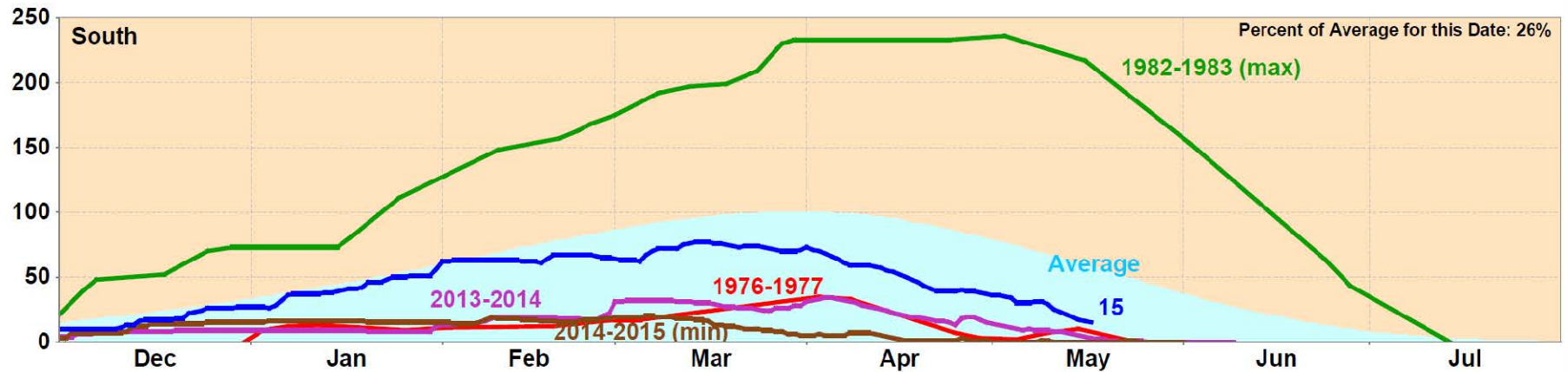
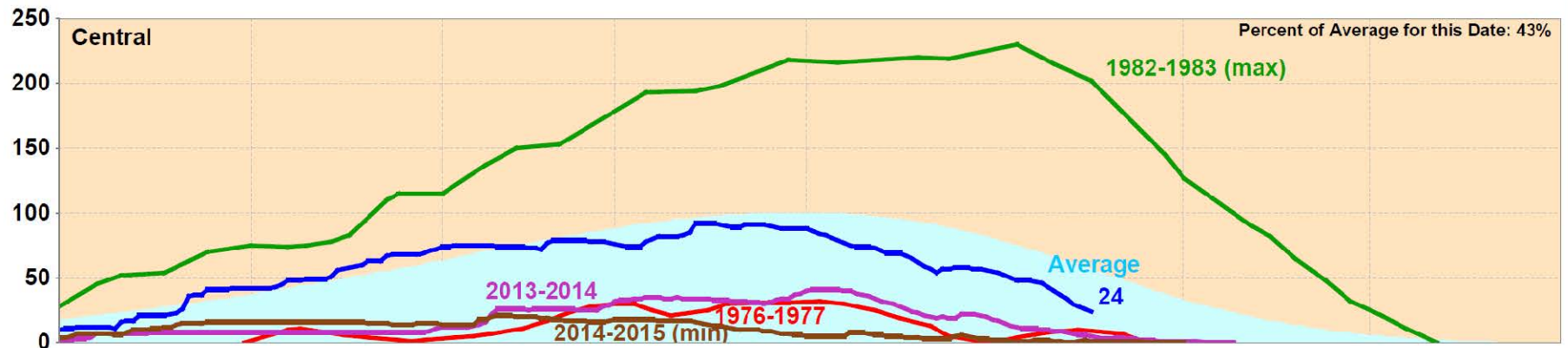
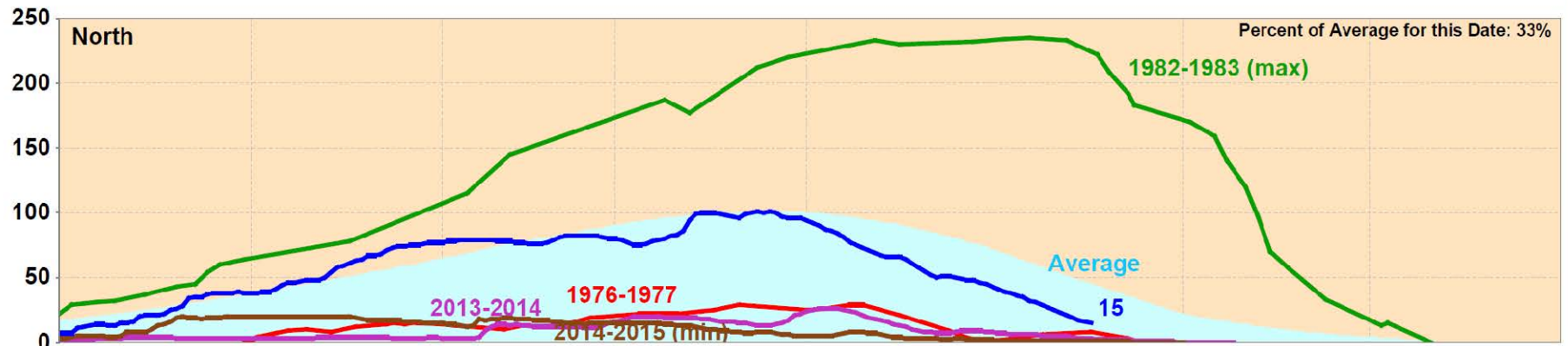
CENTRAL	
Data as of May 17, 2016	
Number of Stations Reporting	40
Average snow water equivalent (Inches)	6.8
Percent of April 1 Average (%)	24
Percent of normal for this date (%)	43

SOUTH	
Data as of May 17, 2016	
Number of Stations Reporting	27
Average snow water equivalent (Inches)	4.0
Percent of April 1 Average (%)	15
Percent of normal for this date (%)	26

STATE	
Data as of May 17, 2016	
Number of Stations Reporting	96
Average snow water equivalent (Inches)	5.3
Percent of April 1 Average (%)	19
Percent of normal for this date (%)	35

Data as of May 17, 2016

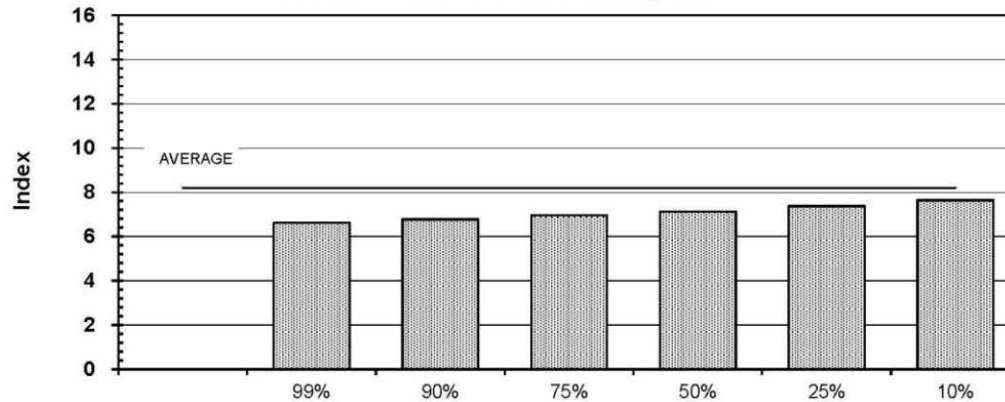
California Snow Water Content, May 17, 2016, Percent of April 1 Average



Statewide Percent of April 1: 19%

Statewide Percent of Average for Date: 35%

**SACRAMENTO VALLEY
WATER YEAR TYPE INDEX (40-30-30)
2016 Water Year Forecast as of May 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
April 1, 2016	6.4	6.7	7.0	7.3	7.8	8.5
May 1, 2016	6.6	6.8	7.0	7.1	7.4	7.6

Water Year Index based on flow in million acre feet

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

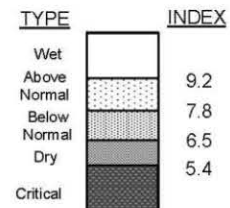
Notes:

- (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

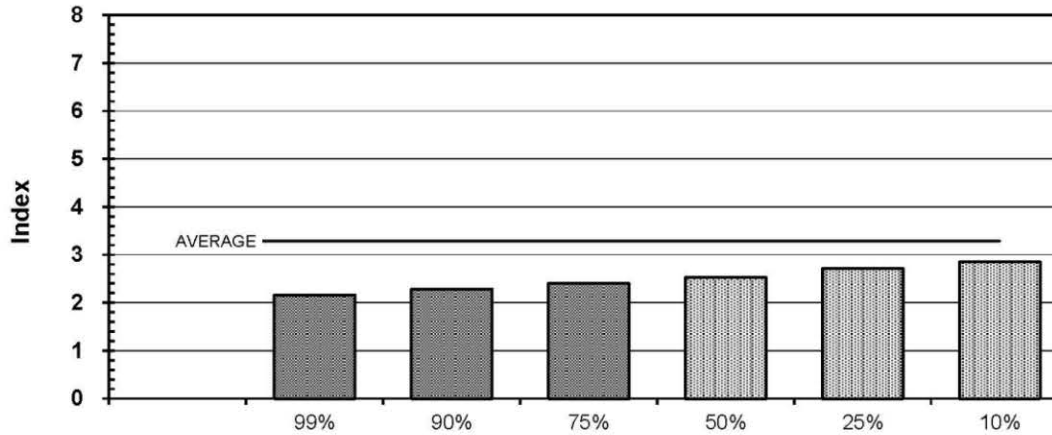
Previous Water Year Indices:

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



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



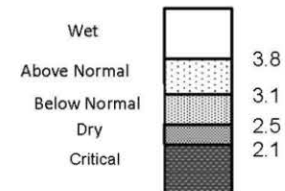
Date of Forecast	Probability of Exceedance					
	99%	90%	75%	50%	25%	10%
December 1, 2015	0.6	1.1	1.5	2.2	3.0	4.0
January 1, 2016	1.0	1.4	1.9	2.4	3.1	3.9
February 1, 2016	1.7	2.0	2.4	2.8	3.7	4.5
March 1, 2016	1.6	1.9	2.1	2.4	2.9	3.6
April 1, 2016	2.0	2.2	2.4	2.5	2.9	3.3
May 1, 2016	2.2	2.3	2.4	2.5	2.7	2.9

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

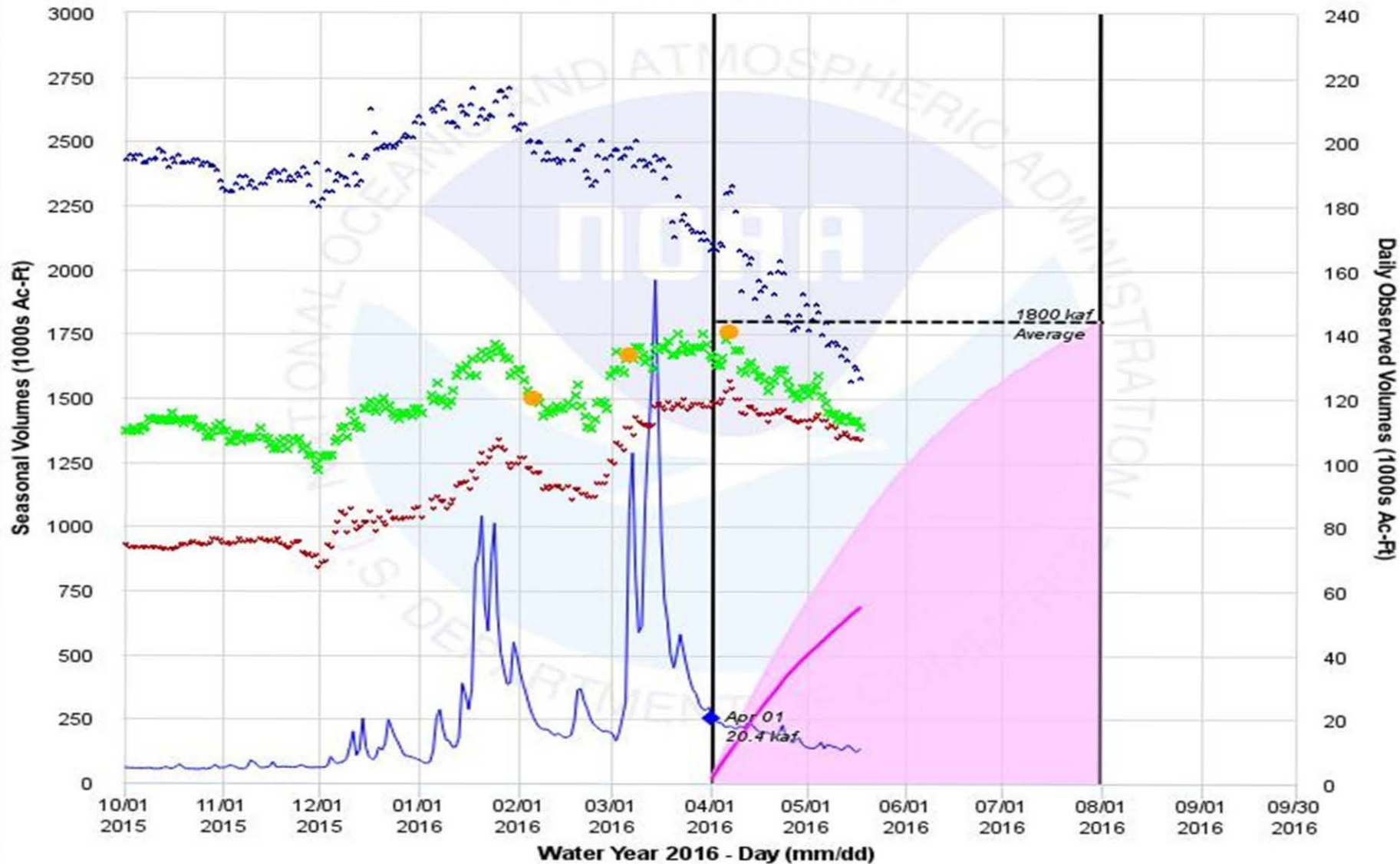
Previous Water Year Indices:

2015 =	0.8	25% of avg.
2015 (Min) =	0.8	25% of avg.
1983 (Max) =	7.2	219% of avg.
1961-2010 average =	3.3	

SACRAMENTO - SHASTA (SHDC1) 05/17/2016

Most Probable: 1390 kaf | 77% of Average

Created: 05/17/2016 at 09:43 AM PDT



Observed Season to Date Percent of Average: 68% (685 kaf)

Season to Date Average: 1010 kaf

Historical Apr-Jul Vol Max: 3530 kaf in 1998

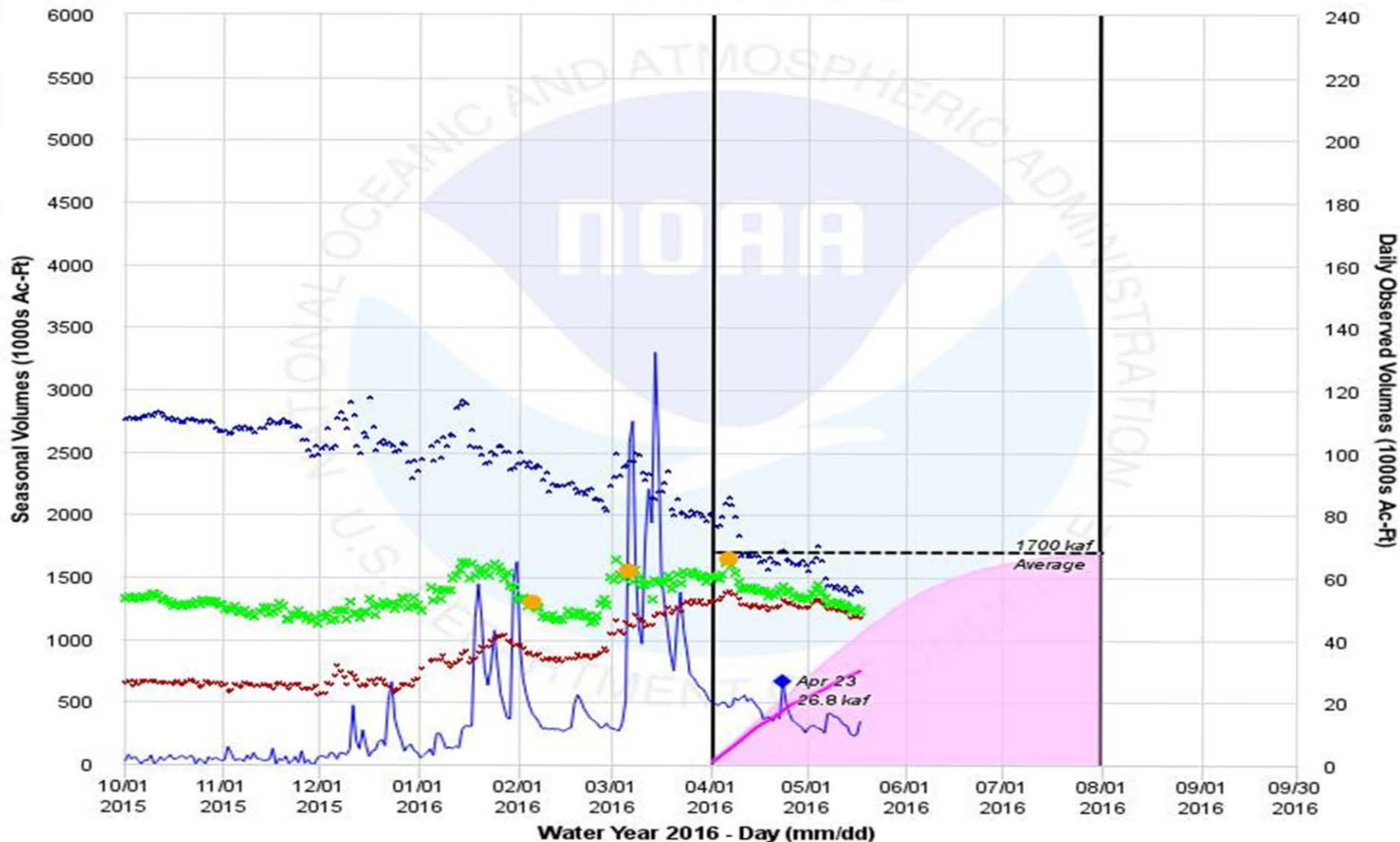
Historical Apr-Jul Vol Min: 726 kaf in 1924

-- 30-Year Apr-Jul Vol Mean Season to Date Avg ● NWS Apr-Jul Fcst — Season to Date Obs — Daily Obs ◆ Obs Peak
 ▲ ESP Apr-Jul Fcst 10% ▲ ESP Apr-Jul Fcst 25% × ESP Apr-Jul Fcst 50% ▼ ESP Apr-Jul Fcst 75% ▼ ESP Apr-Jul Fcst 90%

FEATHER - OROVILLE (ORDC1) 05/17/2016

Most Probable: **1230 kaf** | **72% of Average**

Created: 05/17/2016 at 09:43 AM PDT



Observed Season to Date Percent of Average: **72% (752 kaf)**

Season to Date Average: **1040 kaf**

Historical Apr-Jul Vol Max: **4680 kaf** in 1952

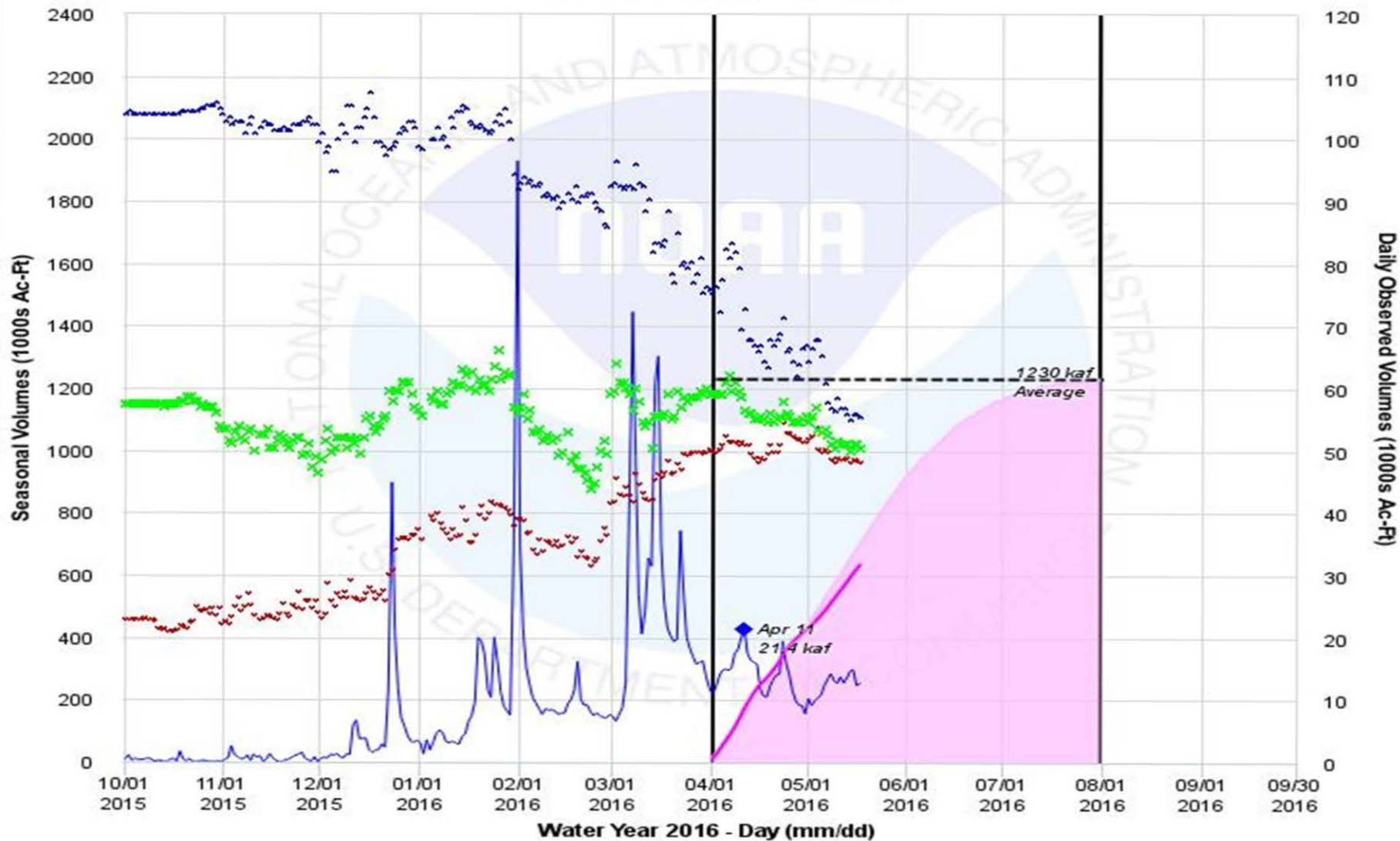
Historical Apr-Jul Vol Min: **392 kaf** in 1977

-- 30-Year Apr-Jul Vol Mean Season to Date Avg ● NWS Apr-Jul Fcst — Season to Date Obs — Daily Obs ◆ Obs Peak
 ▲ ESP Apr-Jul Fcst 10% ● ESP Apr-Jul Fcst 25% × ESP Apr-Jul Fcst 50% ▼ ESP Apr-Jul Fcst 75% ▾ ESP Apr-Jul Fcst 90%

AMERICAN - FOLSOM FNF (FOLC1) 05/17/2016

Most Probable: **1010 kaf** | **82% of Average**

Created: 05/17/2016 at 09:43 AM PDT



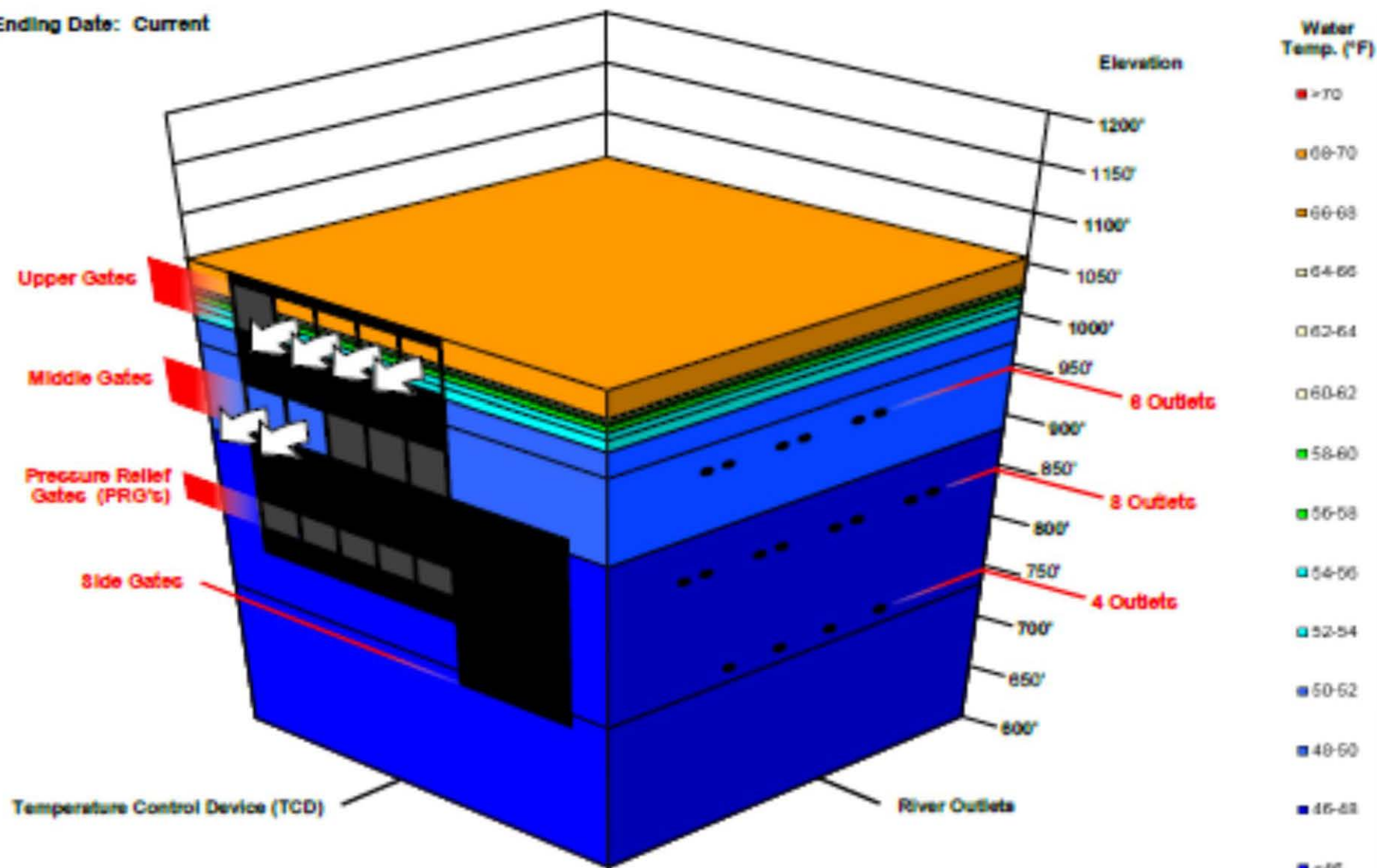
Observed Season to Date Percent of Average: 91% (635 kaf) **Season to Date Average: 701 kaf**
Historical Apr-Jul Vol Max: 3070 kaf in 1911 **Historical Apr-Jul Vol Min: 229 kaf in 1977**

-- 30-Year Apr-Jul Vol Mean Season to Date Avg ● NWS Apr-Jul Fcst — Season to Date Obs — Daily Obs ◆ Obs Peak
 ^ ESP Apr-Jul Fcst 10% + ESP Apr-Jul Fcst 25% × ESP Apr-Jul Fcst 50% ▽ ESP Apr-Jul Fcst 75% ▾ ESP Apr-Jul Fcst 90%

Shasta TCD Configuration

Starting Date: 06/18/2018

Ending Date: Current



Arrows indicate open Gate or Outlet (i.e. Water flowing from this location)

Profile data collected 05/18/2018

San Joaquin River at Vernalis

