



2016-2017 Water Year and River Stage Perspective

NCEI Drought Amelioration Workshop

Alan Haynes

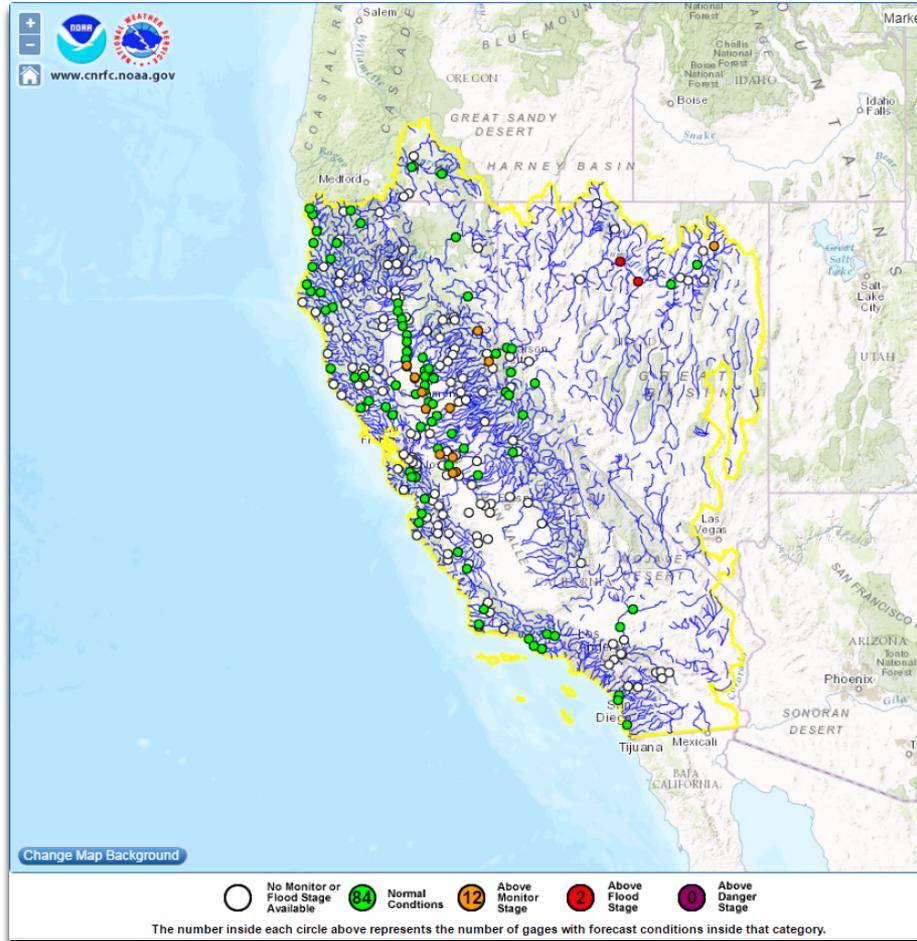
**Service Coordination Hydrologist
California Nevada River Forecast Center**

Incline Village, NV

June 2nd 2017



CNRFC Operations



Domain and Forecast Parameters

- 245,000 sq. miles
- ~270 Basins modeled
- 94 Forecast Points
- ~60 Reservoir Inflows

Staffing – 14 people

- Hydrologist-In-Charge
- 2 Program Managers
- 6 Hydrologists
- 3 Meteorologists
- Information Technology Officer
- Administrative Assistant
- +8 DWR Engineer/Hydrologists



SACRAMENTO VALLEY - WATER RESOURCES INDEX (SACC0)

Sacramento River - Bend Bridge (BDBC1)

Feather River - Lake Oroville (ORDC1)

Yuba River - Englebright Reservoir (HLEC1)

American River - Folsom Lake (FOLC1)

Issuance Time: Jun 01 2017 at 7:55 AM PDT

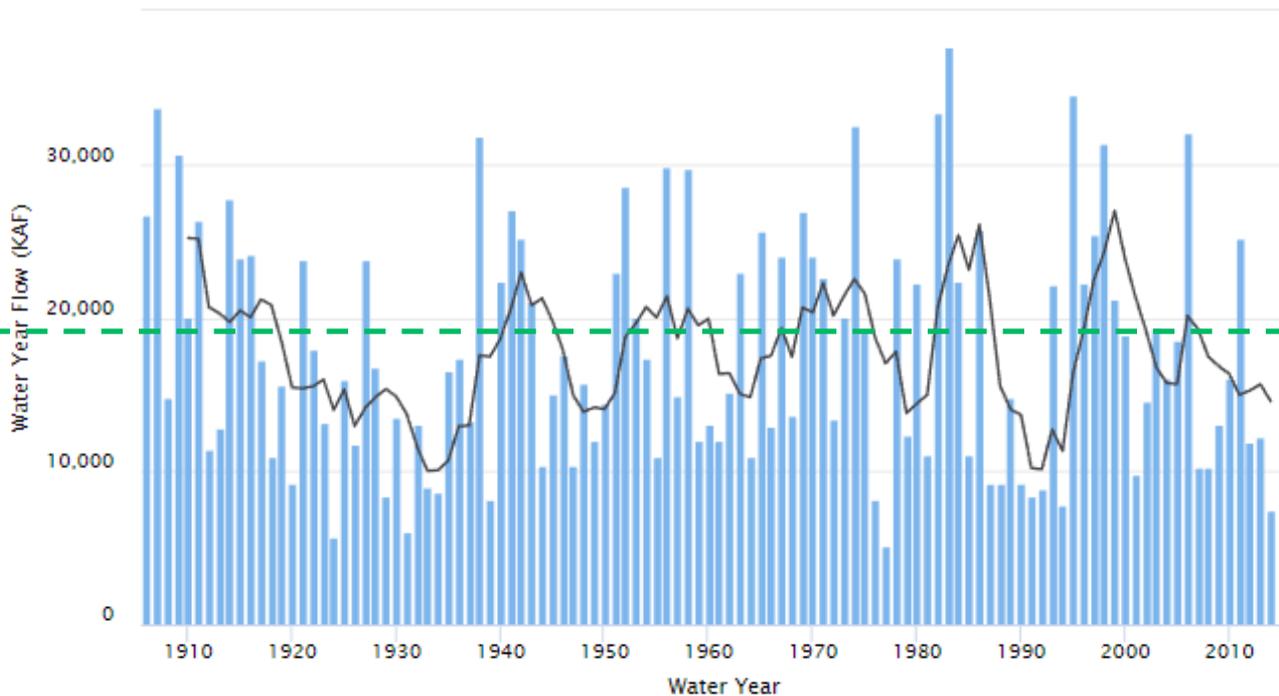
Historical Flows

Water Year Seasonal (Apr-Jul)

Water Year Historical Flow for SACC0



average



● Annual Flow — 5-Year Average



SACRAMENTO VALLEY - WATER RESOURCES INDEX (SACC0)

- Sacramento River - Bend Bridge (BDBC1)
- Feather River - Lake Oroville (ORDC1)
- Yuba River - Englebright Reservoir (HLEC1)
- American River - Folsom Lake (FOLC1)

Issuance Time: Jun 01 2017 at 7:55 AM PDT

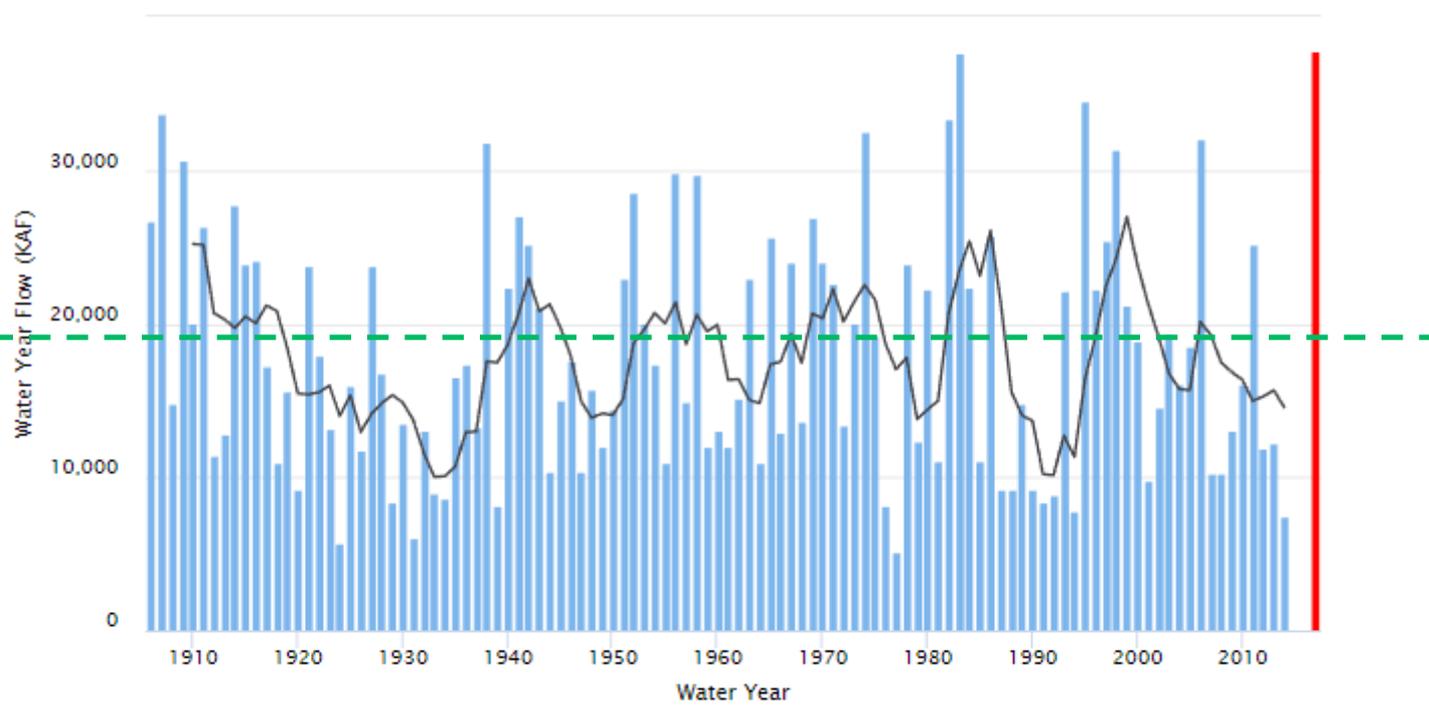
Historical Flows

Water Year Seasonal (Apr-Jul)

Water Year Historical Flow for SACC0



average



● Annual Flow — 5-Year Average



Anticipating Winter Operations



Winter is
coming.



Winter Showed Up!





Widespread Flooding



San Diego River



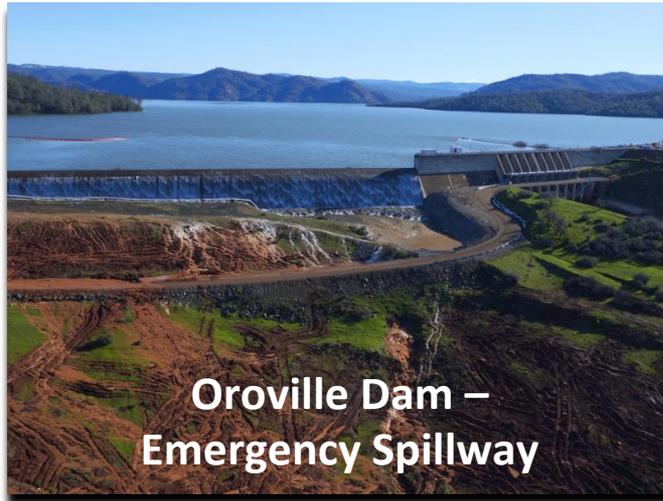
Yolo Bypass



Tuolumne River - Modesto



Oroville Dam –
Spillway Damage



Oroville Dam –
Emergency Spillway



Coyote Creek – San Jose



Deep Snowpack



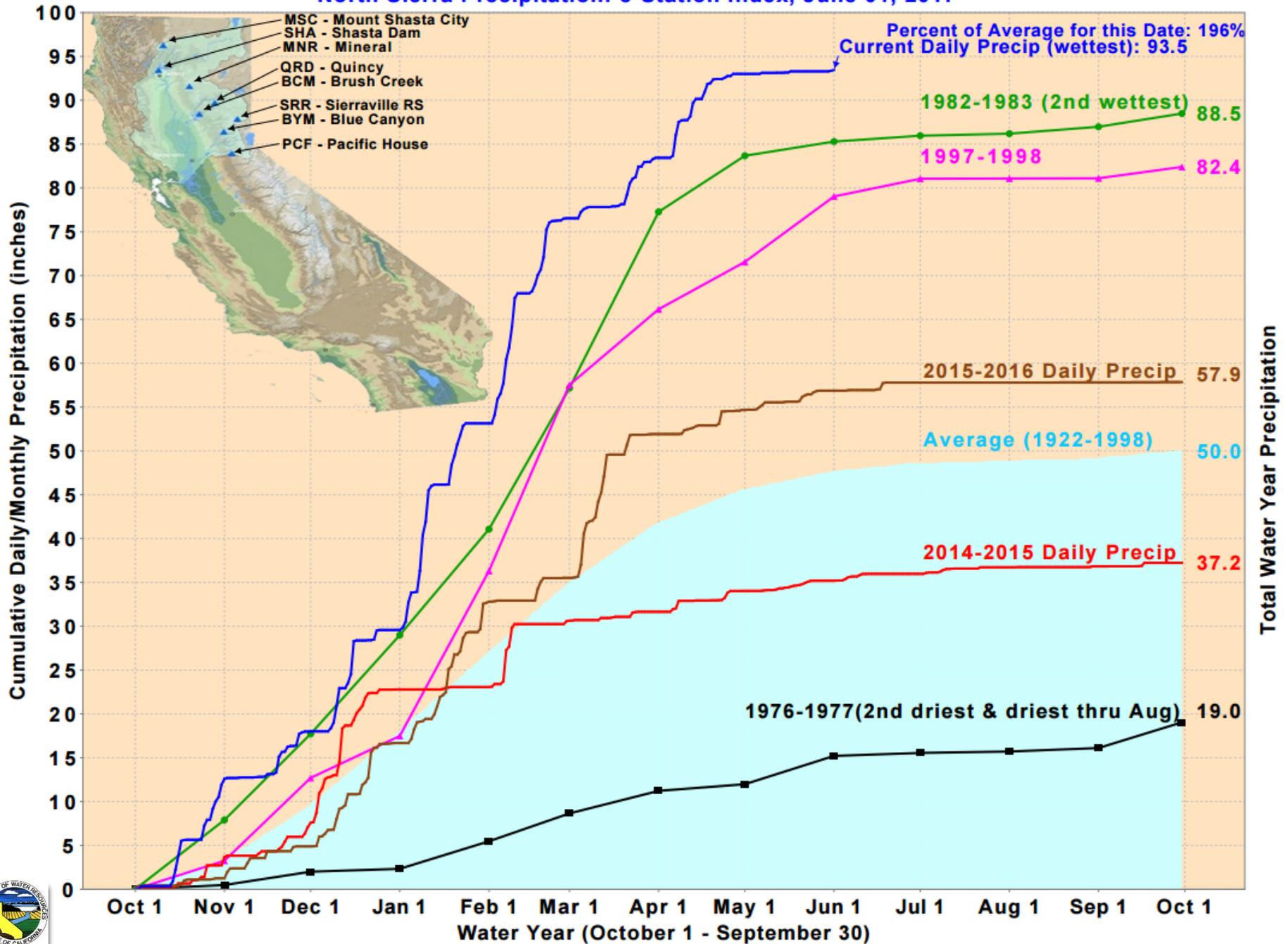
Leavitt Lake SNOTEL - 28ft tall precipitation gage



Jeff Anderson, Nevada NRCS



North Sierra Precipitation: 8-Station Index, June 01, 2017





Seasonal (Apr-Jul) Historical Flow for Folsom

AMERICAN RIVER - FOLSOM LAKE (FOLC1)

Latitude: 38.71° N

Longitude: 121.16° W

Elevation: 350 Feet

Location: Sacramento County in California

River Group: Lower Sacramento

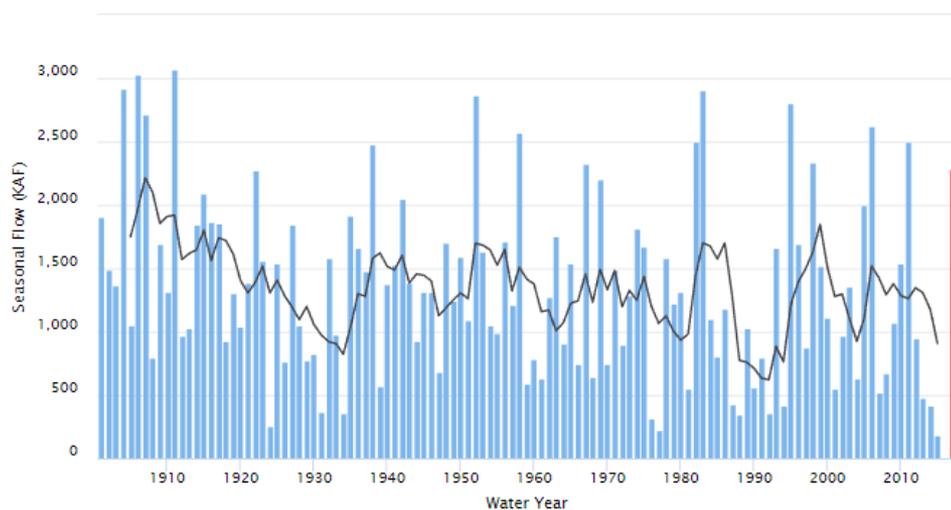
Issuance Time:

Jun 01 2017 at 7:55 AM PDT

Historical Flows

Water Year **Seasonal (Apr-Jul)**

Seasonal (Apr-Jul) Historical Flow for FOLC1



Rank	Year	Seasonal Flow
1	1911	3073.6
2	1906	3026.6
3	1904	2922.5
4	1983	2912.3
5	1952	2864.1
6	1995	2810.4
7	1907	2713.6
8	2006	2622.4
9	1958	2570.2
10	2011	2497.1
11	1982	2495.6
12	1938	2475.1
13	1998	2333.0
14	1967	2329.2
15	2017	2283.2

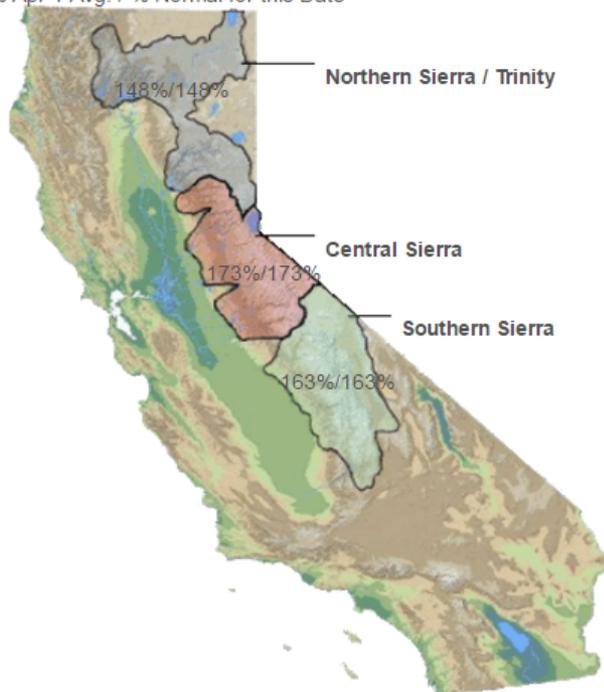


Snow Water Equivalent on April 1st 2017

Provided by the California Cooperative Snow Surveys

Data For: 01-Apr-2017

% Apr 1 Avg. / % Normal for this Date



Change Date :

NORTH

Data For: 01-Apr-2017	
Number of Stations Reporting	28
Average snow water equivalent	41.5"
Percent of April 1 Average	148%
Percent of normal for this date	148%

CENTRAL

Data For: 01-Apr-2017	
Number of Stations Reporting	41
Average snow water equivalent	49.9"
Percent of April 1 Average	173%
Percent of normal for this date	173%

SOUTH

Data For: 01-Apr-2017	
Number of Stations Reporting	26
Average snow water equivalent	43.7"
Percent of April 1 Average	163%
Percent of normal for this date	163%

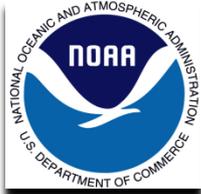
STATEWIDE SUMMARY

Data For: 01-Apr-2017	
Number of Stations Reporting	95
Average snow water equivalent	45.7"
Percent of April 1 Average	163%
Percent of normal for this date	163%

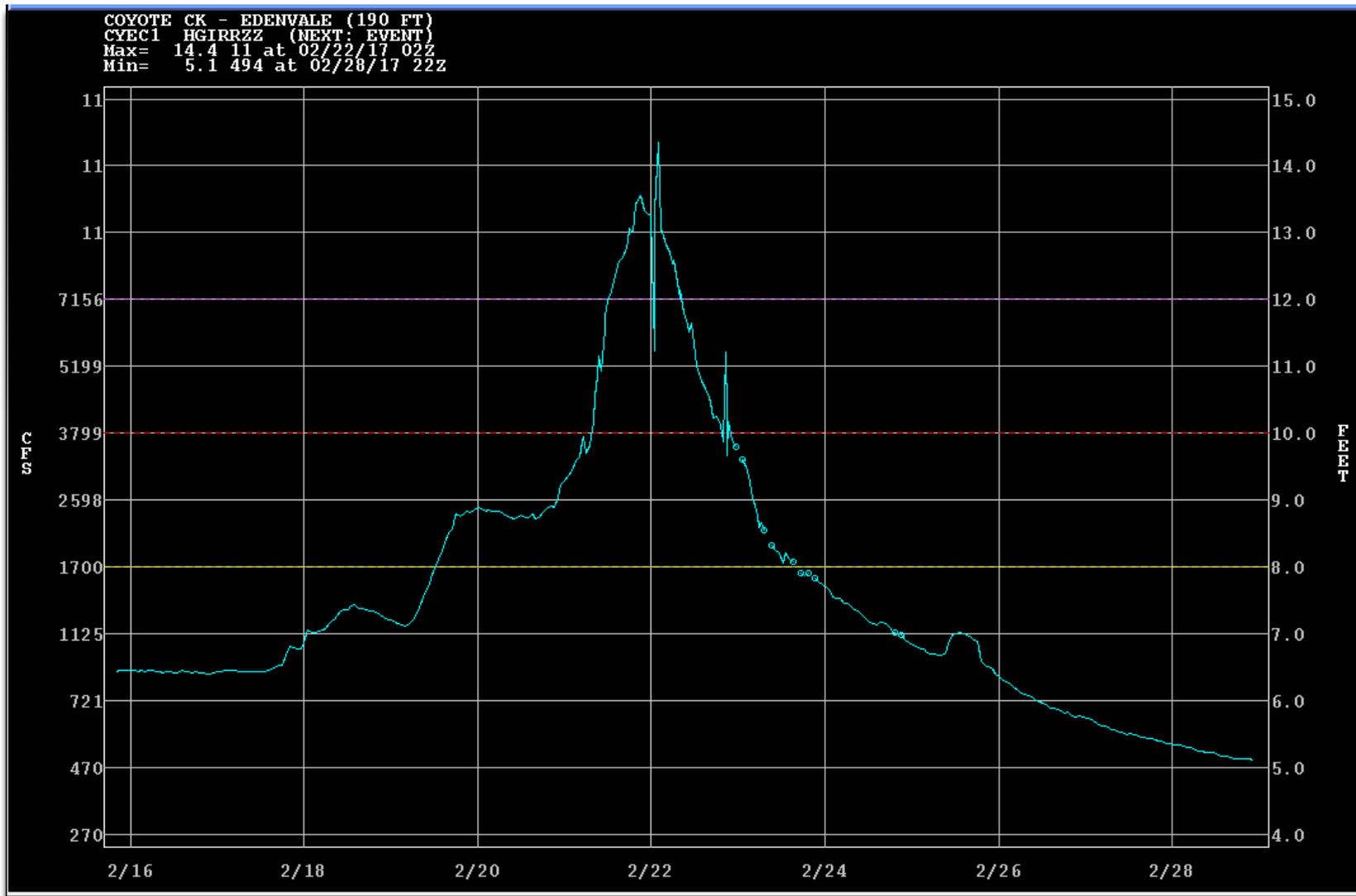


Anderson Dam Spill – 1st Time in 11 Years





Historic Coyote Creek Flooding





Historic Coyote Creek Flooding

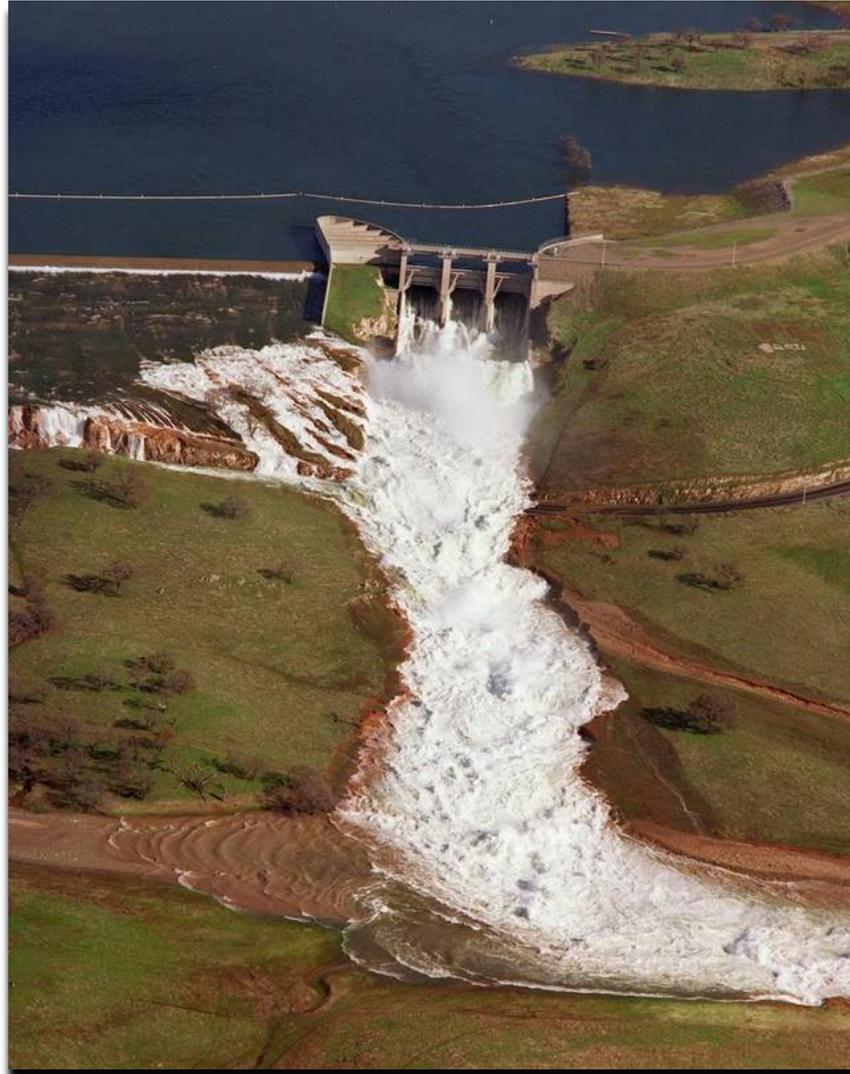
- More than \$70 million in damage
- 10,000 people evacuated

past five days





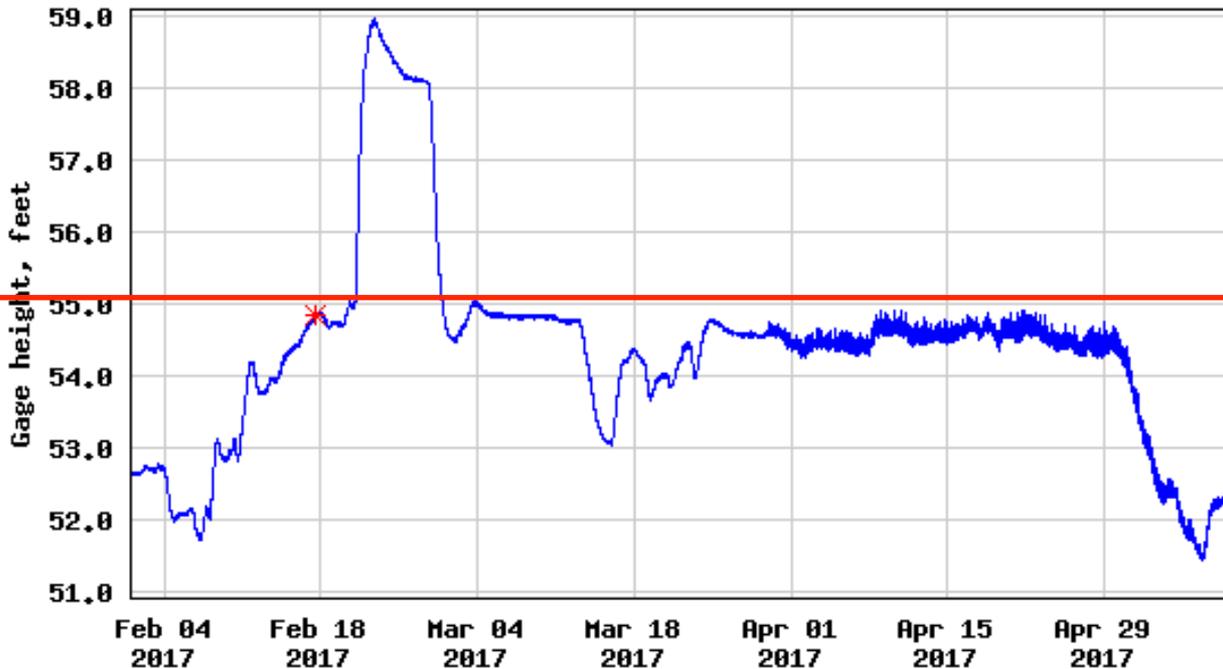
New Don Pedro Emergency Spillway – 1st Time





USGS 11290000 TUOLUMNE R A MODESTO CA

Flood Stage

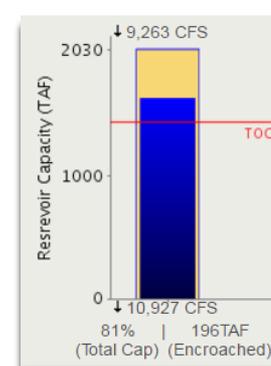
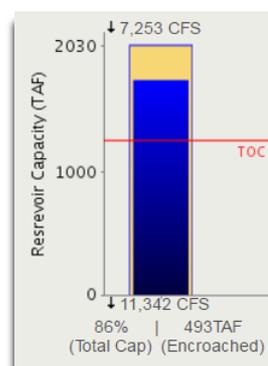
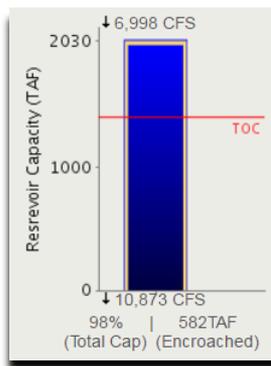
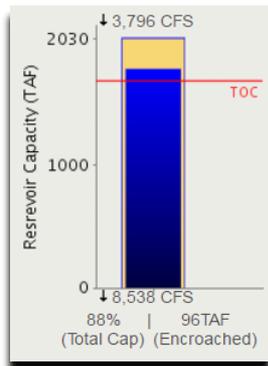


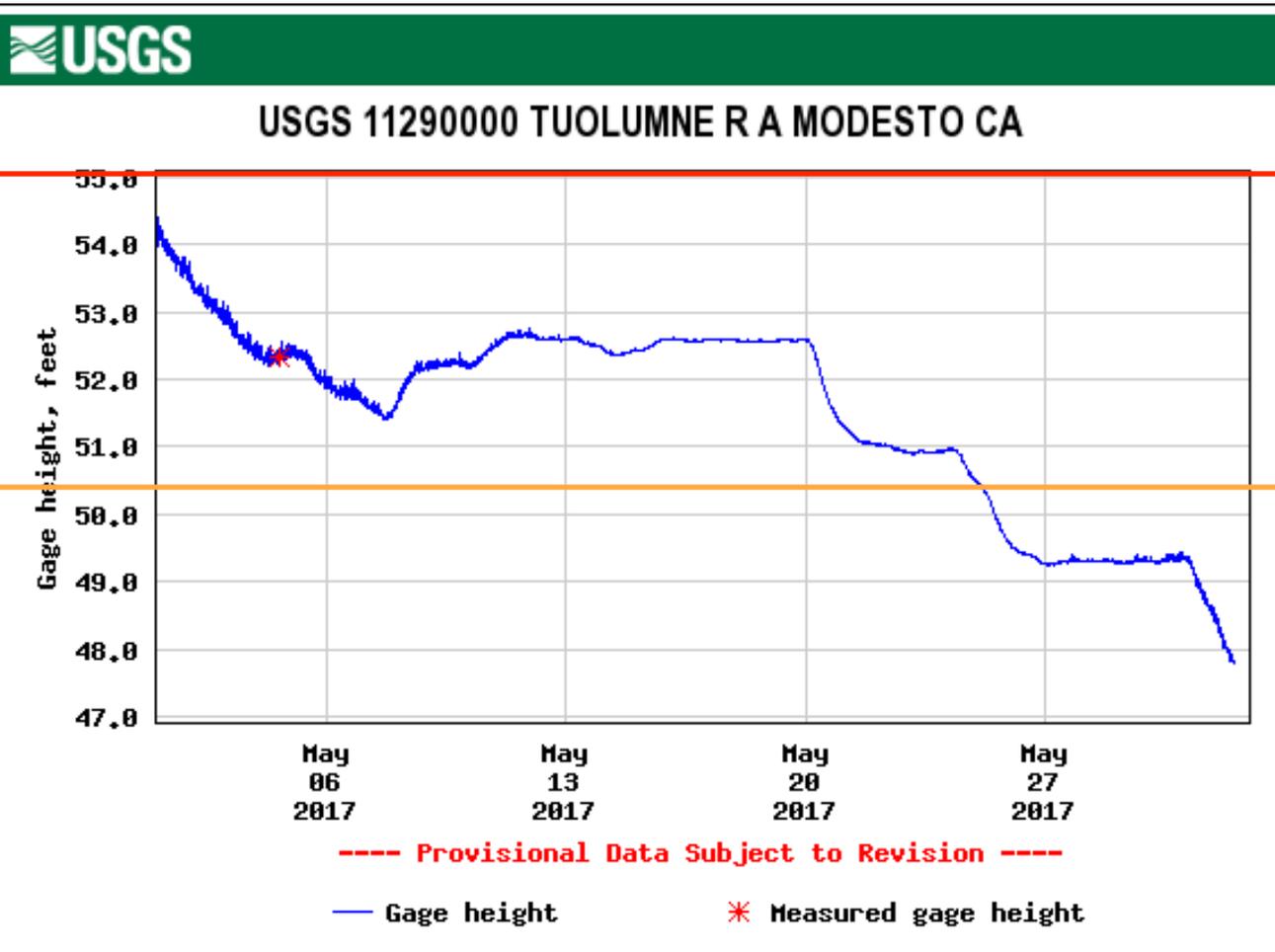
---- Provisional Data Subject to Revision ----

— Gage height

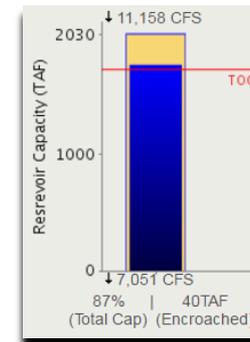
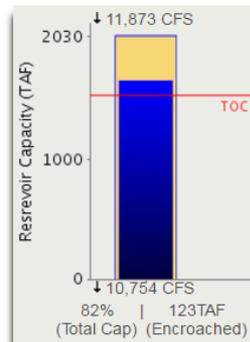
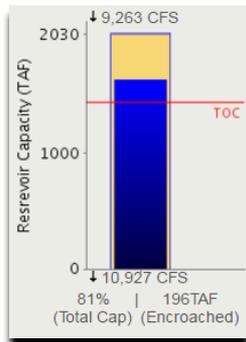
* Measured gage height

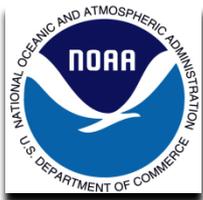
New Don Pedro Reservoir





New Don Pedro Reservoir

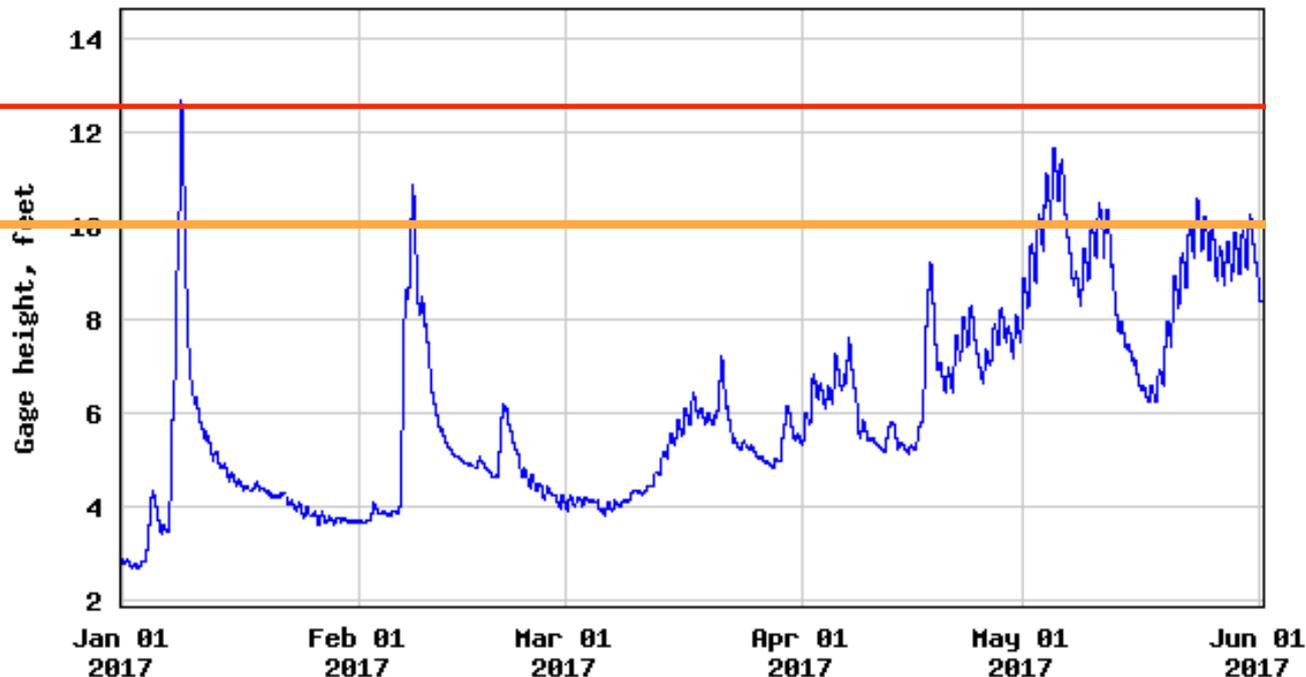




USGS 11266500 MERCED R A POHONO BRIDGE NR YOSEMITE CA

Moderate Flood

Minor Flood



----- Provisional Data Subject to Revision -----

— Gage height — Floodstage

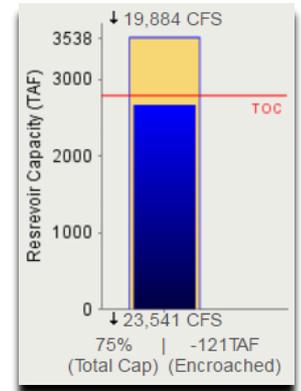
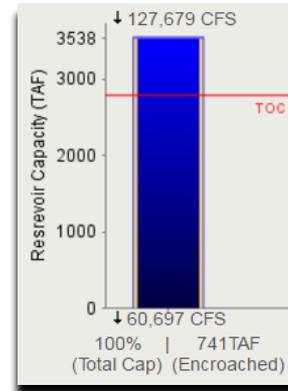
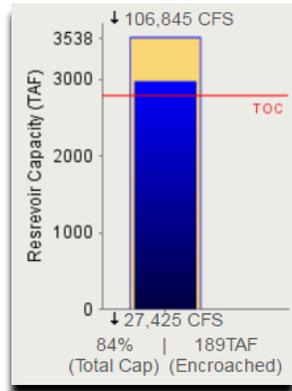
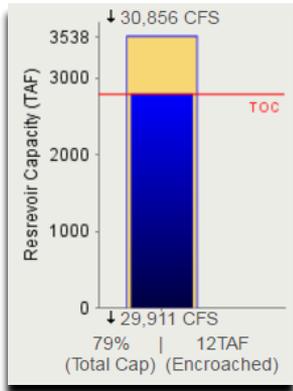
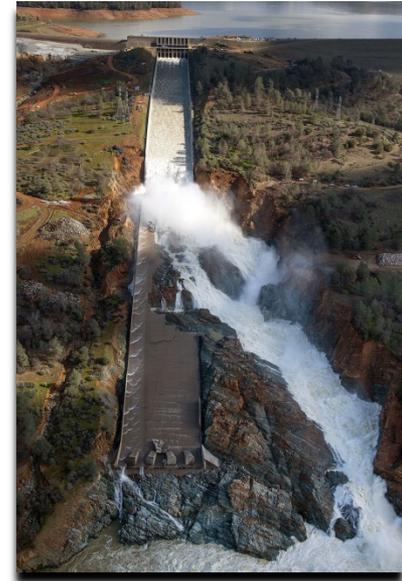
CENTRAL	
Data For: 01-Jan-2017	
Number of Stations Reporting	44
Average snow water equivalent	6.4"
Percent of April 1 Average	21%
Percent of normal for this date	57%

CENTRAL	
Data For: 01-Apr-2017	
Number of Stations Reporting	41
Average snow water equivalent	49.9"
Percent of April 1 Average	173%
Percent of normal for this date	173%

CENTRAL	
Data For: 01-Jun-2017	
Number of Stations Reporting	39
Average snow water equivalent	20.9"
Percent of April 1 Average	72%
Percent of normal for this date	220%



Oroville Dam Spillway Crisis

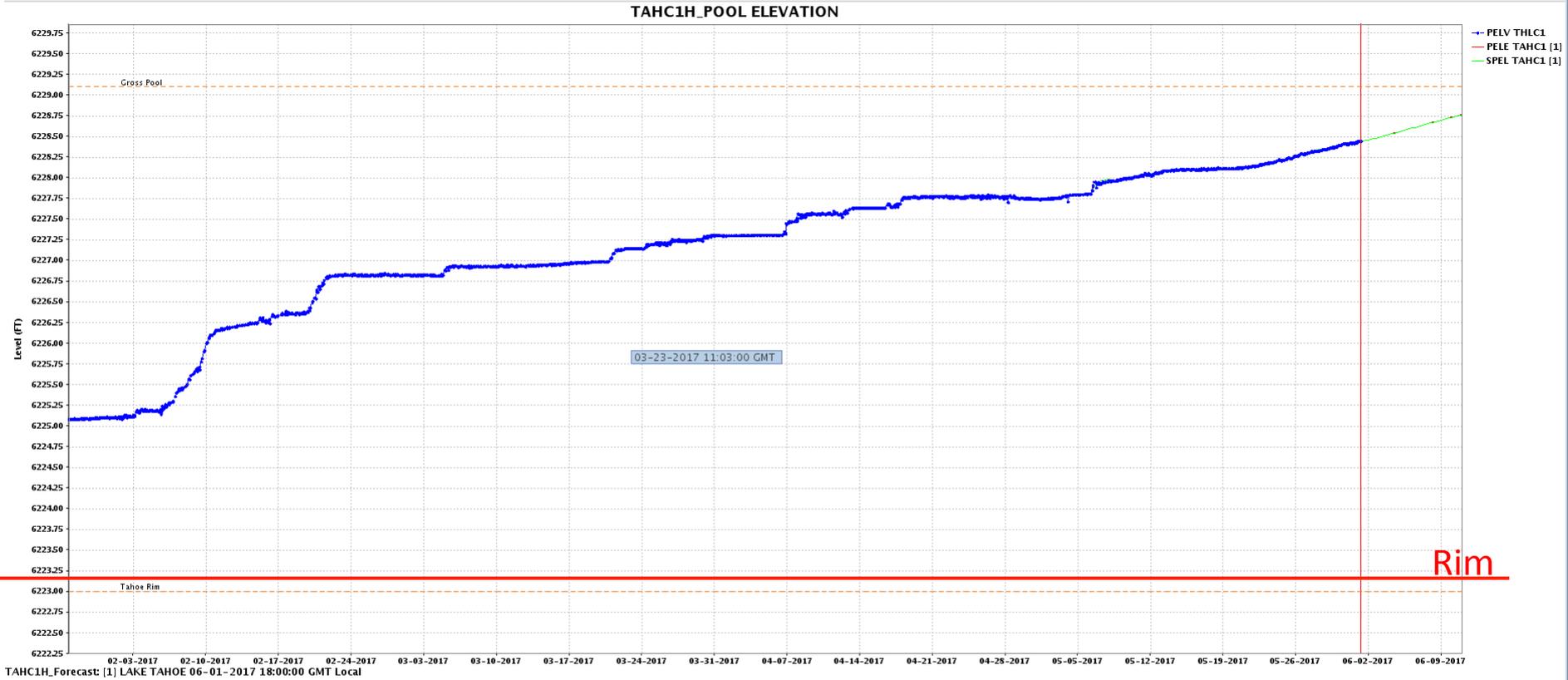


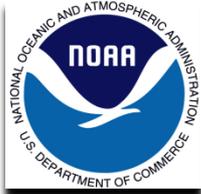


Lake Tahoe Rise



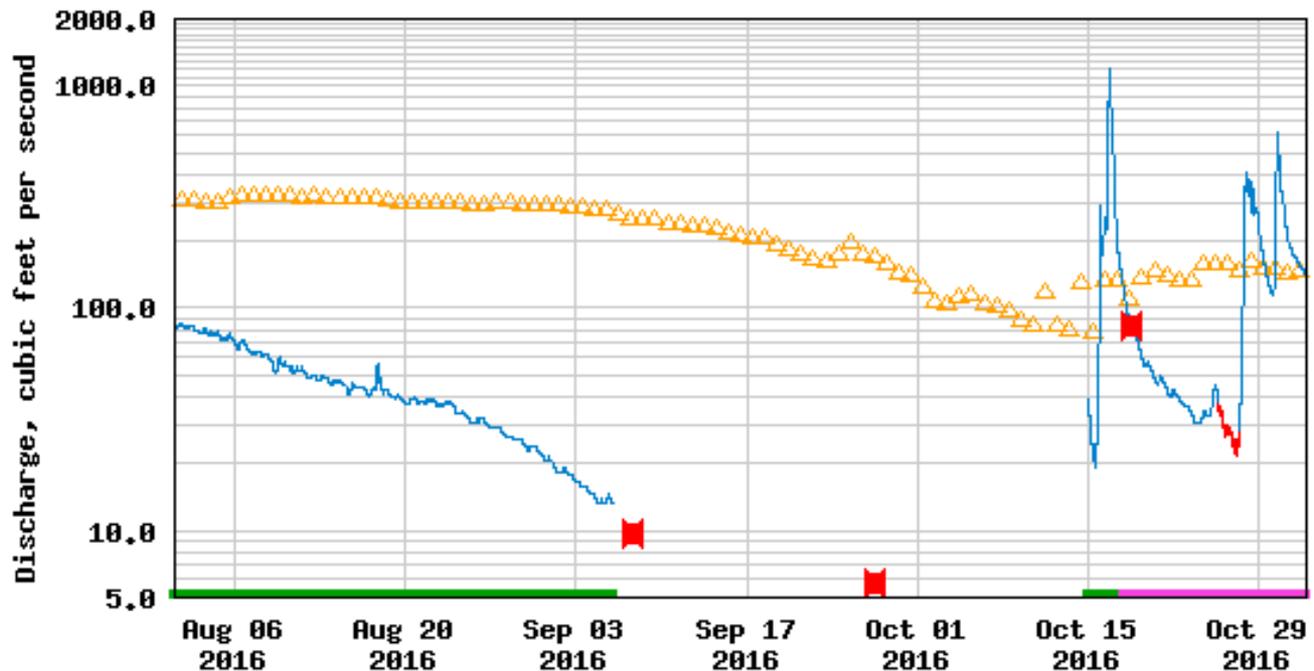
past five days next five days





USGS

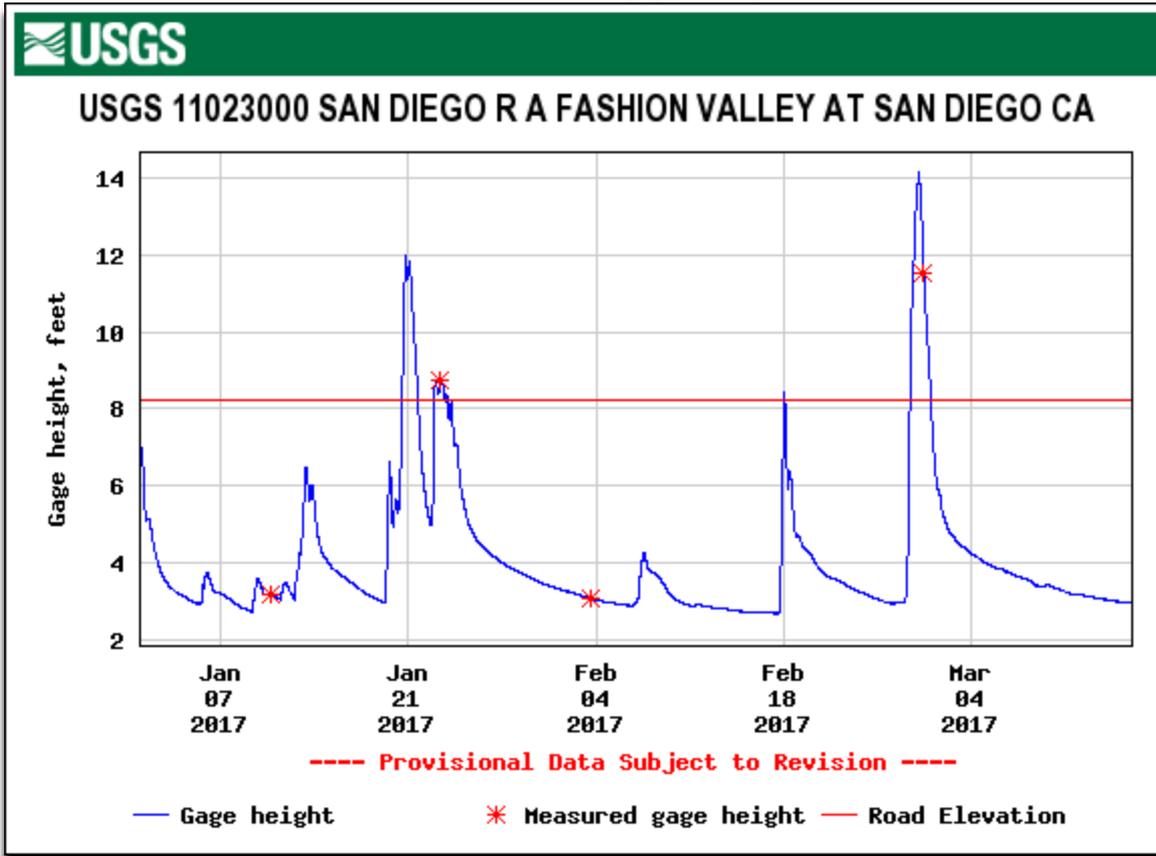
USGS 10338000 TRUCKEE R NR TRUCKEE CA



- △ Median daily statistic (44 years)
- Discharge
- Estimated discharge
- Period of approved data
- Period of provisional data
- ★ Measured discharge

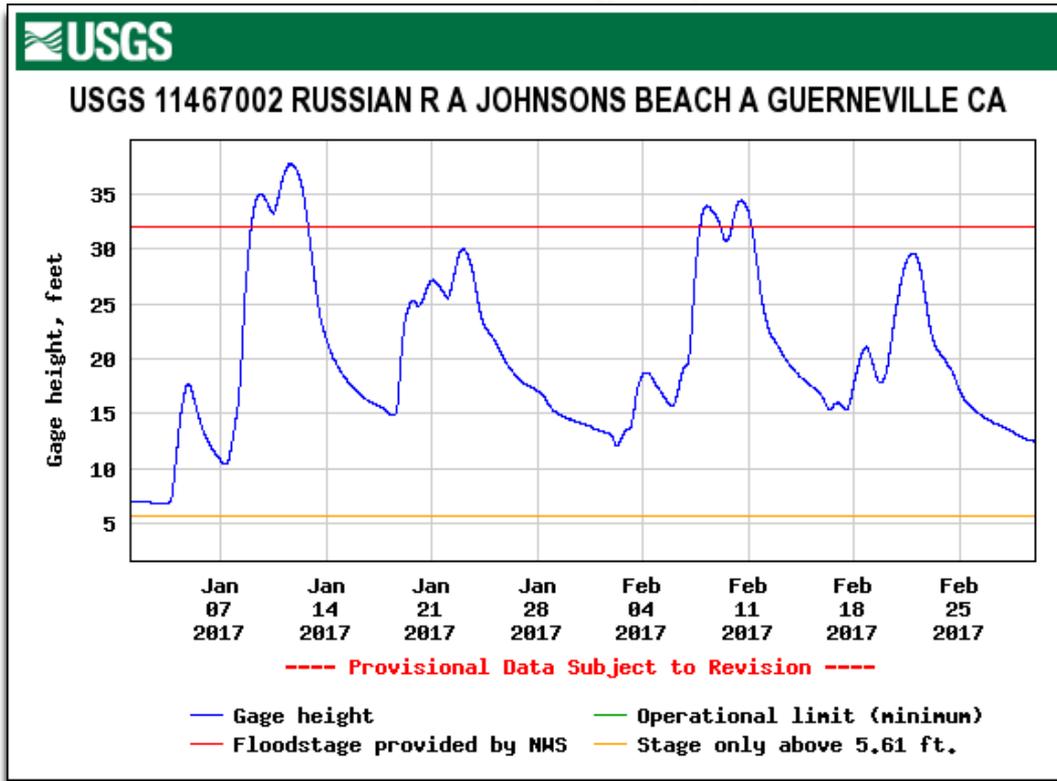


The Usual Suspects – San Diego River





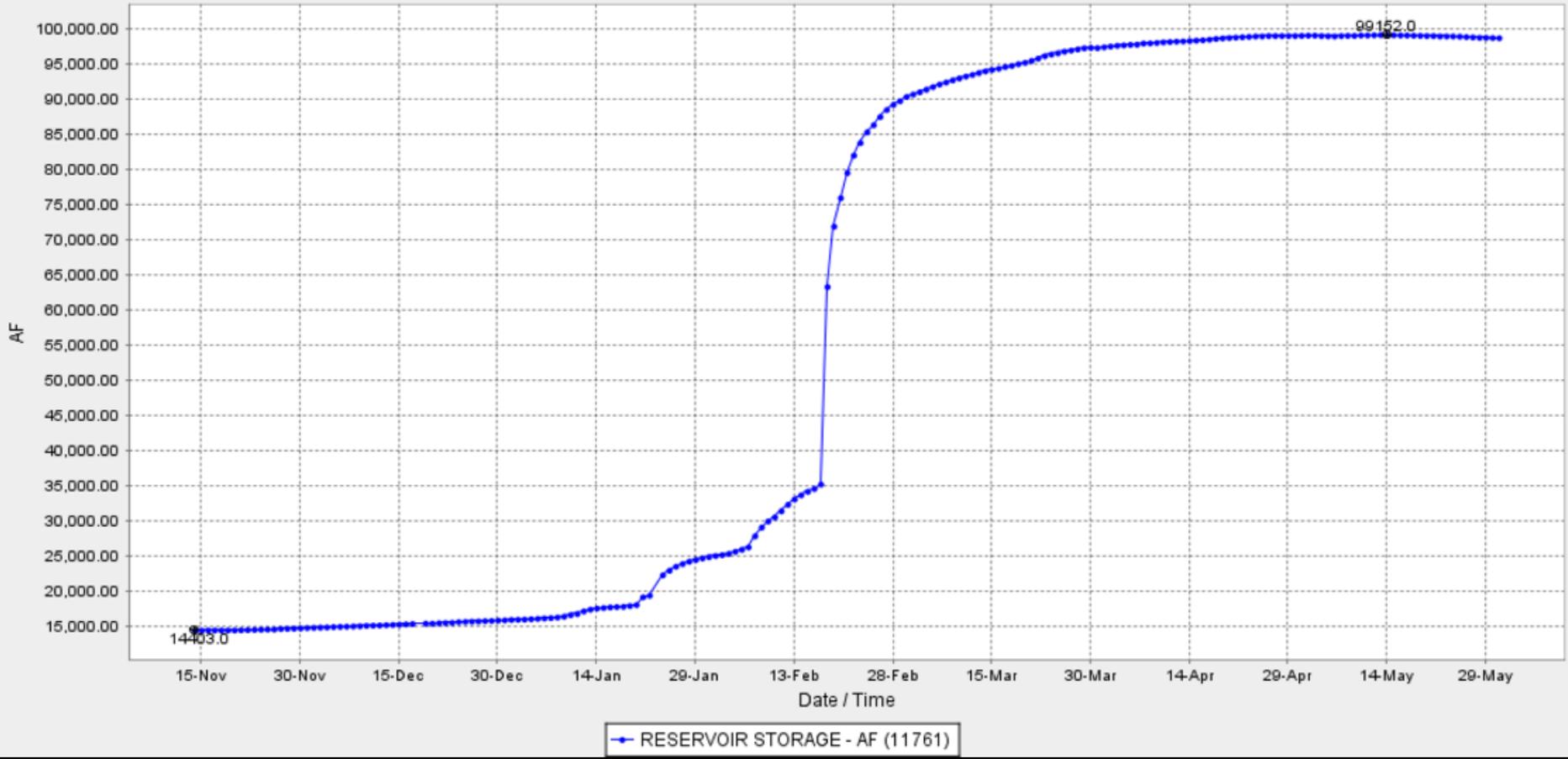
The Usual Suspects – Russian River





CACHUMA LAKE (CCH)

Date from 11/13/2016 17:07 through 06/01/2017 17:07 Duration : 199 days
Max of period : (05/14/2017 00:00, 99152.0) Min of period: (11/14/2016 00:00, 14403.0)





Summary & Key Points



- Early, warm, wet storms filled reservoirs at five days
- Flooding was a problem in some areas
- Still dealing with anomalously high snowpack
- Reservoirs are mostly in good shape for water supply
- Southern CA still hasn't fully recovered from the drought
- Groundwater recharge is variable
- CNRFC hydrologic forecasts were used extensively this past year!



California Nevada River Forecast Center



Alan S. Haynes
Service Coordination Hydrologist (SCH)

National Oceanic & Atmospheric Administration
National Weather Service
3310 El Camino Ave., Suite 227
Sacramento, CA 95821-6373
www.cnrfc.noaa.gov

Tel: (916) 979-3056 x328
Fax: (916) 979-3067
Cell: (916) 202-9473
E-mail: alan.haynes@noaa.gov