

2015 Snowpack Status and Streamflow Outlook for the Truckee, Carson, Walker, and Humboldt River Basins

March 20, 2015

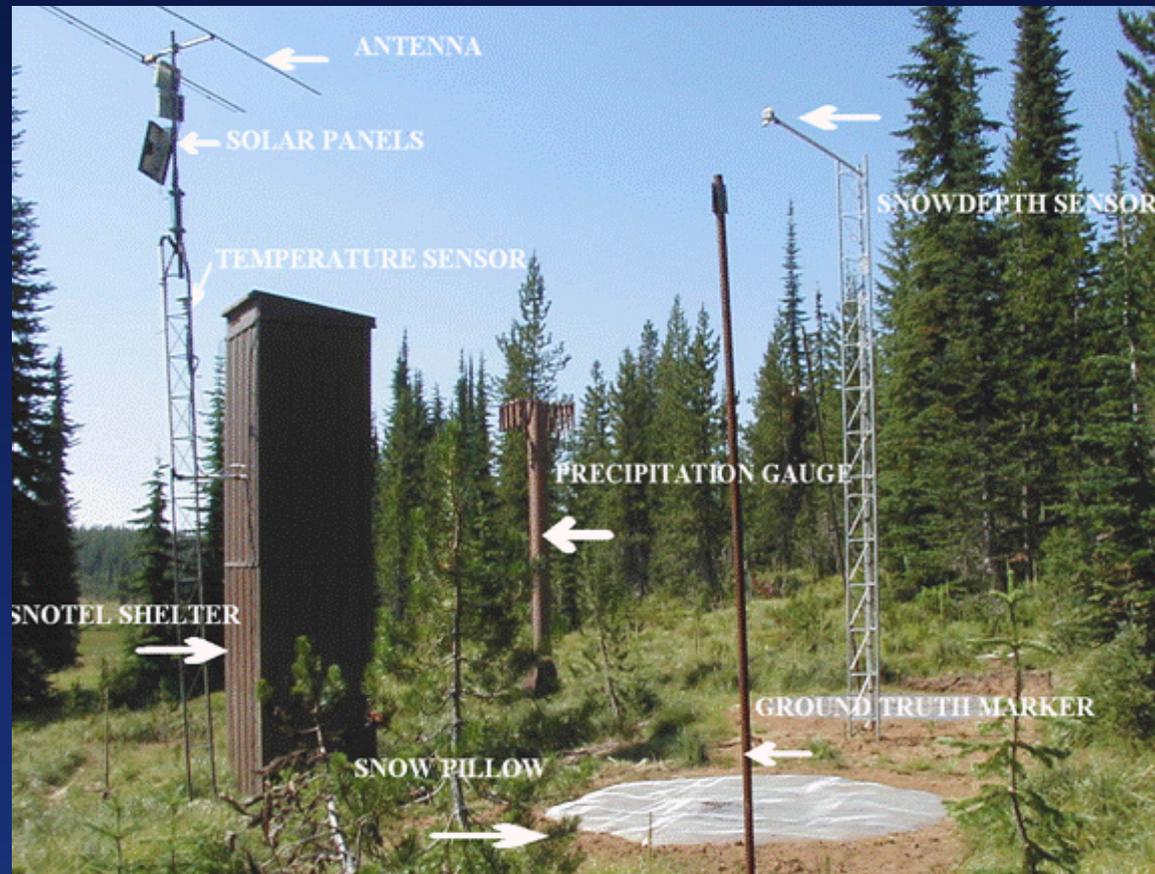
Jeff Anderson
USDA-NRCS - Snow Survey
Reno, NV

LAUNCH
AT YOUR OWN
RISK

What is a SNOTEL Site?

Automated Weather Station
that measures...

- SWE
- Cumulative precipitation
- Temperature
- Snow Depth
- Soil moisture / temperature
(2",8",20") +10yrs data
- In NV & East Sierra
43 sites have data
back to 1981



SNOTEL is short for SNOW TELelemetry

Snow Water Equivalent (SWE) is the amount of **water** contained within the snowpack. It can be thought of as the depth of **water** that would result if you melted the entire snowpack instantaneously.



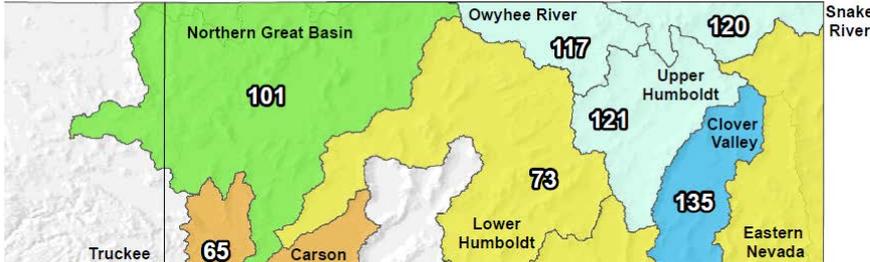
Outline

- How low is the snowpack?
 - In context of current drought
 - Compared to period of record data
- What about water year precipitation?
- Soil moisture / Stream response to snow melt
- Streamflow forecasts

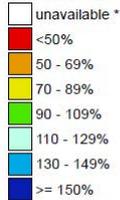
Snowpack

Nevada/California SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Jan 01, 2015



Current Snow Water Equivalent Basin-wide Percent of 1981-2010 Median



* Data unavailable at time of posting or measurement is not representative at this time of year

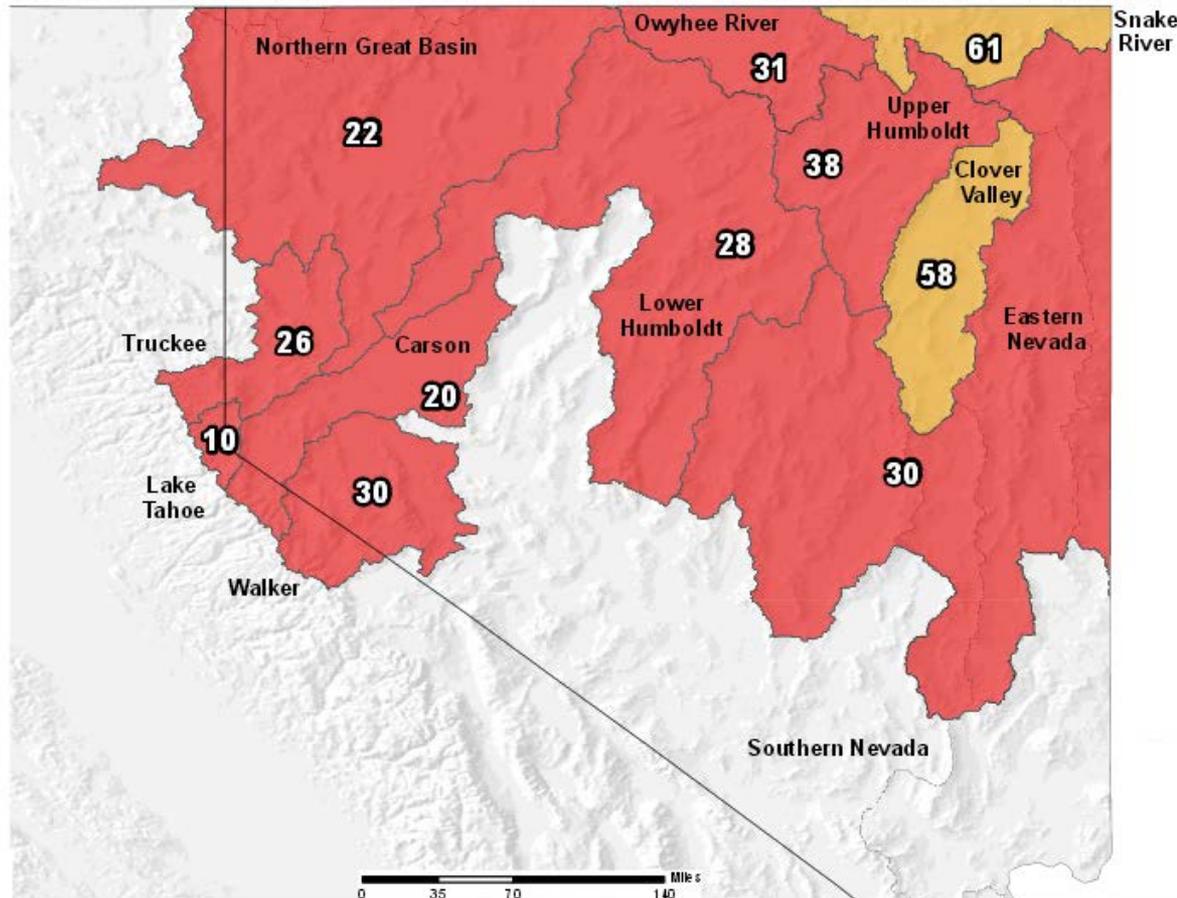
Provisional data subject to revision



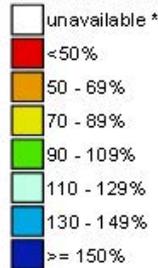
The current snow water equivalent percent of normal snow water equivalent found at selected SNOTEL compared to the average value for those sites on the first reading of the day (typically 00:00).

Nevada/California SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Mar 19, 2015



Current Snow Water Equivalent Basin-wide Percent of 1981-2010 Median

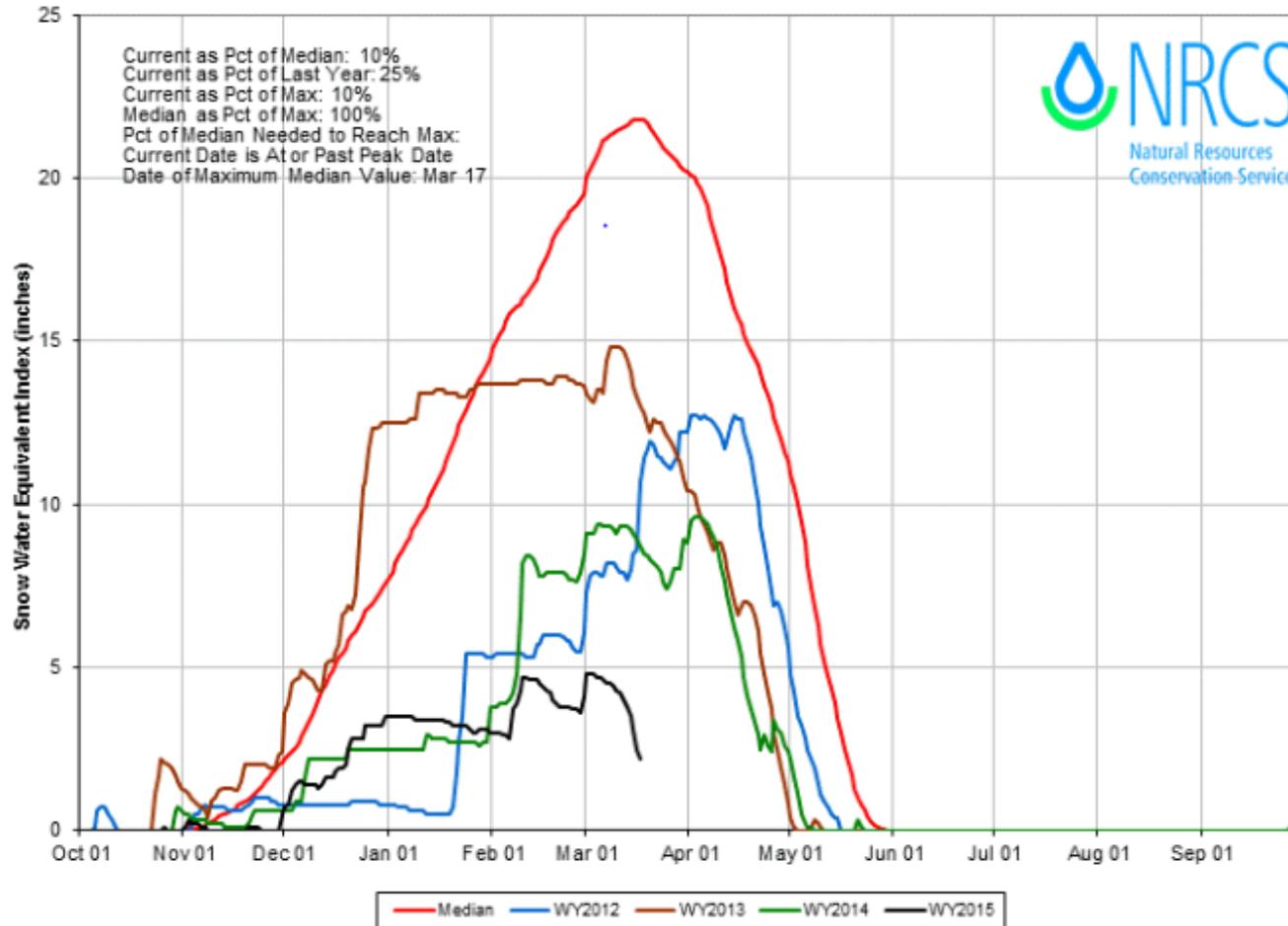


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Provisional data subject to revision



Lake Tahoe Basin

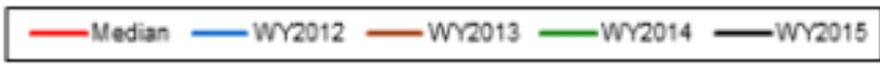
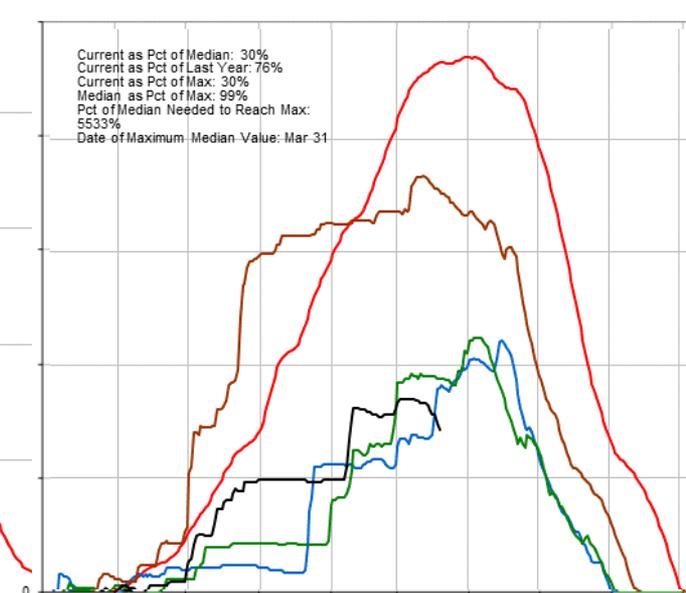
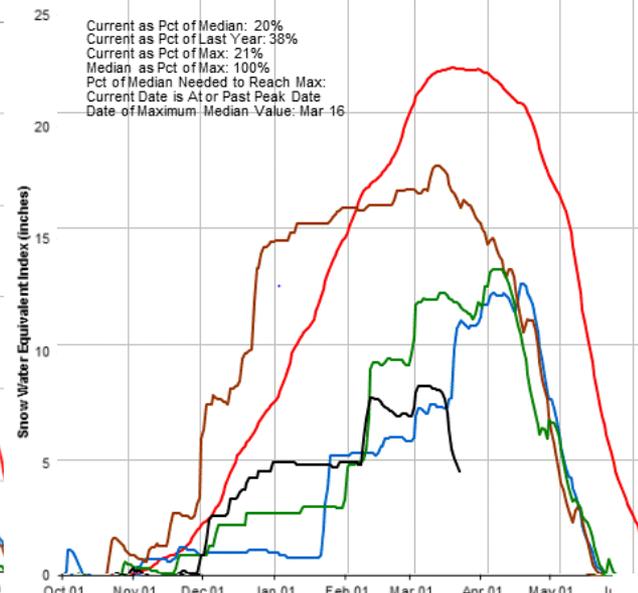
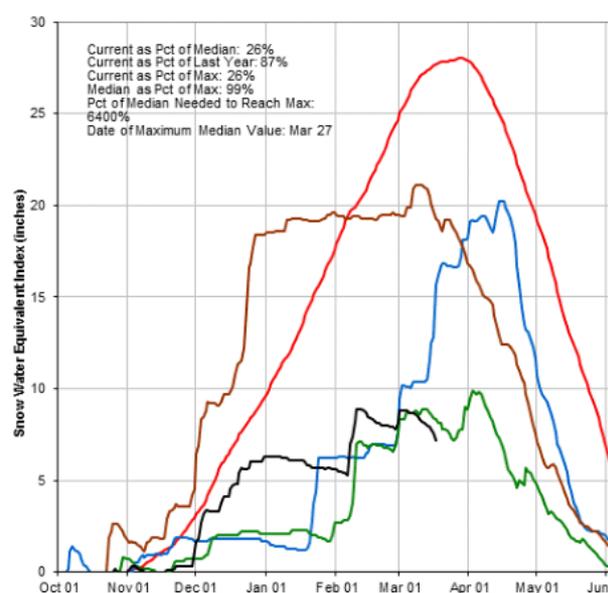


2015 lowest our of last four winters.

Truckee Basin

Carson Basin

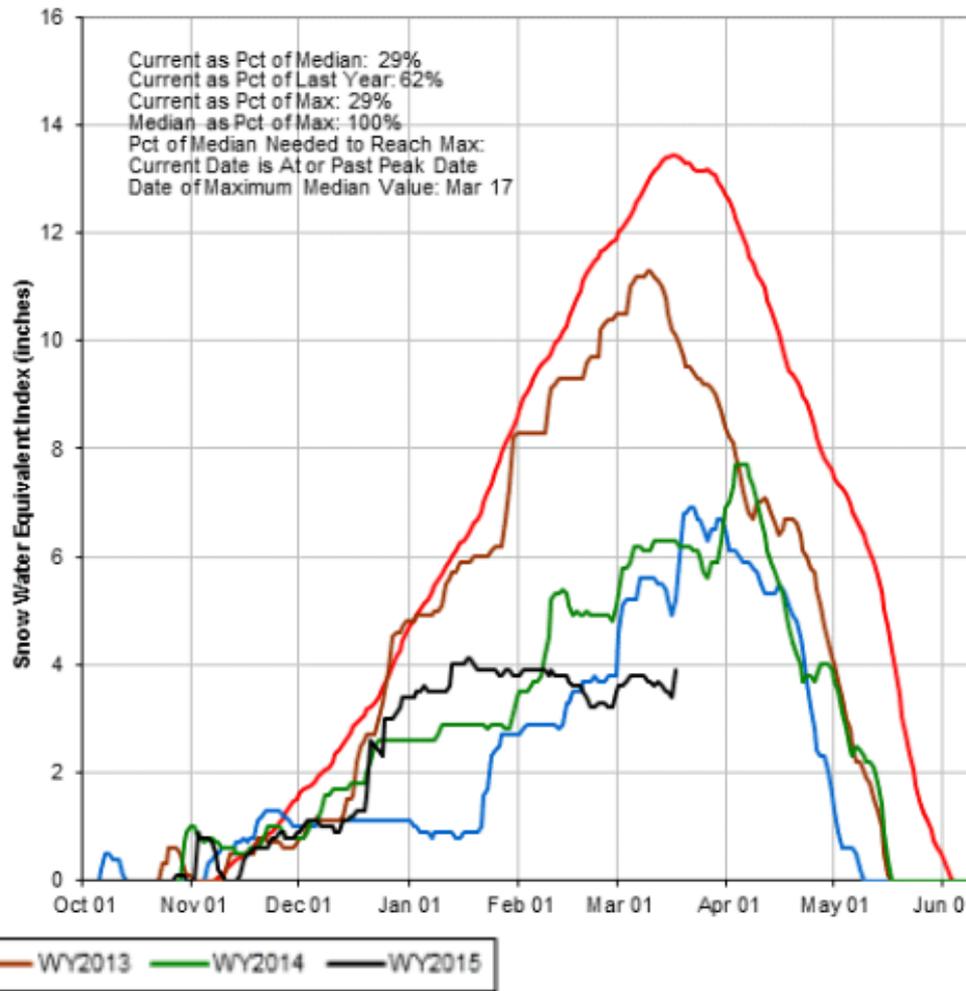
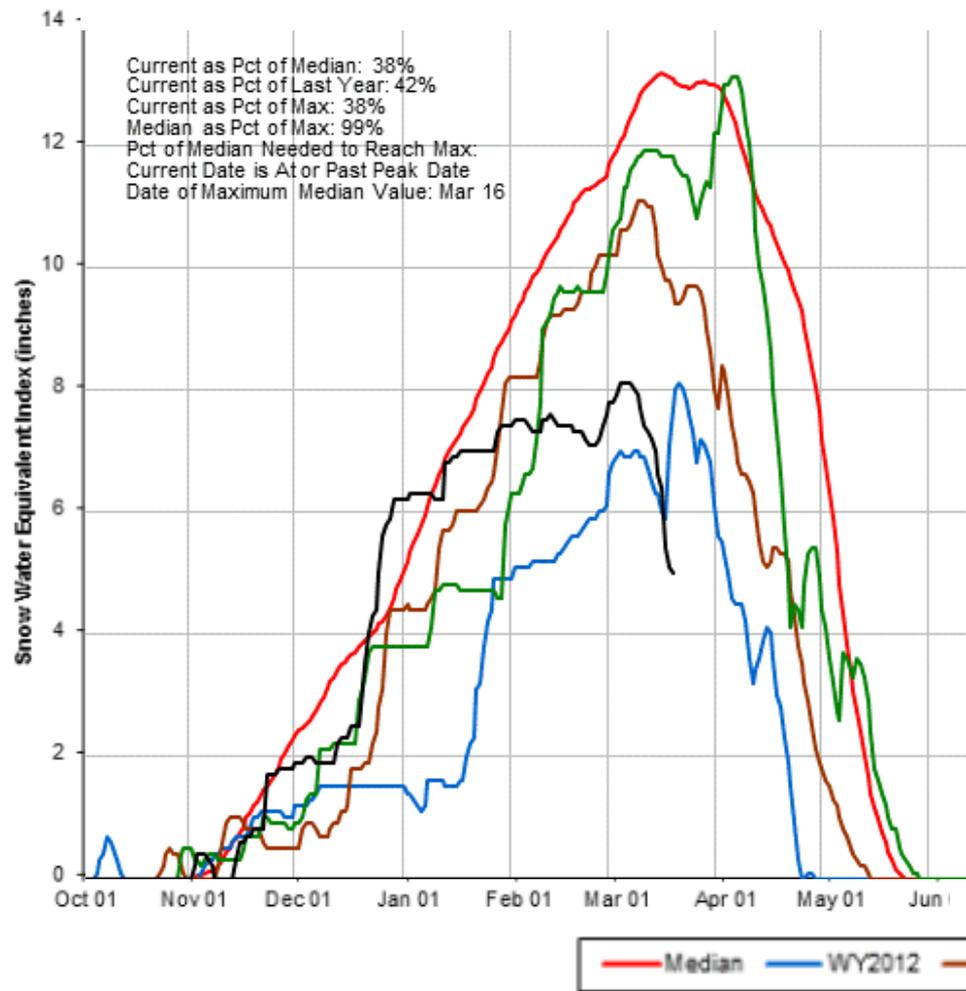
Walker Basin



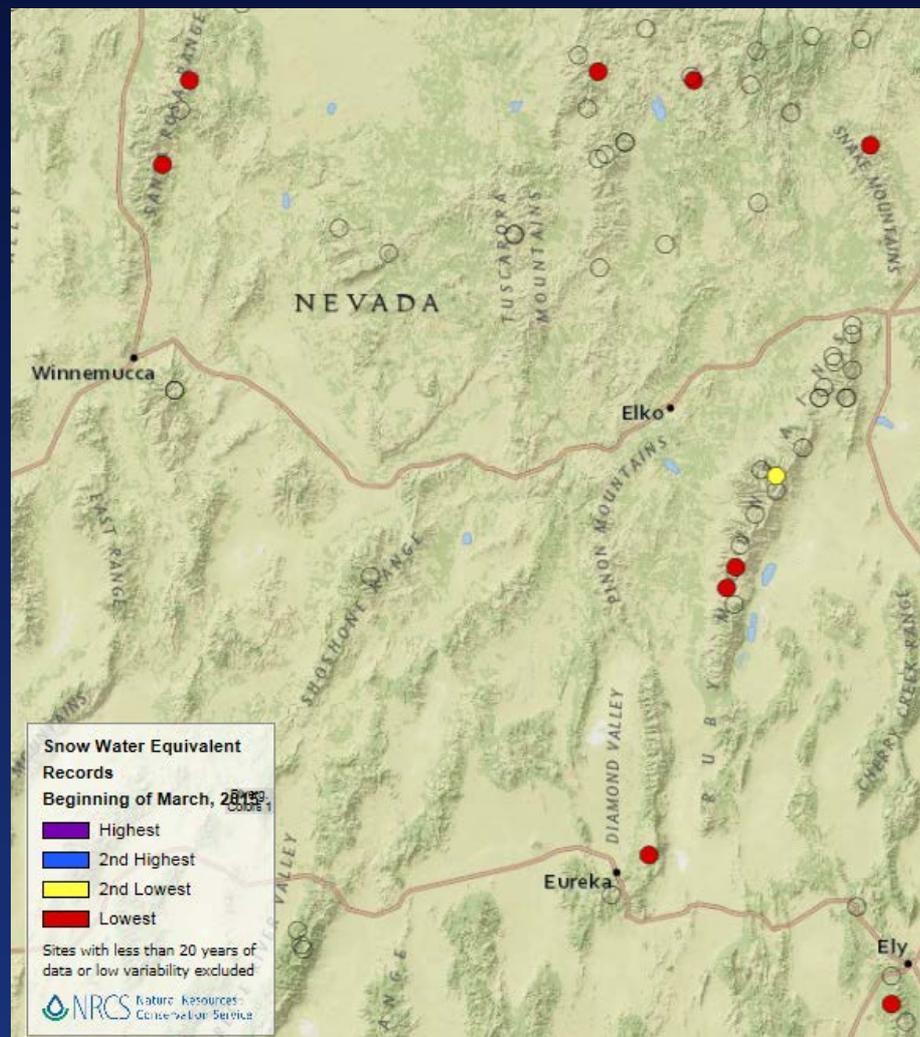
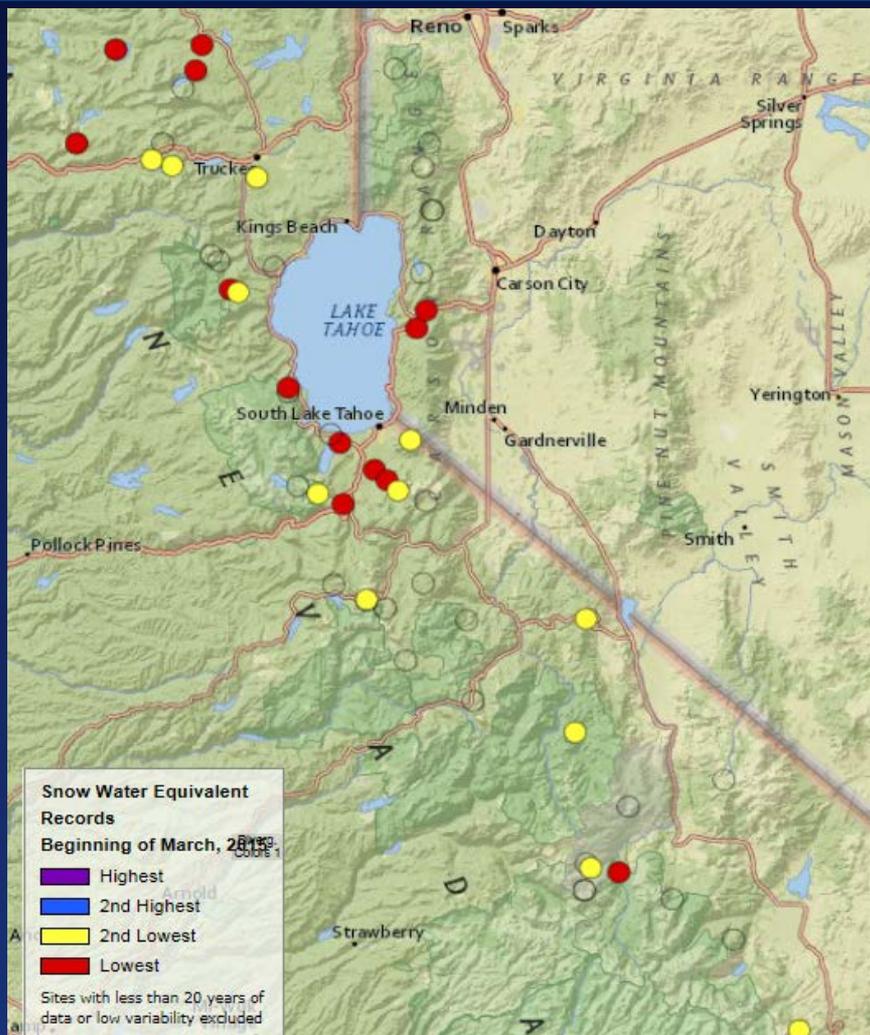
2015 lowest our of last four winters.

Upper Humboldt Basin

Lower Humboldt Basin



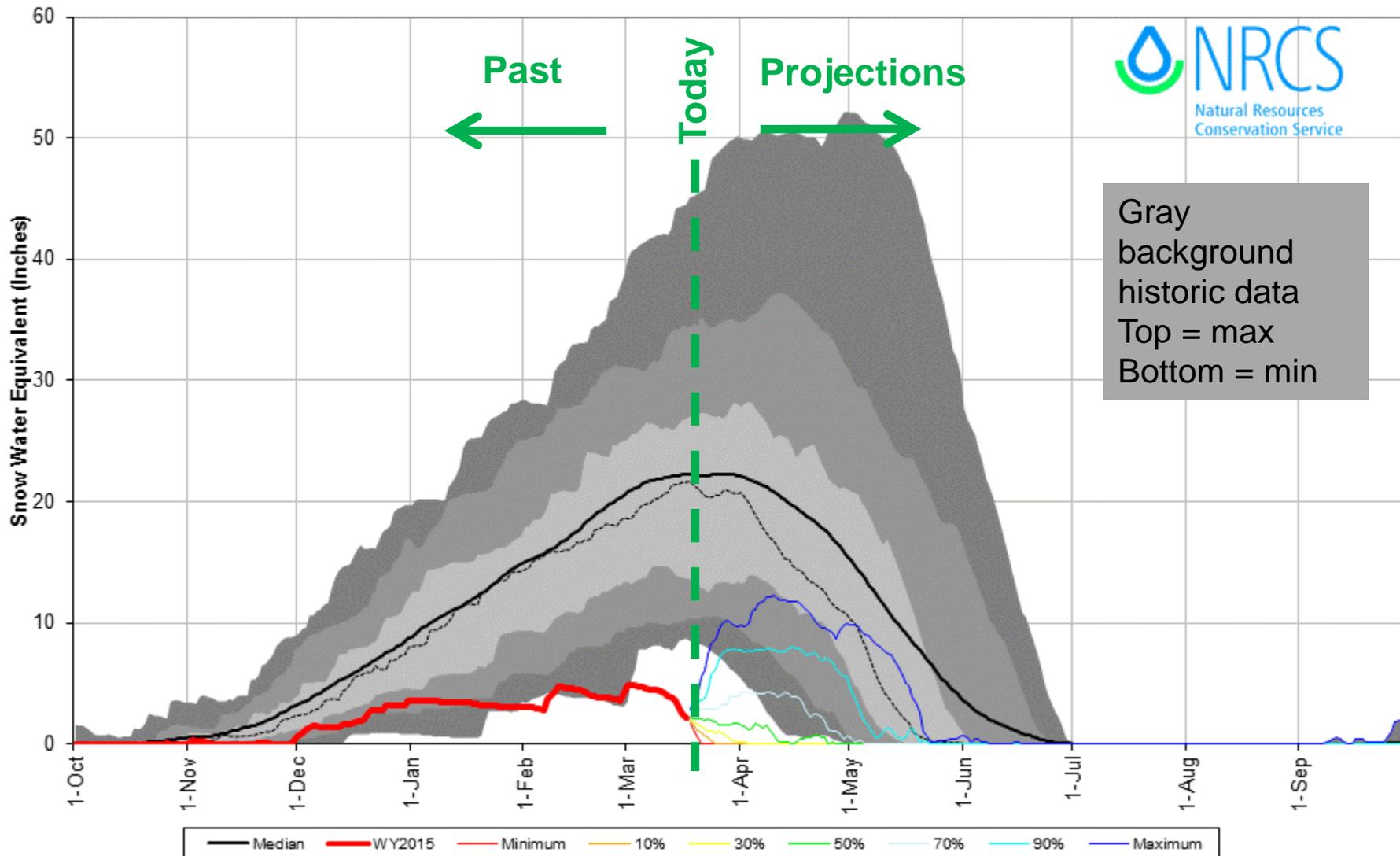
2015 lowest our of last four winters.



March 1, 2015 total of 32 SNOTEL and snow courses across the region were record low or 2nd lowest

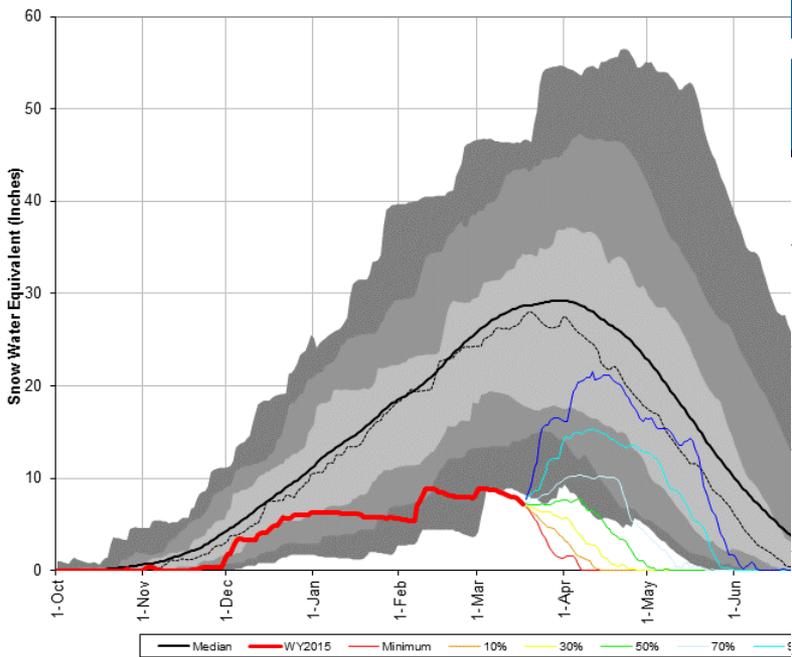
Lake Tahoe with Non-Exceedence Projections

Based on Provisional SNOTEL Data as of Mar 17, 2015



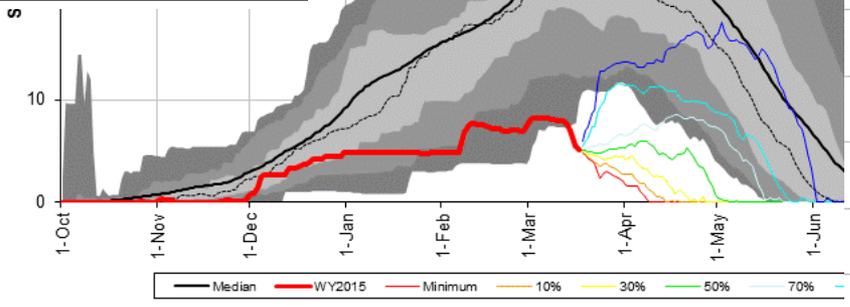
Truckee with Non-Exceedence Projections
 Based on Provisional SNOTEL Data as of Mar 17, 2015

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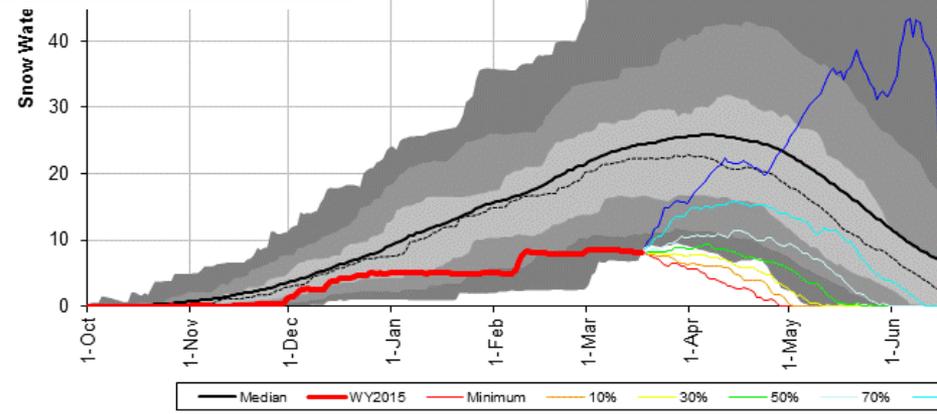
Carson with Non-Exceedence Projections
 Based on Provisional SNOTEL Data as of Mar 17, 2015

S



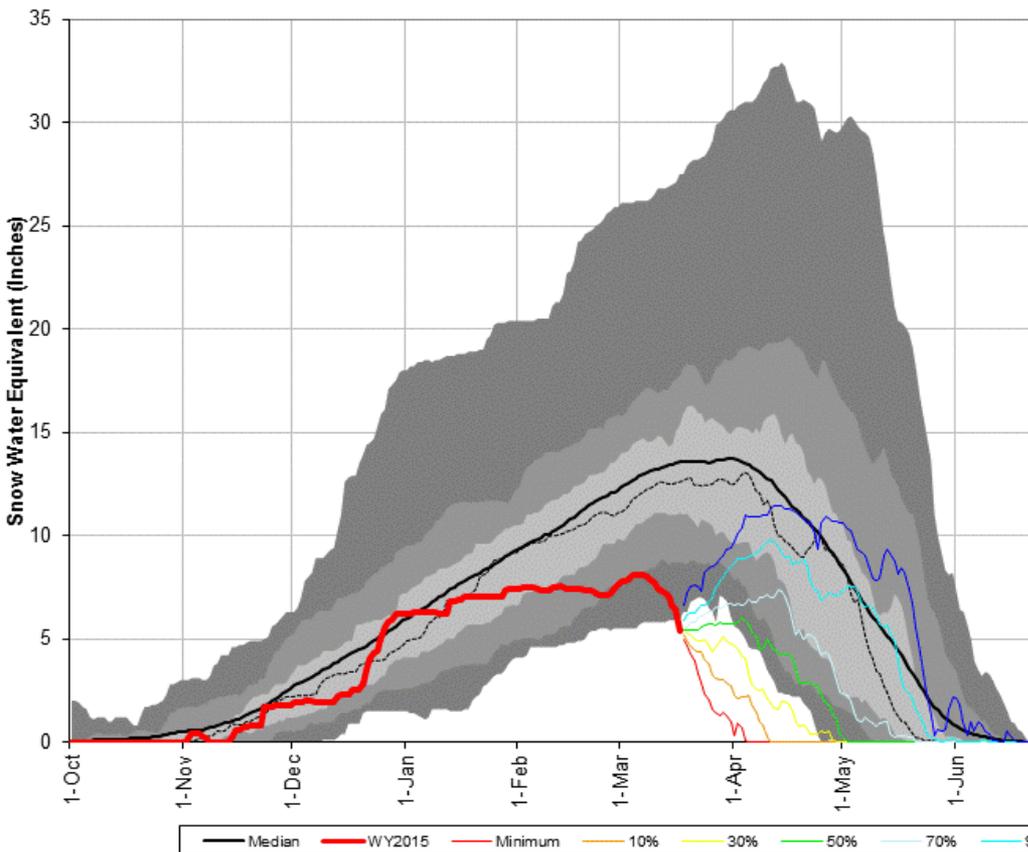
Walker with Non-Exceedence Projections
 Based on Provisional SNOTEL Data as of Mar 17, 2015

Snow Water



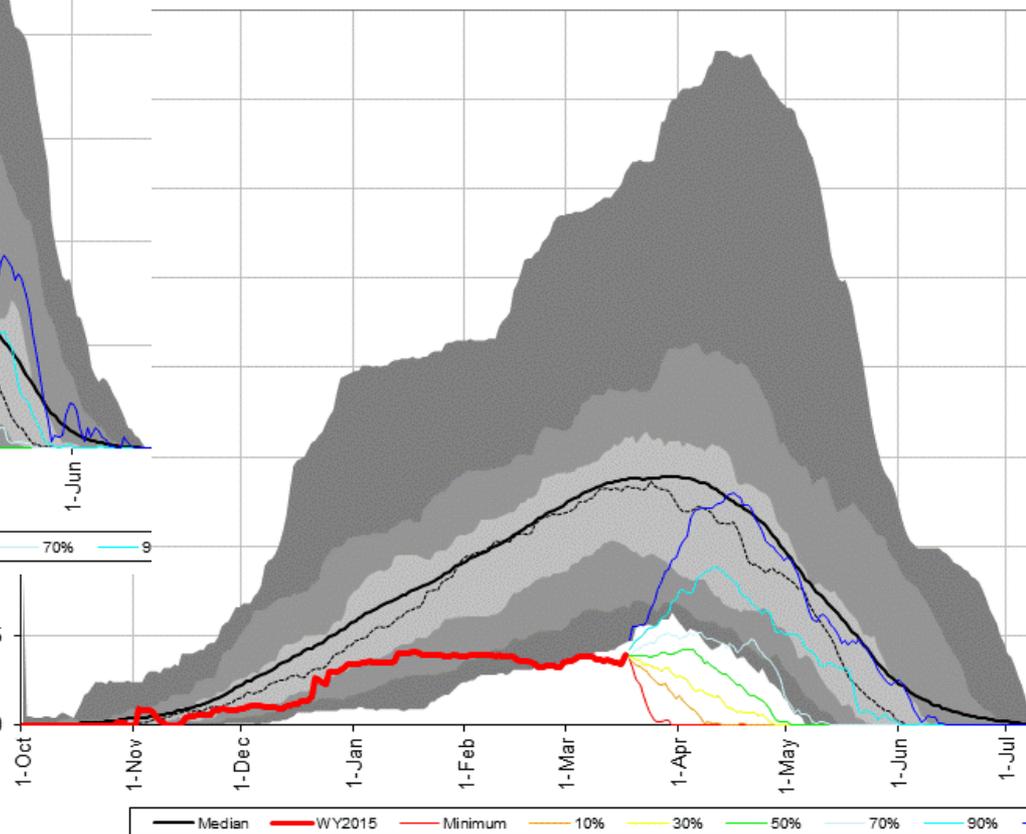
Upper Humboldt with Non-Exceedence Projections

Based on Provisional SNOTEL Data as of Mar 17, 2015



Lower Humboldt with Non-Exceedence Projections

Based on Provisional SNOTEL Data as of Mar 17, 2015





Glenbrook#2 1-30-2015



Upper Truckee 2-25-2015



Richardsons#2 2-25-2015

Bare Ground below 7500ft



Independence Creek SNOTEL 1-28-15



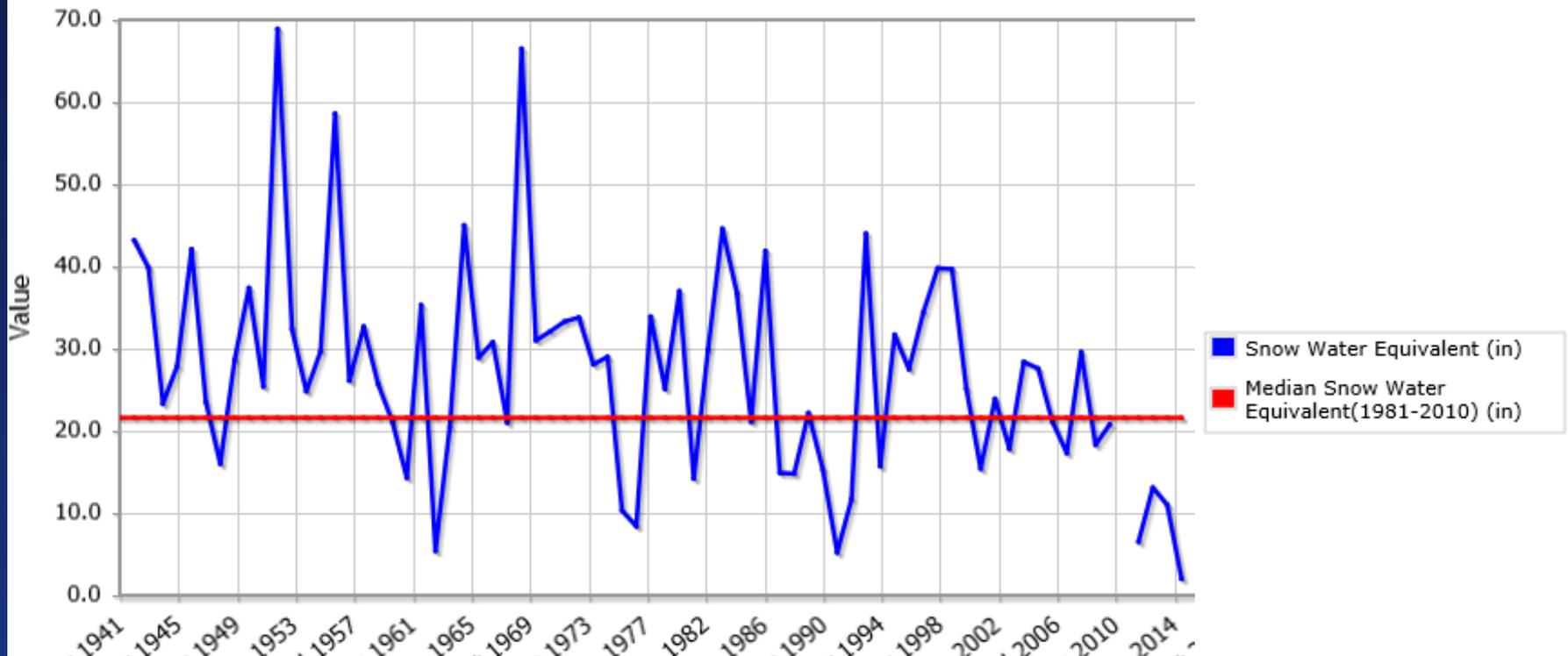
Truckee#2 SNOTEL 2-27-15



Independence Camp SNOTEL 1-28-15

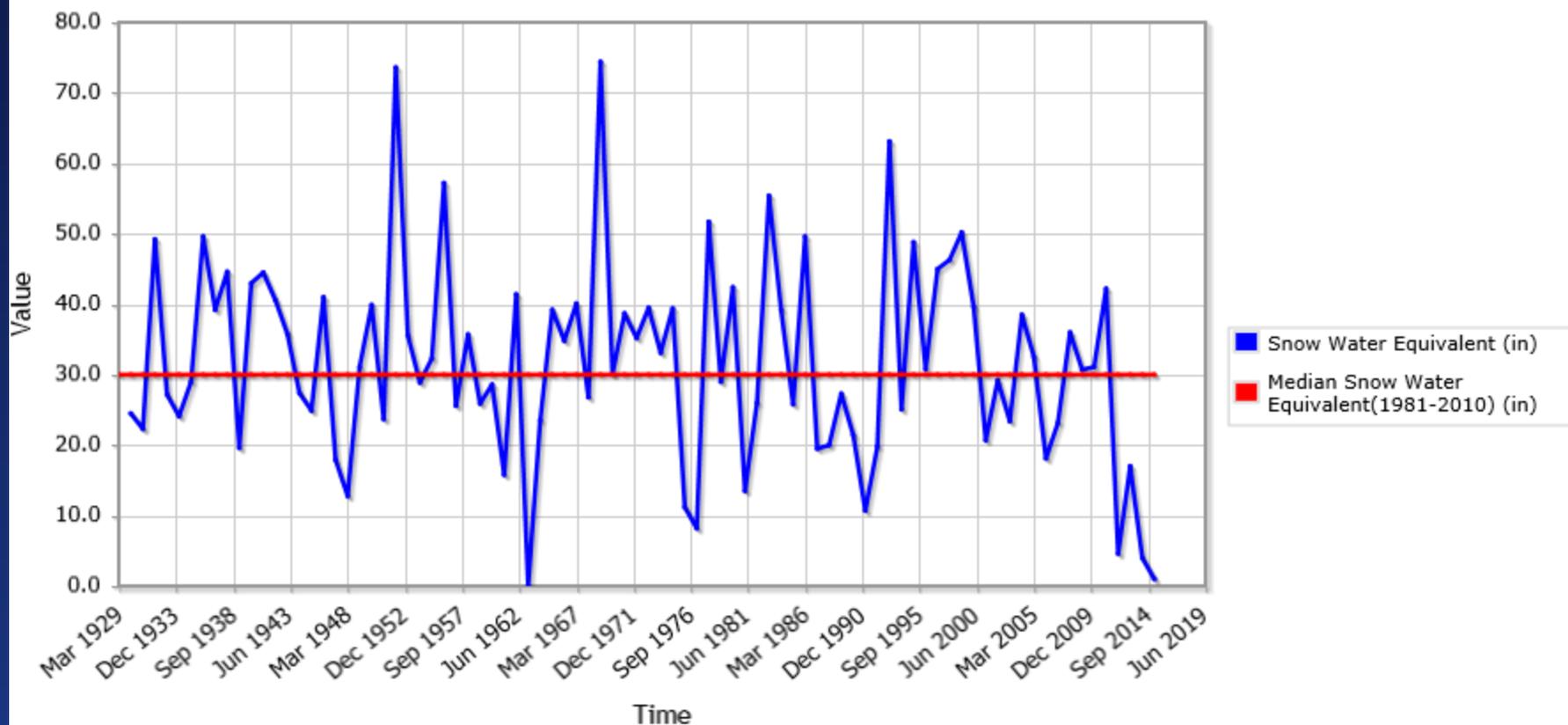
Echo Summit SC: 2015 had lowest March 1 SWE going back to 1942 (73 years)

Echo Summit (20L05) California SNOW COURSE/AERIAL MARKER Site - 7500 ft



Donner Summit SC: 2015 had 2nd lowest March 1 SWE going back to 1930 (85years)

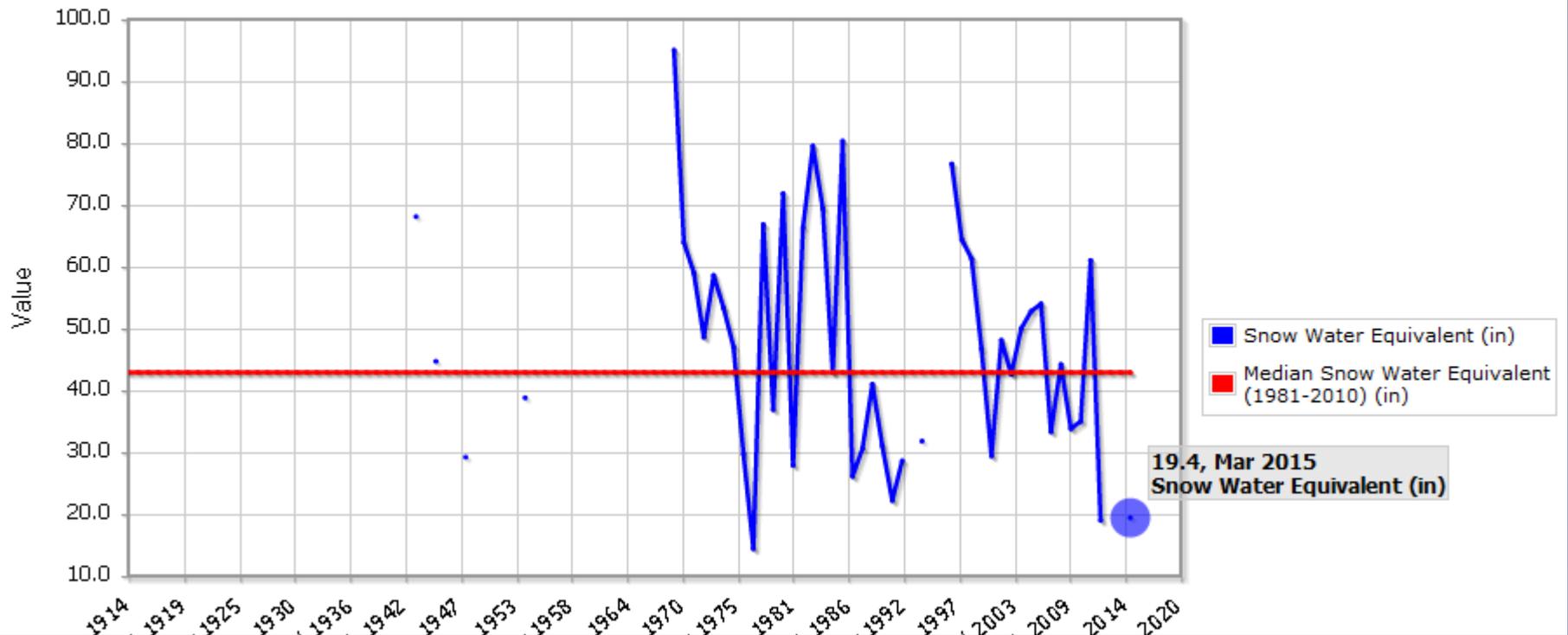
Donner Summit (20K10) California SNOW COURSE/AERIAL MARKER Site - 6900 ft



Lake Lucille SC

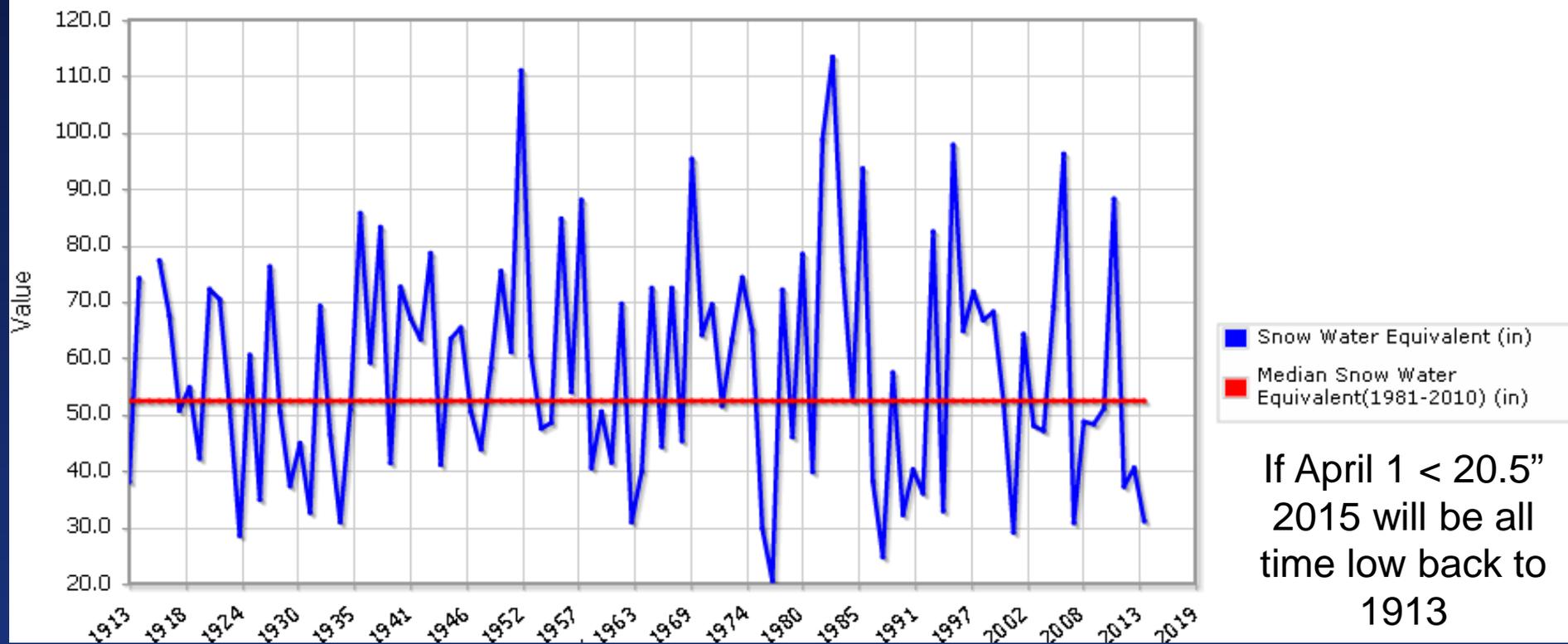
March 1, 2015 = 19.4" SWE

Lake Lucille (20L04) California SNOW COURSE/AERIAL MARKER Site - 8188 ft



April 1 at Lake Lucille SC (8,188ft)

Lake Lucille (20L04) California SNOW COURSE/AERIAL MARKER Site - 8188 ft

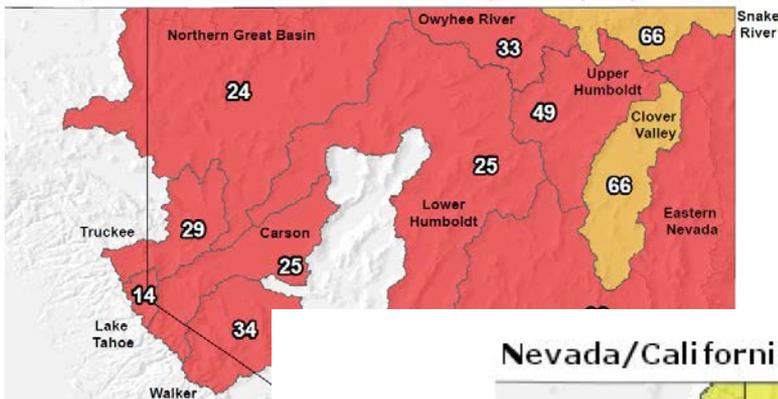


Nevada/California SNOTEL Current Snow Water Equivalent (SWE) % of Normal



Precipitation

Mar 16, 2015



Current Snow Water Equivalent Basin-wide Percent of 1981-2010 Median

- unavailable *
- <50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- >= 150%

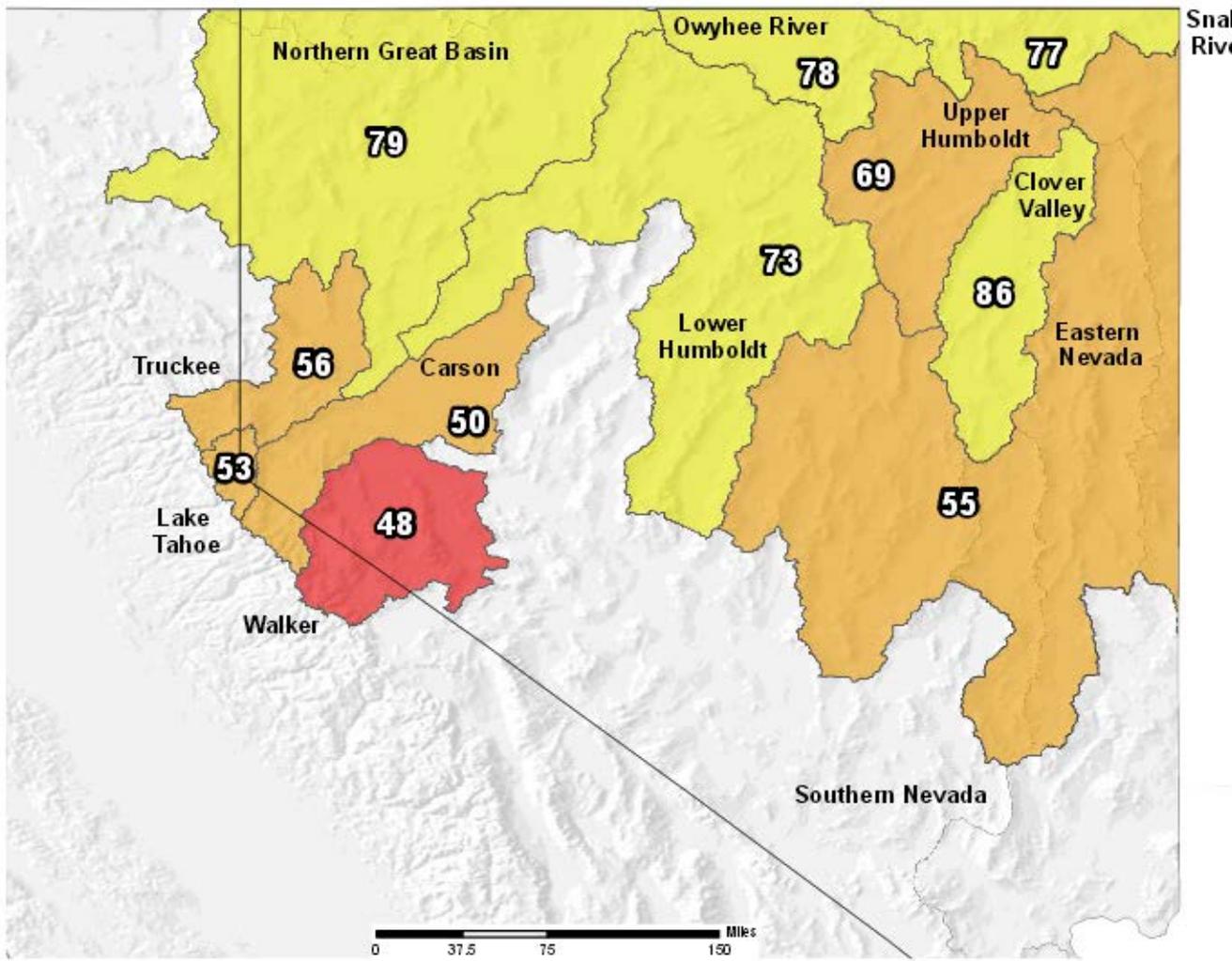
* Data unavailable at time of posting or measurement is not representative at this time of year

Provisional data subject to revision



Mar 19, 2015

Nevada/California SNOTEL Water Year (Oct 1) to Date Precipitation % of Normal

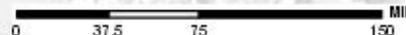


Water Year (Oct 1) to Date Precipitation Basin-wide Percent of 1981-2010 Average

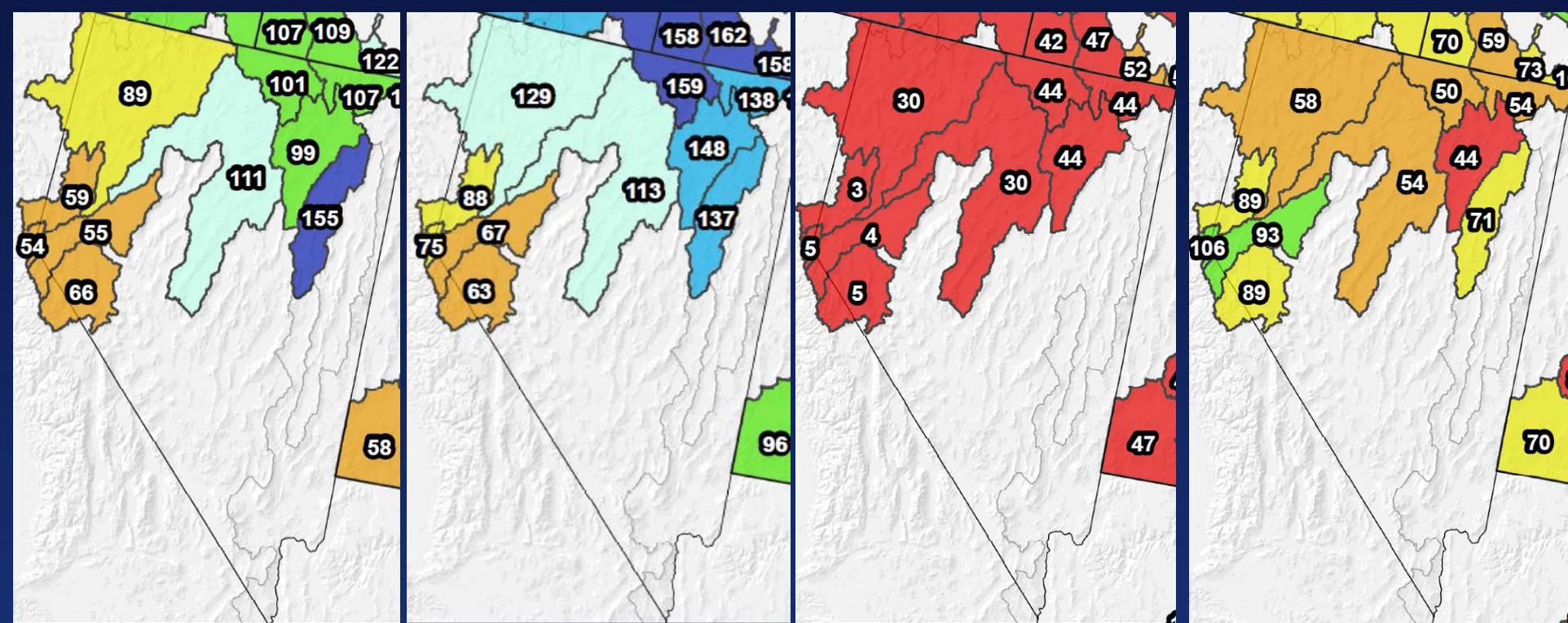
- unavailable *
- <50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- >= 150%

* Data unavailable at time of posting or measurement is not representative at this time of year

Provisional data subject to revision



Monthly SNOTEL Precipitation as % of Average

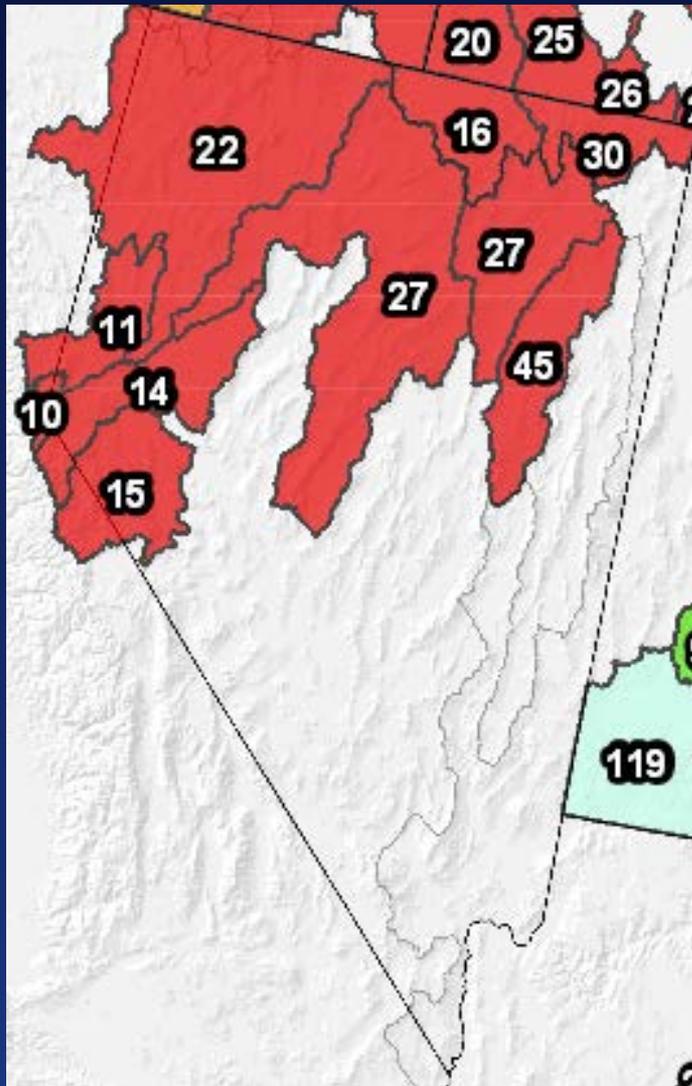


November 2014

December 2014

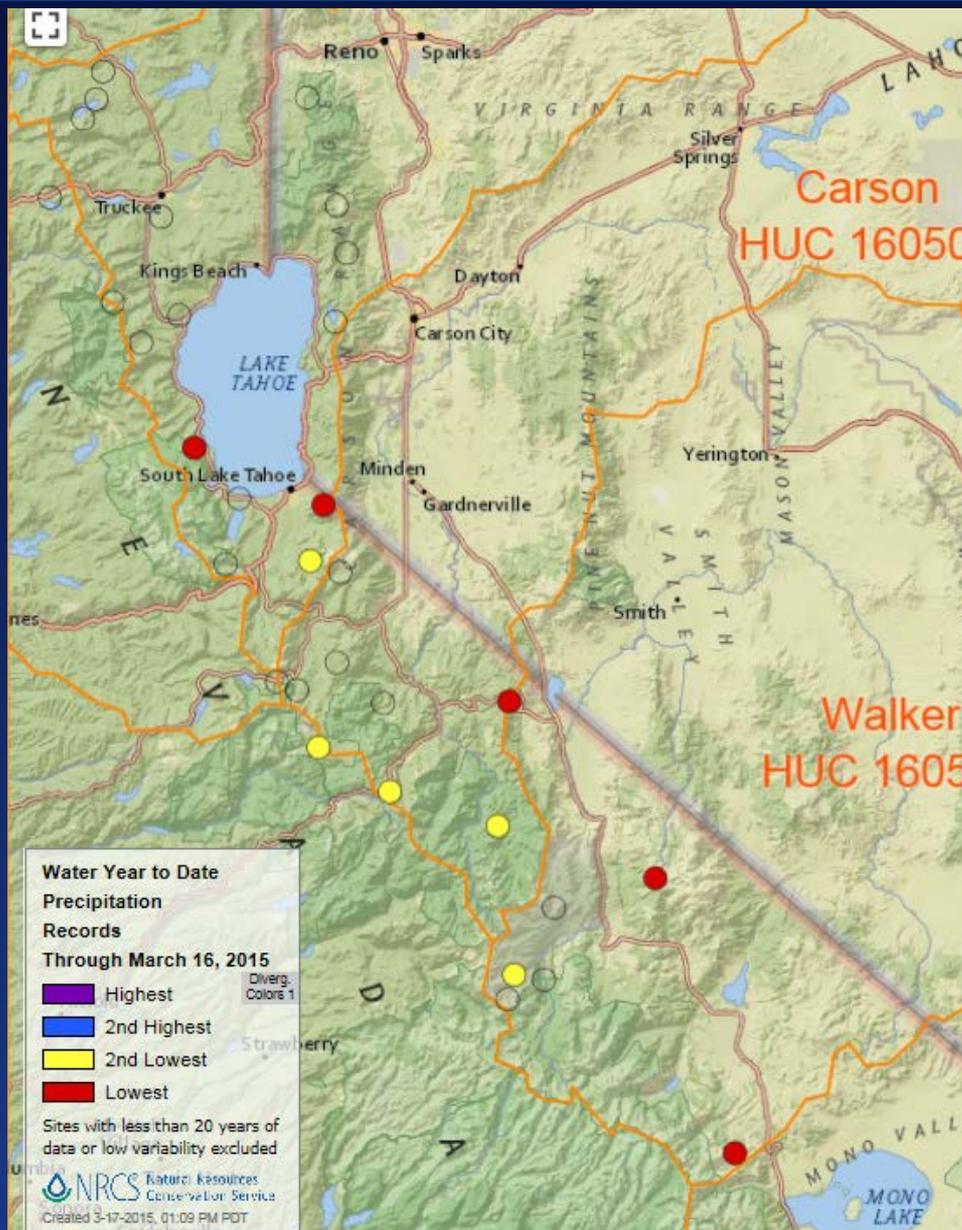
January 2015

February 2015



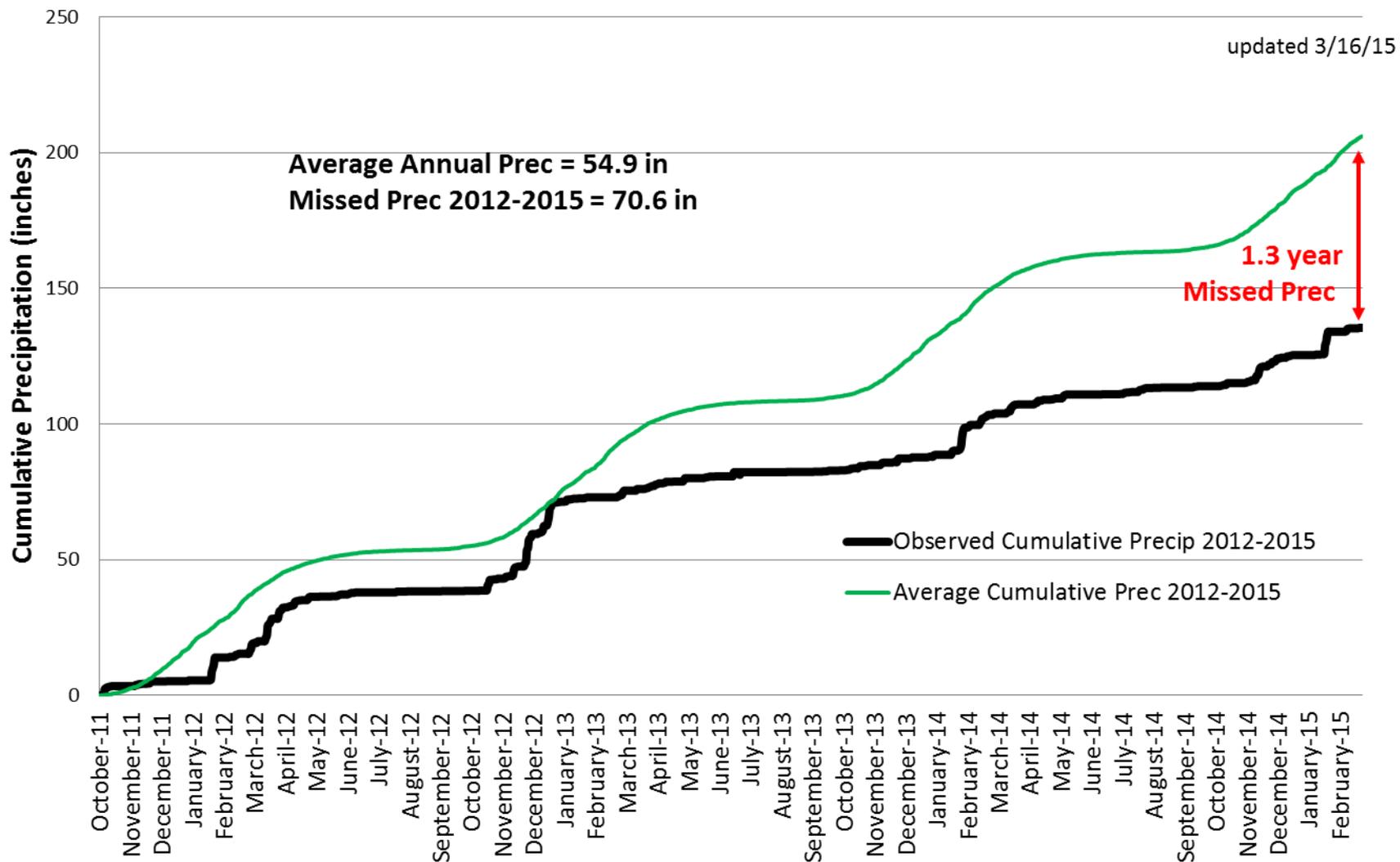
% of Average monthly precipitation for March 19, 2015

As a percent of normal monthly total
Sierra is 5-9%
Humboldt is 15%



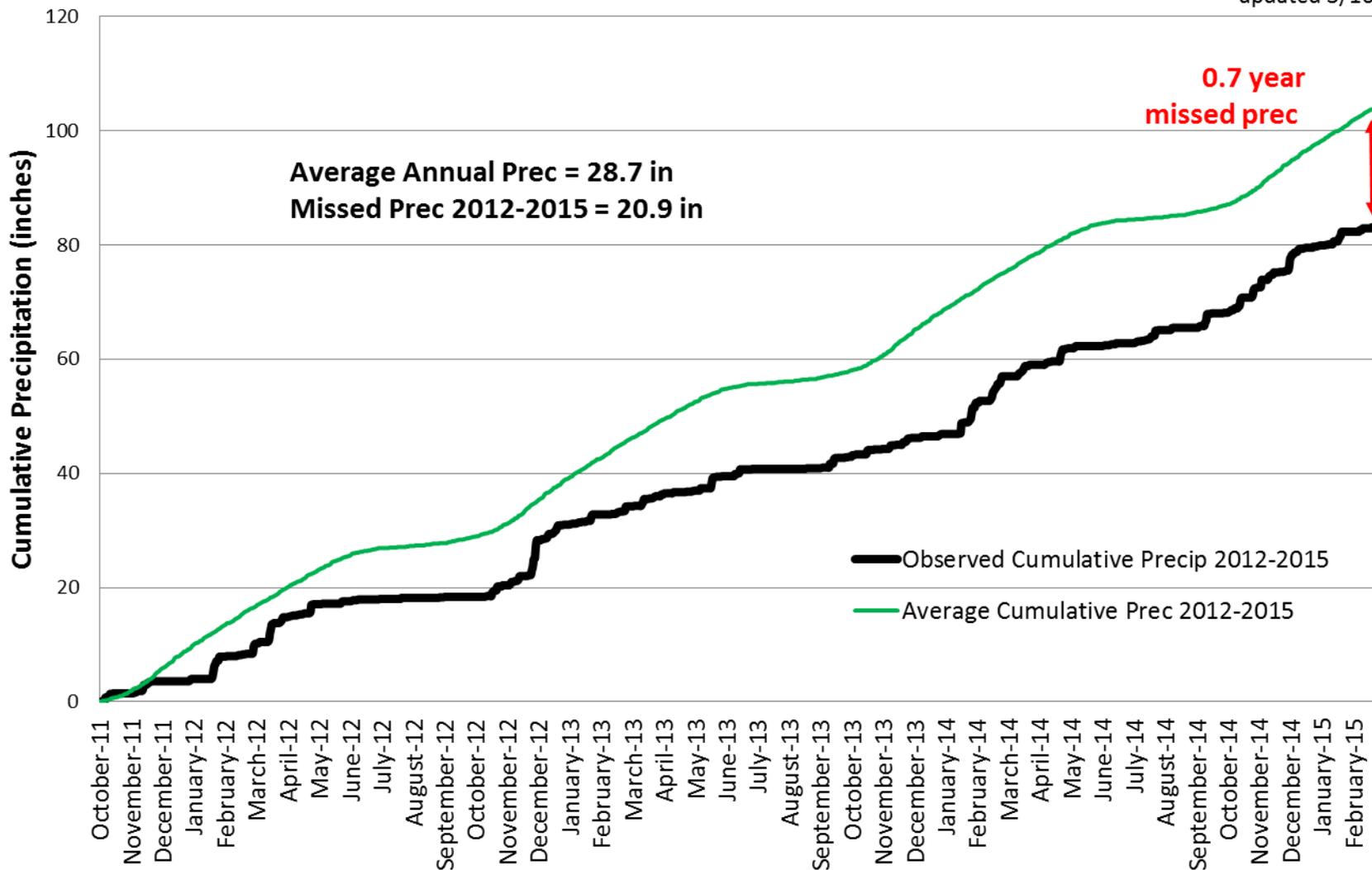
10 SNOTEL sites in Tahoe, Carson and Walker basins near record low for water year precipitation to date

Mt Rose SNOTEL Precipitation Accumulation WY 2012-2015



Lamance Creek SNOTEL Precipitation Accumulation WY 2012-2015

updated 3/16/15



Basin Average Missed Precipitation 2012-2015

Name	# Sites	Average # Yrs Missed Prec
Walker	6	1.3
Carson	7	1.3
Truckee	8	1.3
Tahoe	7	1.0
Humboldt	10	0.7
Middle Snake - Owyhee, Burneau, Sam Falls	9	0.6
Eastern Nevada	3	0.5

United States Department of Agriculture
Natural Resources Conservation Service

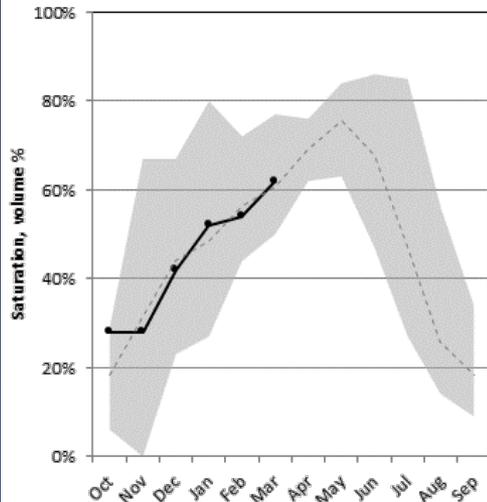
2012-2015
Cumulative Missed
Precipitation
by SNOTEL site

30 sites
have missed the equivalent of
1 year or more
of precipitation
since 10/1/2012

Station Name	Basin	2012-2015 Prec Missed	Years Prec Missed
Virginia Lakes Ridge	Walker	42.3	1.5
Sonora Pass	Walker	55.5	1.5
Poison Flat	Carson	48.4	1.5
Blue Lakes	Carson	65.0	1.5
Carson Pass	Carson	67.0	1.4
Independence Camp	Truckee	48.3	1.4
Independence Creek	Truckee	46.0	1.4
Monitor Pass	Carson	32.1	1.4
Leavitt Lake	Walker	73.1	1.3
Lobdell Lake	Walker	32.7	1.3
Rubicon #2	Tahoe	55.3	1.3
Burnside Lake	Carson	55.8	1.3
Mt Rose Ski Area	Truckee	70.5	1.3
Squaw Valley G.C.	Truckee	83.4	1.3
Forestdale Creek	Carson	63.1	1.3
Big Meadow	Truckee	39.5	1.2
Leavitt Meadows	Walker	38.6	1.2
Css Lab	Truckee	79.9	1.2
Truckee #2	Truckee	40.7	1.2
Horse Meadow	Carson	30.8	1.2
Spratt Creek	Carson	37.2	1.2
Ebbetts Pass	Carson	61.2	1.2
Ward Creek #3	Tahoe	77.0	1.1
Echo Peak	Tahoe	62.8	1.1
Tahoe City Cross	Tahoe	38.6	1.1
Lewis Peak	Lower Humboldt	27.1	1.1
Marlette Lake	Tahoe	34.9	1.0
Independence Lake	Truckee	48.4	1.0
Heavenly Valley	Tahoe	33.8	1.0
Big Creek Sum	Lower Humboldt	25.0	1.0

Soil
Moisture
is
average
or
better

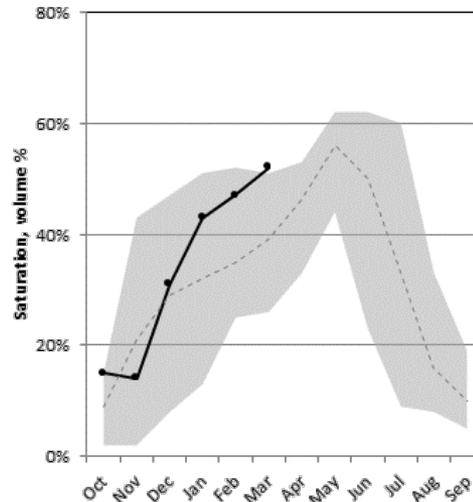
Lake Tahoe Basin



Calculated using soil moisture content at 2, 8, and 20-inch depths.

2005-Current WY 2015 Avg

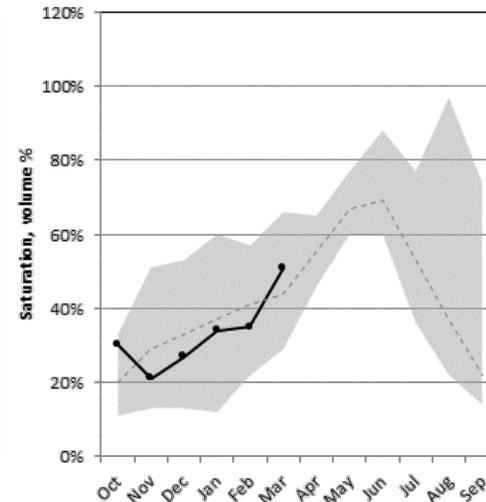
Truckee River Basin



Calculated using soil moisture content at 2, 8, and 20-inch depths.

2005-Current WY 2015 Avg

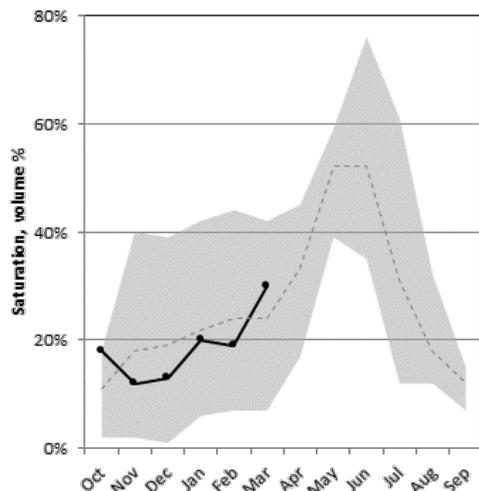
Carson River Basin



Calculated using soil moisture content at 2, 8, and 20-inch depths.

2005-Current WY 2015 Avg

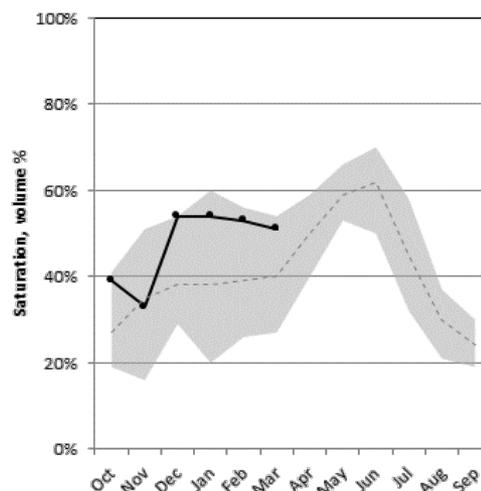
Walker River Basin



Calculated using soil moisture content at 2, 8, and 20-inch depths.

2005-Current WY 2015 Avg

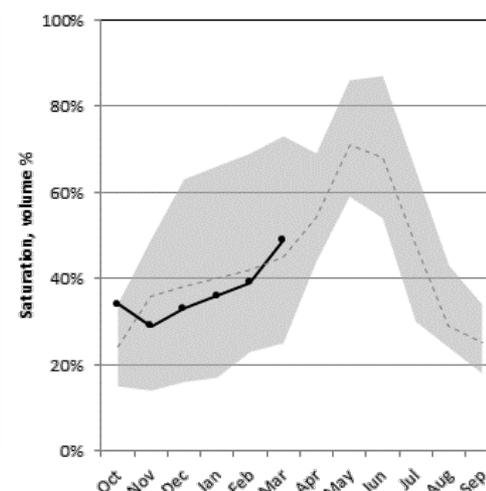
Lower Humboldt River Basin



Calculated using soil moisture content at 2, 8, and 20-inch depths.

2005-Current WY 2015 Avg

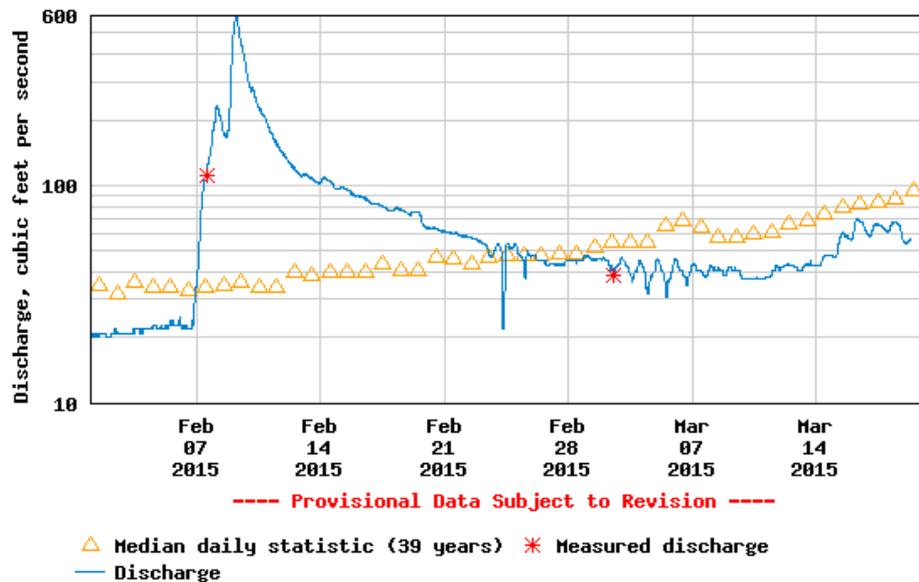
Upper Humboldt River Basin



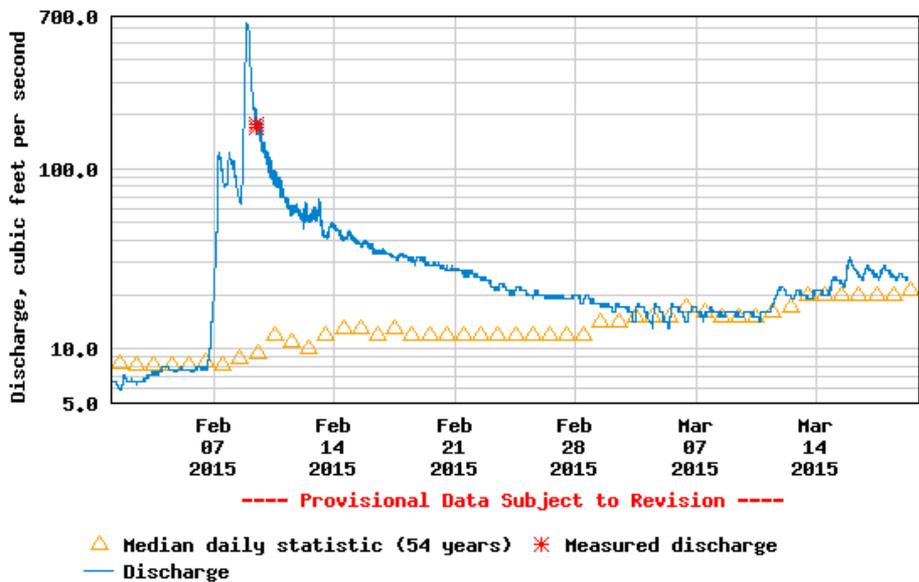
Calculated using soil moisture content at 2, 8, and 20-inch depths.

2005-Current WY 2015 Avg

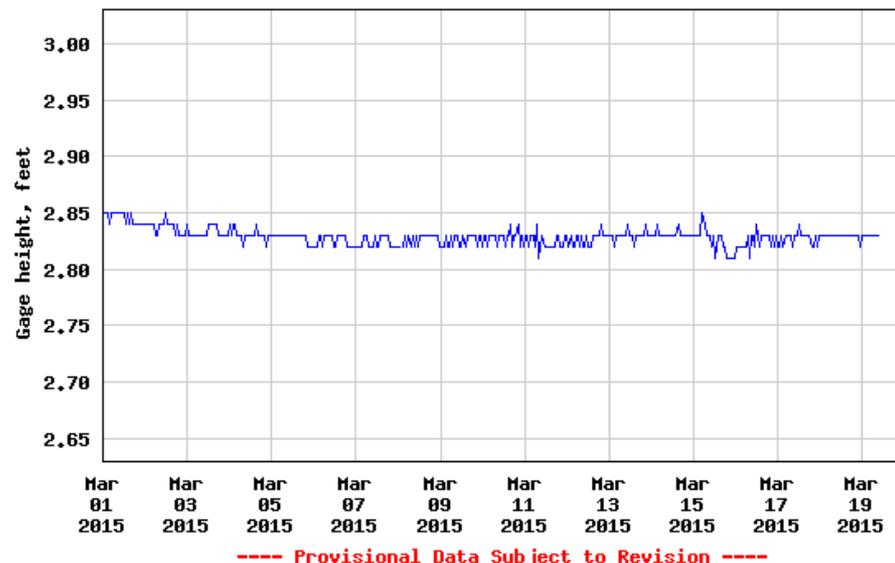
USGS 10336610 UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA



USGS 10336660 BLACKWOOD C NR TAHOE CITY CA

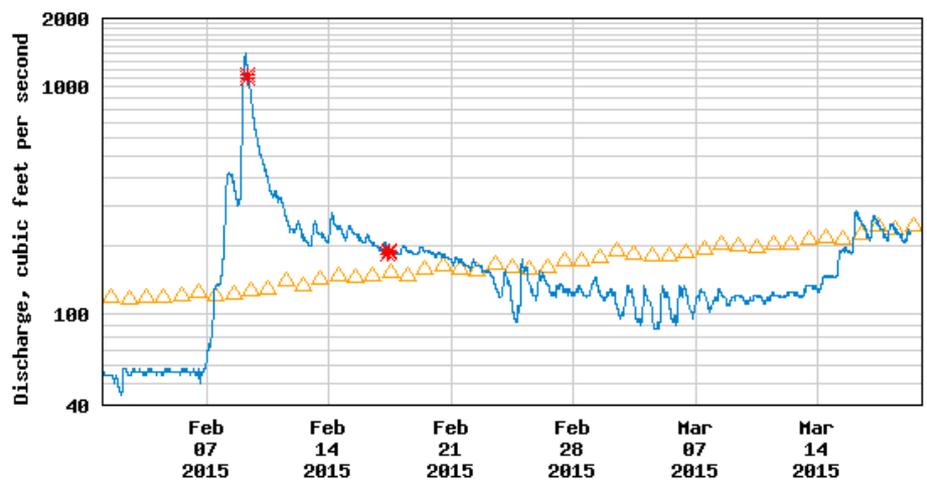


USGS 10337000 LAKE TAHOE A TAHOE CITY CA



Lake Tahoe's water surface elevation has decreased since March 1. It may not get above its natural rim this spring.

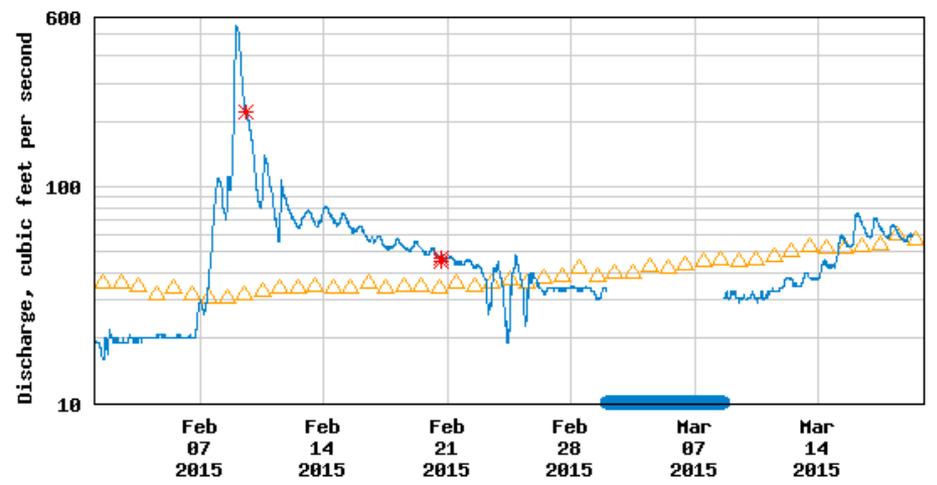
USGS 10309000 E FK CARSON RV NR GARDNERVILLE, NV



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

△ Median daily statistic (93 years) * Measured discharge
— Discharge

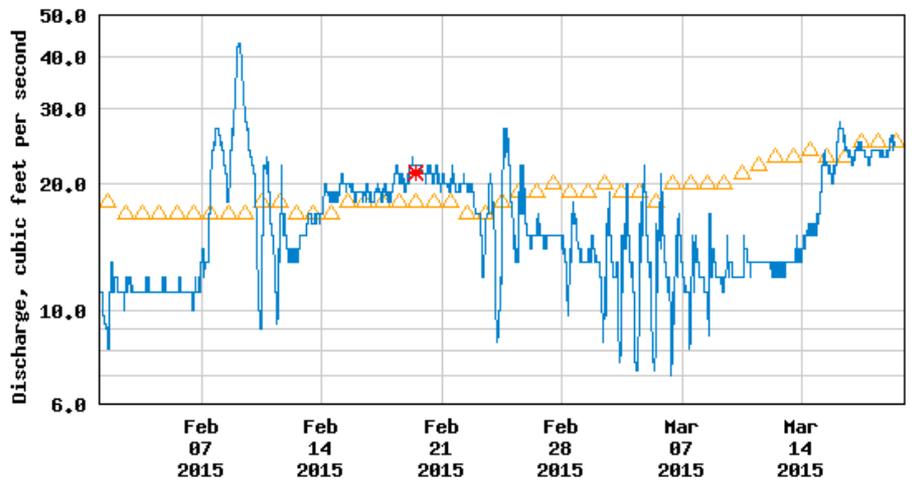
USGS 10310000 W FK CARSON RV AT WOODFORDS, CA



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

△ Median daily statistic (83 years) * Measured discharge
— Discharge ● Flow at station affected by ice

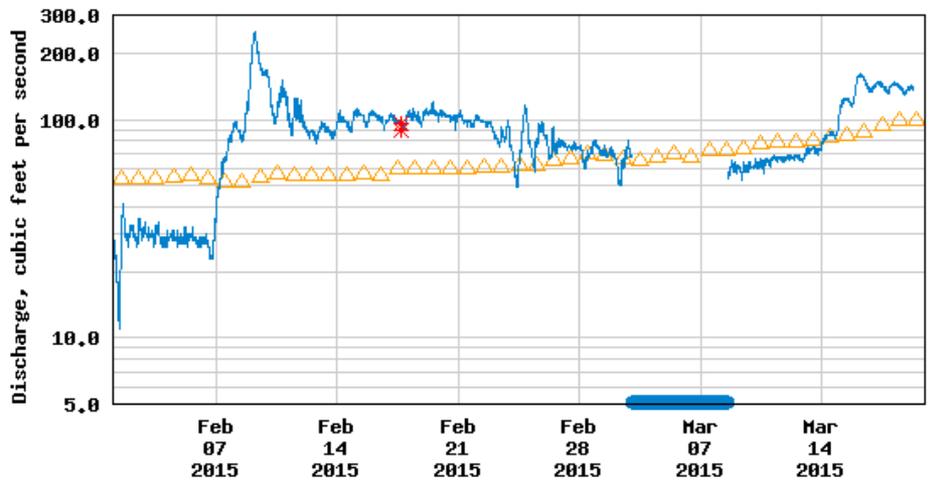
USGS 10291500 BUCKEYE CK NR BRIDGEPORT, CA



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

△ Median daily statistic (44 years) * Measured discharge
— Discharge

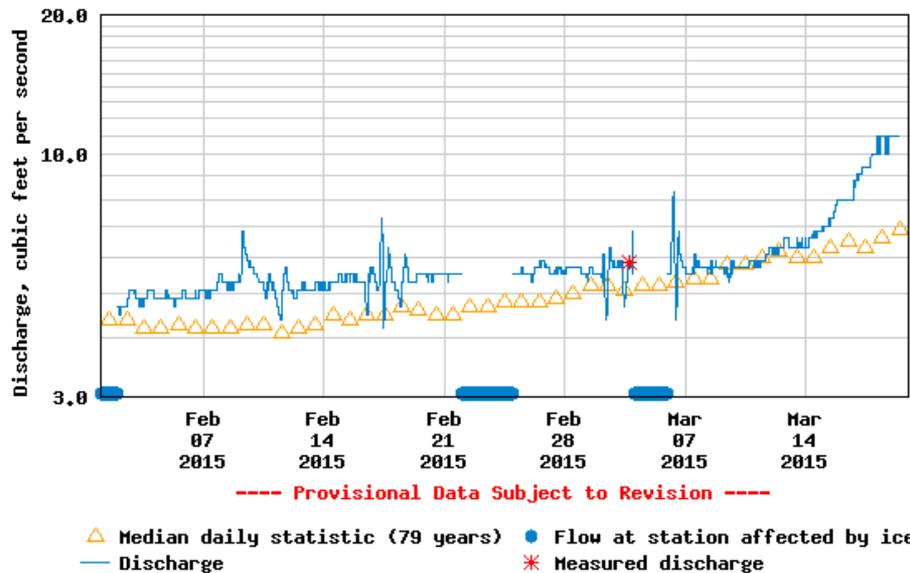
USGS 10296000 W WALKER RV BLW L WALKER RV NR COLEVILLE, CA



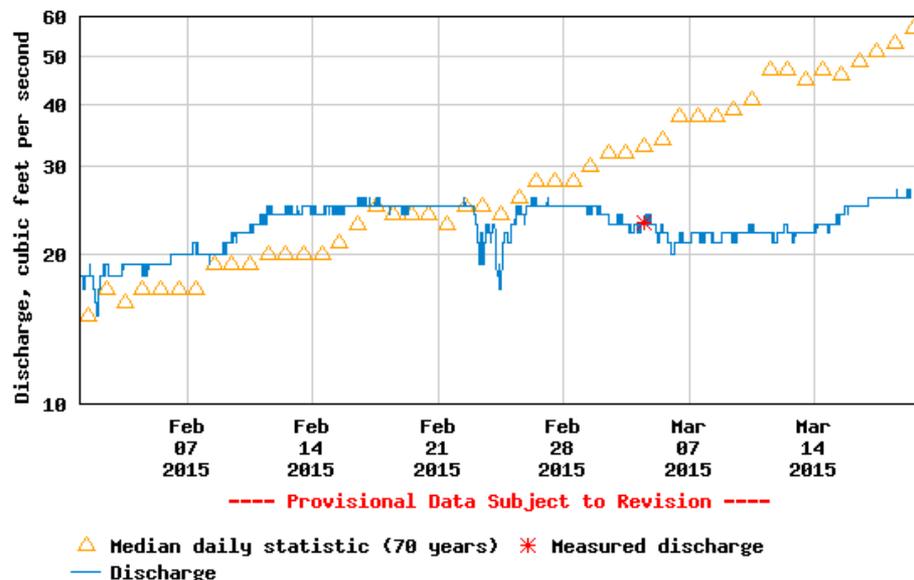
----- Provisional Data Subject to Revision -----

△ Median daily statistic (76 years) * Measured discharge
— Discharge ● Flow at station affected by ice

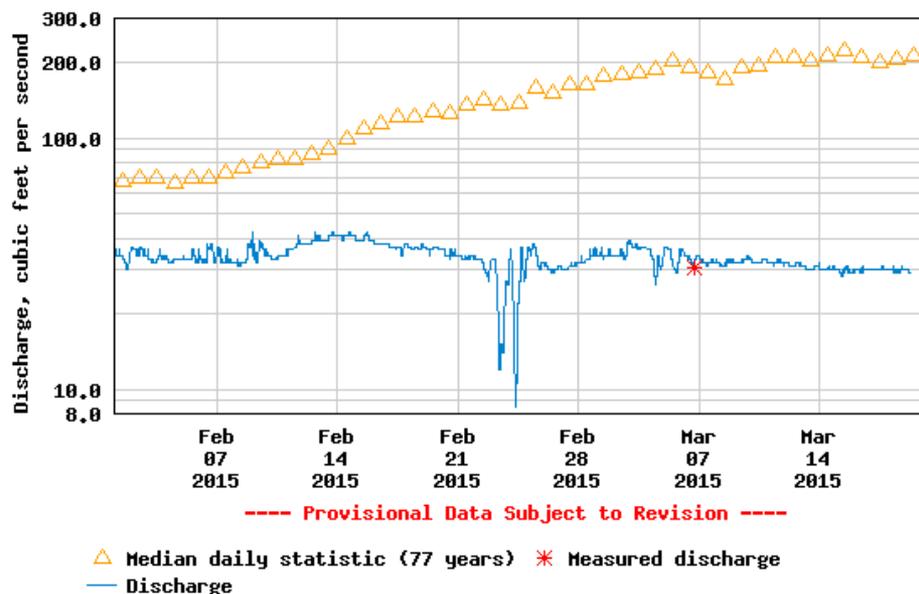
USGS 10316500 LAMOILLE CK NR LAMOILLE, NV



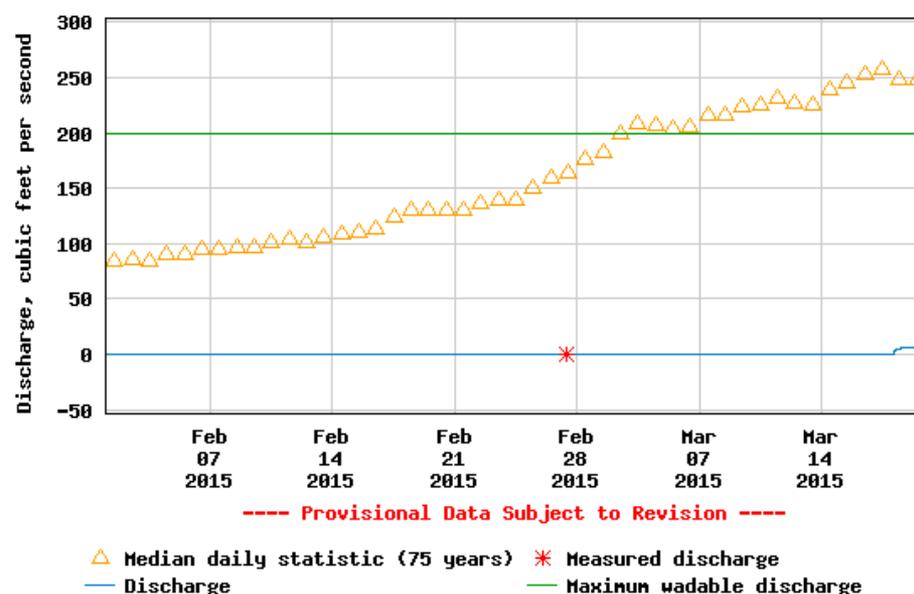
USGS 10315500 MARYS RV ABV HOT SPGS CK NR DEETH, NV



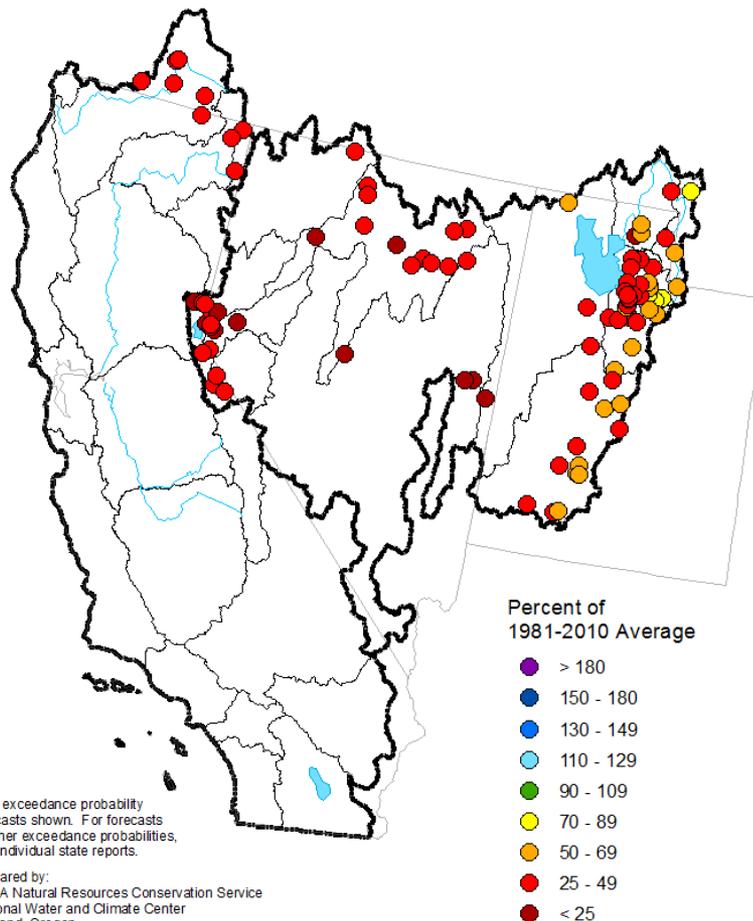
USGS 10318500 HUMBOLDT RV NR ELKO, NV



USGS 10333000 HUMBOLDT RV NR IMLAY, NV



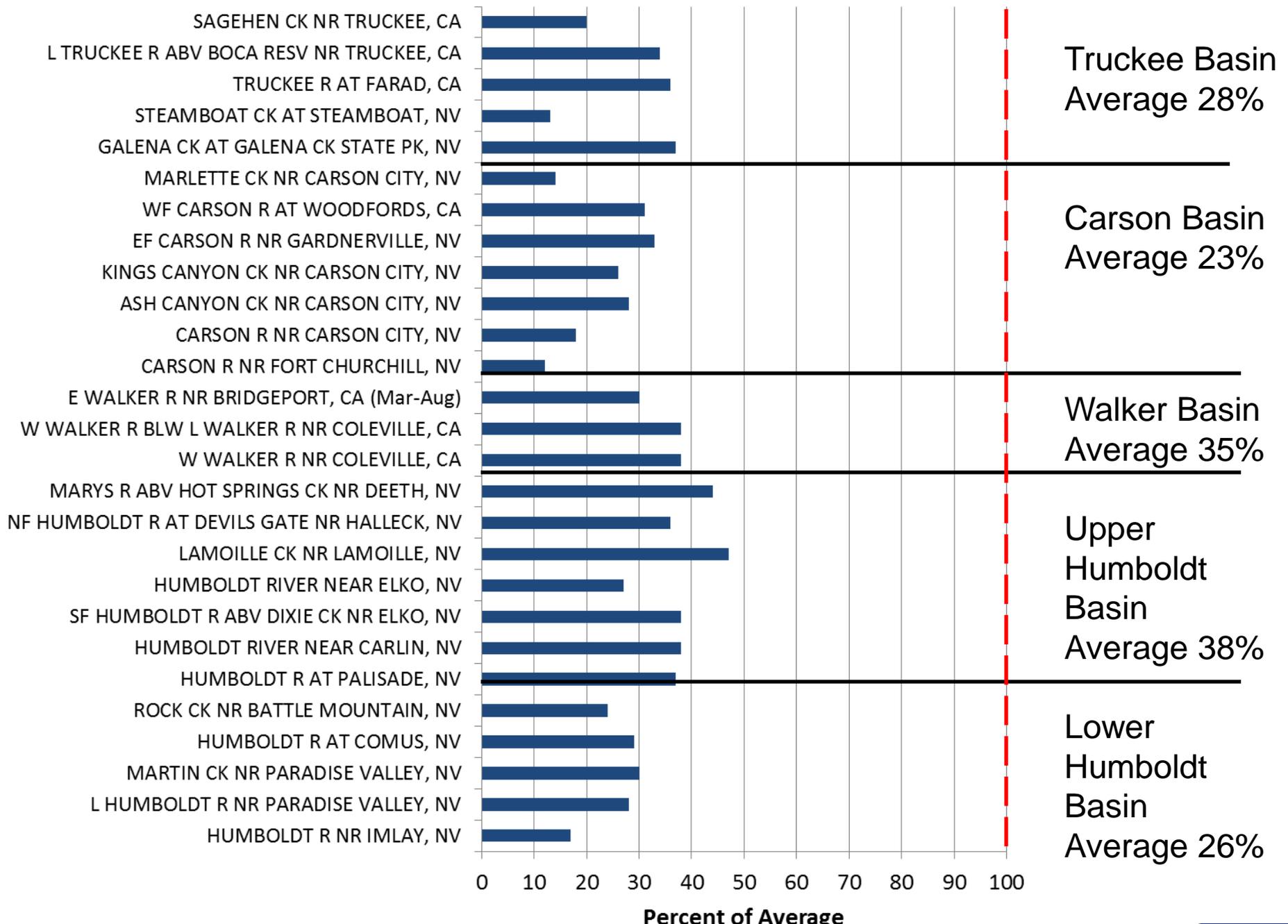
Great Basin and California Spring and Summer Streamflow Forecasts as of March 1, 2015



50% exceedance probability forecasts shown. For forecasts at other exceedance probabilities, see individual state reports.

Prepared by:
USDA Natural Resources Conservation Service
National Water and Climate Center
Portland, Oregon
<http://www.wcc.nrcs.usda.gov>
Created: 6 Mar 2015 10:51

March 1 Streamflow Forecasts - 50% Exceedance - March to July Period



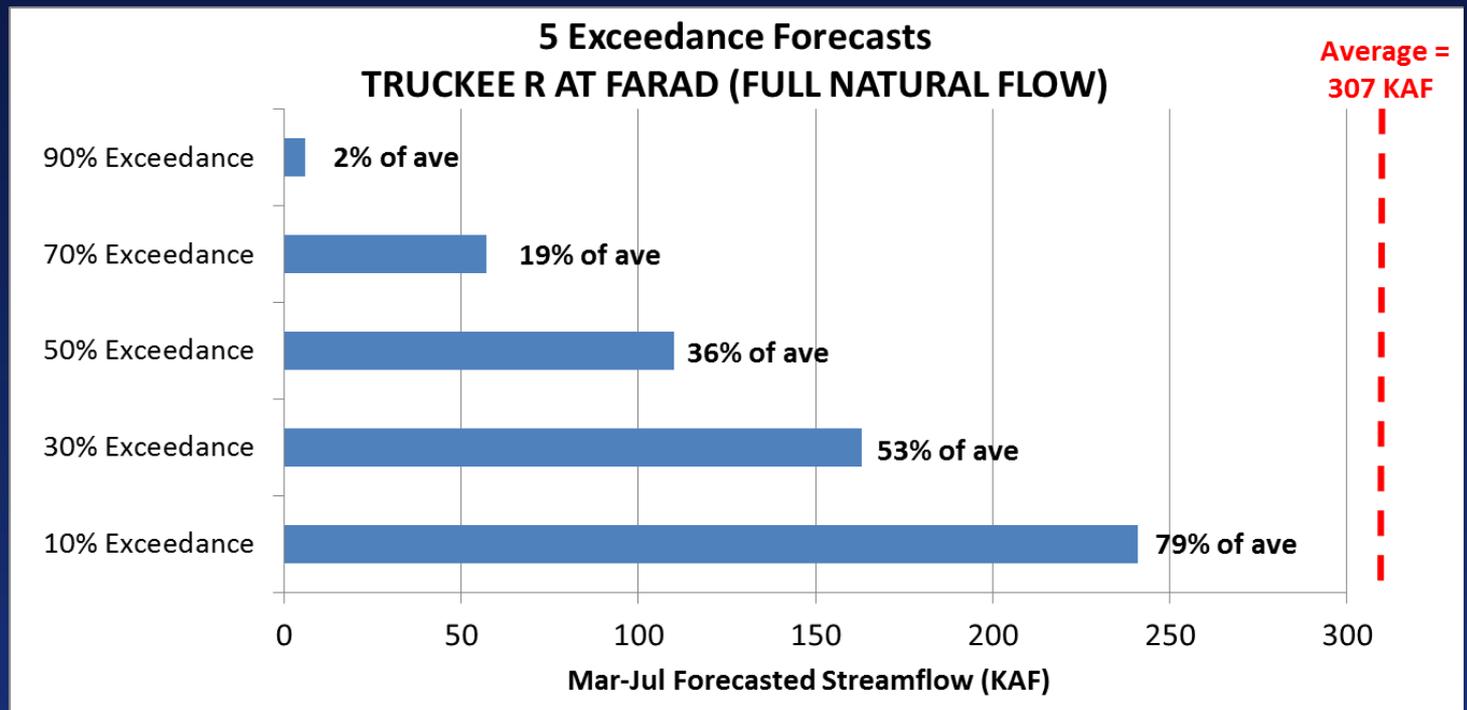
Drier than
Normal
Future

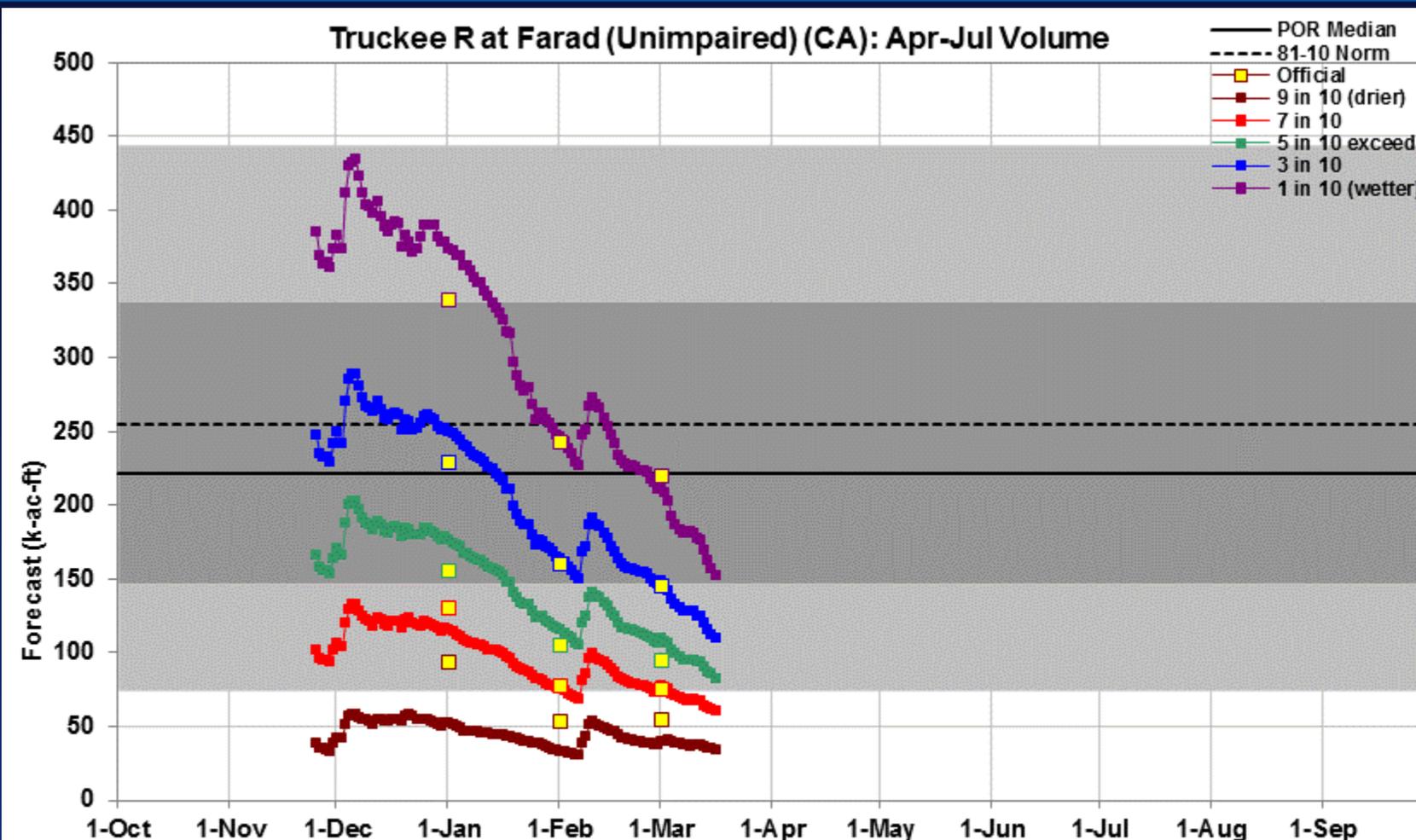


Normal Future
Precip



Wetter than
Normal
Future

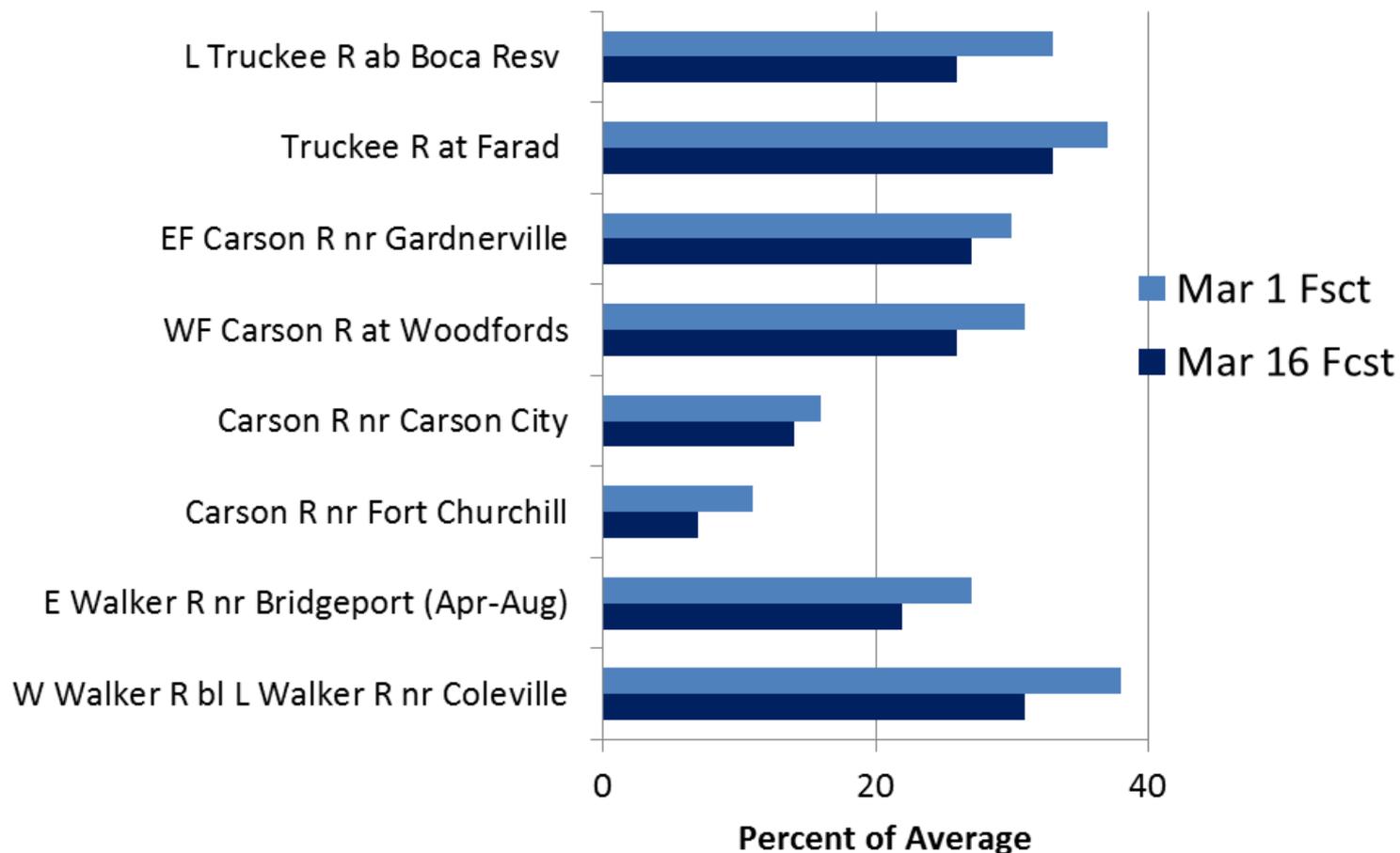




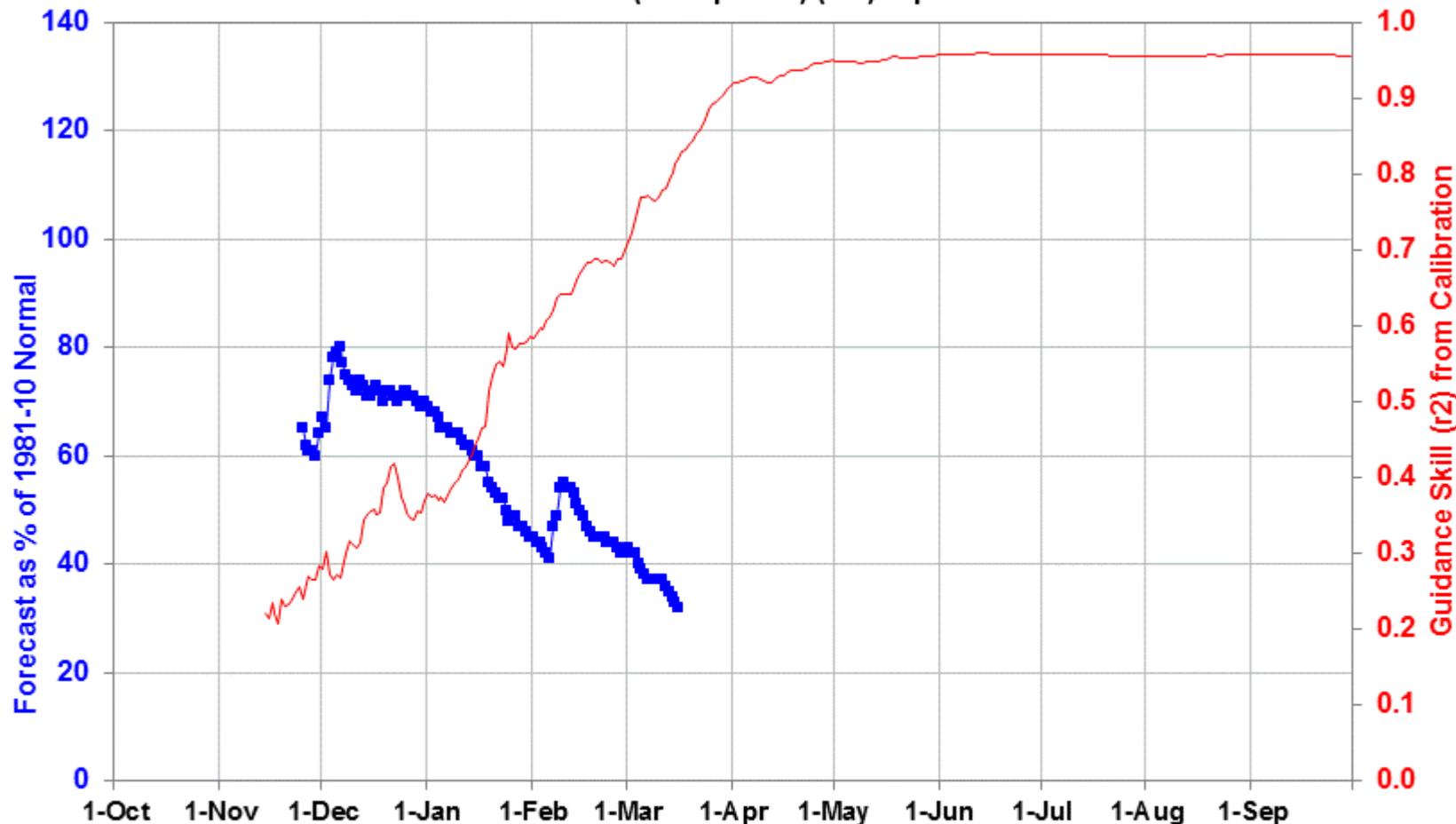
Created 12:48 Mar 16 2015

This is an automated product based solely on SNOTEL data, provisional data are subject to change. This product is a statistically based guidance forecast combining indices of snowpack and precipitation. **Yellow squares** are the official outlooks. **Gray background** is the historical period of record variability. This product does not consider climate information such as El Nino or short range weather forecasts, or a variety of other factors considered in the official forecasts. This product is not meant to replace or supercede the official forecasts produced in coordination with the National Weather Service. Science Contact: Cara.s.McCarthy@por.usda.gov www.wcc.nrcs.usda.gov/wsf/daily_forecasts.html

50% Exceedance Streamflow Forecasts - April to July Period



Created 12:48 Mar 16 2015 Truckee R at Farad (Unimpaired) (CA): Apr-Jul Volume

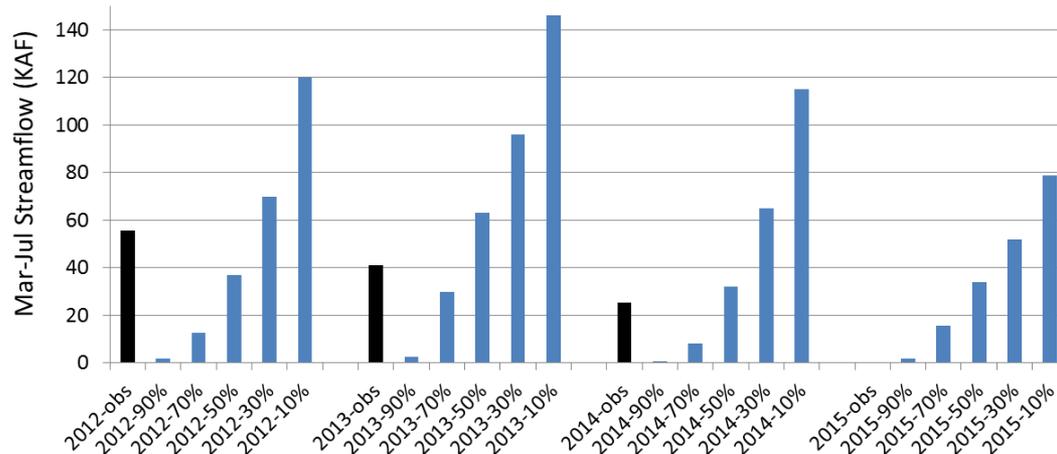


- Guidance fcst % norm
- Official fcst % norm
- Guidance Skill (r²)



This is an automated product based solely on SNOTEL data, provisional data are subject to change. This product is a statistically based guidance forecast combining indices of snowpack and precipitation. Skill is defined as the correlation (squared) between the guidance and observed during calibration. This product does not consider climate information such as El Nino or short range weather forecasts, or a variety of other factors considered in the official forecasts. This product is not meant to replace or supercede the official forecasts produced in coordination with the National Weather Service. Science Contact: Cara.s.McCarthy@por.usda.gov www.wcc.nrcs.usda.gov/ws/daily_forecasts.html

L Truckee R ab Boca Resv
Forecasted vs Observed Mar-Jul Streamflow



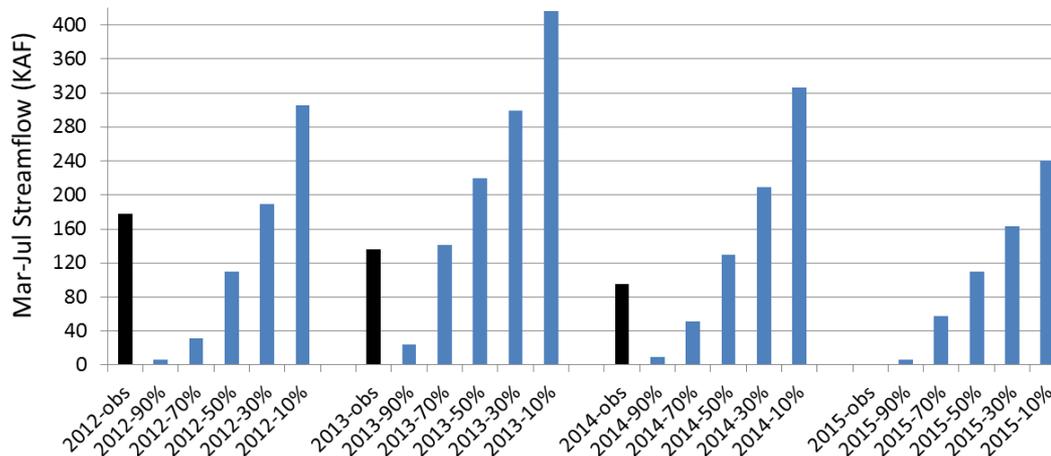
**Mar-Jul
Precipitation**

2012 = 116%

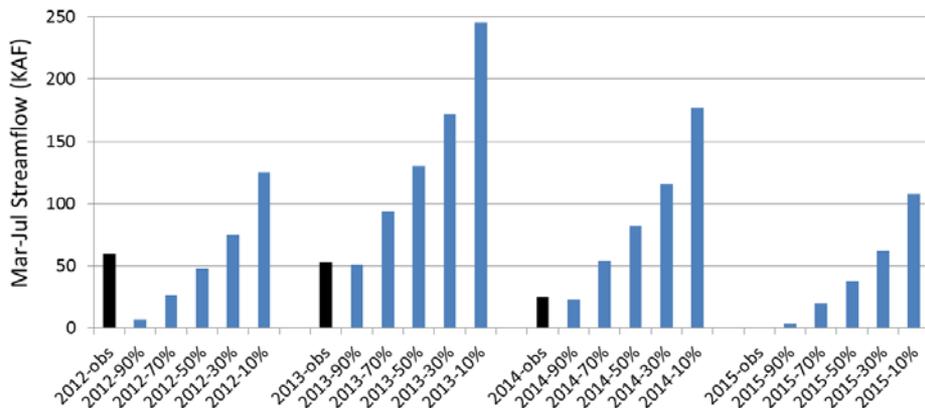
2013 = 54%

2014 = 69%

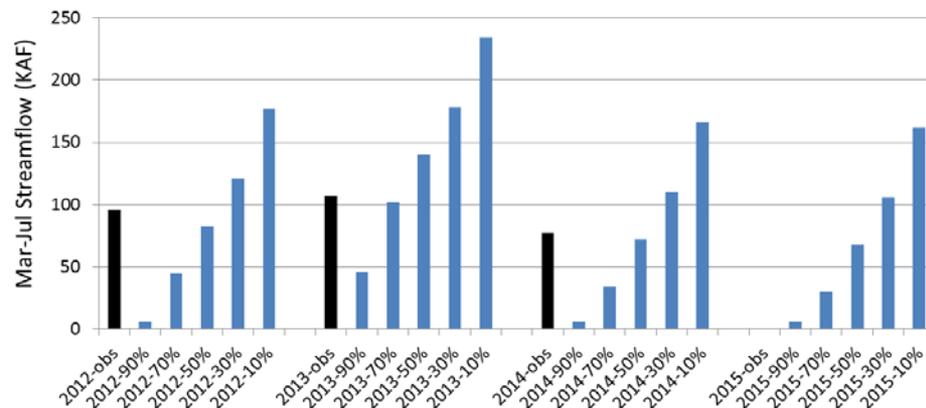
Truckee R at Farad
Forecasted vs Observed Mar-Jul Streamflow



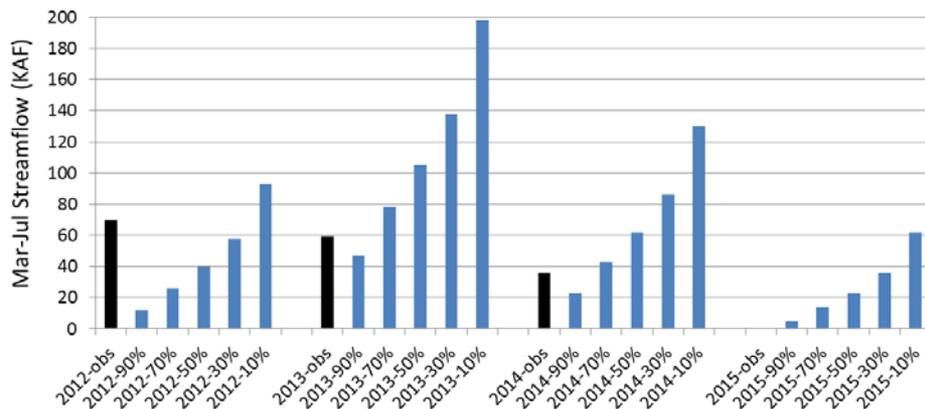
Carson R nr Carson City
Forecasted vs Observed Mar-Jul Streamflow



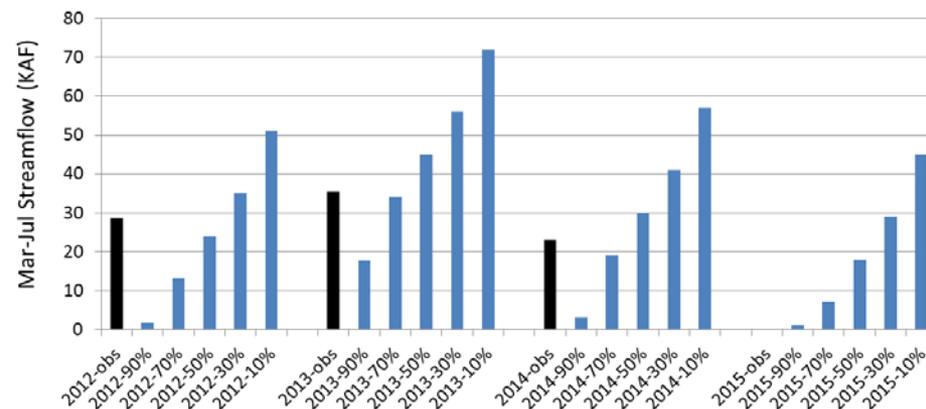
EF Carson R nr Gardnerville
Forecasted vs Observed Mar-Jul Streamflow



Carson R nr Fort Churchill
Forecasted vs Observed Mar-Jul Streamflow



WF Carson R at Woodfords
Forecasted vs Observed Mar-Jul Streamflow



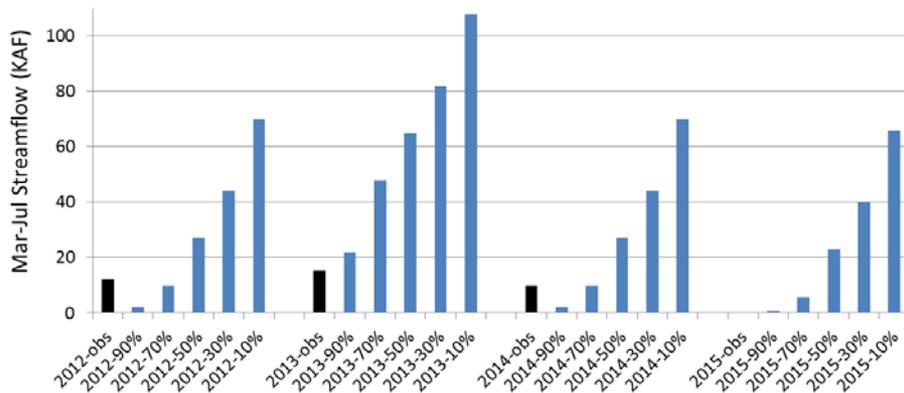
2012 = 95%

2013 = 63%

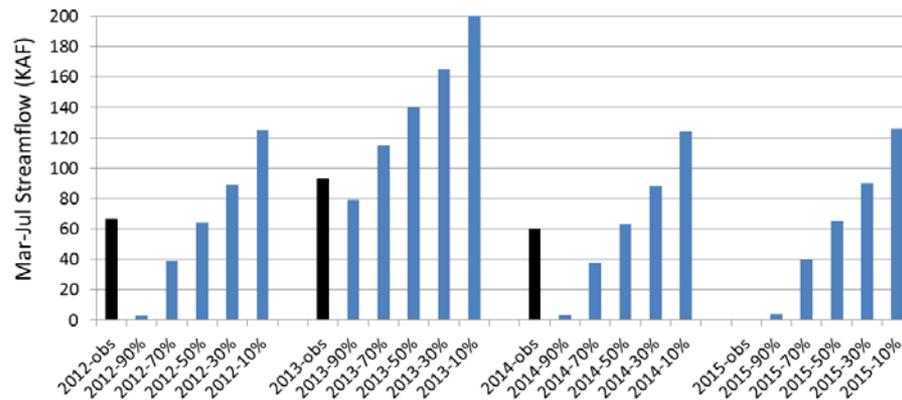
2014 = 73%

Mar-Jul Precipitation

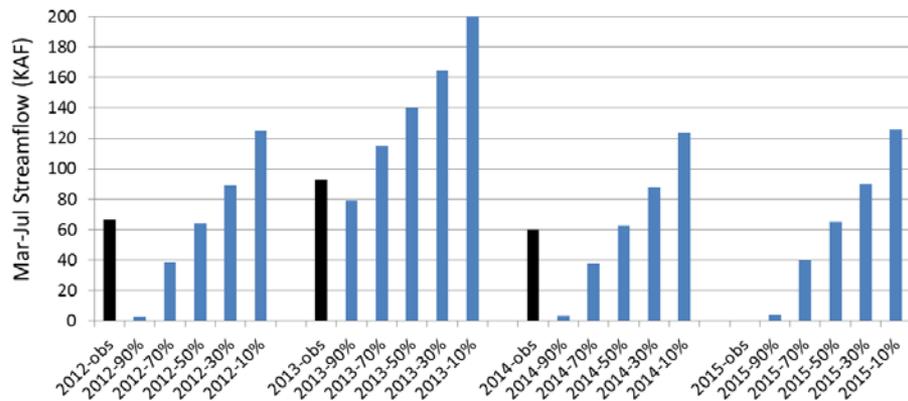
E Walker R nr Bridgeport
Forecasted vs Observed Mar-Jul Streamflow



W Walker R bl L Walker R nr Coleville
Forecasted vs Observed Mar-Jul Streamflow



W Walker R bl L Walker R nr Coleville
Forecasted vs Observed Mar-Jul Streamflow



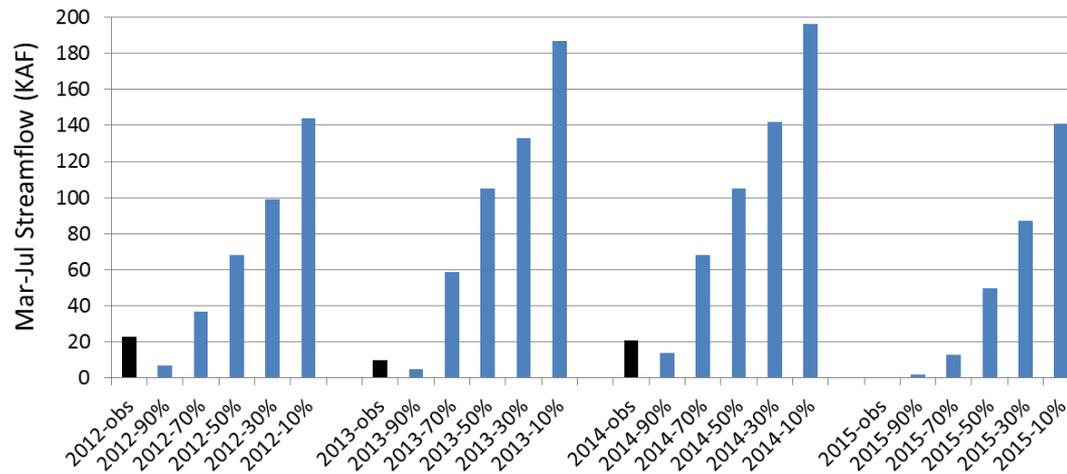
2012 = 76%

2013 = 59%

2014 = 88%

Mar-Jul Precipitation

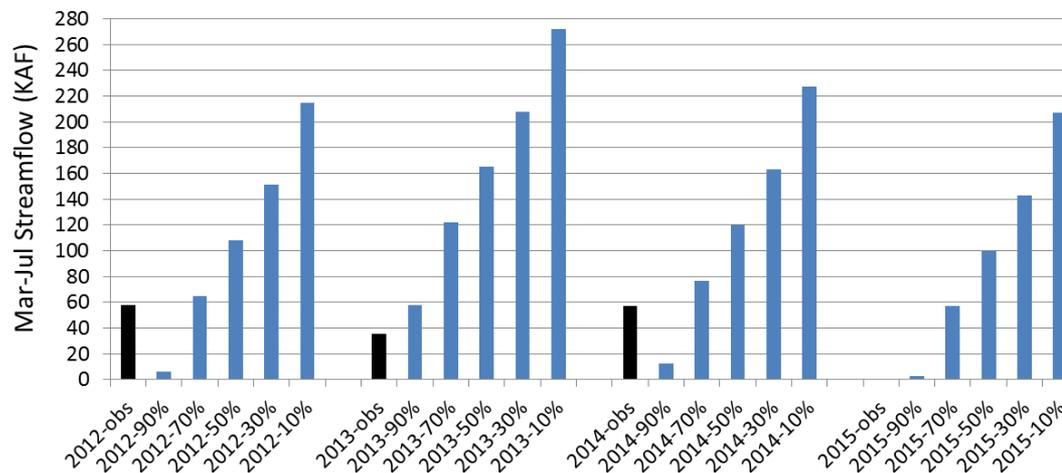
Humboldt nr Elko
Forecasted vs Observed Mar-Jul Streamflow



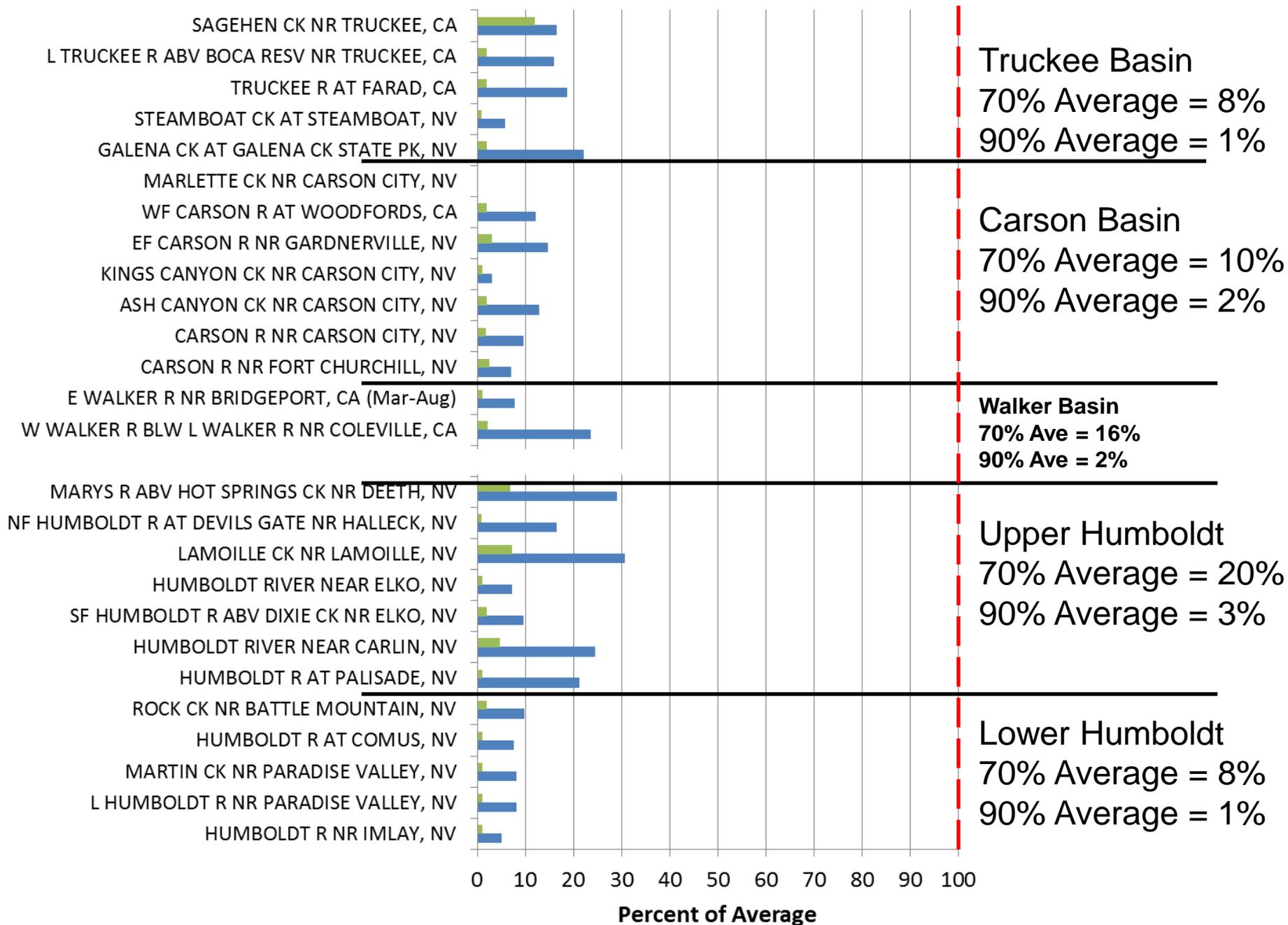
Mar-Jul Precipitation

2012 = 76%
2013 = 59%
2014 = 88%

Humboldt at Palisades
Forecasted vs Observed Mar-Jul Streamflow



March 1 Streamflow Forecasts 70% & 90% Exceedance - March to July Period



Summary

- Snowpack
 - 2015 currently lowest out of the 4 recent drought winters
 - March 1 snowpack lowest or second lowest at 32 SNOTEL and snow courses
 - April 1 snow survey will likely set all time low records
 - Snowmelt already in full swing at many locations
- Precipitation
 - January SNOTEL precipitation in Sierra averaged 0.2” – new minimum record
 - 10 SNOTEL sites in Tahoe, Carson and Walker basins near record low for water year precipitation
- Soil Moisture
 - Soil moisture has been good all season due to rain and snowmelt
 - Snowmelt producing response at upstream points
- Streamflow Forecasts
 - Forecasts continue to drop
 - Based on last two years, advise using drier 70% or 90% exceedance forecasts

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When will this happen again?