

Idaho's Water Outlook

2016 Idaho Eastern and Oregon Alfalfa & Seed Growers Association Winter Meeting
January 12, 2016 Caldwell, Idaho



Measuring Mores Creek

Summit

Dec 30, 2015

150% of normal

Ron Abramovich
Water Supply Specialist

Snow Survey 
Boise, Idaho

 NRCS Natural Resources
Conservation Service

Summary First

Streamflow April - September as % of 1981-2010 Average



12 Strong
El Nino
Years
Sorted

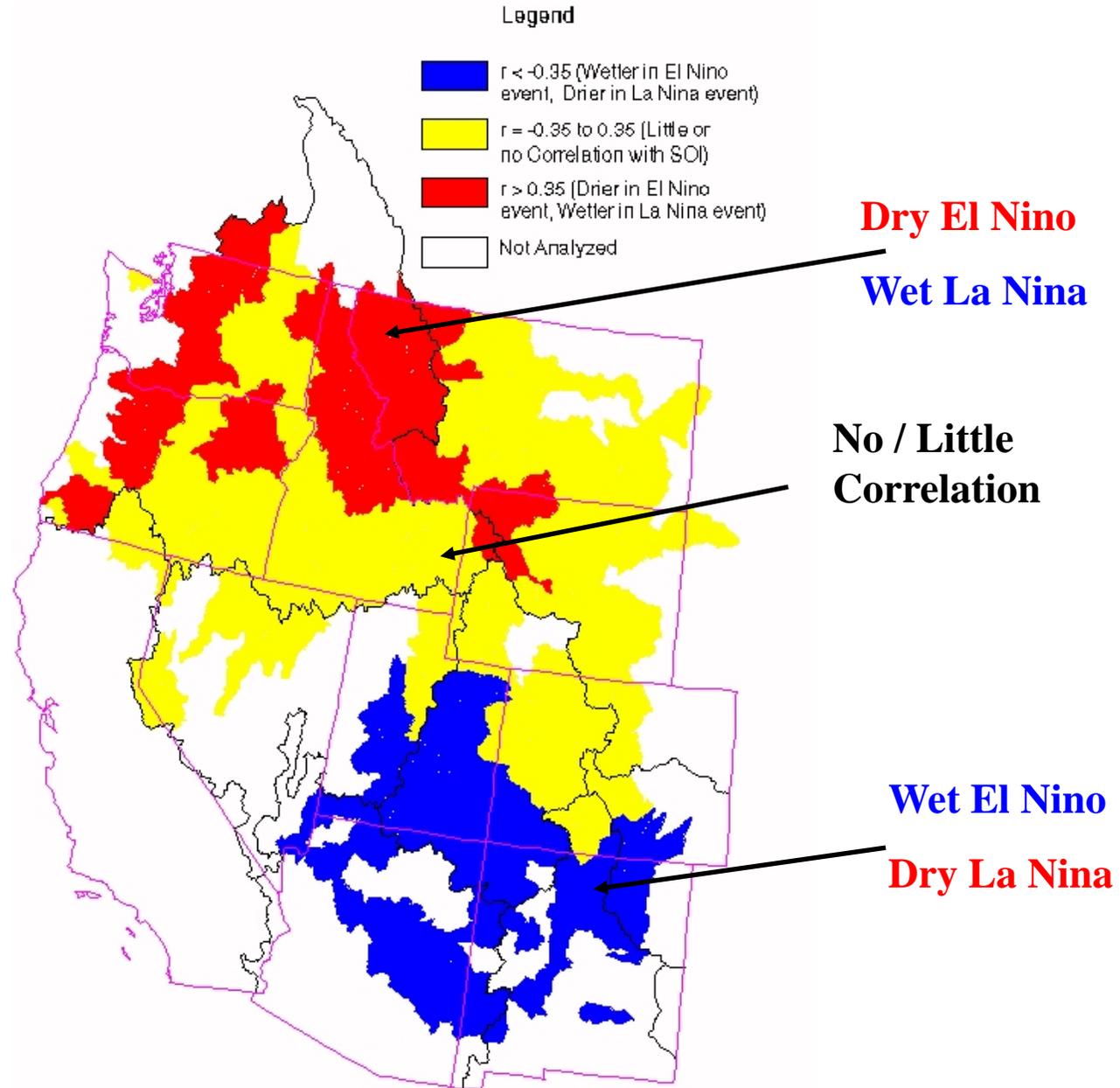
Year	ENSO	PDO	Owyhee River blw Dam	Salmon Falls Creek	Big Wood River blw Magic Dam	Snake River nr Heise	Spokane River nr Post Falls
	SE Strong El Nino	Positive or Negative					
1994	SE	pos	23	36	12	61	51
1966	SE	neg	28	48	51	78	90
1947	SE	pos / neg	44	50	59	108	90
1941	SE	pos	83	53	69	73	45
1988	SE	pos	30	65	24	70	71
1978	SE	pos	110	112	140	133	99
1973	SE	pos / neg	61	114	51	79	45
1995	SE	pos	124	135	195	118	70
1998	SE	pos / neg	135	138	161	119	82
1983	SE	pos	221	157	282	132	91
1942	SE	pos	122	173	117	86	77
1952	SE	neg	247	178	263	116	123
2016	SE	Currently pos	?	?	?	?	?

Correlation Map of the Southern Oscillation Index (SOI) with spring and summer streamflow

Key is what happens during the July – Nov period

Winter 2014/2015:
Slight El Nino & SOI

Winter 2015/2016:
Strong El Nino!



La Nina and Pacific Decadal Oscillation (PDO)

Cooling in the Pacific Ocean

Don J. Easterbrook, Dept. of Geology, Western Washington University, Bellingham, WA

The announcement by NASA's Jet Propulsion Laboratory that the Pacific Decadal Oscillation (PDO) had shifted to its cool phase (Fig. 1) is right on schedule as predicted by past climate and PDO changes (Easterbrook, 2001, 2006, 2007). It is not an oddity superimposed upon and masking the predicted severe warming by the IPCC.

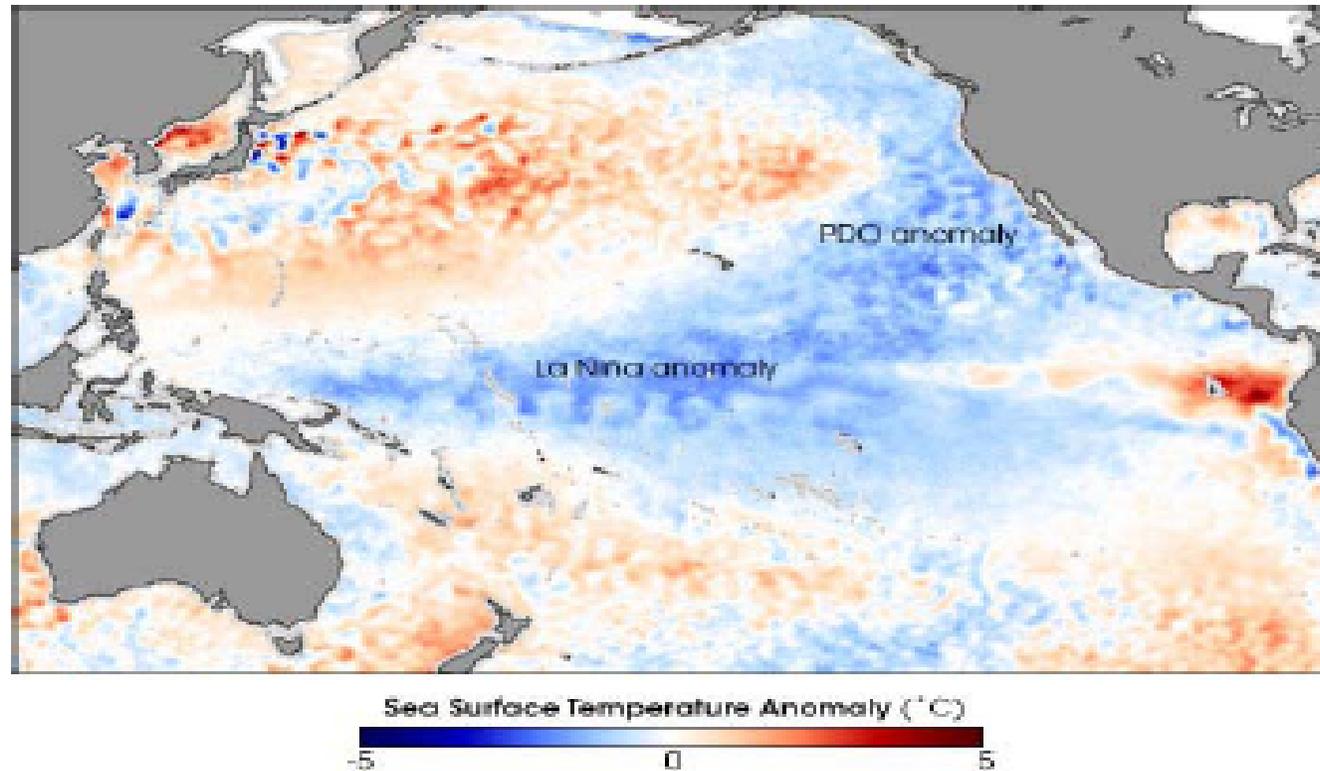
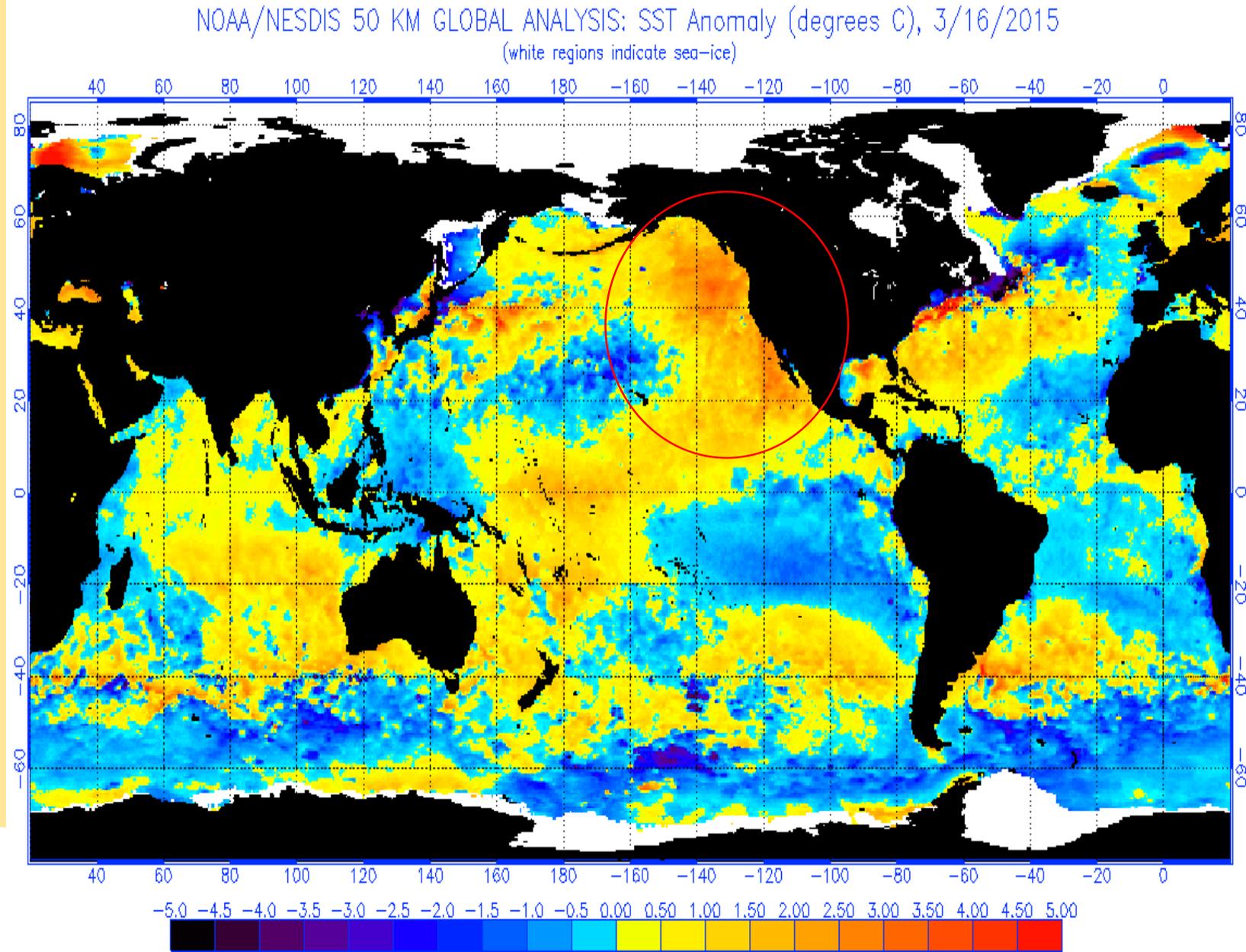
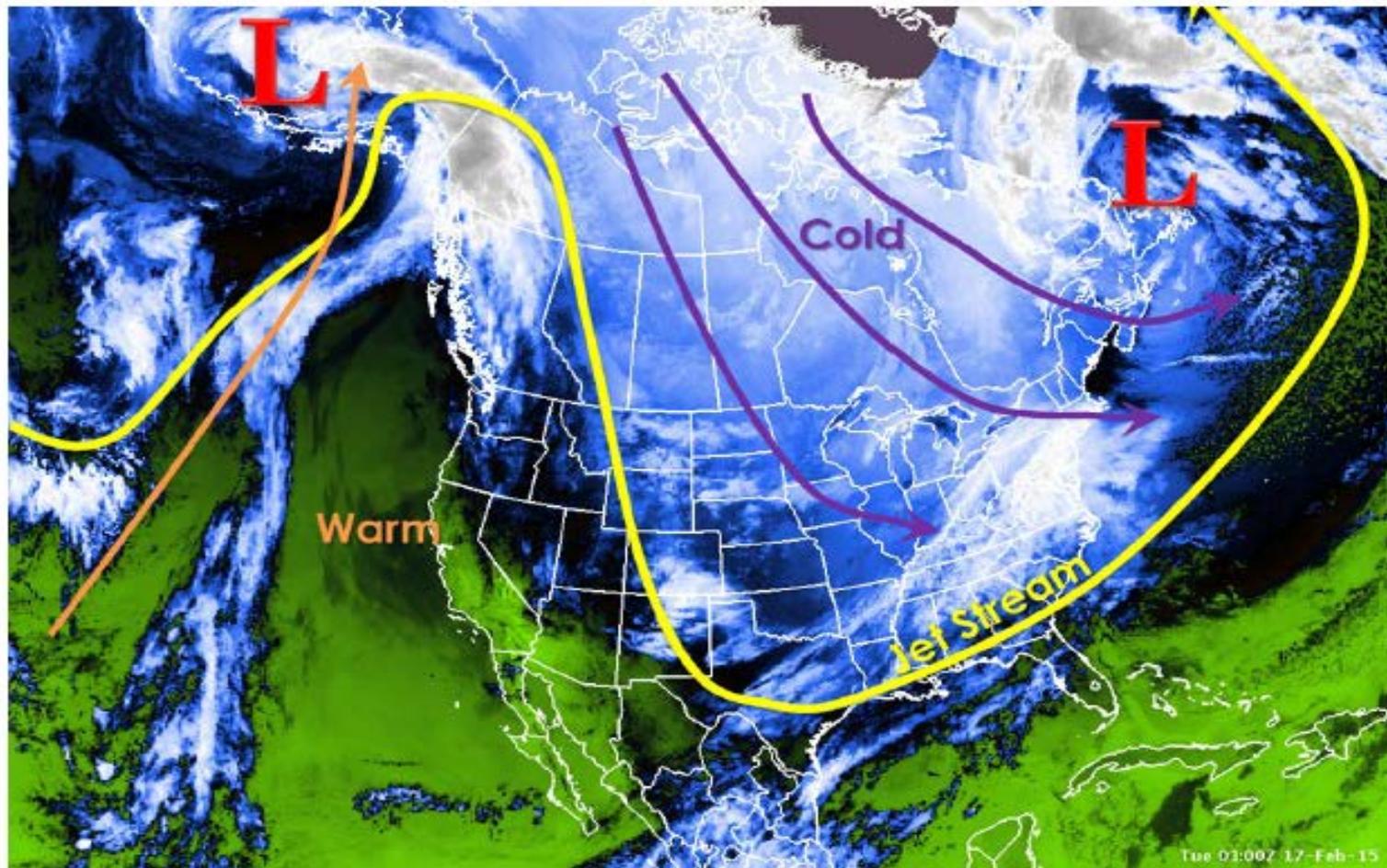


Figure 1. Cooling of the Pacific Ocean and setting up of the PDO. Sea surface temperature anomaly in the Pacific Ocean from April 14–21, 2008. The anomaly compares the recent temperatures measured by the Advanced Microwave Scanning Radiometer for EOS (AMSR-E) on NASA's Aqua satellite with

Sea Surface Temperatures March 16, 2015

- **Warm waters off west coast: warmest in 60-70 years**
- **PDO flipped to positive in January 2014**
- **Temperatures were ~6 F above normal, similar to Seattle's 2015 winter temperatures**
- **NOAA mentioned warm waters have extended to depths of 60-100 meters**





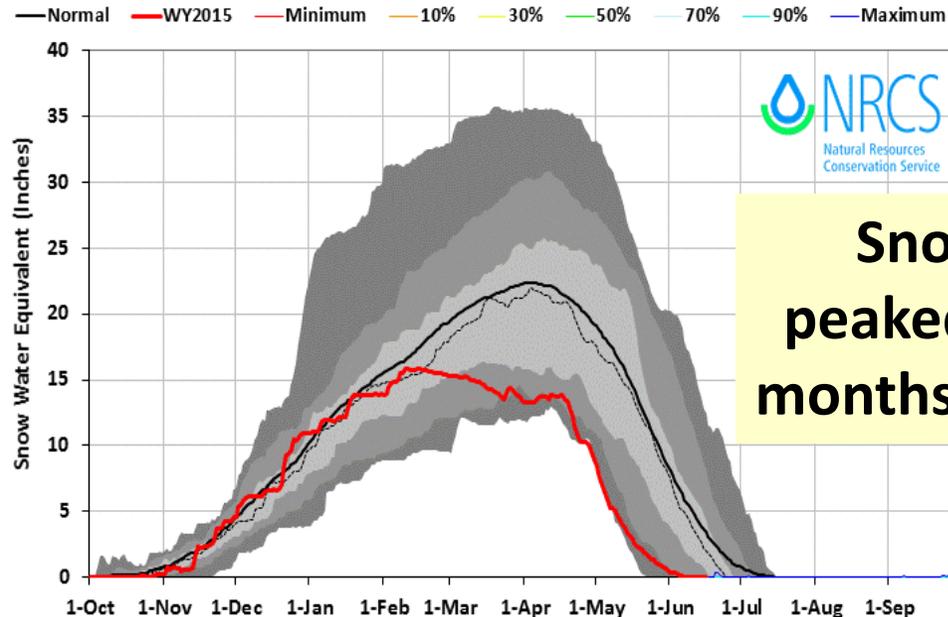
**From NWS:
Example of
winter weather
pattern for
2015 but also
for most of
2014**

The ridge has kept our area unseasonably warm and relatively dry through early March. A few Pacific weather systems were able to punch through, but precipitation totals for January through the first part of March were less than 50% of normal across most of southwest Idaho and southeast Oregon, and less than 25% of normal in a few areas.

Boise Basin 2015 Snow Water with Non-Exceedance Projections (10 sites)

Based on Provisional SNOTEL data as of Jun 16, 2015

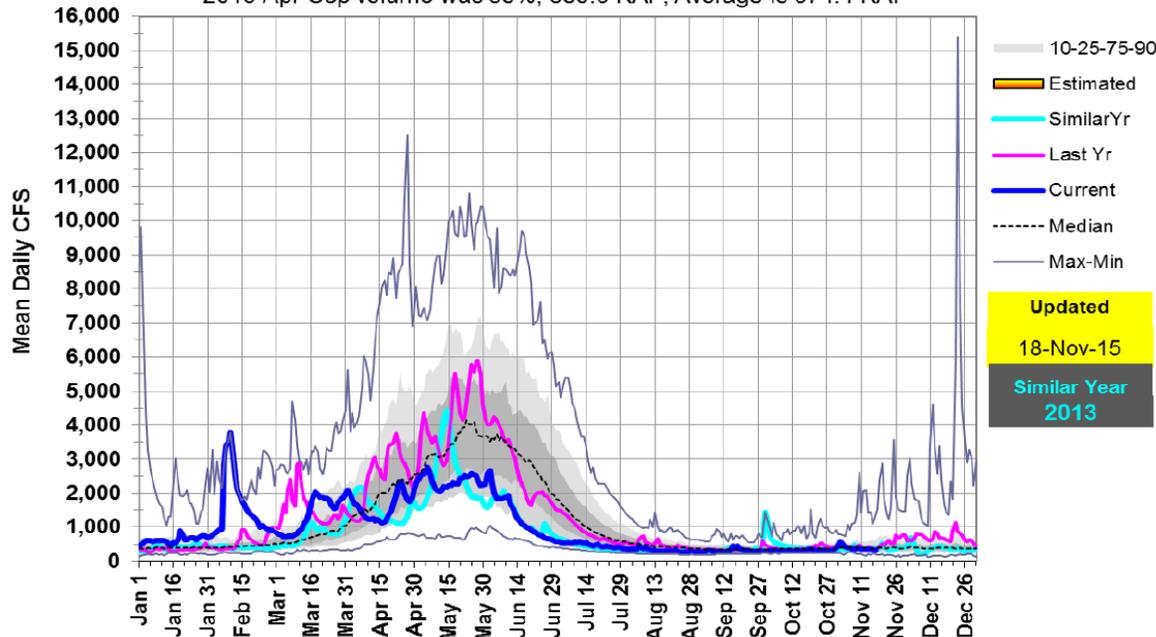
Recap of Last Winter



Snow peaked 1-2 months early

13185000: Boise R near Twin Springs, ID

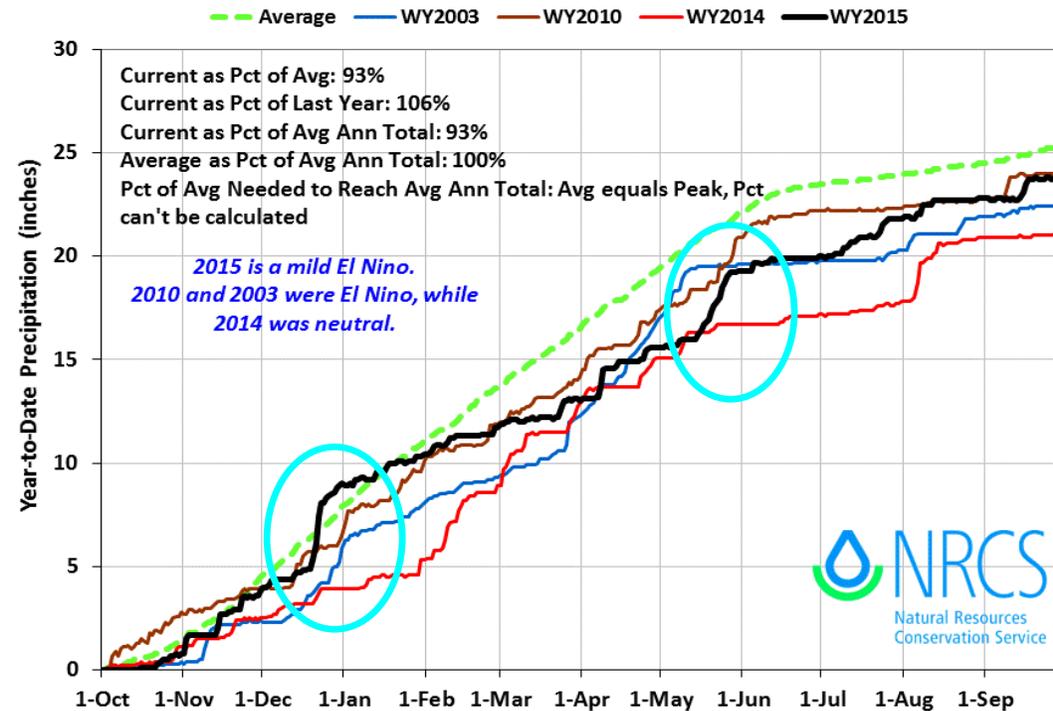
2013 Apr-Sep volume was 58%, 389.6 KAF, Average is 674.4 KAF



Rain is good but snow is better

Owyhee Basin 2015 Precipitation Comparison Graph (7 sites)

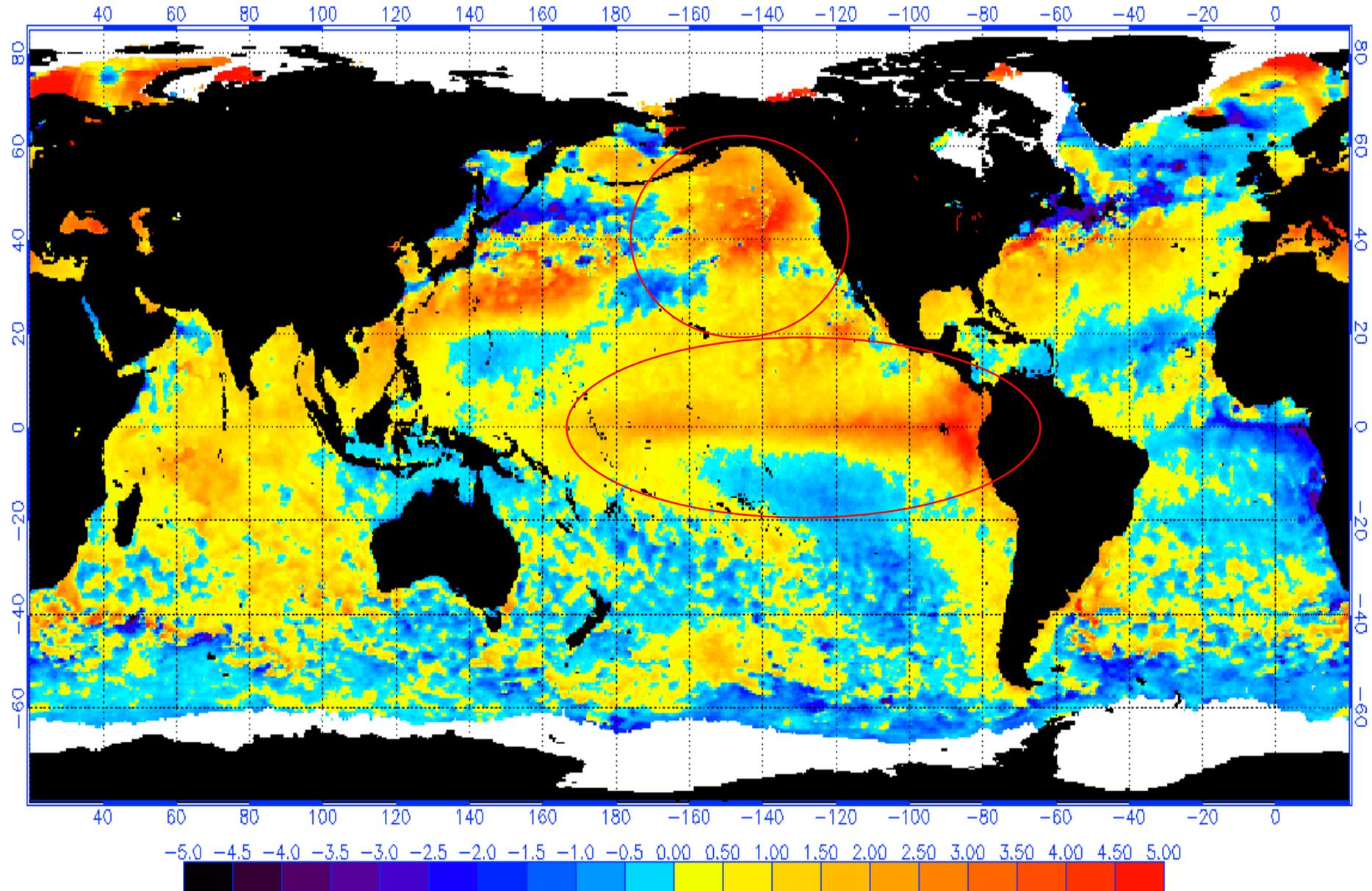
Based on Provisional SNOTEL data as of Sep 30, 2015



Snowmelt peak flows were low and early, with an early return to base flows, especially northern Idaho & Owyhee basin

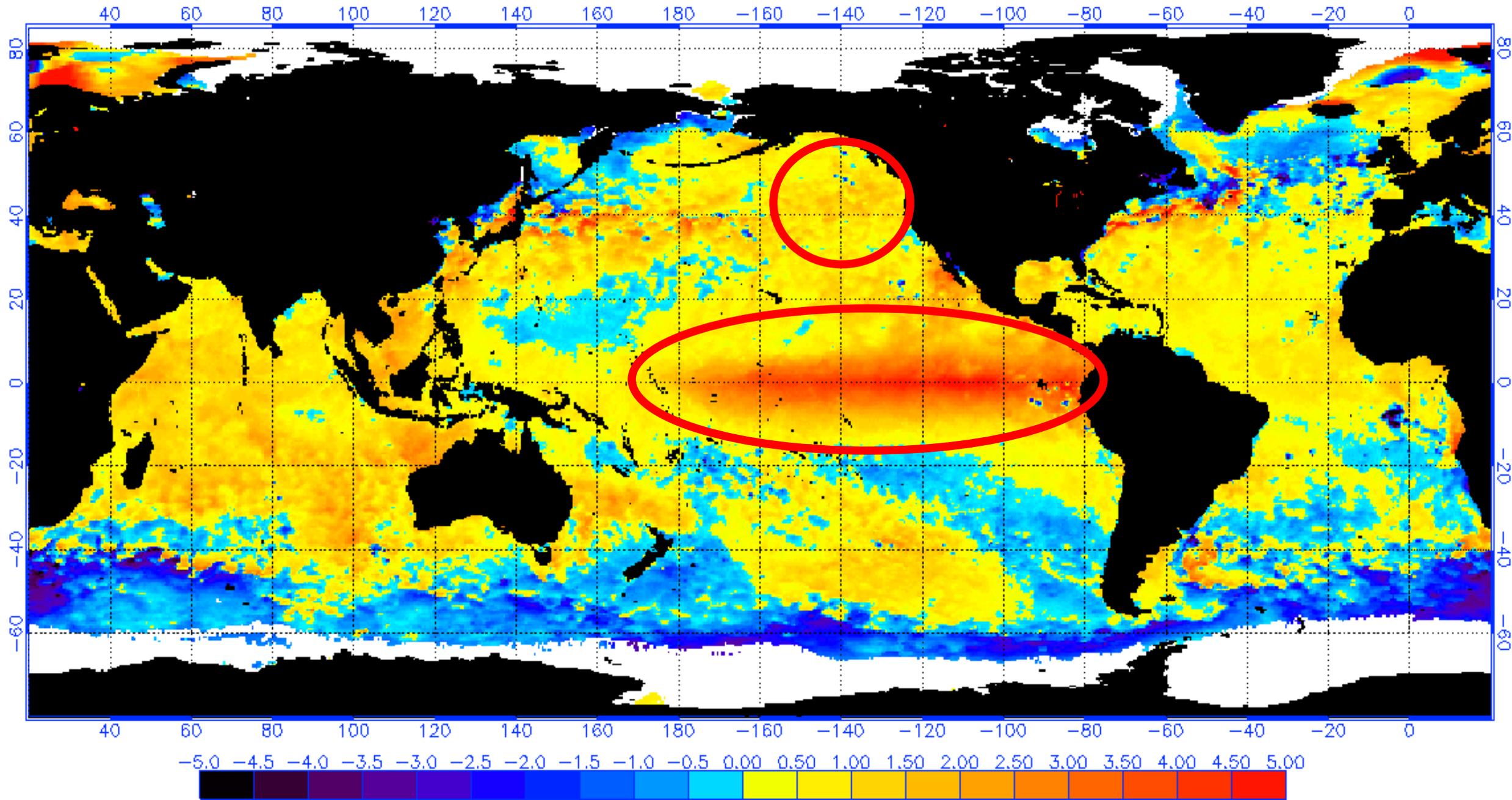
Sea Surface Temperatures June 15, 2015 – Strong El Nino Building

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 6/15/2015
(white regions indicate sea-ice)



NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 11/30/2015
(white regions indicate sea-ice)

Nov 30 2015



**Decoded Science - Weather Around The World, 7/28:
Heat, Local And Worldwide; El Niño; Monsoon; Tropics
July 28, 2015 by [Jon Plotkin](#)**

If El Niño takes control of the weather pattern during fall and winter, we can expect a new alignment with a trough in the west and a ridge in the east.

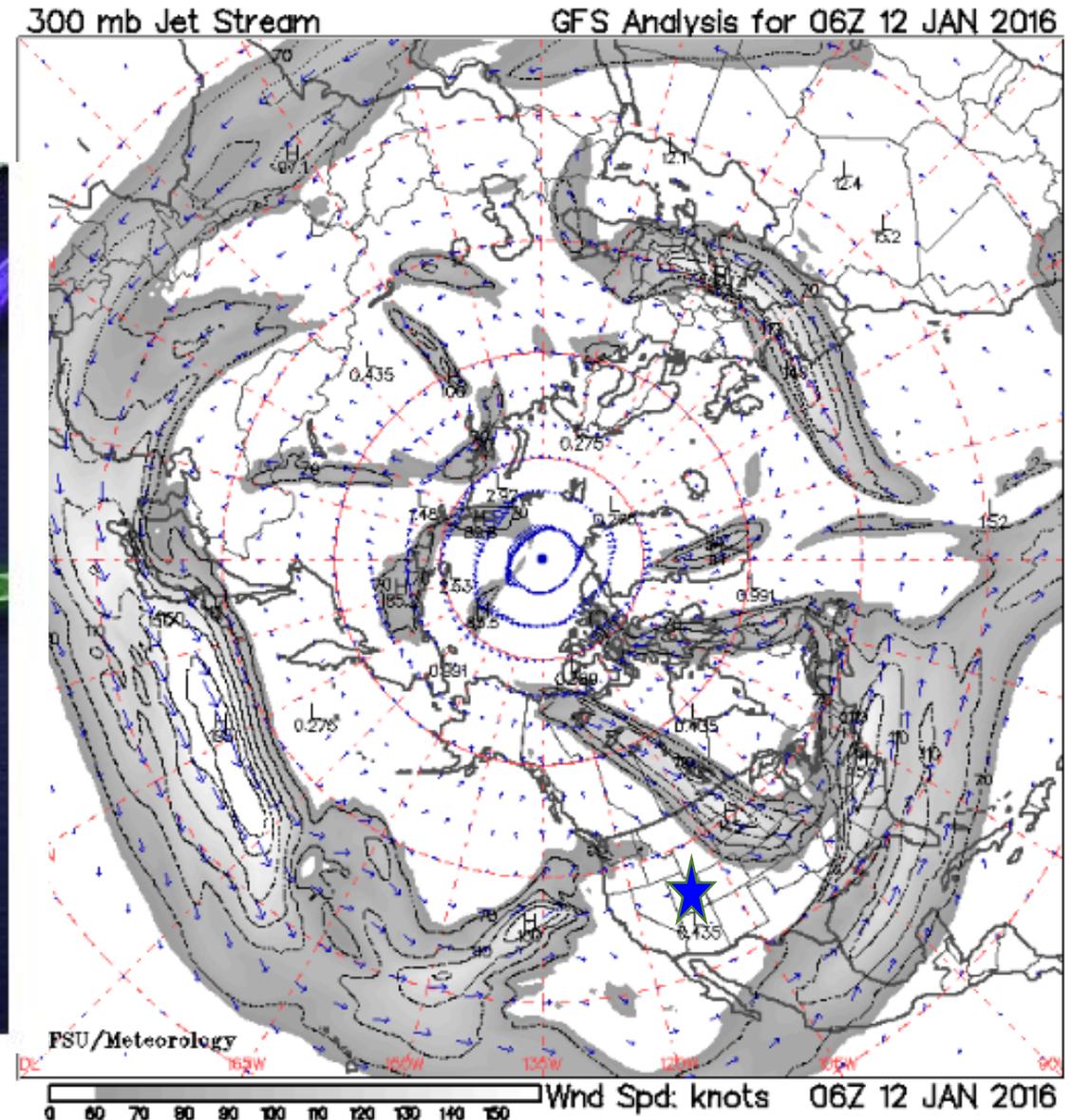
The weather of the past two winters will be reversed, with warm in the east, and cool and rainy in the west.

This pattern resembles a modified Strong El Niño pattern, and could stick around for the winter months.

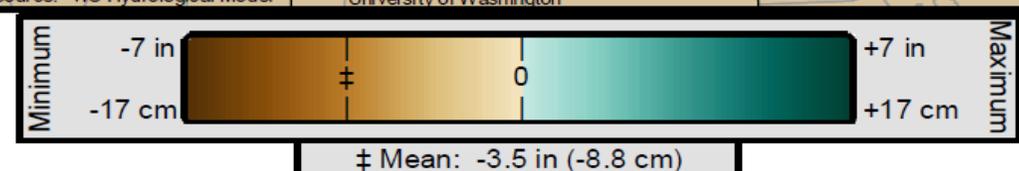
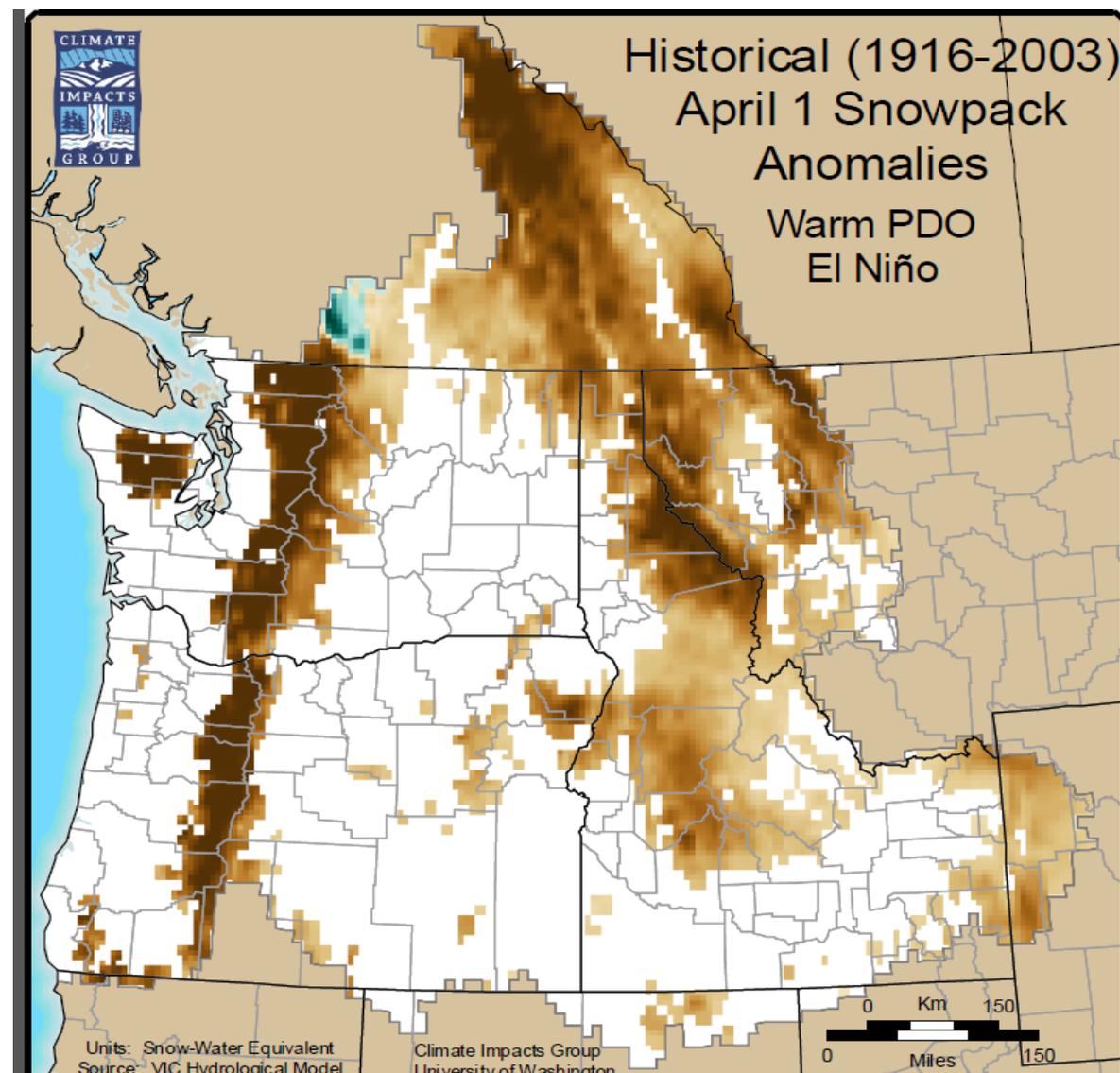
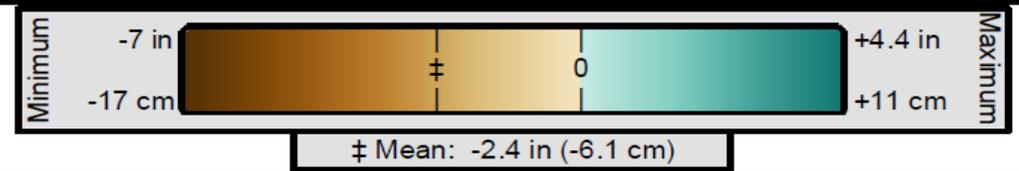
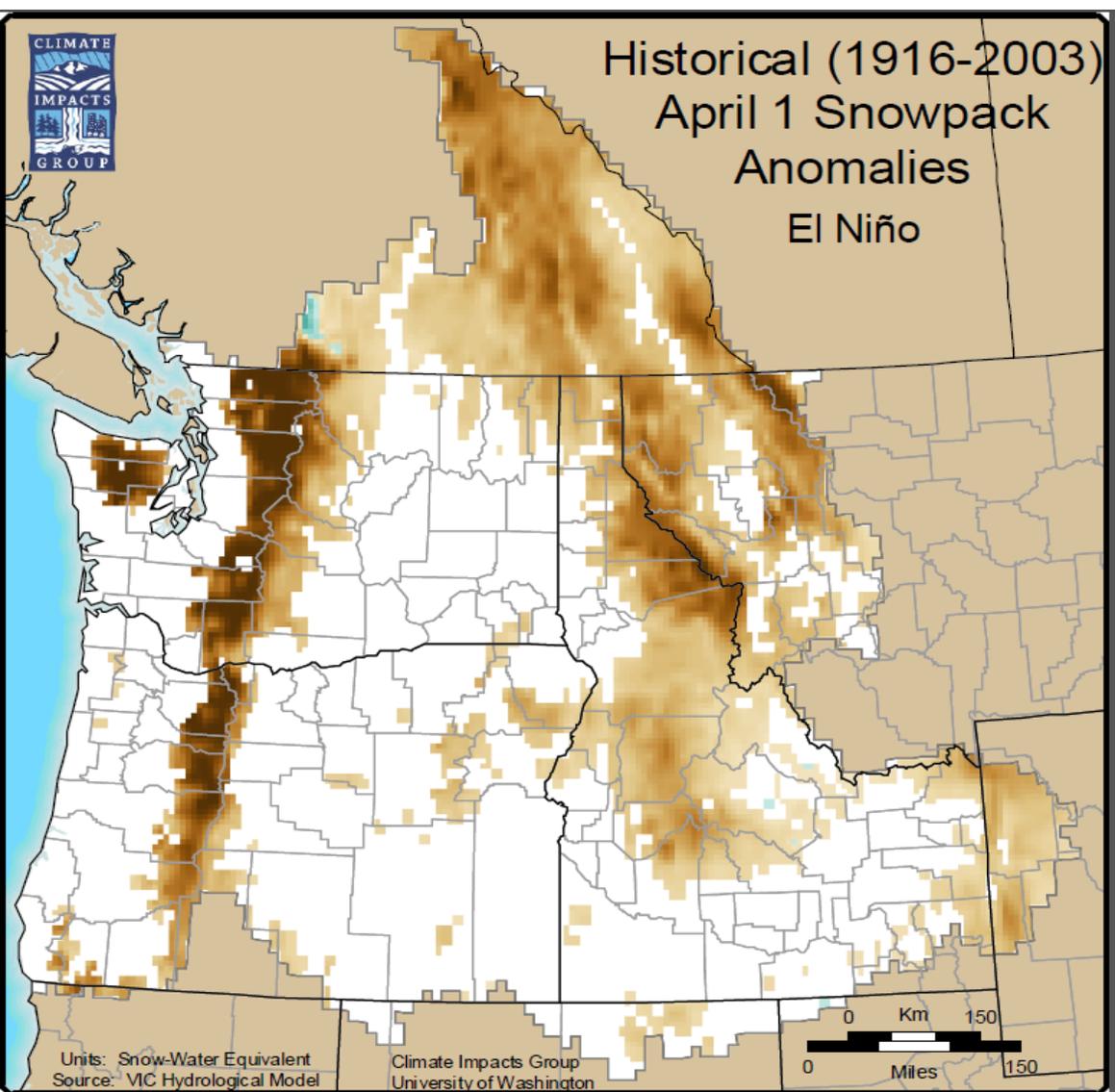
From Andrew at The Weather Centre

<http://theweathercentre.blogspot.com/#sthash.SoE5xzjO.dpuf>

Jet Stream Jan 12, 2016



April 1 Snowpack Anomalies based on El Nino (left) and El Nino + warm PDO (right)



El Niño Southern Oscillation (ENSO)

Current Status and Forecast

- The Climate Prediction Center (CPC) has issued an **El Niño Advisory**. Equatorial Pacific Ocean SSTs have warmed into the **very strong** El Niño range.
- The Oceanic Niño Index (ONI) for the Sept.-Nov. period was **+2.0°C**. The CPC thresholds for a weak, **moderate**, and **strong** El Niño are **+0.5°C**, **+1.0°C**, and **+1.5°C** respectively.
- This **very strong** El Niño appears to be peaking and is expected to transition to **ENSO-neutral** by next summer.

From:
ODF Meteorologist
Pete Parsons

Forecast Overview

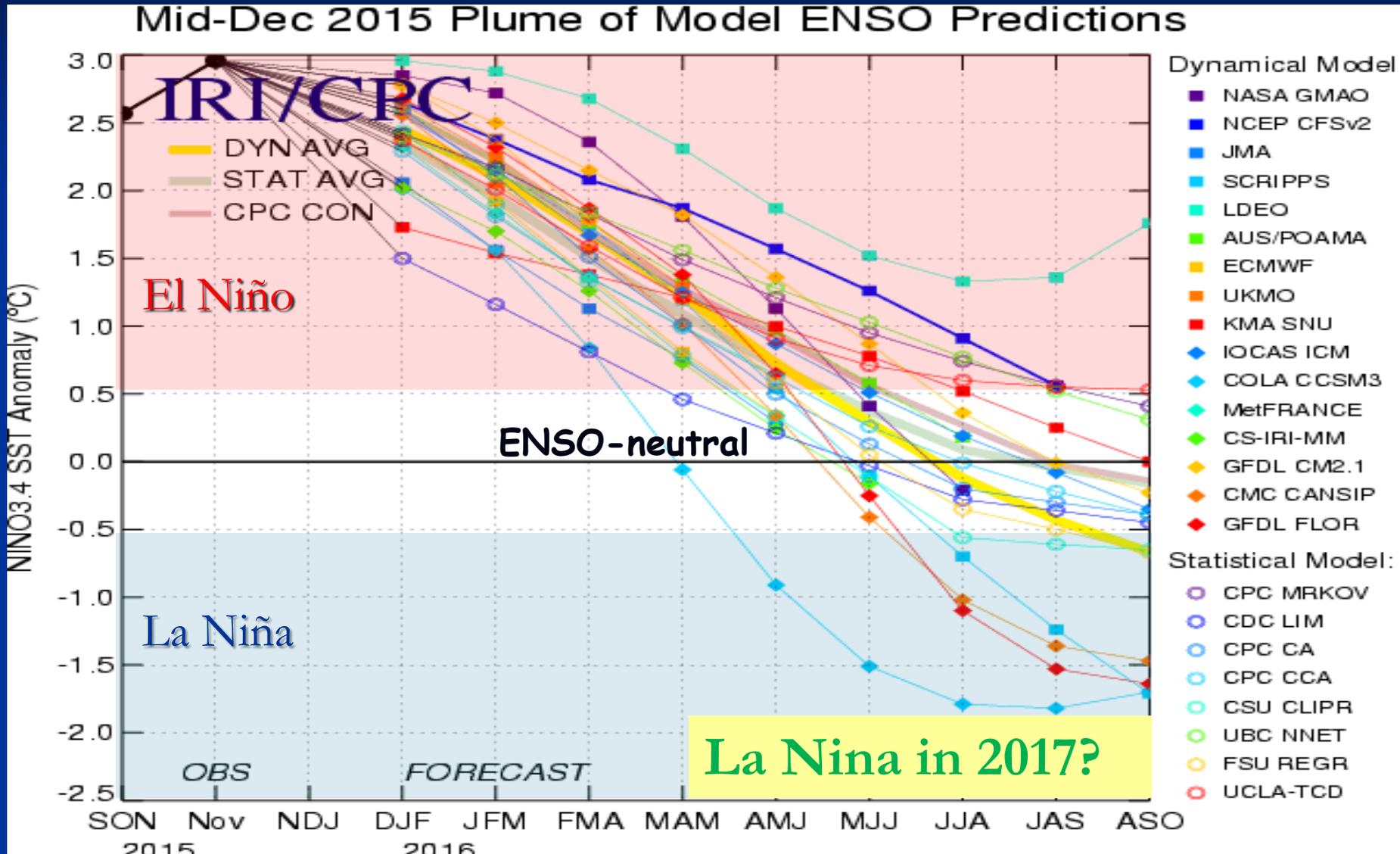
- **The analog years (1987-88; 1991-92; 2004-05)** are unchanged from last month and were weighted equally to generate the forecast graphics. 1987-88 & 1991-92 had a strong El Niño and 2004-5 had a weak El Niño. **Importantly, each had positive ONI anomalies during their previous winters.**
- **The current period of 2015-16 does not have any great analogs, in terms of Pacific Ocean SSTs.** This El Niño is expected to be of similar magnitude to the very strong events of 1982-83 and 1997-98 (ONI values above +2.0). **However, those years were preceded by winters with negative ONI values, while ONI values last winter were positive and bordered on El Niño thresholds.**
- **1987-88 is the closest fit to this winter but did not experience as strong of an El Niño as we are currently seeing.** Although the lack of great analogs significantly reduces forecast confidence, **a strong El Niño usually produces mild winters for Oregon. The precipitation forecast is less certain.**

Due to the lack of great analogs, it is not too surprising that we have seen some unusual weather events leading into this winter.

This forecast is based on historical weather data and does not utilize dynamic modeling (see [Forecasting Methods](#)).

ENSO Predictive Models

El Niño appears to be peaking now and should weaken this spring...

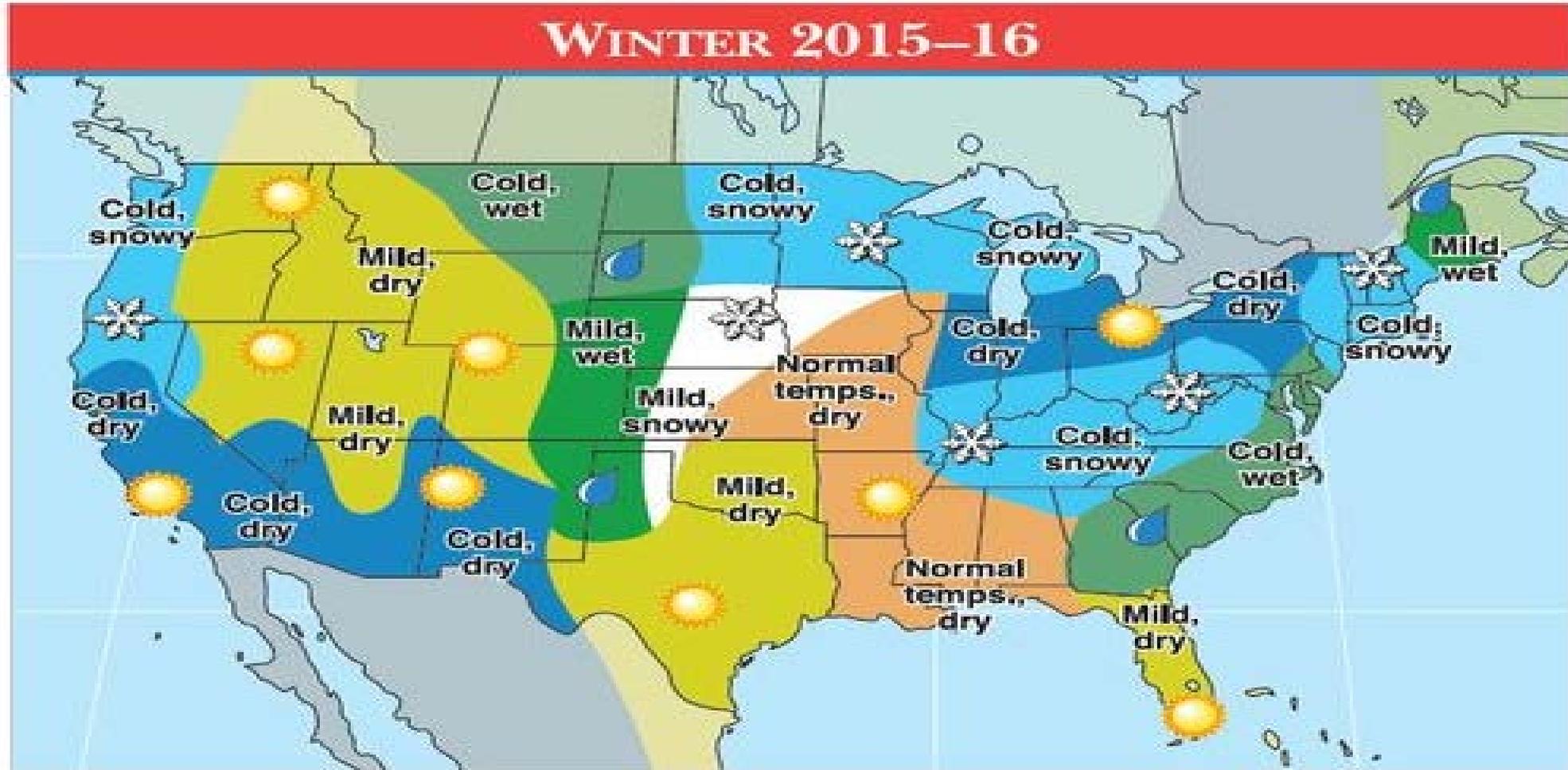


"Base" Graphic Courtesy: <http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

Rule #1

- **Don't believe the 1st forecast you hear**
- **Wait until you hear the Same or Similar forecast from two or more of unrelated sources**

The Old Farmer's Almanac uses a "secret" formula for forecasting that includes sunspots, tides, planetary positions, climatology and meteorology, according to its website.

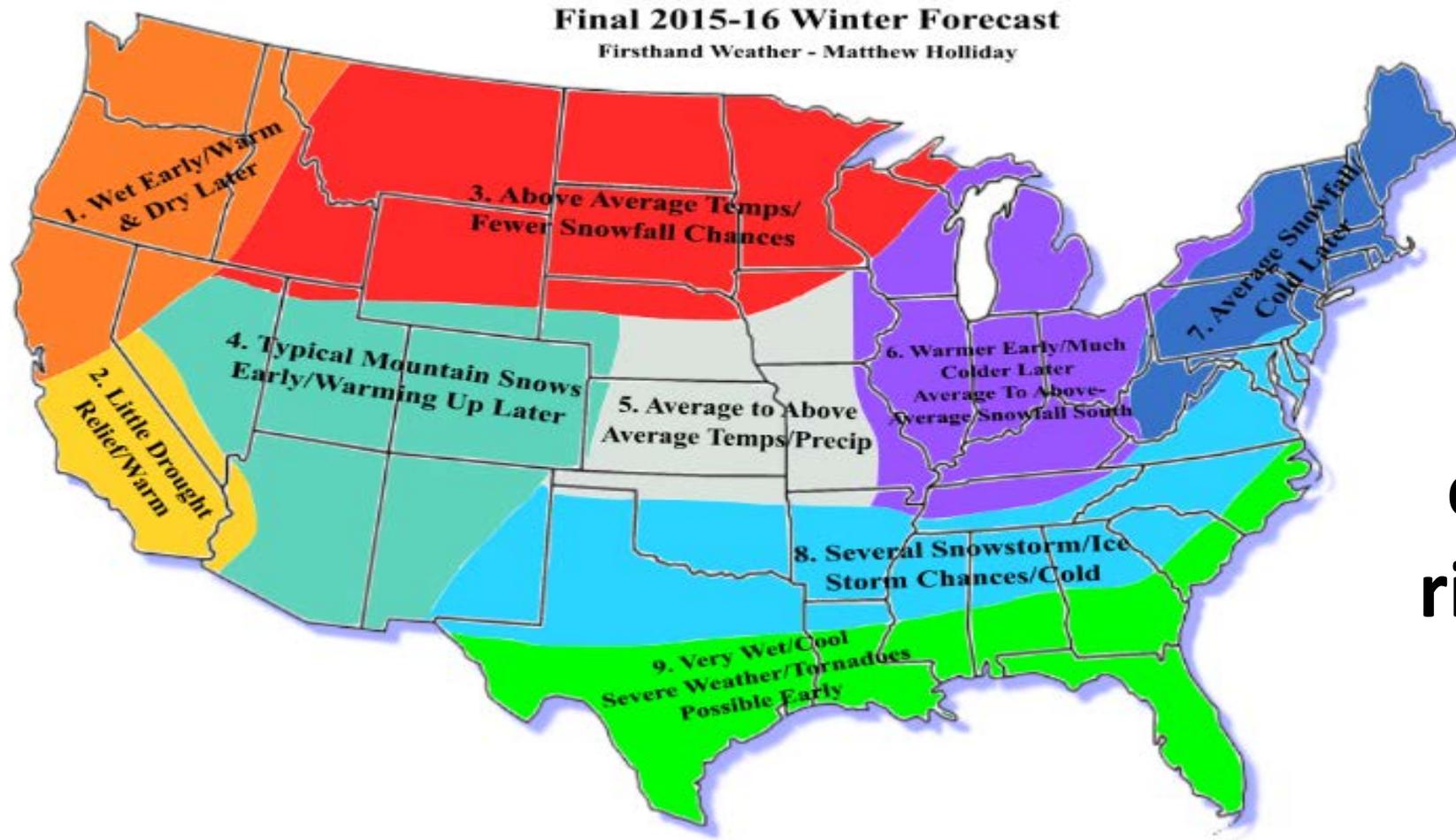


The Old Farmers Almanac's winter weather prediction for the USA. (Photo: Old Farmers Almanac)

Firsthand Weather's Final 2015-16 Winter Forecast

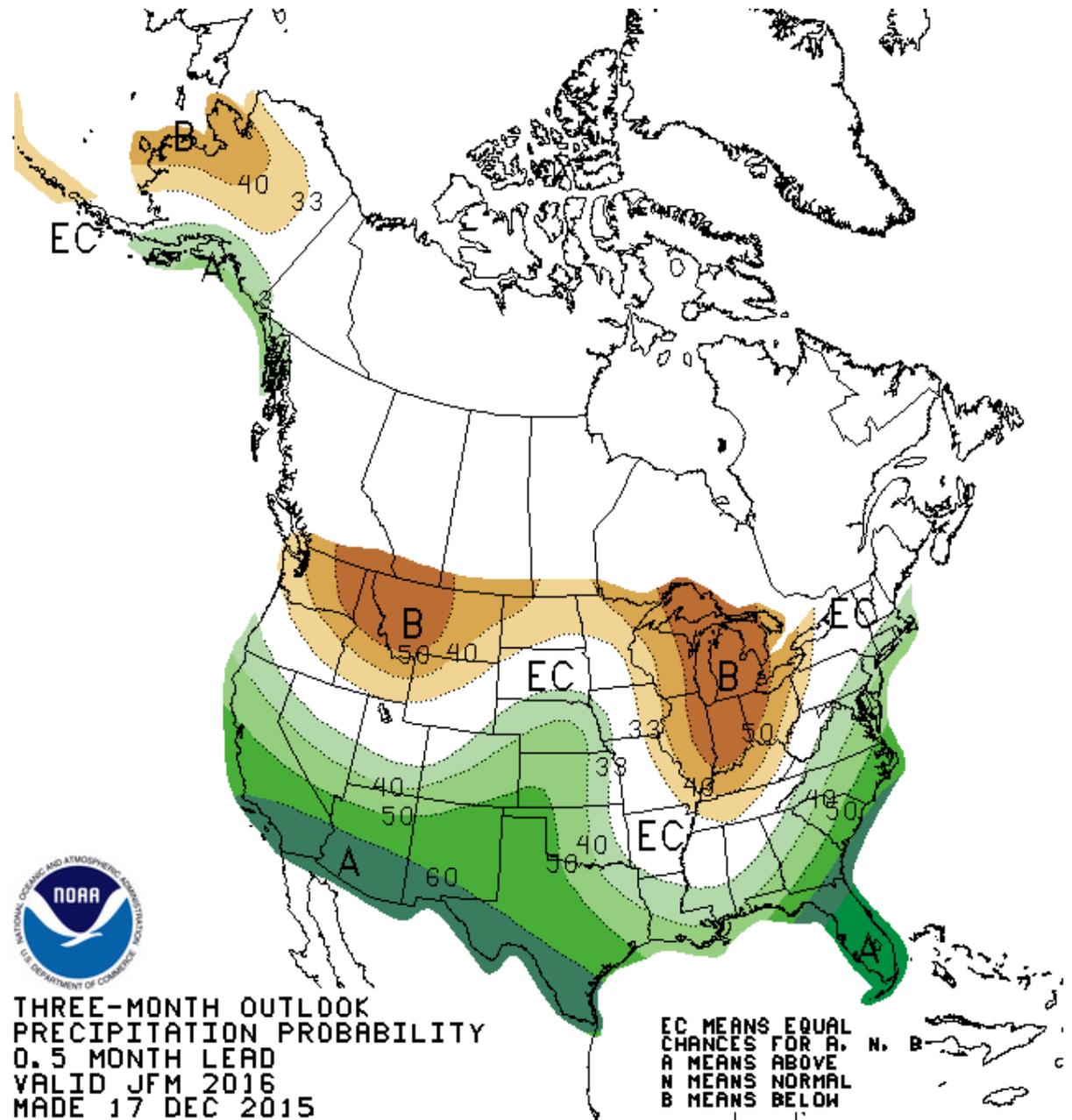
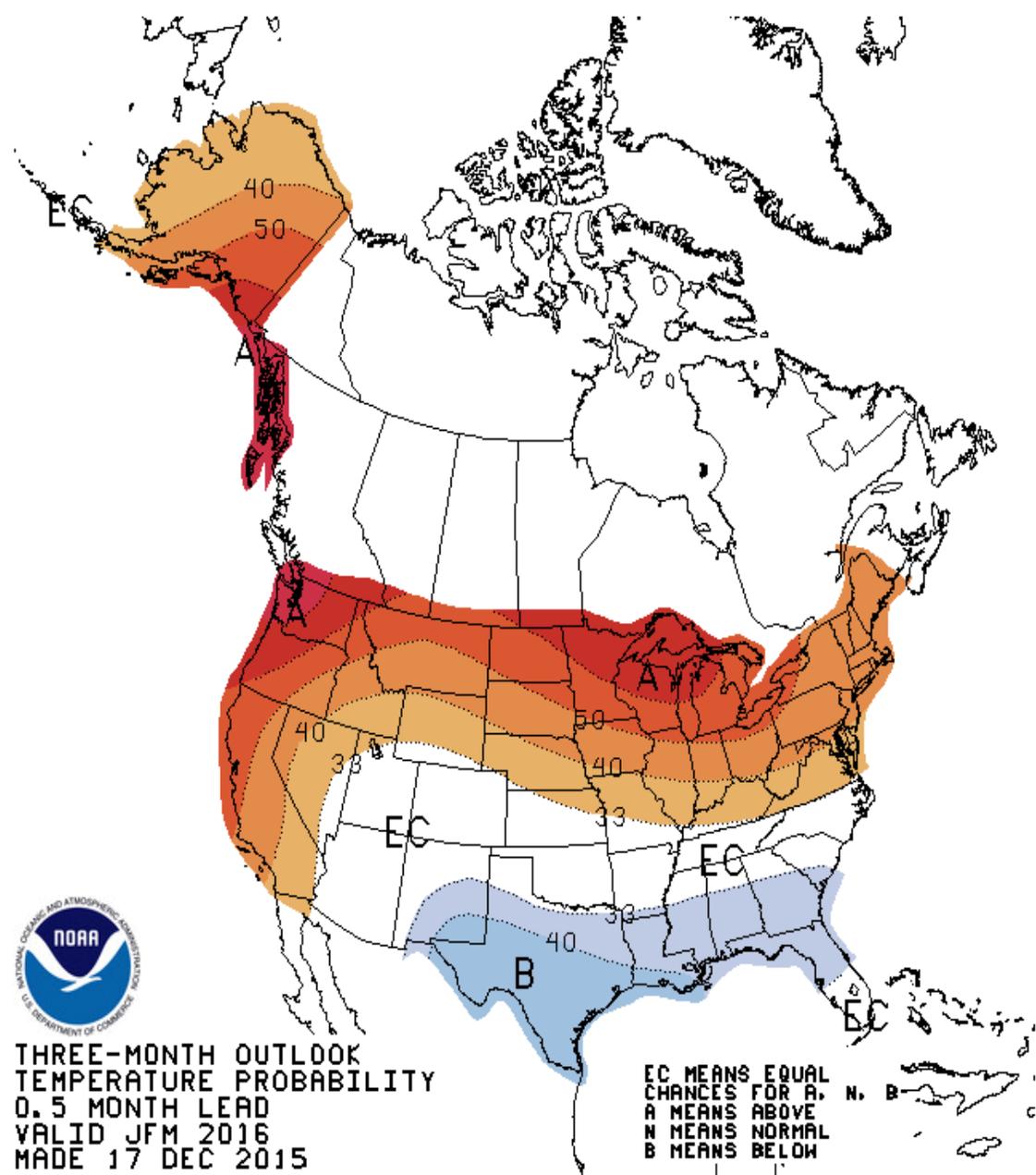
[Matthew Holliday](#) | November 8, 2015

Firsthand Weather's Final 2015-16 Winter Forecast:



... this upcoming winter forecast is going to be more challenging to “get right” than the prior two winter forecasts.

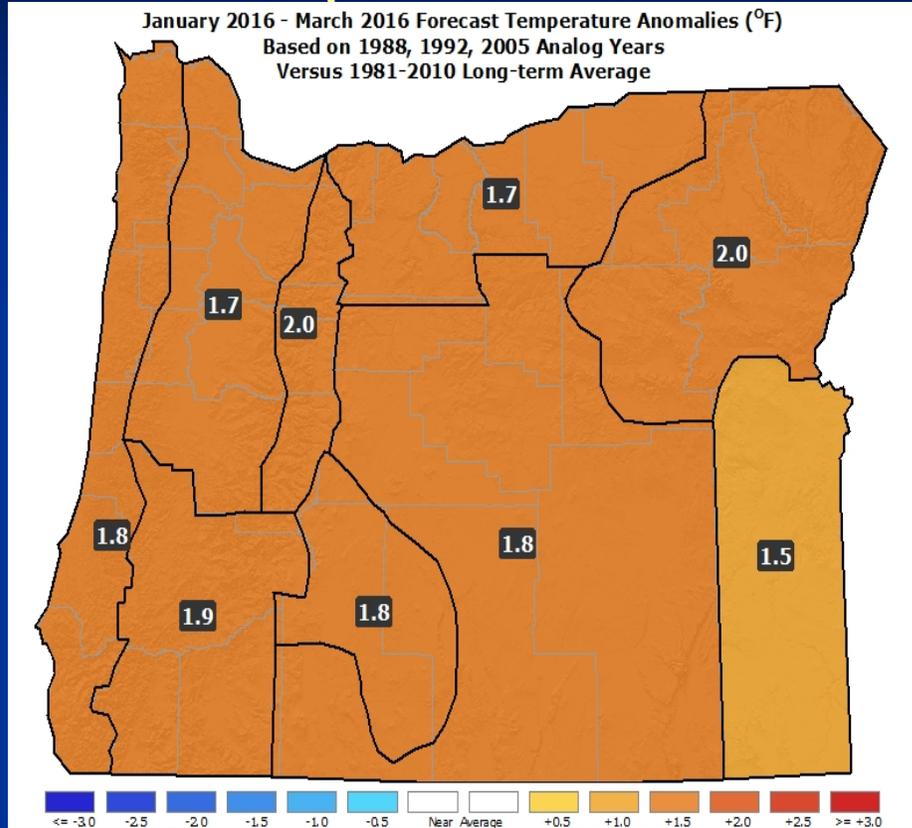
Jan Feb & Mar 3 Month Temperature & Precipitation Forecasts



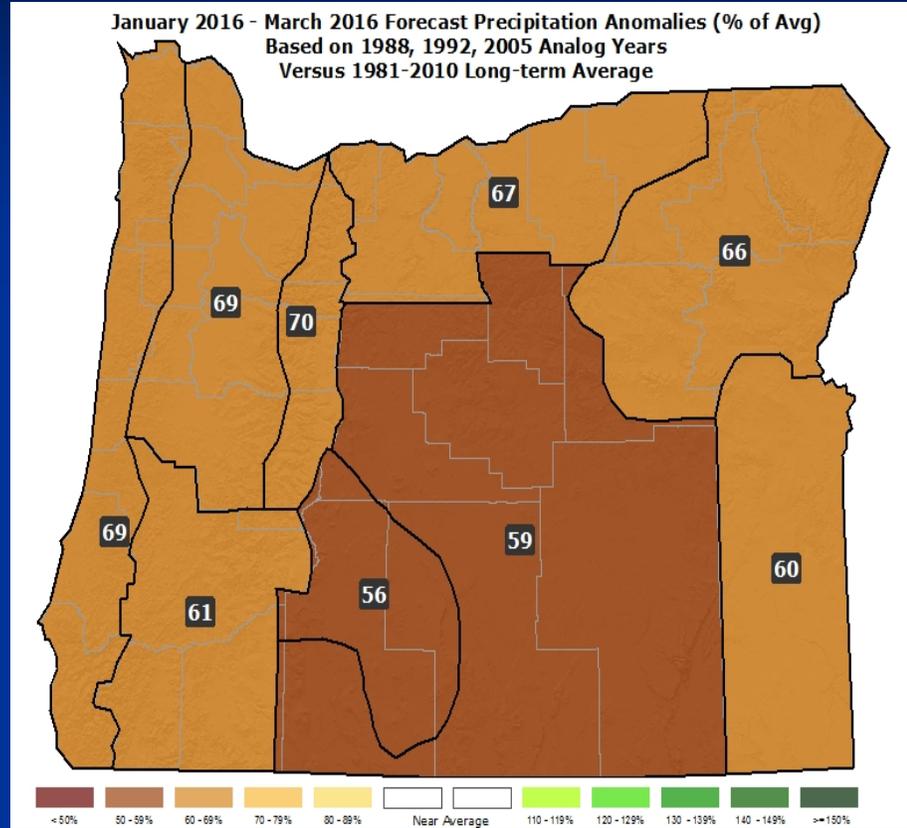
January – March 2016 Forecast

From:
ODF Meteorologist
Pete Parsons

Temperatures



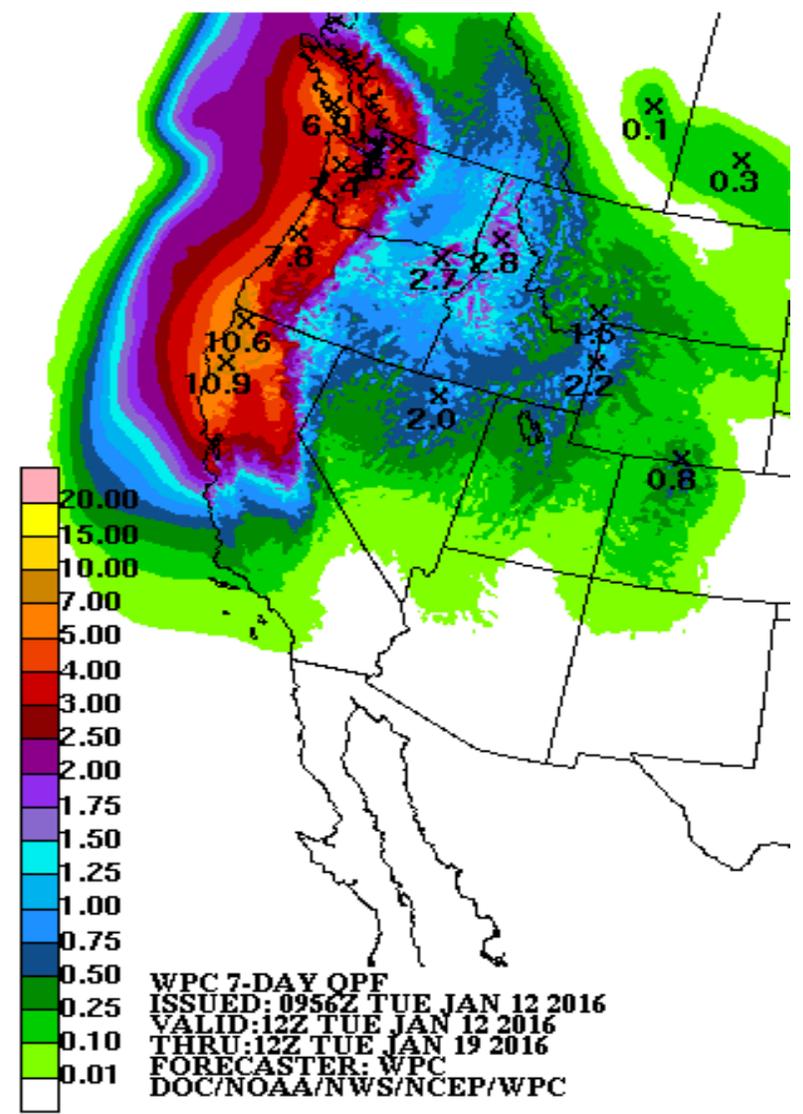
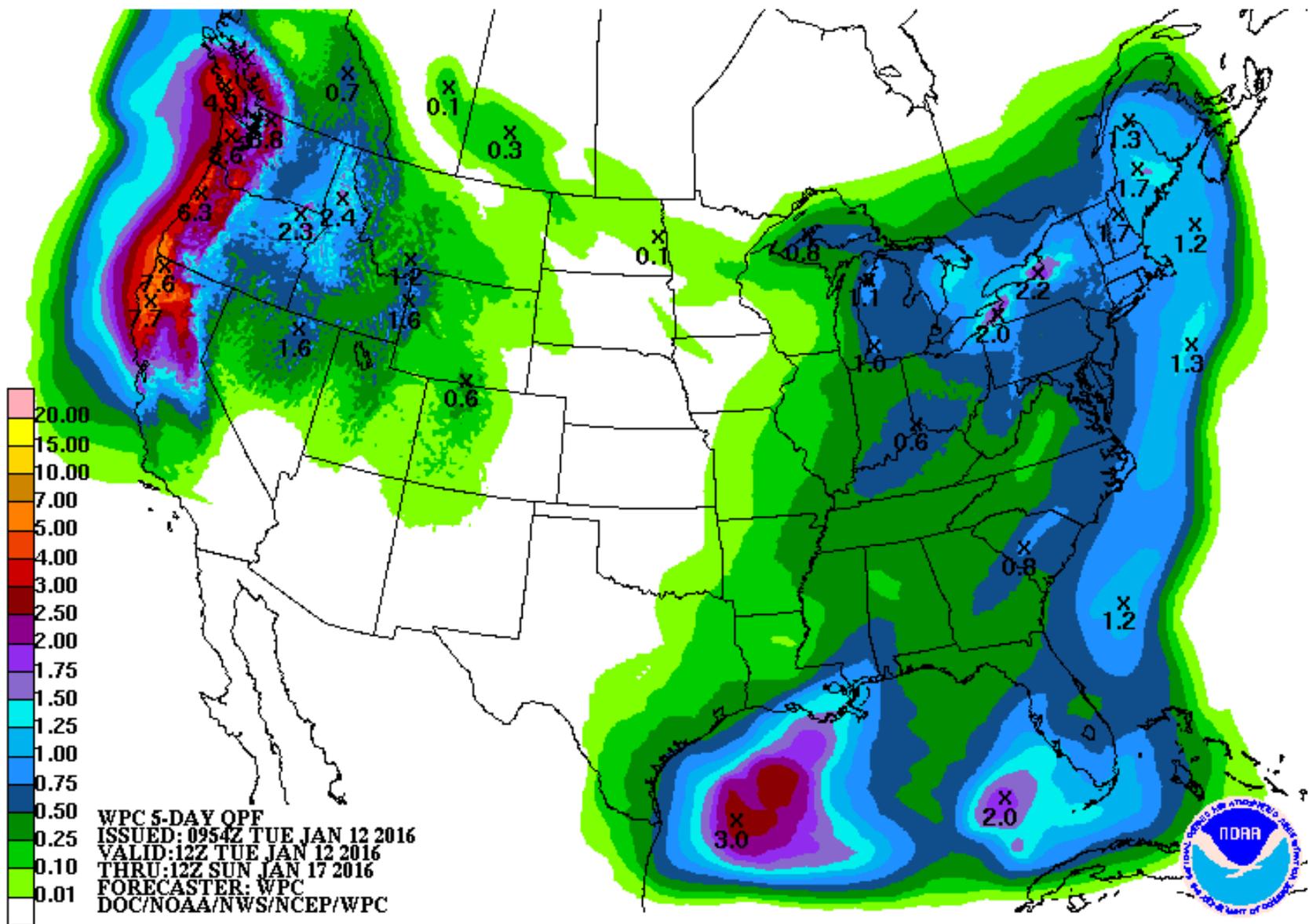
Precipitation



- Above average temperatures likely, on the order of $\approx 1-3$ °F, with severe and/or prolonged cold spells unlikely.
- Precipitation forecast is less certain. Approximately 60% - 80% of average rain/mountain snow is the most likely scenario.

5 Day Total Precipitation Forecast Jan 12 - 17

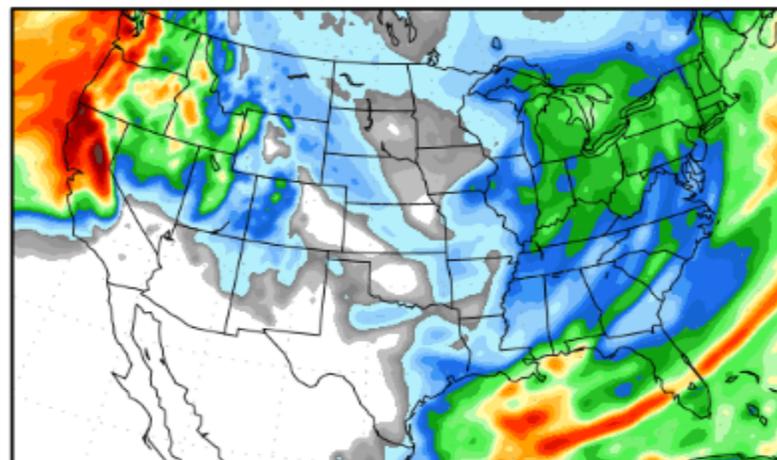
7 Day Total Precipitation Forecast Jan 12 - 19!



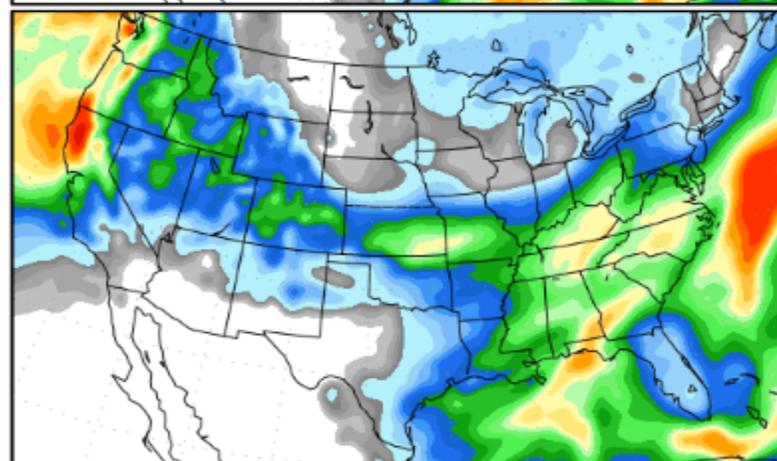
Precipitation Forecasts

Precipitation (in)
during the period:

Tue, 12 JAN 2016 at 00Z
-to-
Wed, 20 JAN 2016 at 00Z

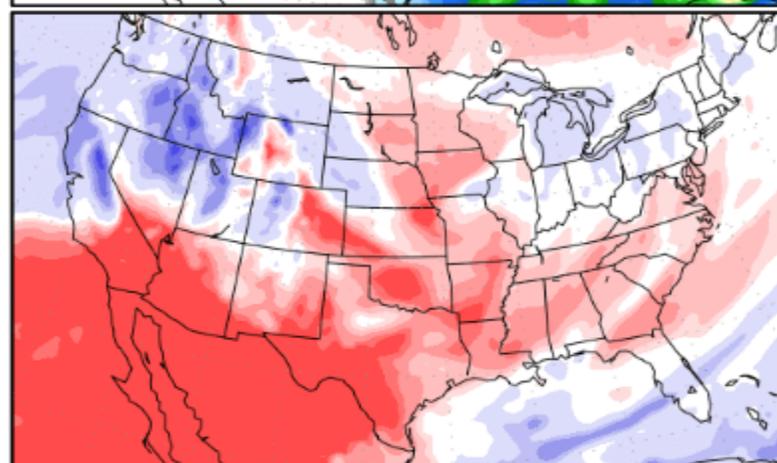
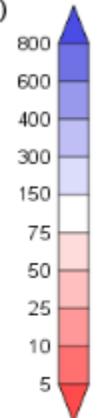


Wed, 20 JAN 2016 at 00Z
-to-
Thu, 28 JAN 2016 at 00Z



Precipitation (% of normal)
during the first period:

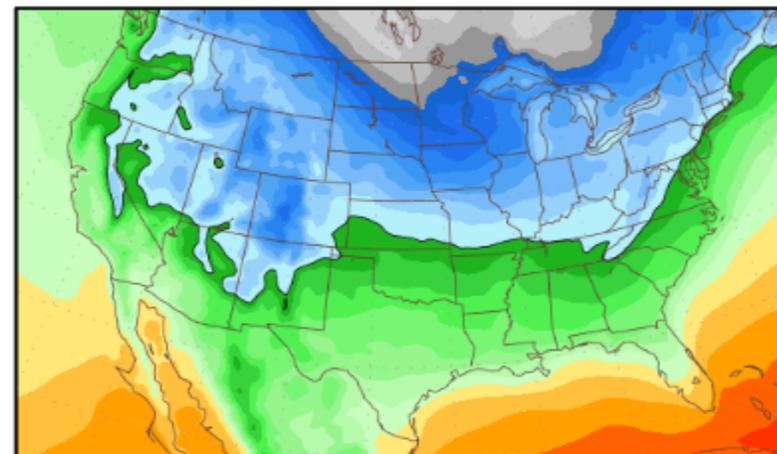
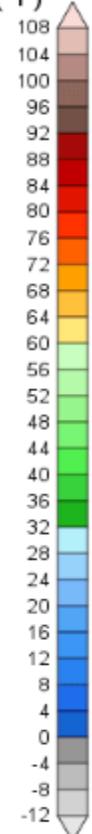
Tue, 12 JAN 2016 at 00Z
-to-
Wed, 20 JAN 2016 at 00Z



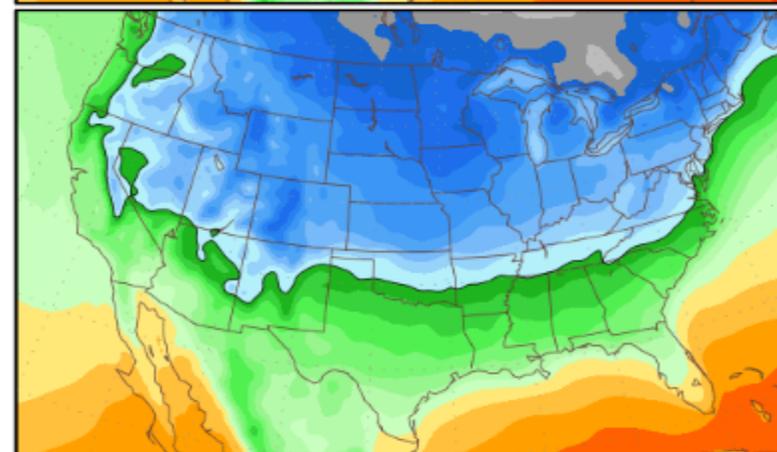
Temperature Forecasts

Mean Surface Temperature (°F)
during the period:

Tue, 12 JAN 2016 at 00Z
-to-
Wed, 20 JAN 2016 at 00Z

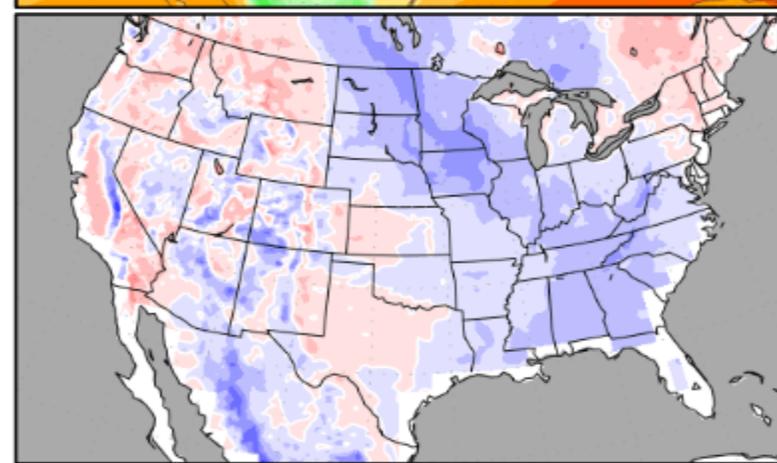


Wed, 20 JAN 2016 at 00Z
-to-
Thu, 28 JAN 2016 at 00Z



Temperature Anomaly
during the first period:

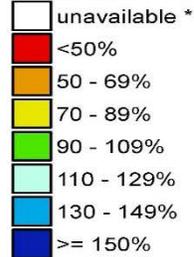
Tue, 12 JAN 2016 at 00Z
-to-
Wed, 20 JAN 2016 at 00Z



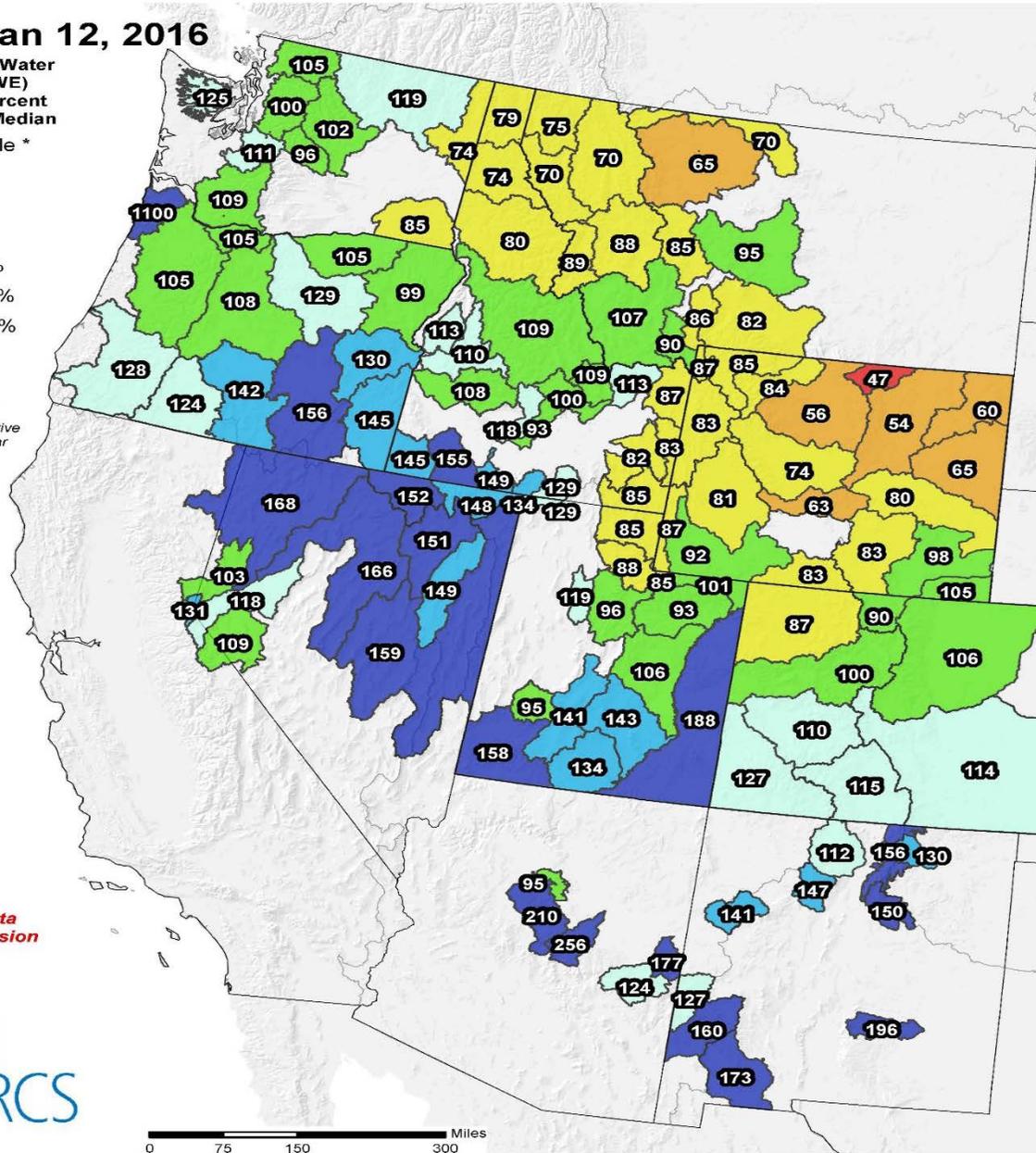
Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Jan 12, 2016

Current Snow Water Equivalent (SWE) 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

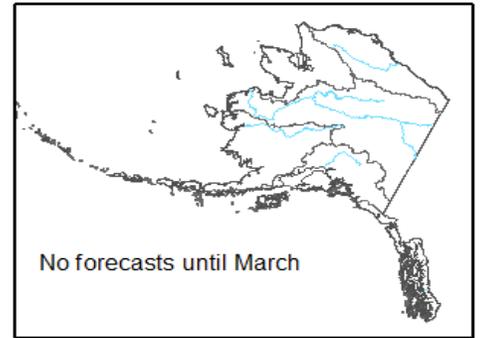
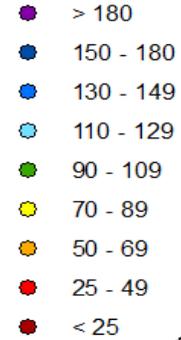


The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

Prepared by:
USDA/NRCS National Water and Climate Center
Portland, Oregon
<http://www.wcc.nrcs.usda.gov>

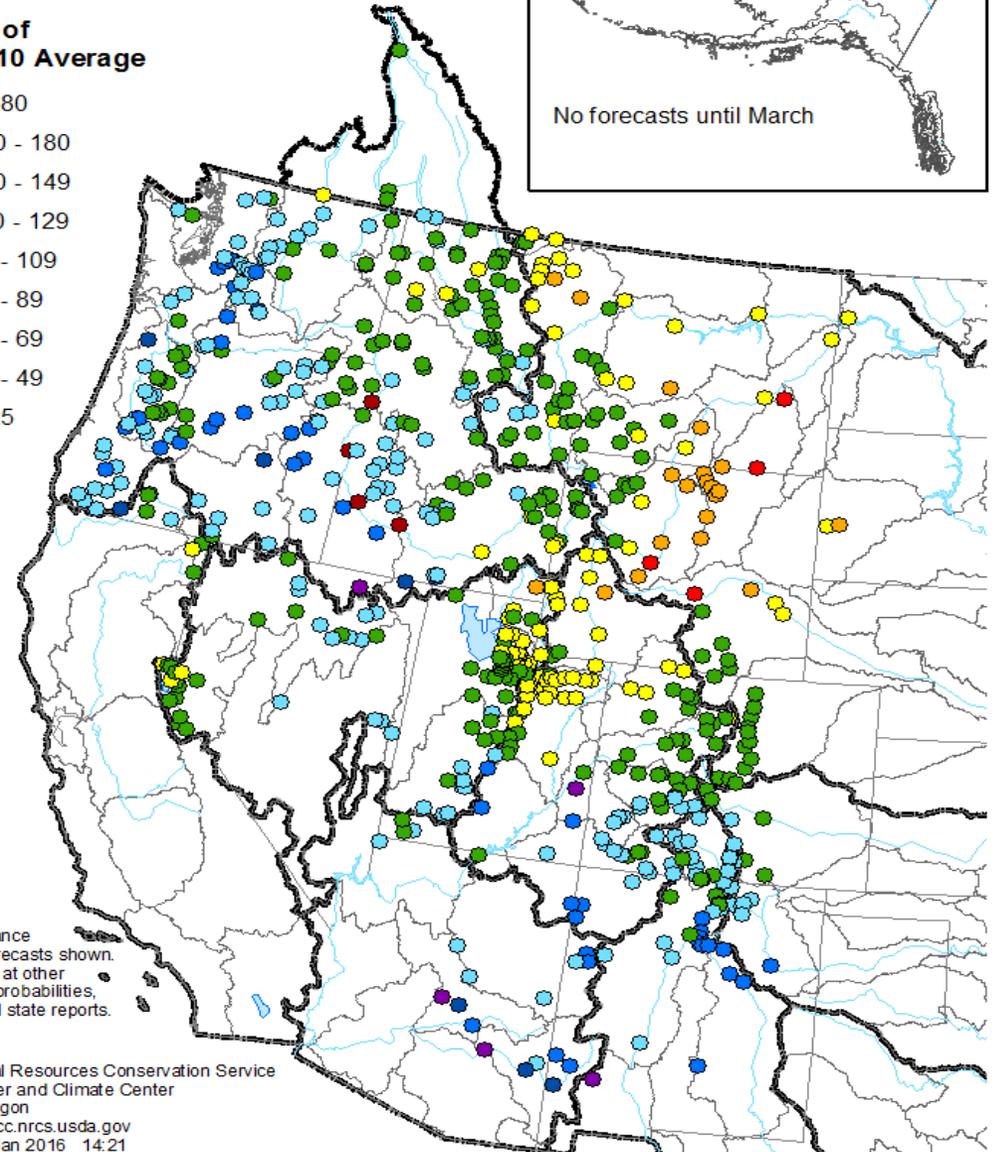
Spring and Summer Streamflow Forecasts as of January 1, 2016

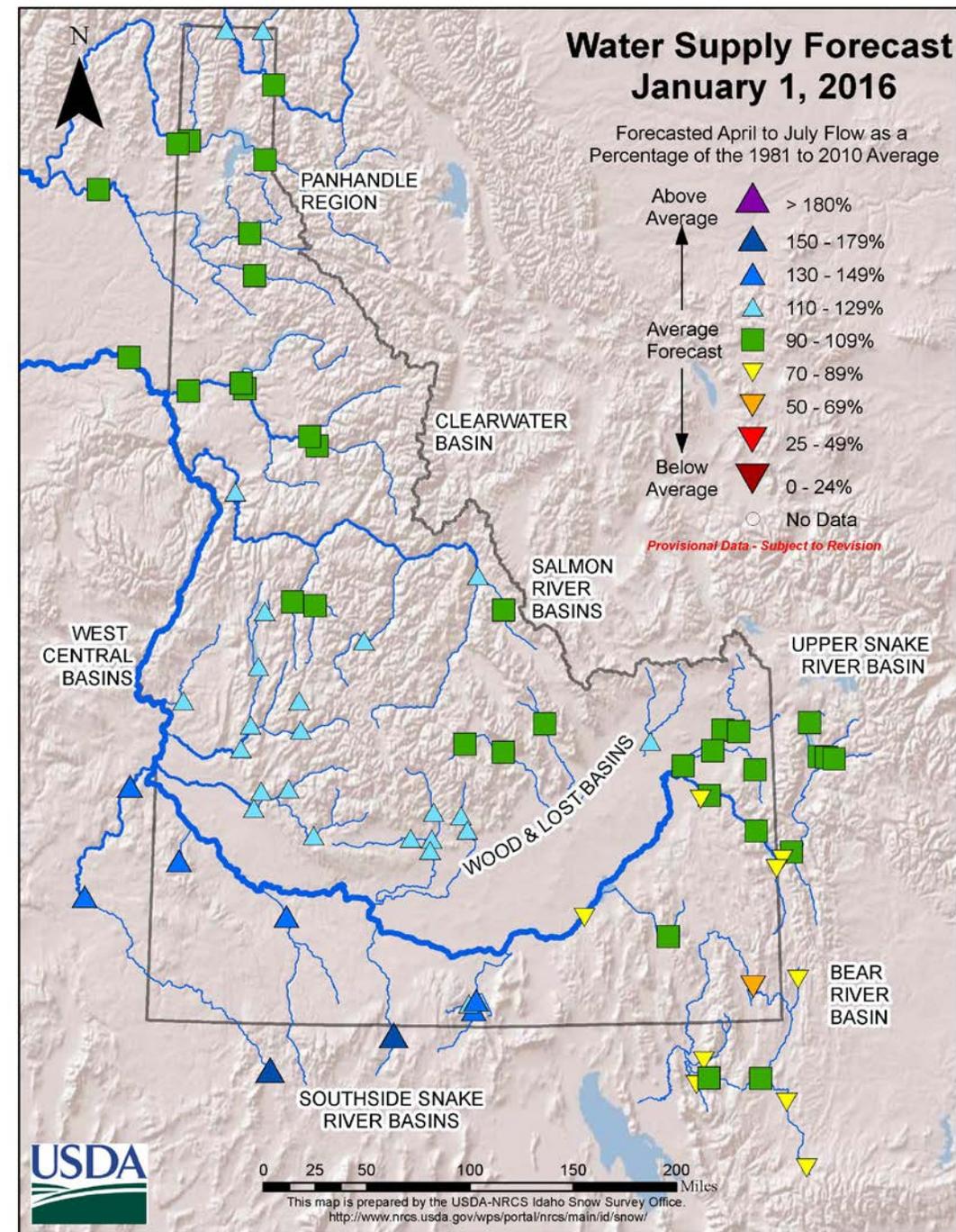
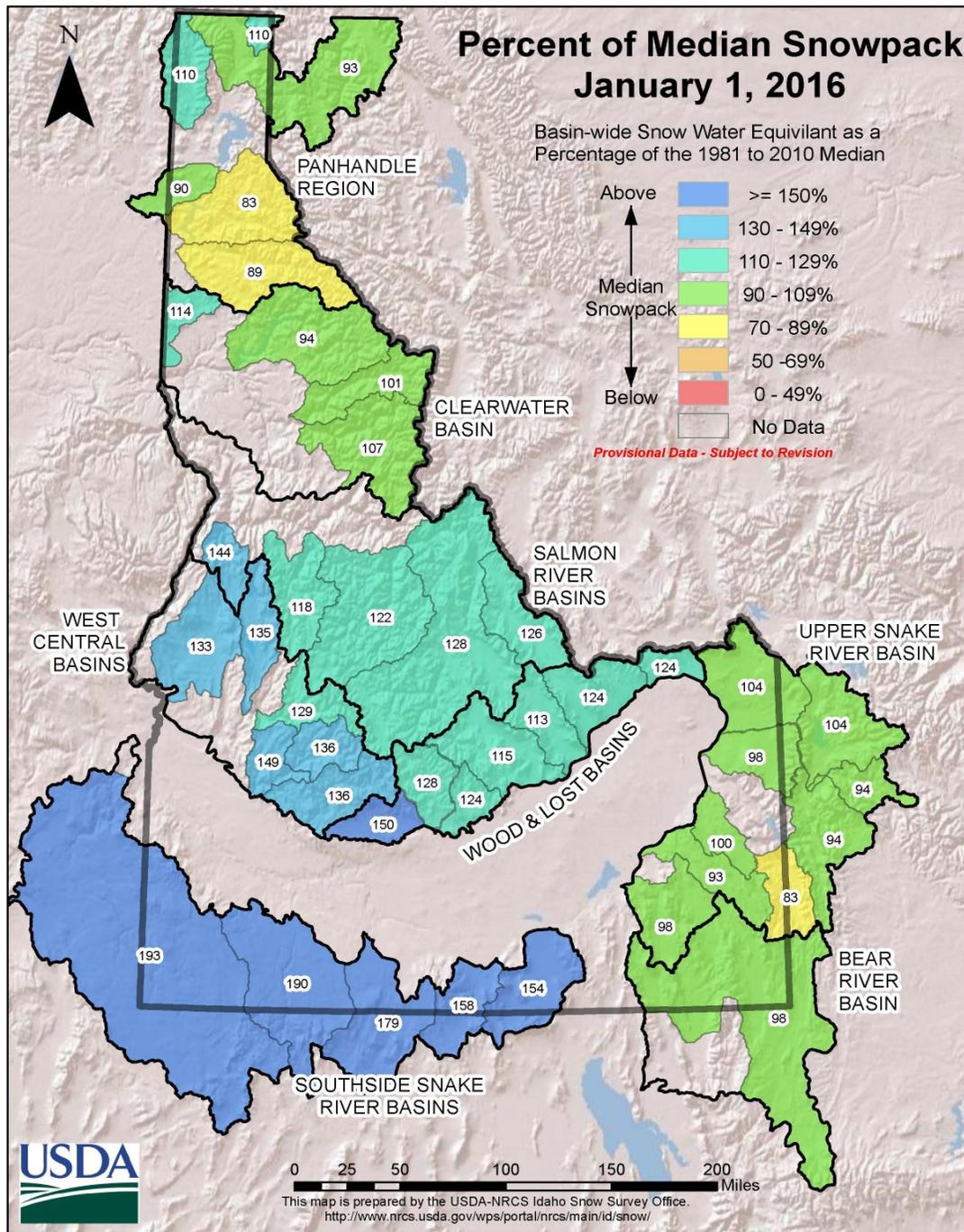
Percent of 1981-2010 Average



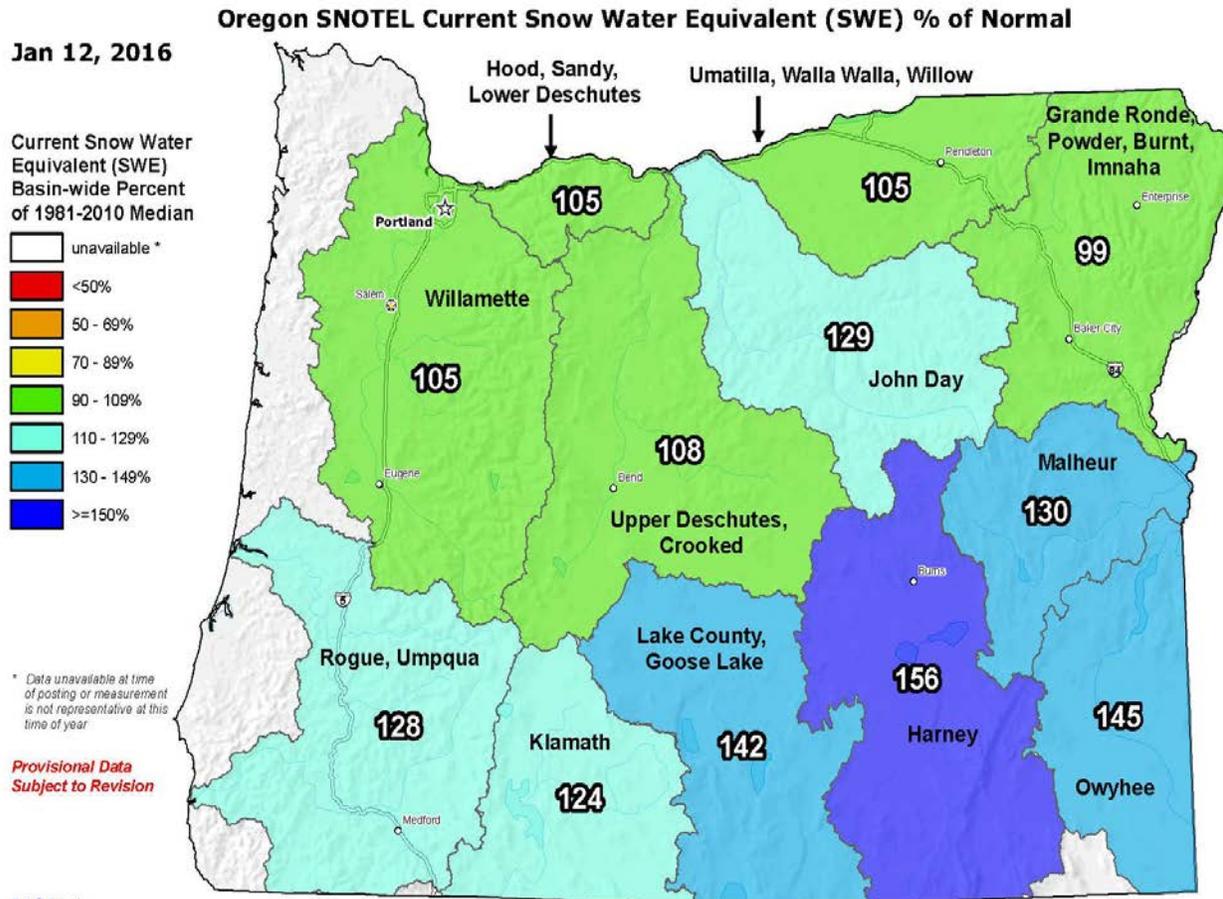
50% exceedance probability forecasts shown. For forecasts at other exceedance probabilities, see individual state reports.

Prepared by:
USDA Natural Resources Conservation Service
National Water and Climate Center
Portland, Oregon
<http://www.wcc.nrcs.usda.gov>
Created: 7 Jan 2016 14:21

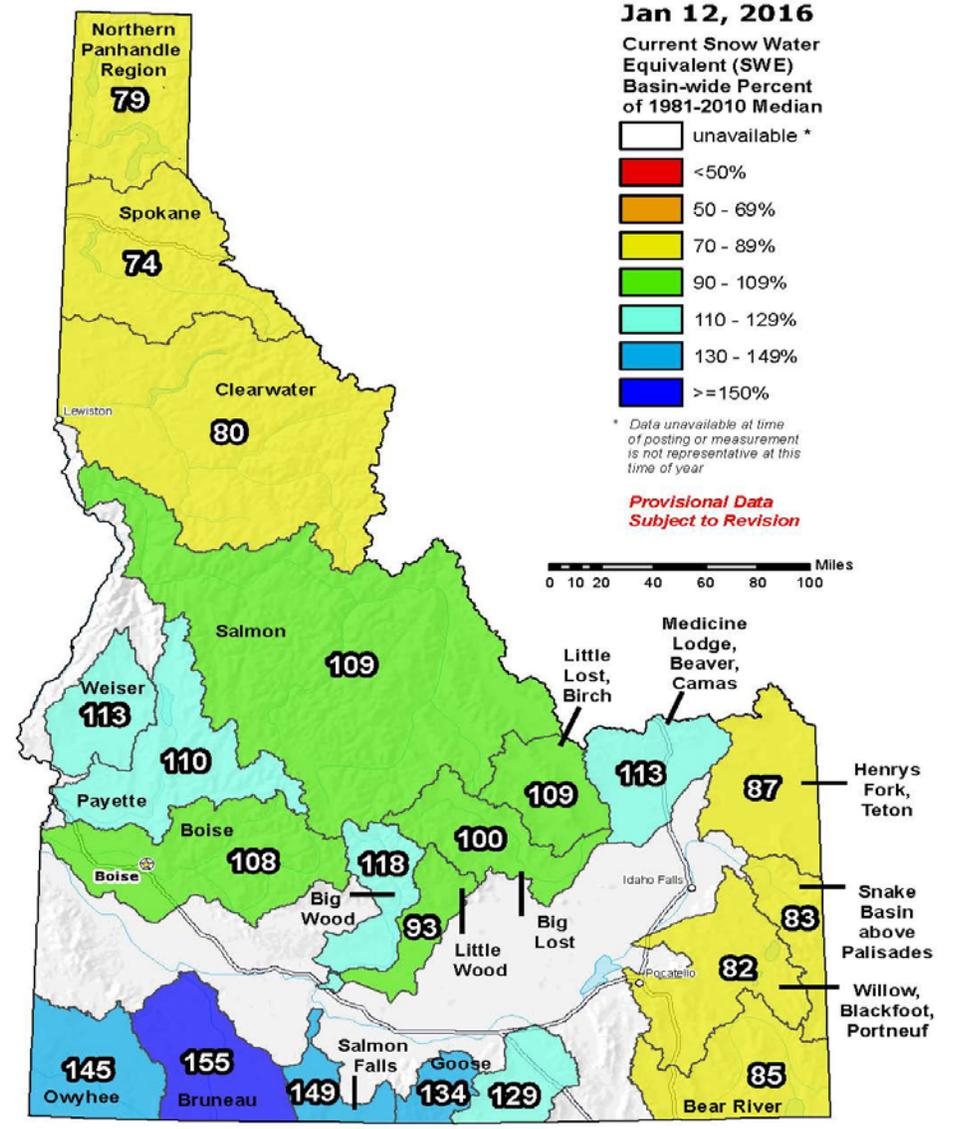




January 1-12 precipitation has been minimal so far, that is why snowpack %'s are dropping 1-2 percentage points a day.



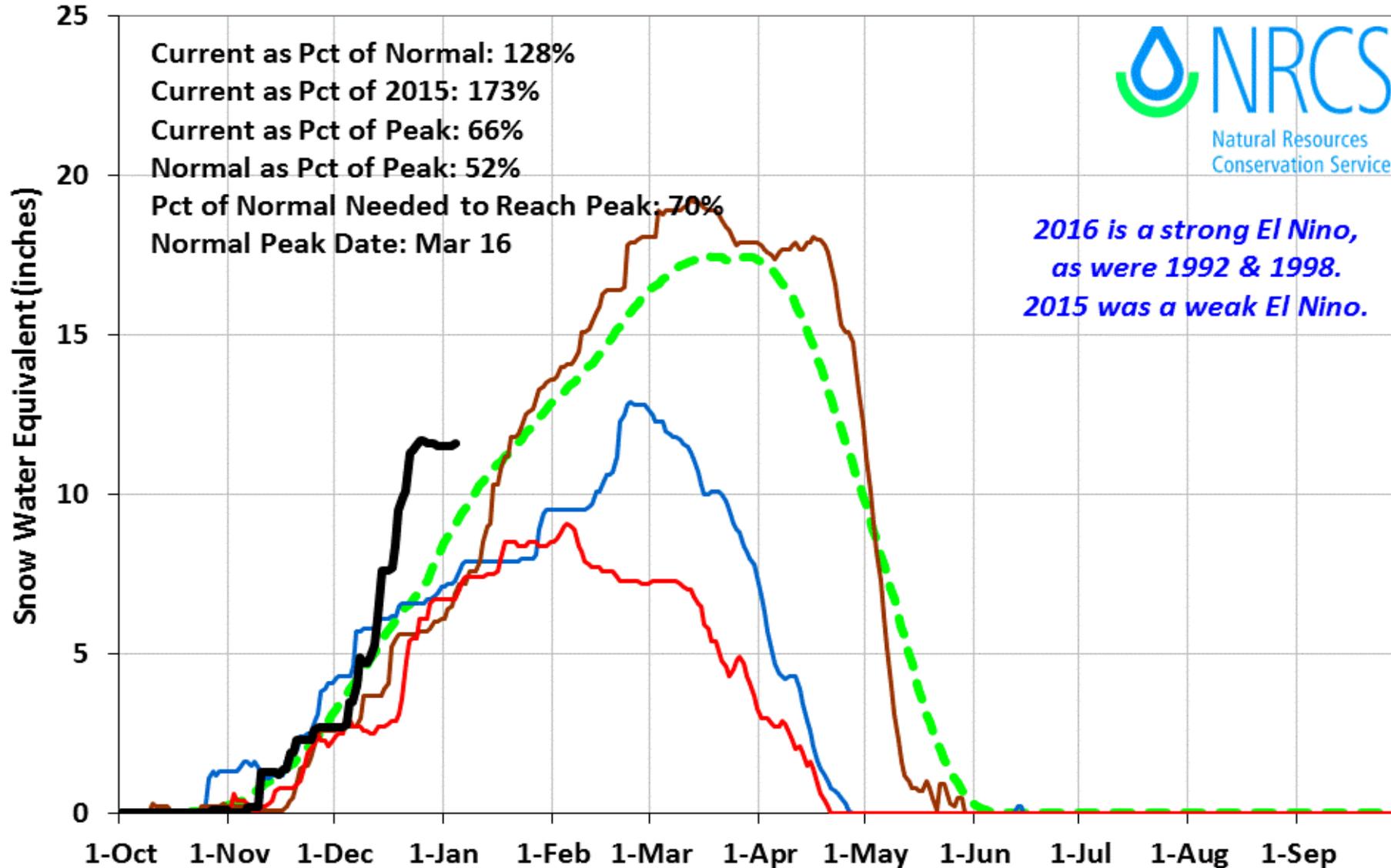
Idaho SNOTEL Current Snow Water Equivalent (SWE) % of Normal



Weiser Basin 2016 Snowpack Comparison Graph (4 sites)

Based on Provisional SNOTEL data as of Jan 04, 2016

Normal WY1992 WY1998 WY2015 WY2016



Weiser River near Weiser

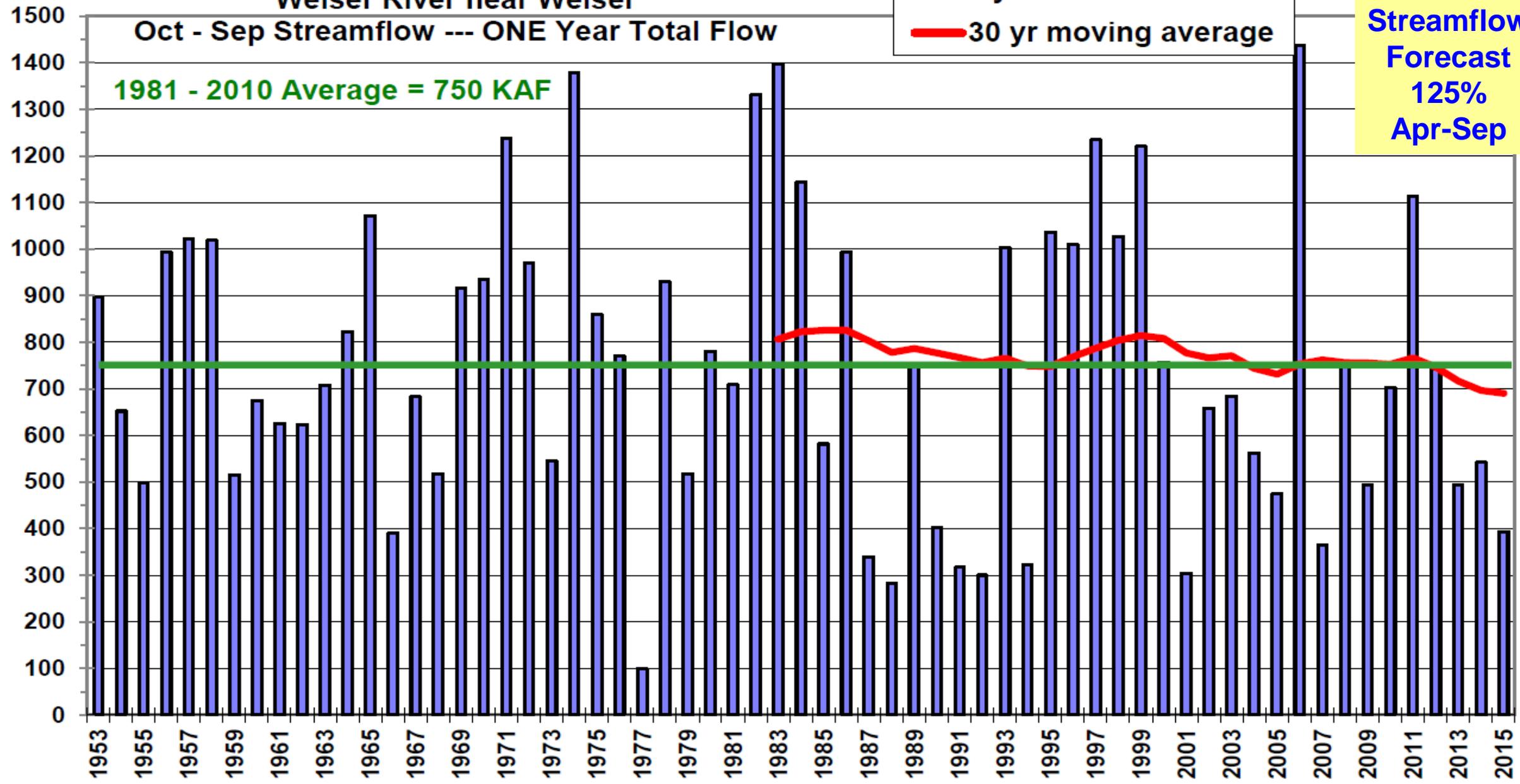
Oct - Sep Streamflow --- ONE Year Total Flow

1981 - 2010 Average = 750 KAF

1 year total flow
30 yr moving average

Jan 2016
Streamflow
Forecast
125%
Apr-Sep

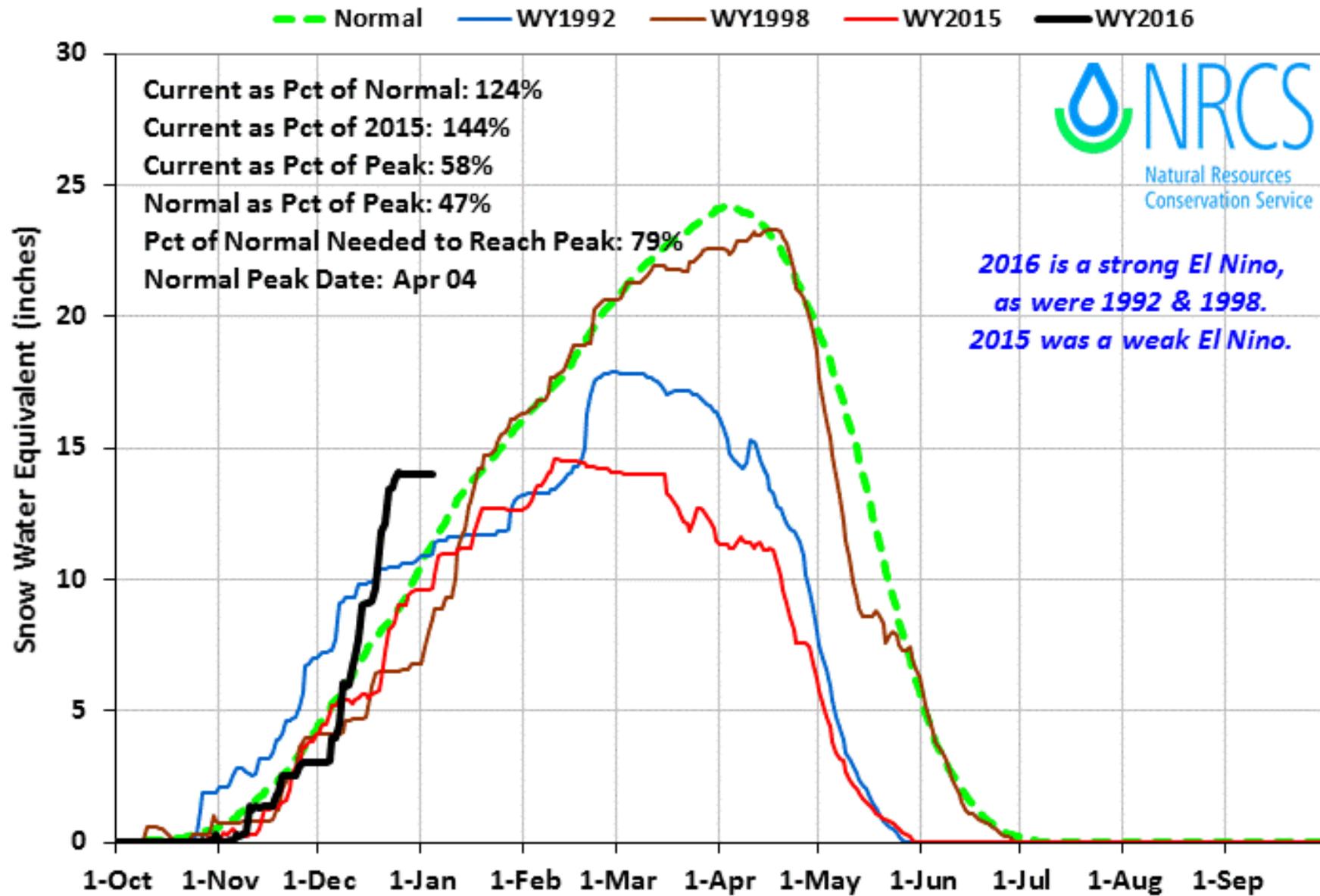
1000 Acre-feet



Years

Payette Basin 2016 Snowpack Comparison Graph (11 sites)

Based on Provisional SNOTEL data as of Jan 04, 2016

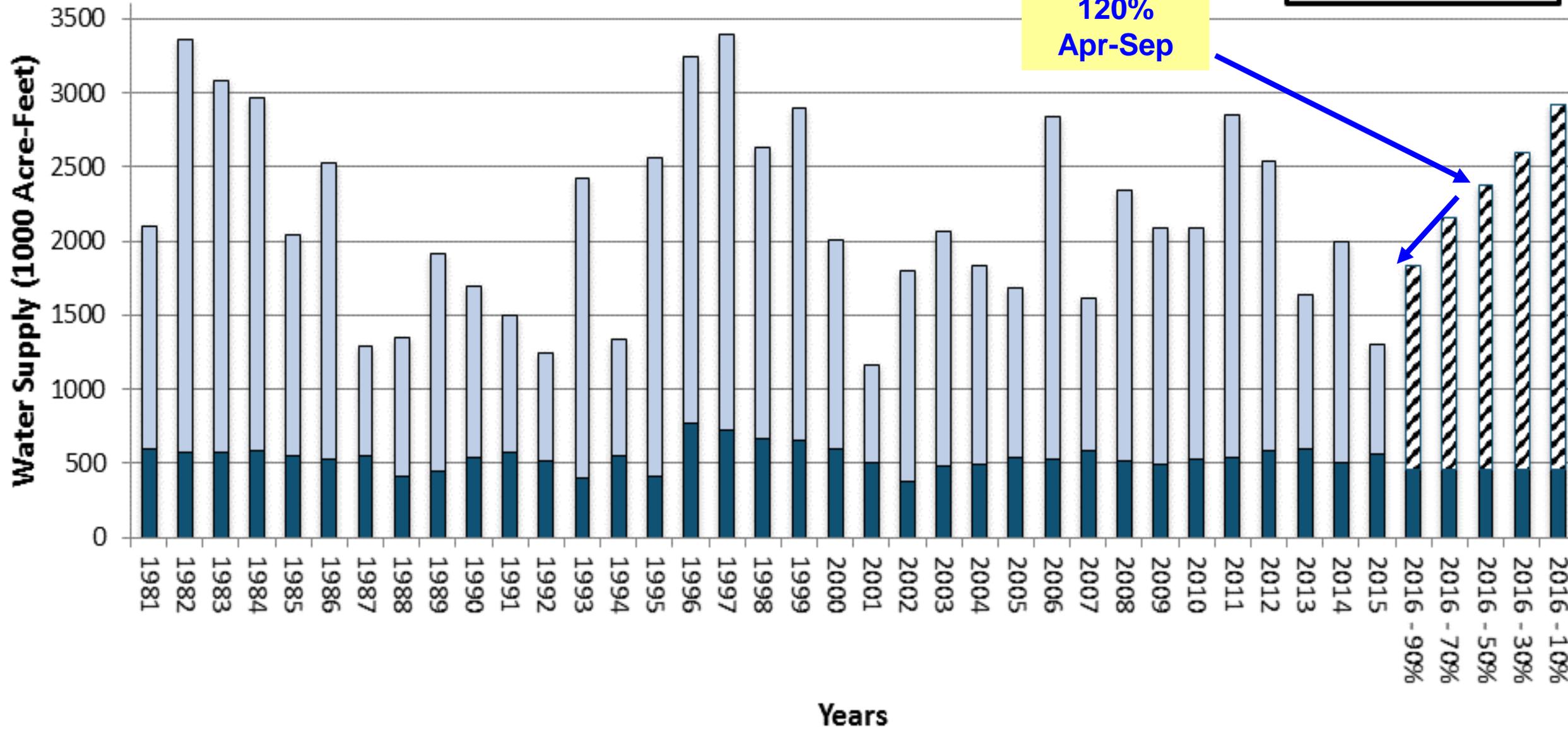


Jan 1 Historic and Forecasted Surface Water Supply Payette River Basin

**Jan 2016
Streamflow
Forecast
120%
Apr-Sep**

□ StreamFlow Apr-Sep

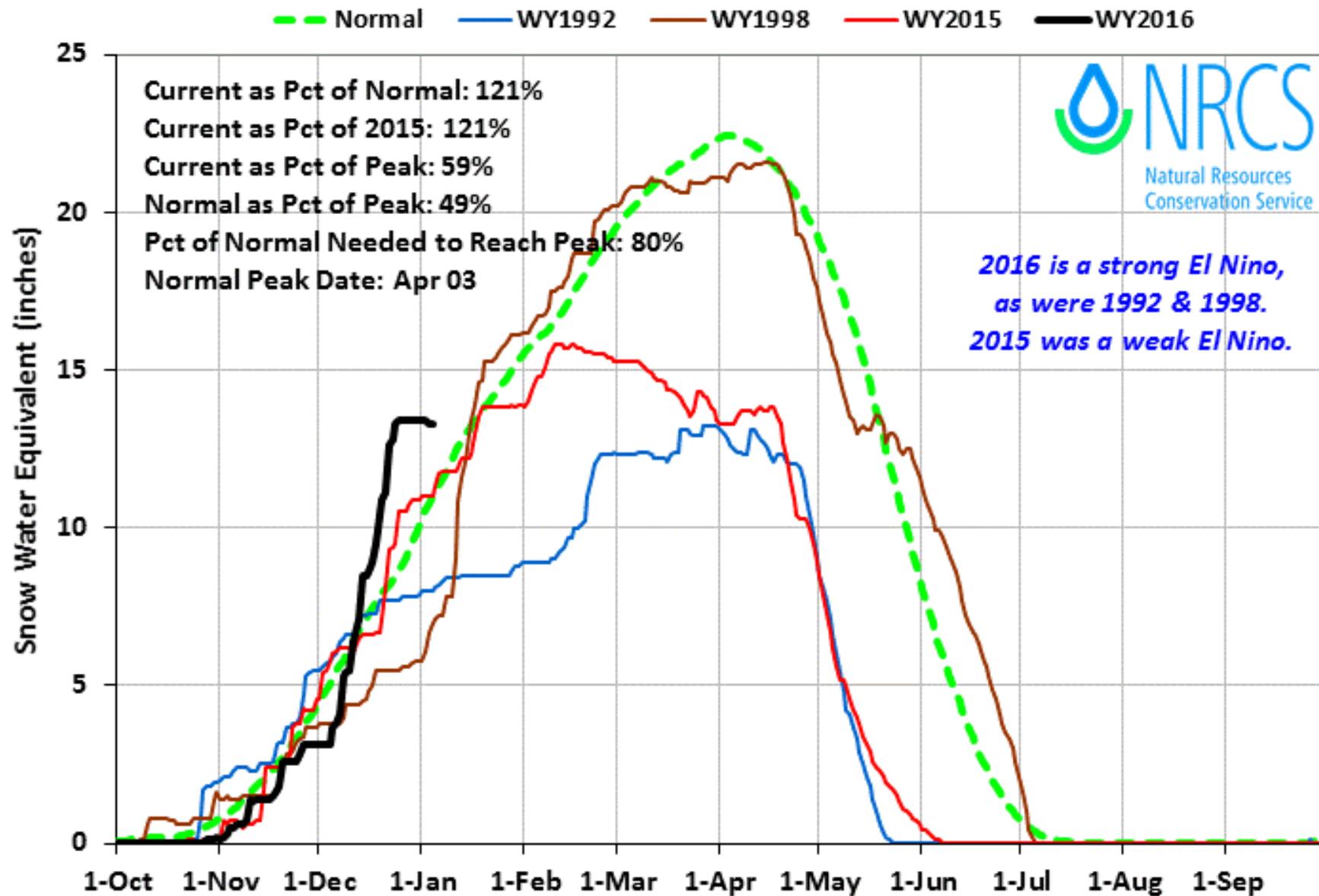
■ Reservoir 31-Dec



Years

Boise Basin 2016 Snowpack Comparison Graph (10 sites)

Based on Provisional SNOTEL data as of Jan 04, 2016



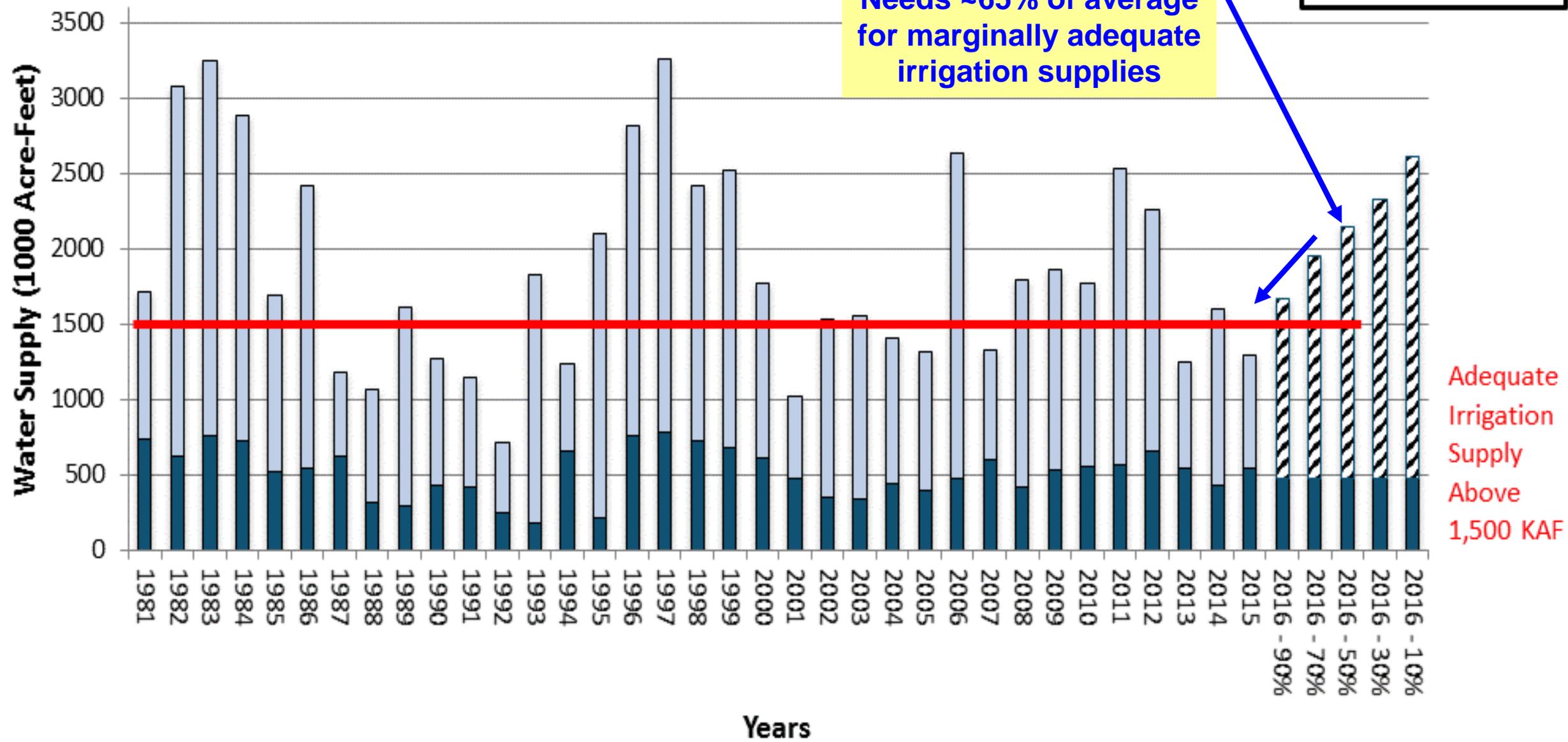
Jan 1 Historic and Forecasted Surface Water Supply Boise River Basin

**Jan 2016 Streamflow
Forecast 120% Apr-Sep**

**Needs ~65% of average
for marginally adequate
irrigation supplies**

□ StreamFlow Apr-Sep

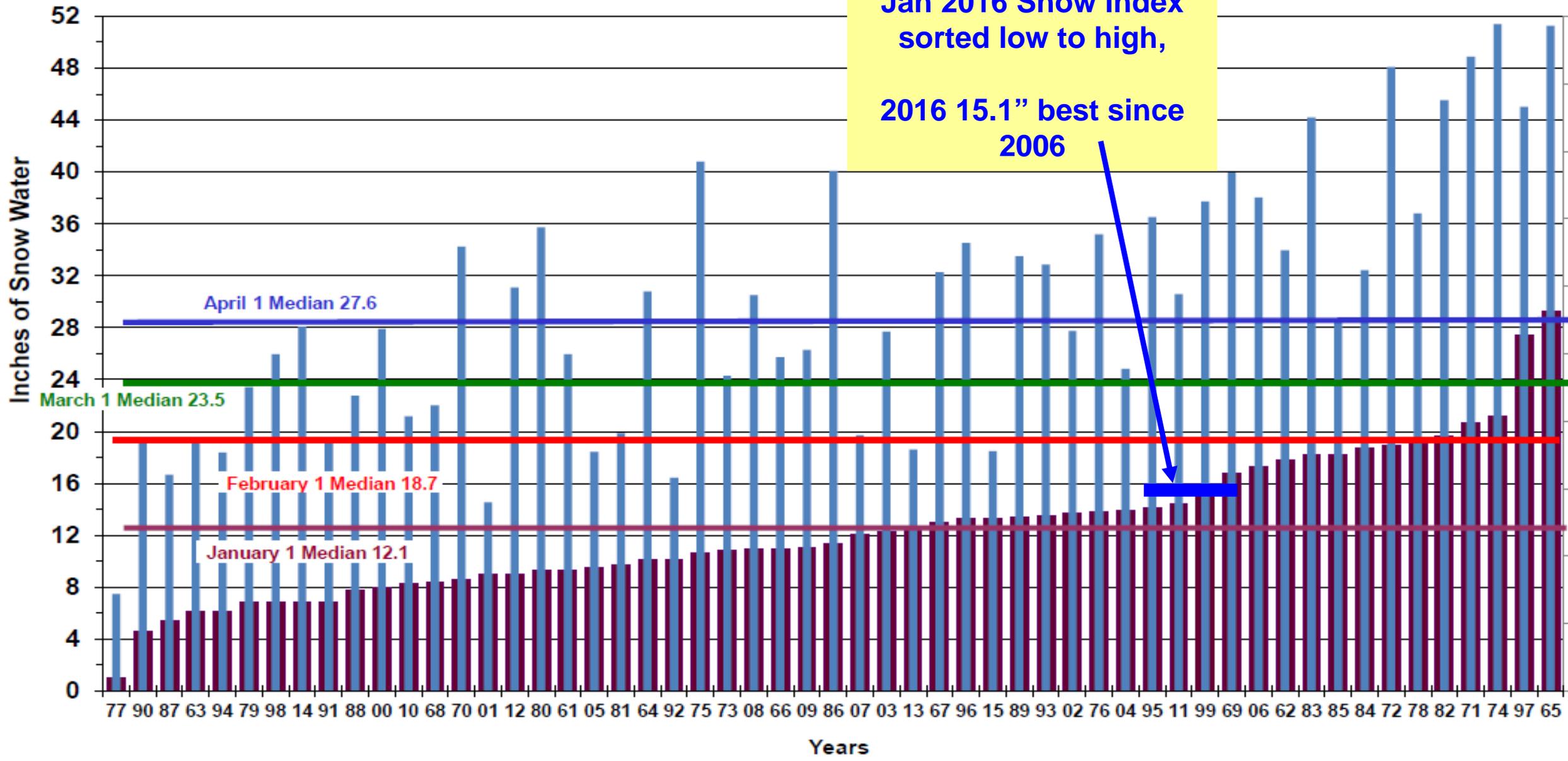
■ Reservoir 31-Dec



January Boise Basin 7 Station Snow Index for Years 1961 - 2015
Atlanta, Dollarhide, Graham, Jackson, Mores Creek, Trinity Mountain, Vienna Mine

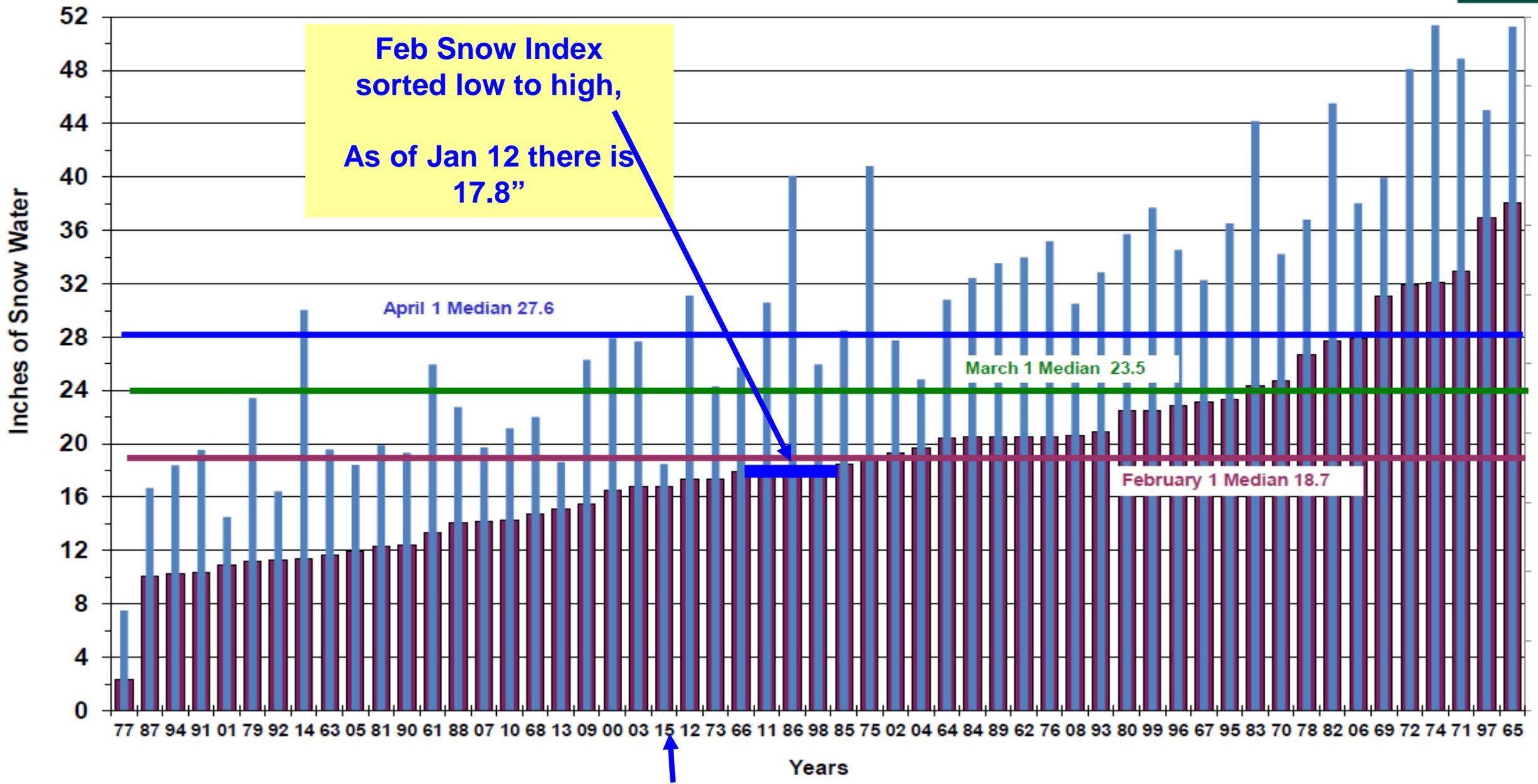


■ January 1 Snow Water
■ April 1 Snow Water



February Boise Basin 7 Station Snow Index for Years 1961 - 2015
Atlanta, Dollarhide, Graham, Jackson, Mores Creek, Trinity Mountain, Vienna Mine

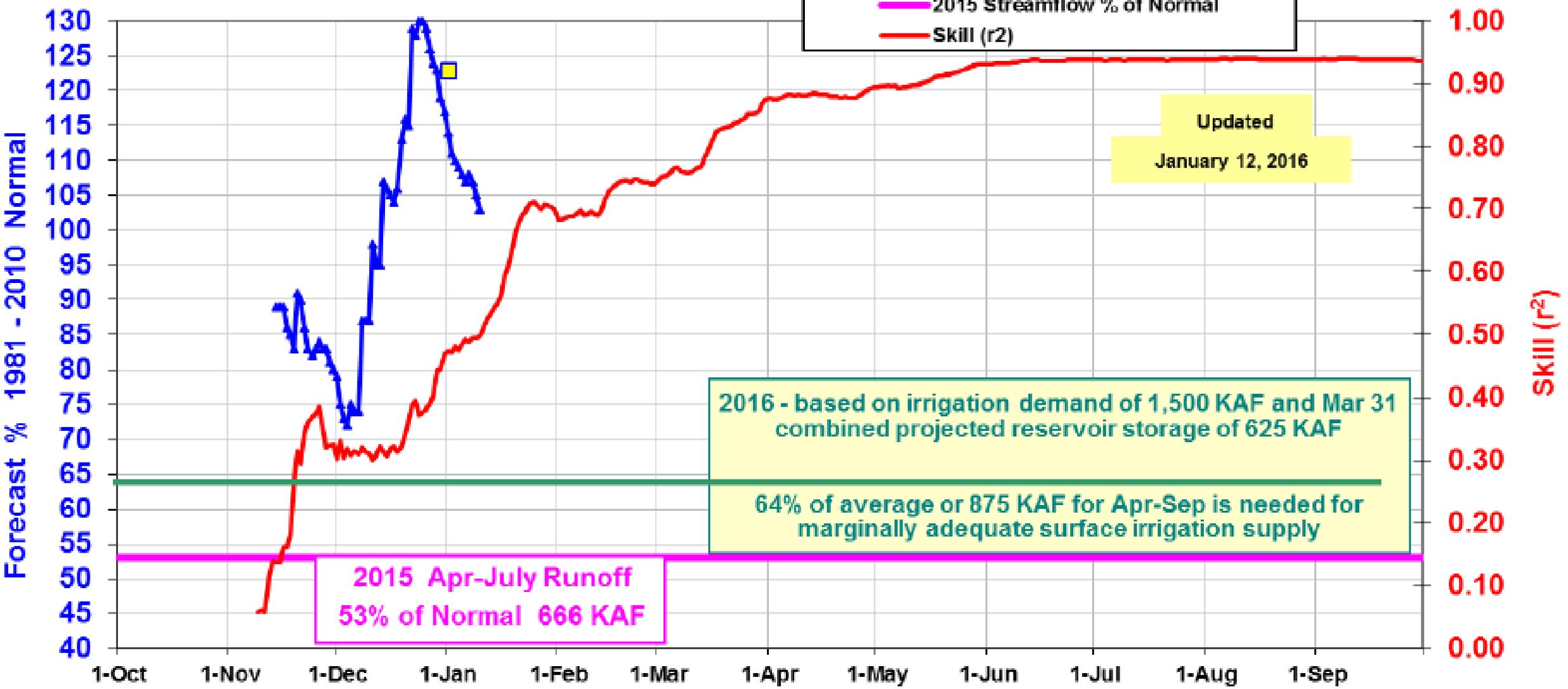
■ February 1 Snow Water
■ April 1 Snow Water



2016 Boise River near Boise: Apr - Jul Volume

NRCS Monthly / mid-Monthly Forecasts are Squares

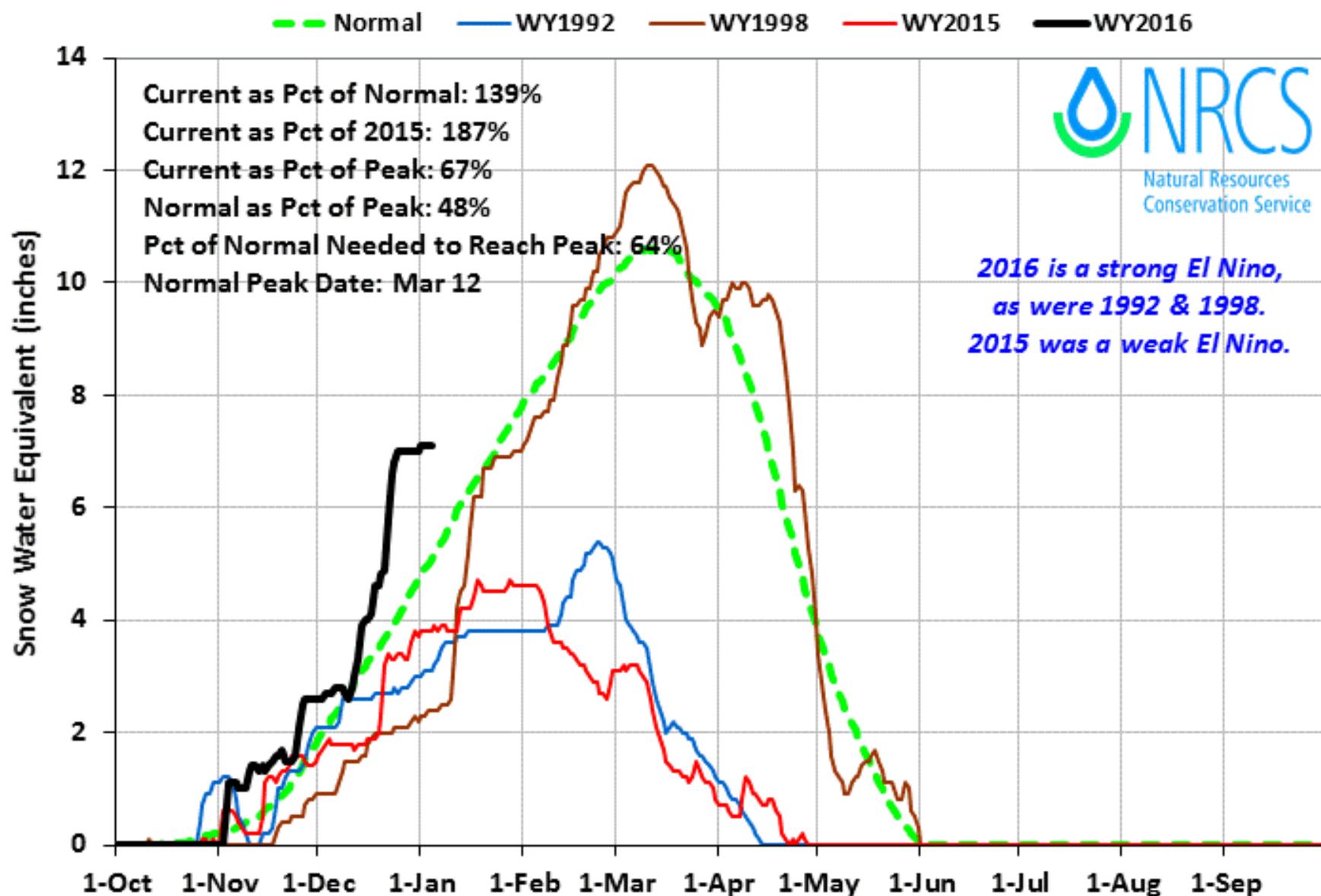
- Daily Guidance Forecast
- Monthly Forecasts
- 2015 Streamflow % of Normal
- Skill (r^2)



SNOTEL Sites used: Atlanta Summit, Trinity Mountain, Dollarhide Summit, Vienna Mine, Galena and Galena Summit

Owyhee Basin 2016 Snowpack Comparison Graph (7 sites)

Based on Provisional SNOTEL data as of Jan 04, 2016



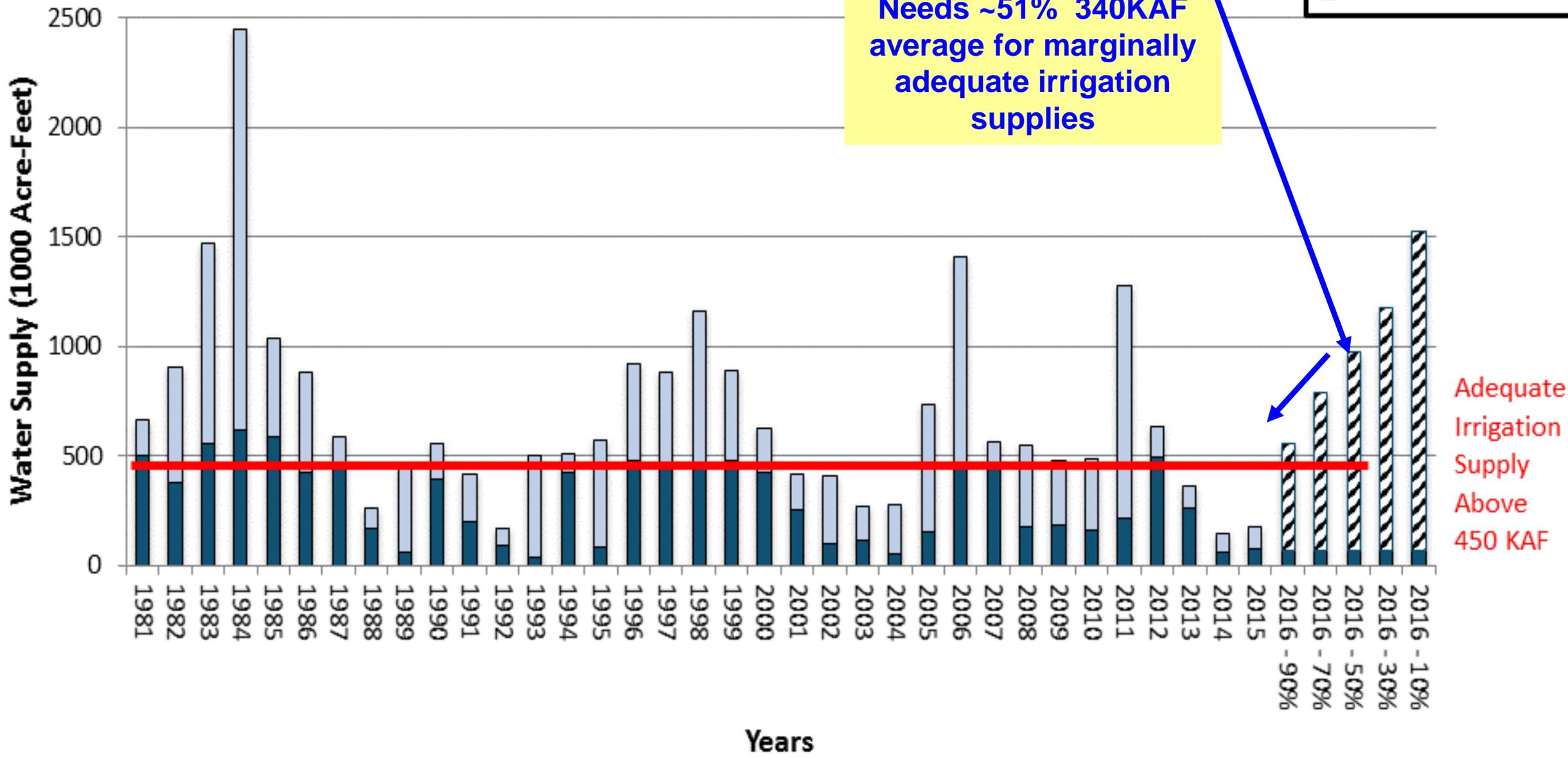
Jan 1 Historic and Forecasted Surface Water Supply Owyhee Basin

**Jan 2016 Streamflow
Forecast 136% Feb-Sep**

**Needs ~51% 340KAF
average for marginally
adequate irrigation
supplies**

□ StreamFlow Feb-Sep

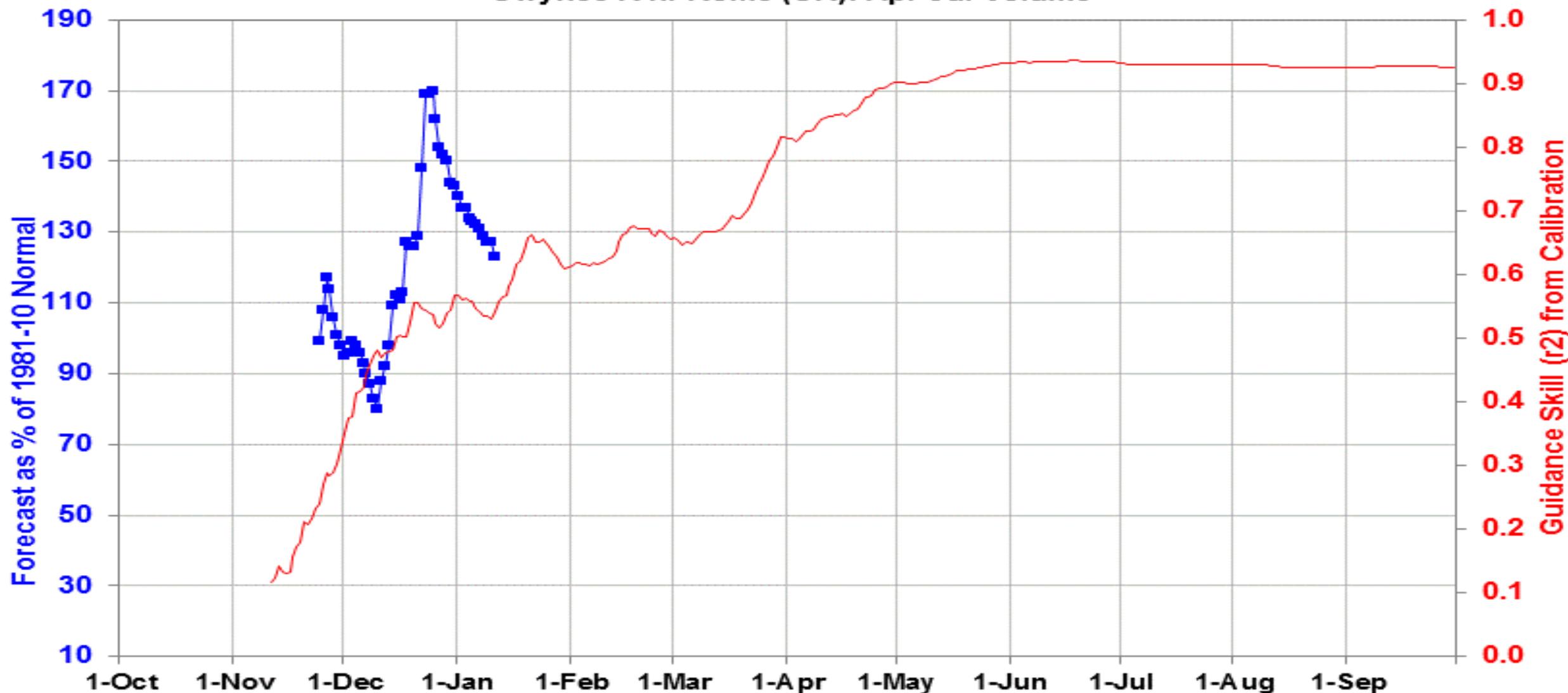
■ Reservoir 31-Dec



Adequate
Irrigation
Supply
Above
450 KAF

Created 7:06 Jan 11 2016

Owyhee R nr Rome (OR): Apr-Jul Volume



■ Guidance fcst % norm

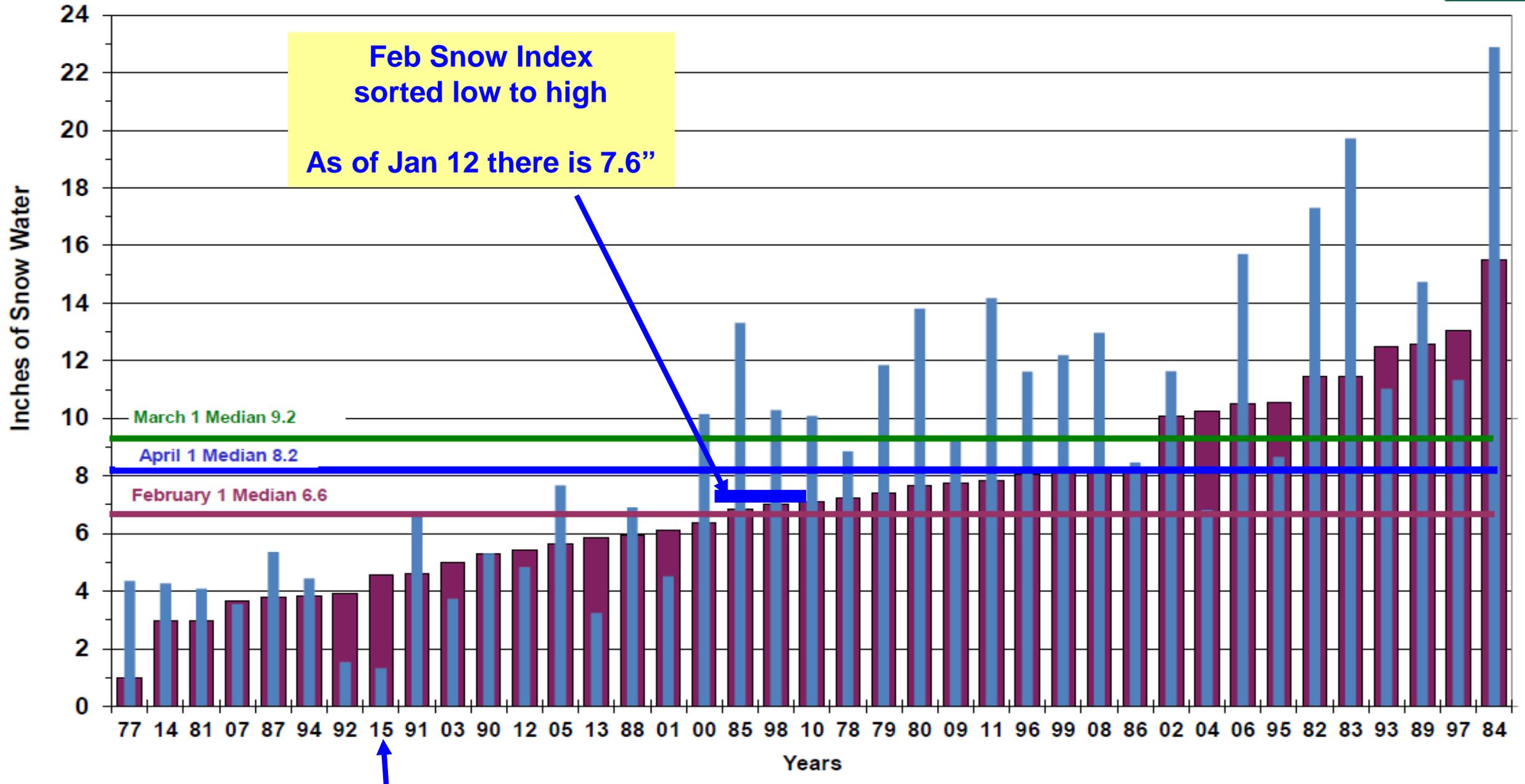
— Guidance Skill (r²)

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



February Owyhee Basin 6 Station Snow Index for Years 1977 - 2015
 Big Bend, Jack Creek Upper, Laurel Draw, Mud Flat, South Mtn., Taylor Canyon

■ February 1 Snow Water
 ■ April 1 Snow Water

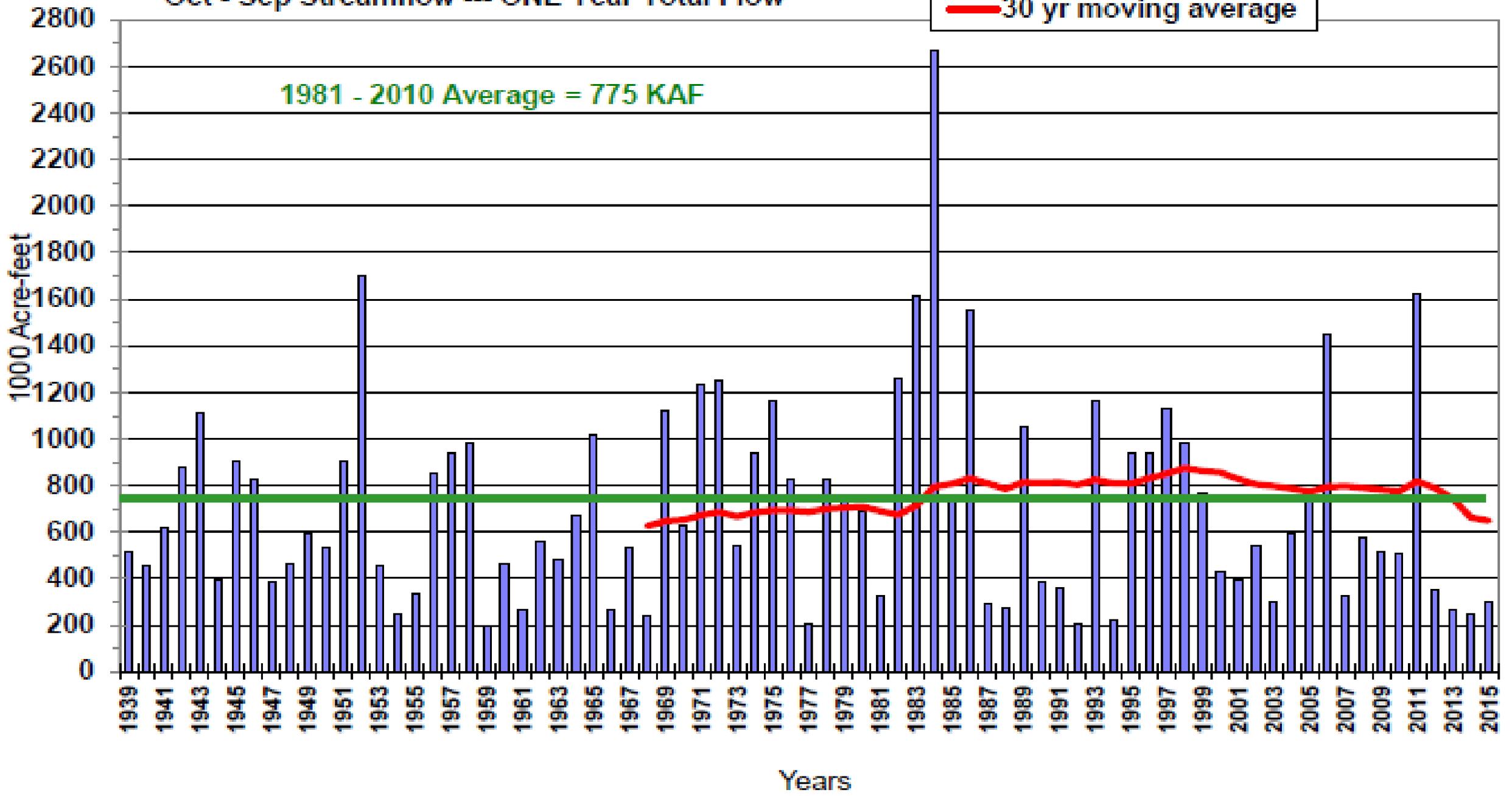


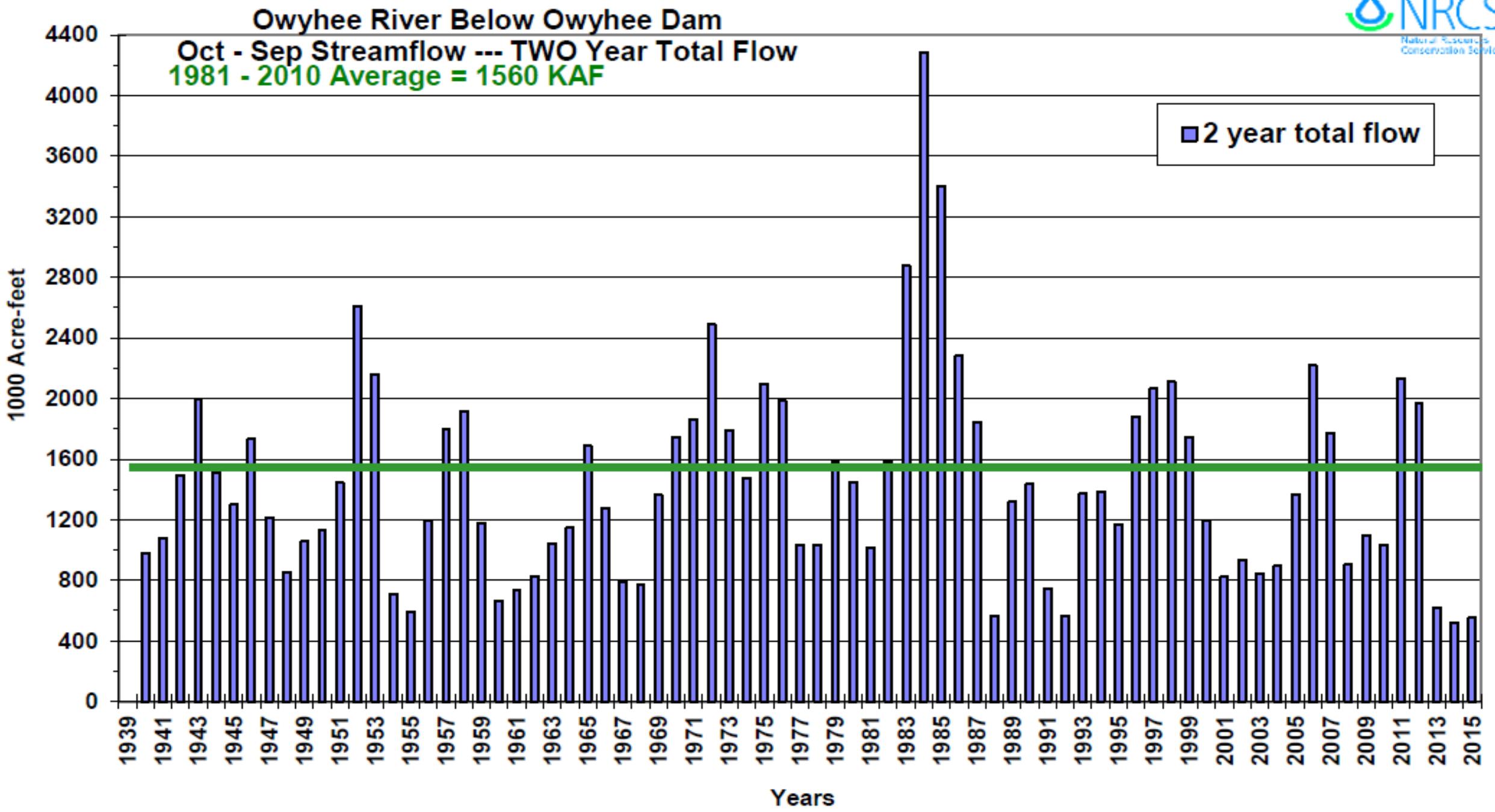
Owyhee River Below Owyhee Dam Oct - Sep Streamflow --- ONE Year Total Flow



1 year total flow
30 yr moving average

1981 - 2010 Average = 775 KAF

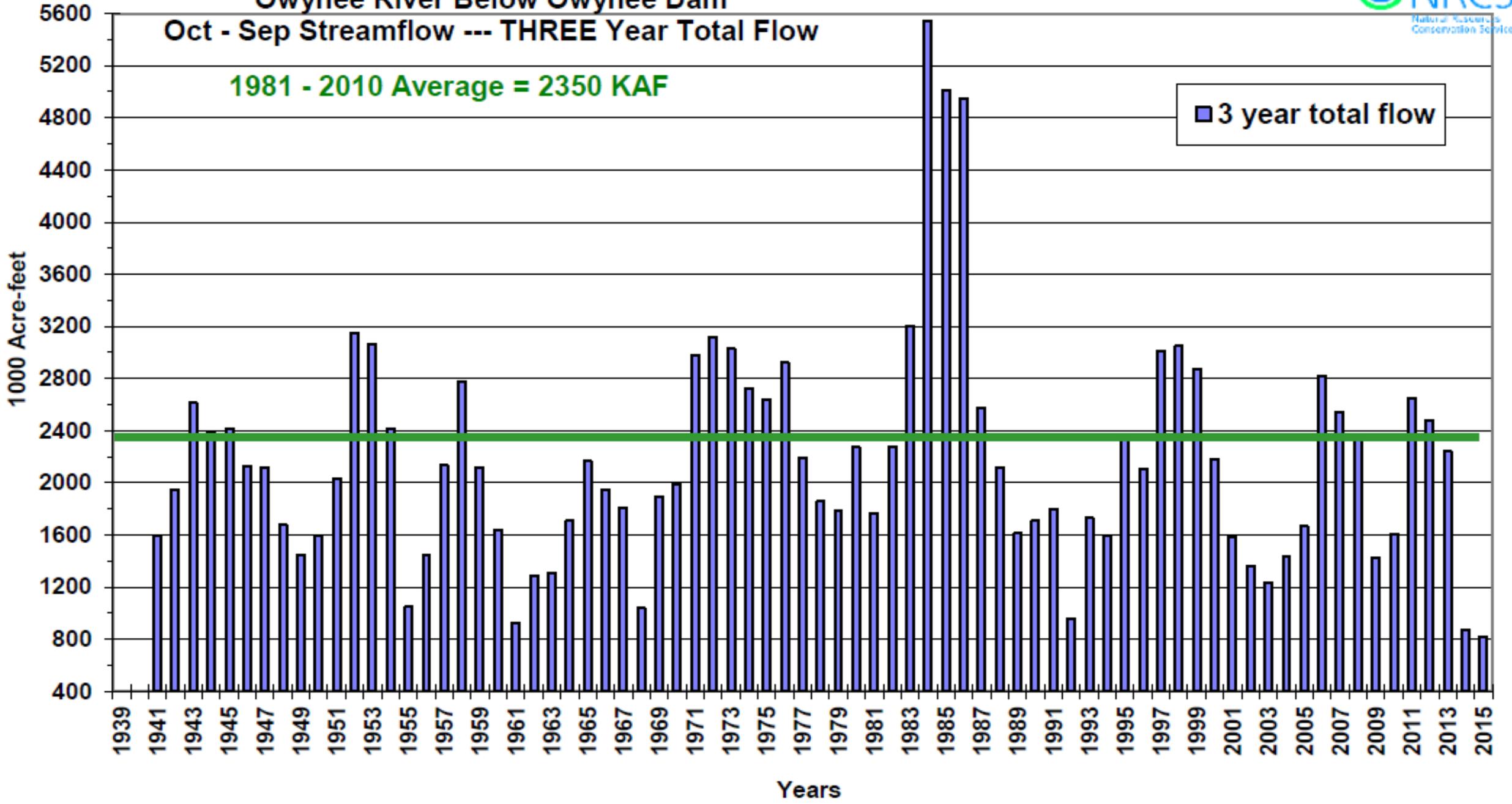




Owyhee River Below Owyhee Dam

Oct - Sep Streamflow --- THREE Year Total Flow

1981 - 2010 Average = 2350 KAF

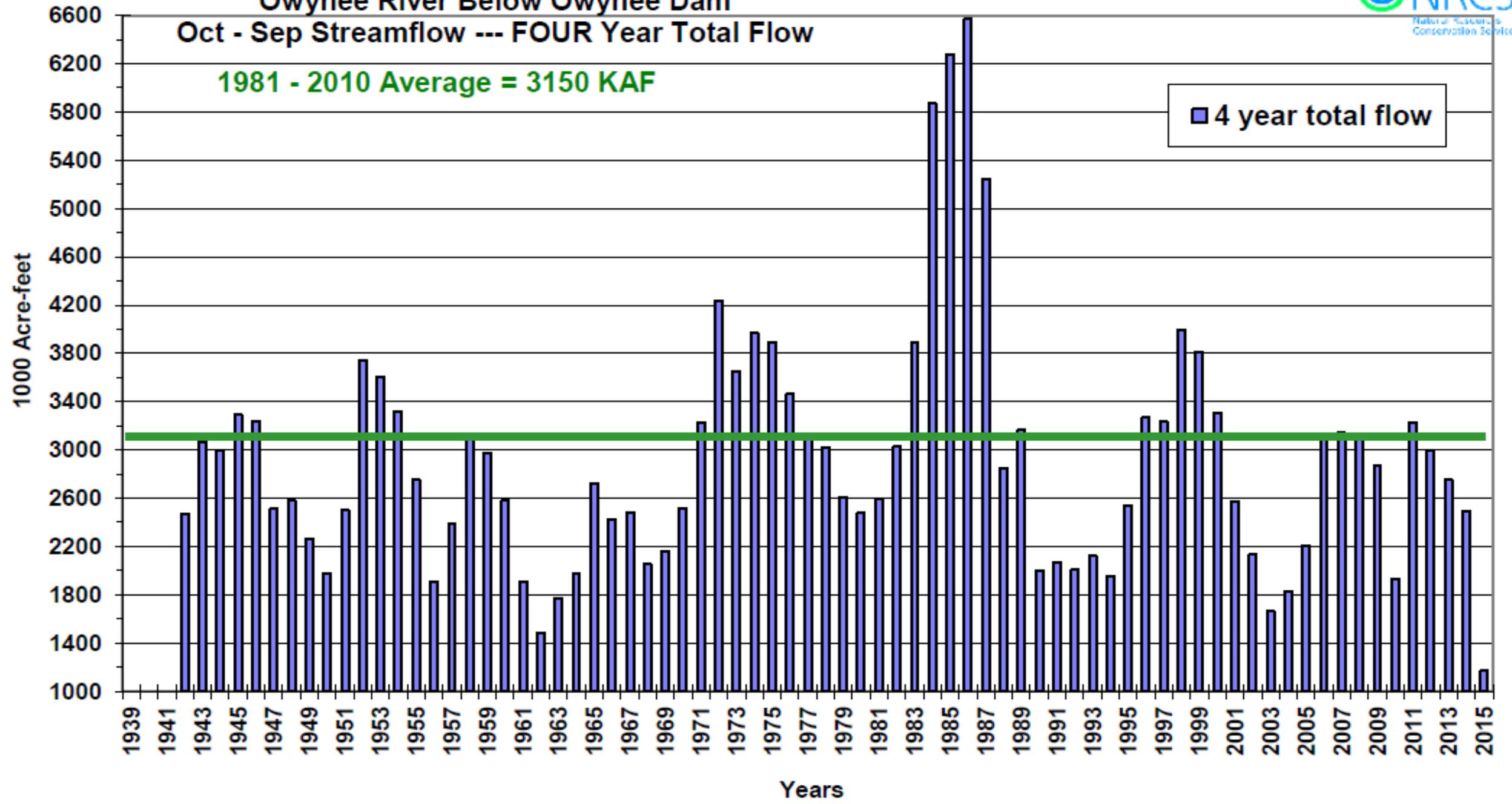


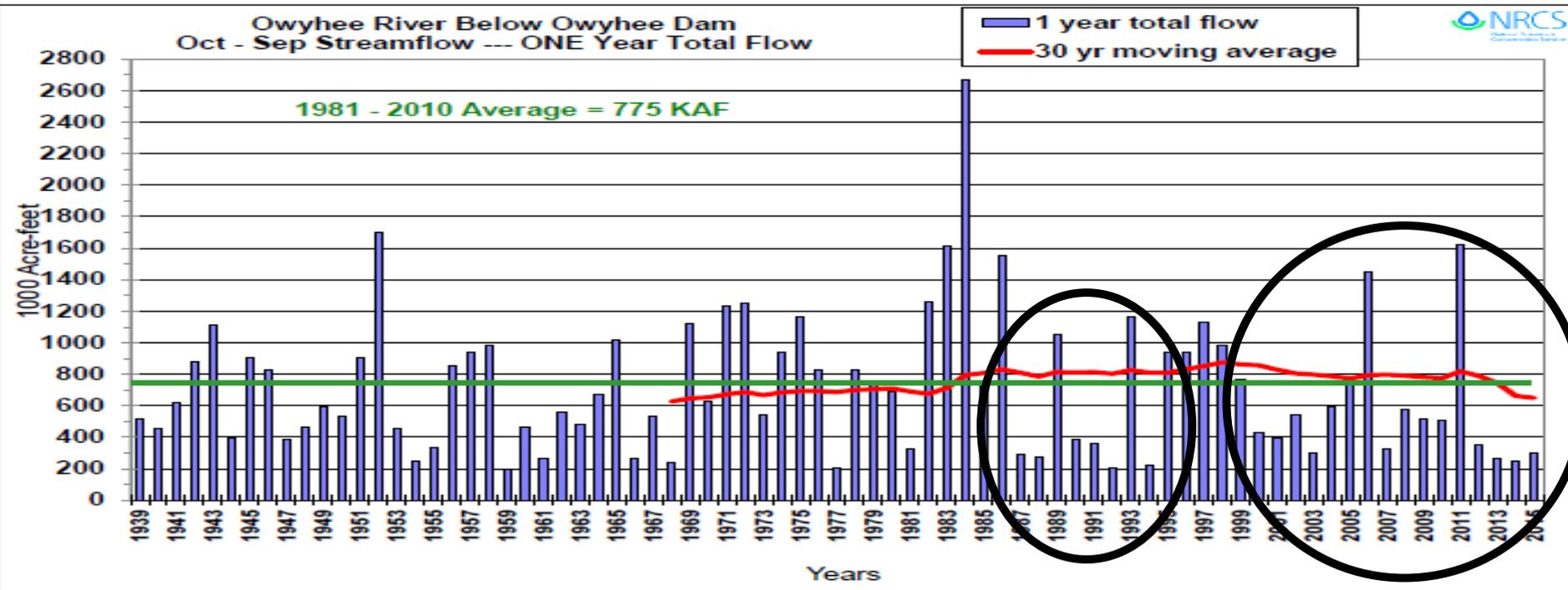
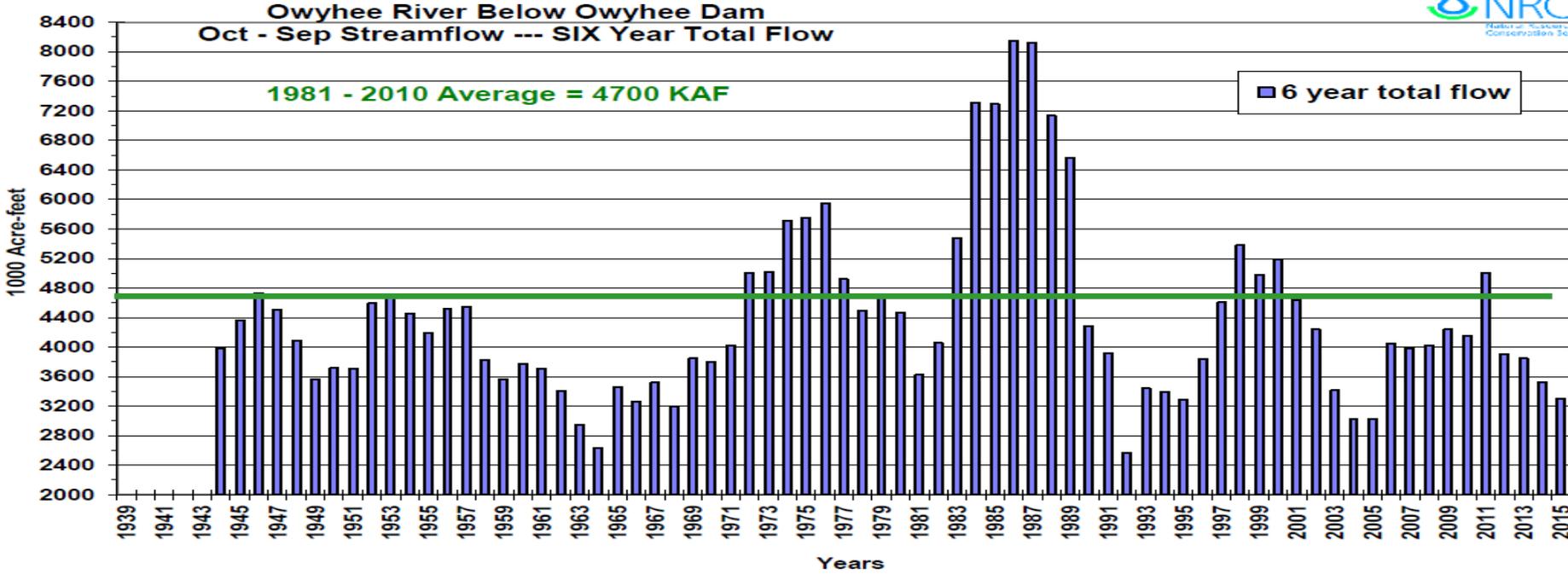
Owyhee River Below Owyhee Dam

Oct - Sep Streamflow --- FOUR Year Total Flow

1981 - 2010 Average = 3150 KAF

4 year total flow

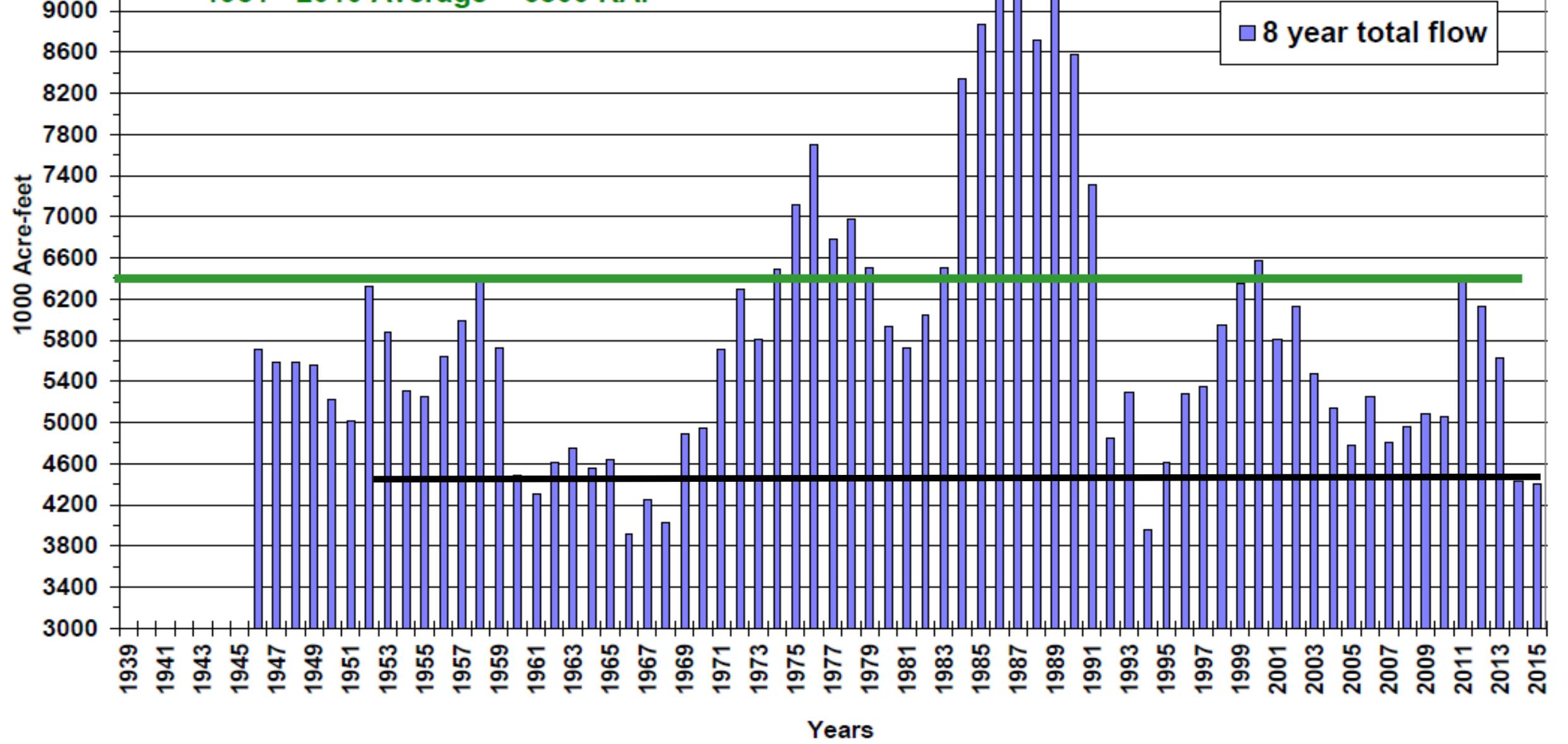




Owyhee River Below Owyhee Dam

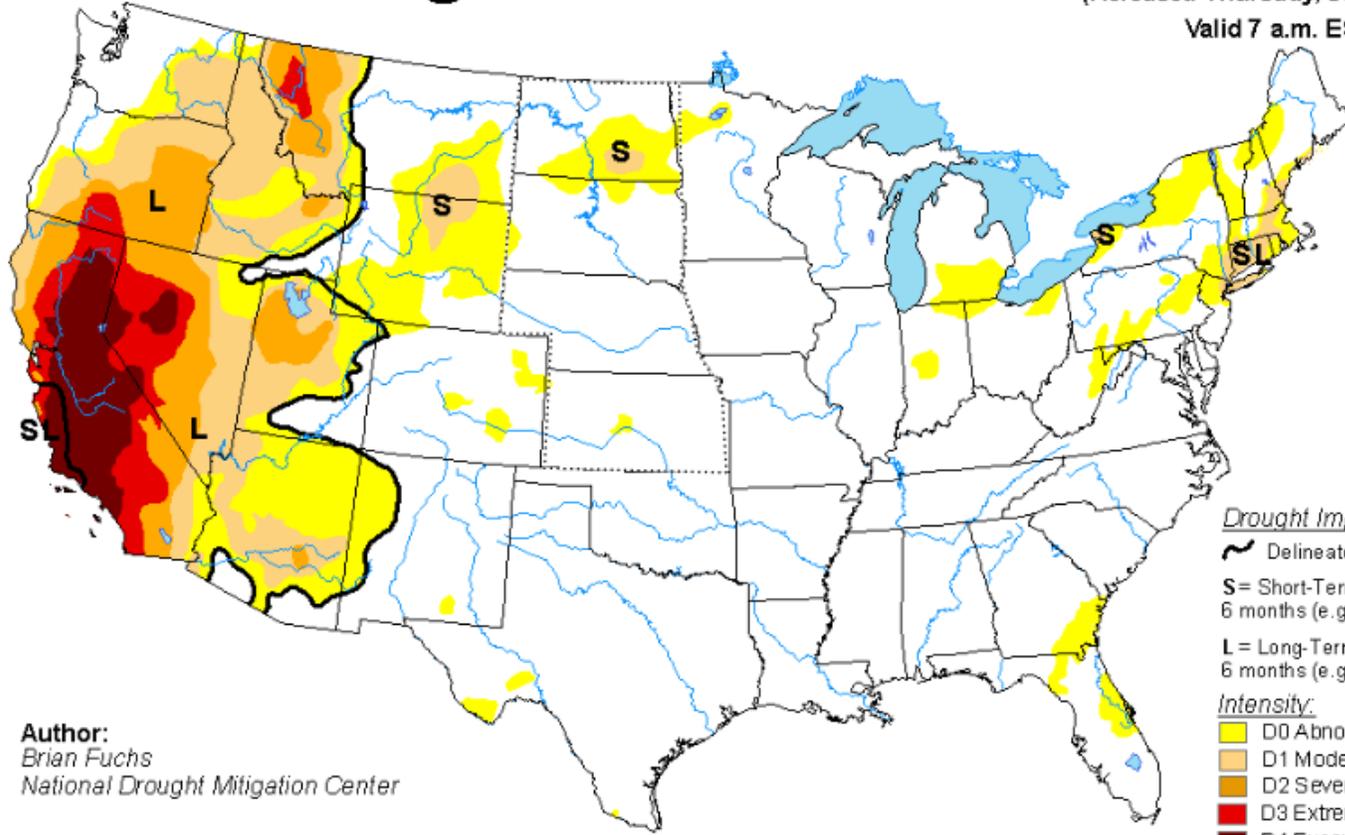
Oct - Sep Streamflow --- EIGHT Year Total Flow

1981 - 2010 Average = 6300 KAF



U.S. Drought Monitor

January 5, 2016
(Released Thursday, Jan. 7, 2016)
Valid 7 a.m. EST



Author:
Brian Fuchs
National Drought Mitigation Center

Drought Impact Types:

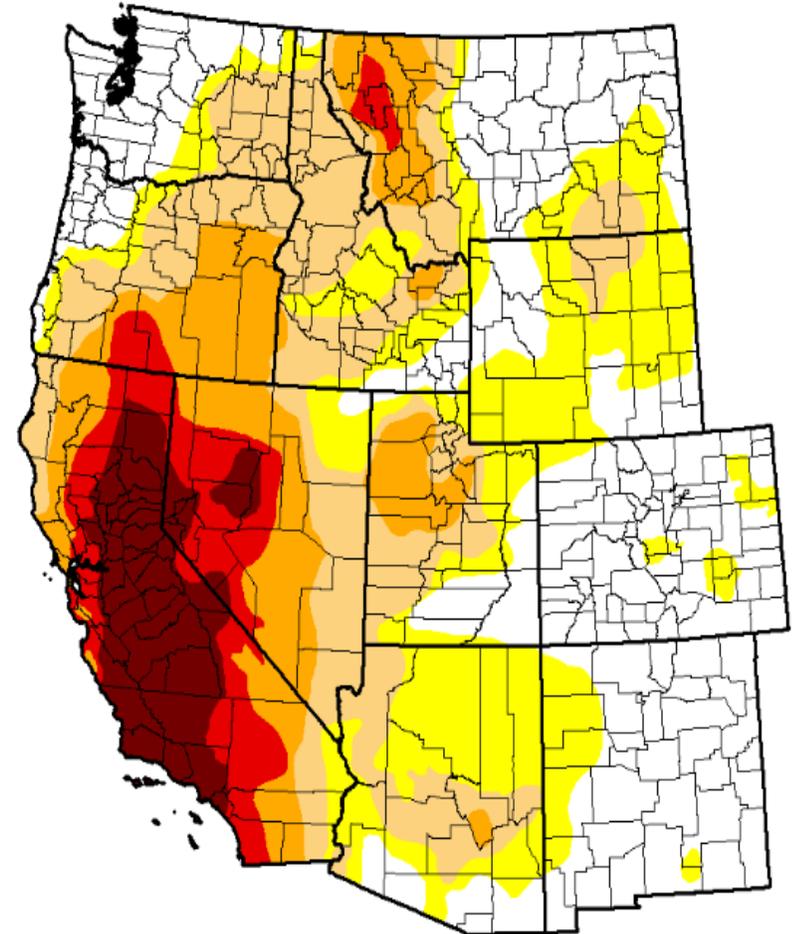
- ~ Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

U.S. Drought Monitor

West



Streamflow April - September as % of 1981-2010 Average



12 Strong
El Nino
Years
Sorted

Year	ENSO	PDO	Owyhee River blw Dam	Salmon Falls Creek	Big Wood River blw Magic Dam	Snake River nr Heise	Spokane River nr Post Falls
	SE Strong El Nino	Positive or Negative					
1994	SE	pos	23	36	12	61	51
1966	SE	neg	28	48	51	78	90
1947	SE	pos / neg	44	50	59	108	90
1941	SE	pos	83	53	69	73	45
1988	SE	pos	30	65	24	70	71
1978	SE	pos	110	112	140	133	99
1973	SE	pos / neg	61	114	51	79	45
1995	SE	pos	124	135	195	118	70
1998	SE	pos / neg	135	138	161	119	82
1999	SE	pos	221	157	282	132	91
1984	SE	pos	122	173	117	86	77
1952	SE	neg	247	178	263	116	123
2016	SE	Currently pos	?	?	?	?	?