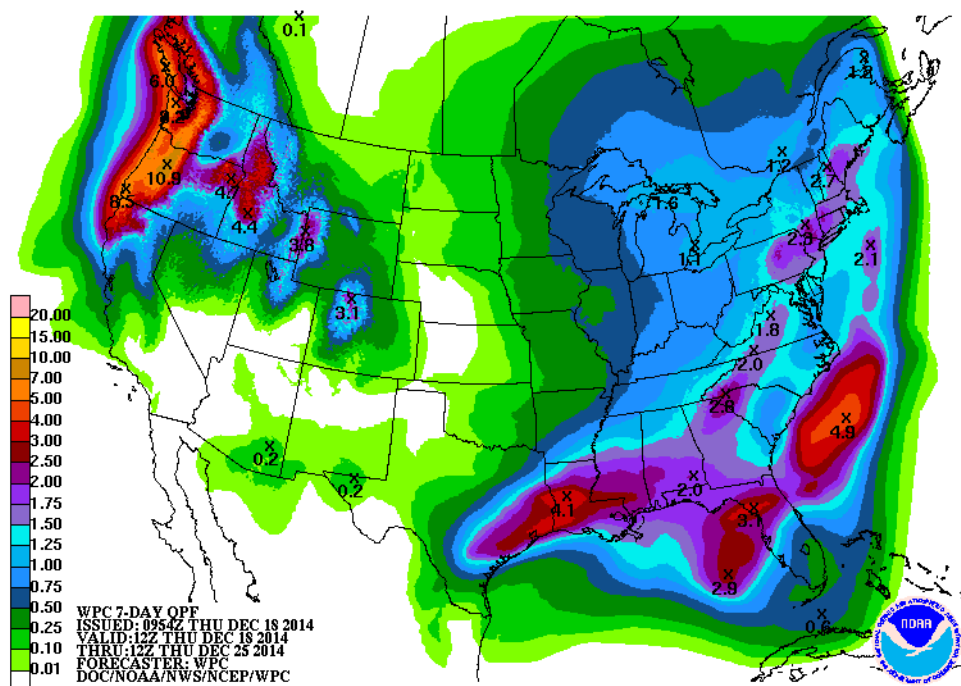


Water Supply Outlook & Long Range Trends



Treasure Valley Irrigation Conference (Idaho & Oregon)



Thursday, December 18, 2014

Treasure Valley Irrigation
Conference (Idaho & Oregon)
December 18, 2014 Nampa, Idaho

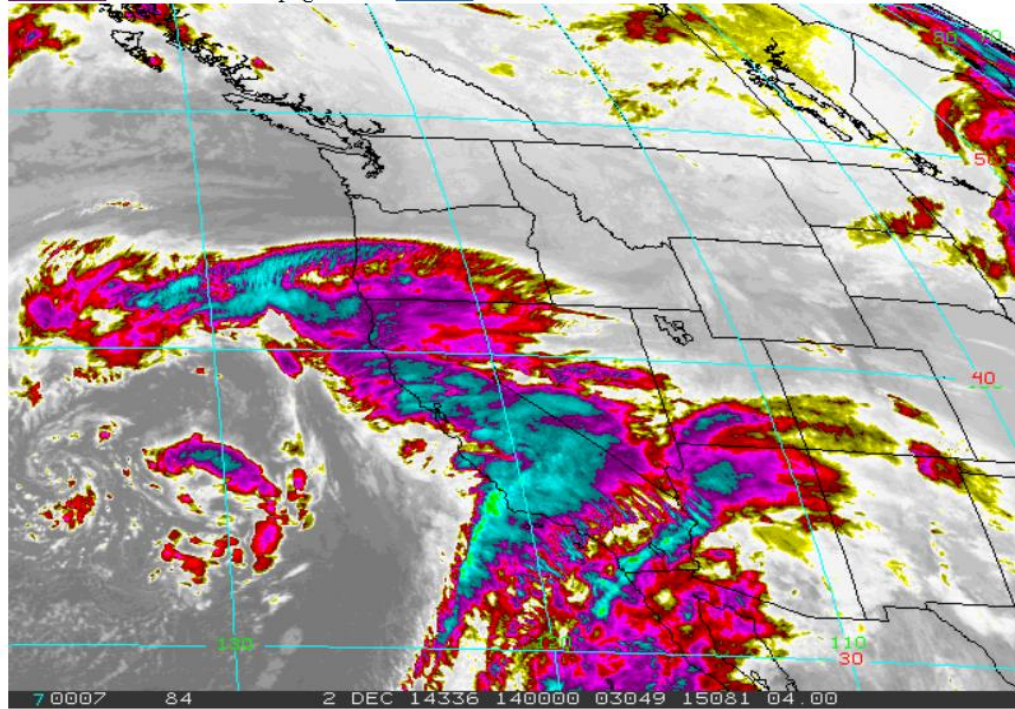
Ron Abramovich
Water Supply Specialist
USDA NRCS Snow Survey Boise, Idaho



United States Department of Agriculture

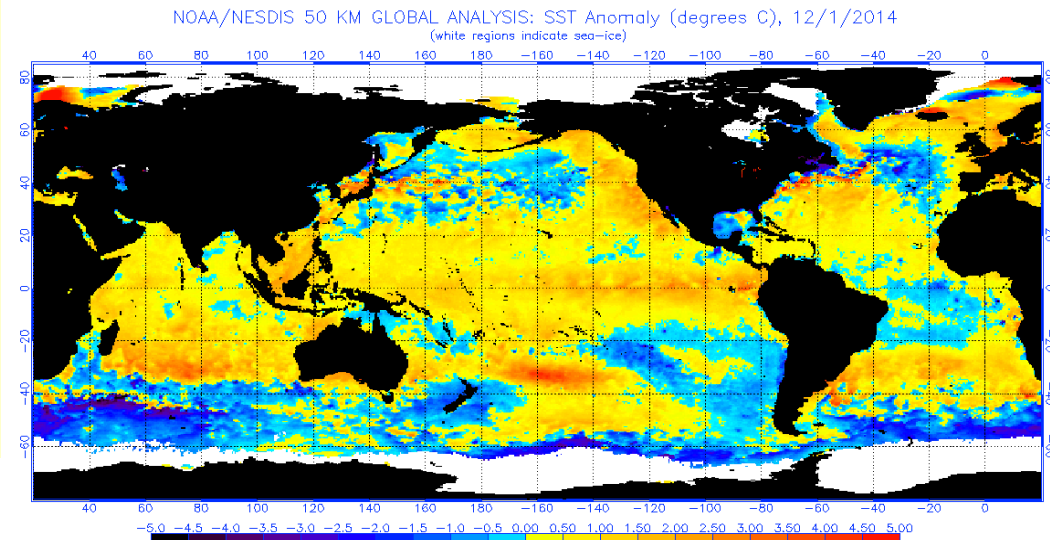
Satellite image Dec 2, 2014 El Nino Storm Track Pattern

[animation](#) To refresh the page click: [Refresh](#)



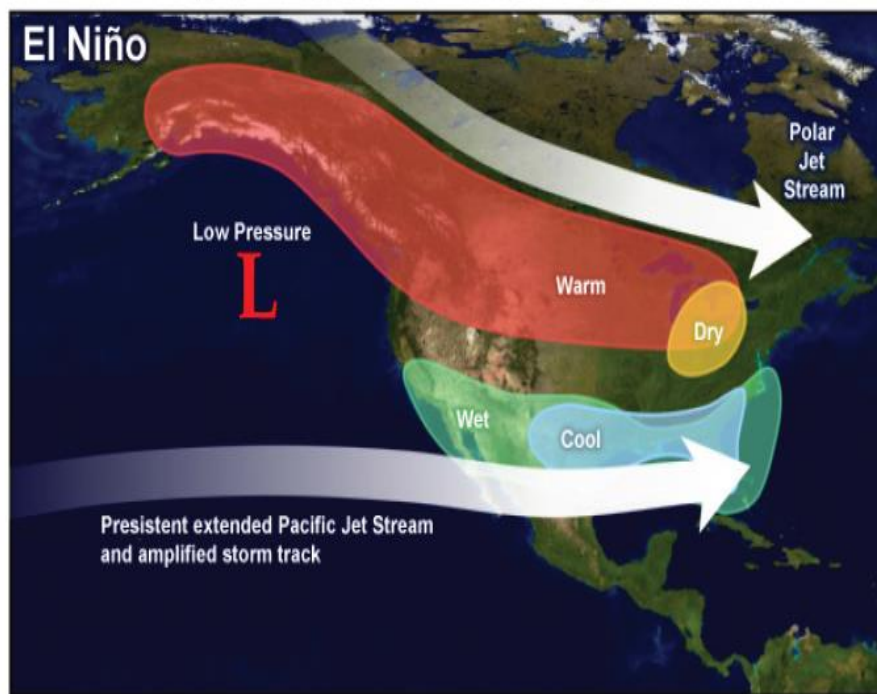
- *Weather outlooks now encompass looking globally at climate conditions around the world to understanding how they impact our local water supply.*

Teleconnections climatic indexes
Key is understanding their correlations AND influence on current weather, snowfall, streamflow, your business & more...



Typical El Niño Winter Pattern

Typical Climate Pattern for the U.S. during El Niño



Typical El Niño jet stream patterns across the U.S. include a stronger than usual storm track across the southern U.S., leaving the northern U.S. removed from the average storm track. Image courtesy of NOAA.

Teleconnections Primary Ones:

- **PDO Pacific Decadal Oscillation**
20 to 30 year cycle

- * **ENSO 3 to 5 year cycle**

El Nino/Neutral/La Nina - measure of Sea Surface Temperature (SST)

SOI Southern Oscillation Index measure of barometric pressure difference between in south Pacific

La Nina and Pacific Decadal Oscillation (PDO) Cooling in the Pacific Ocean

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

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

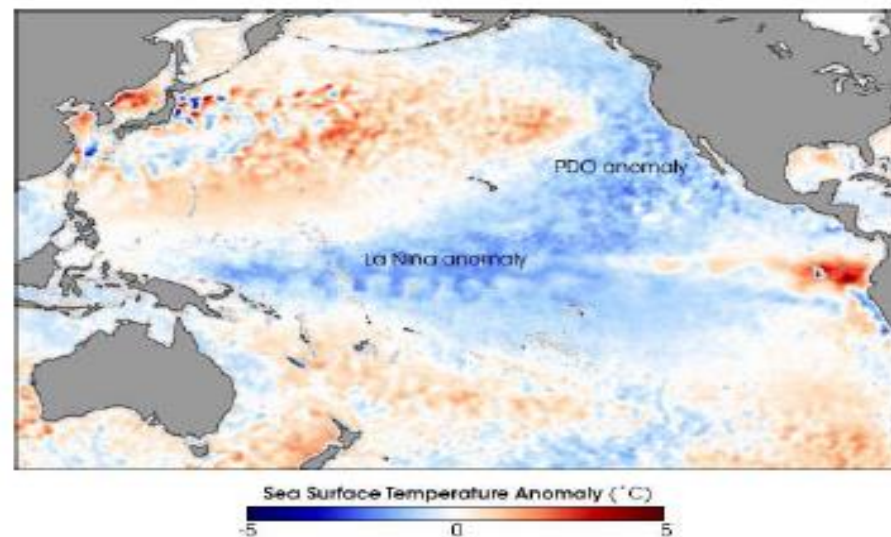
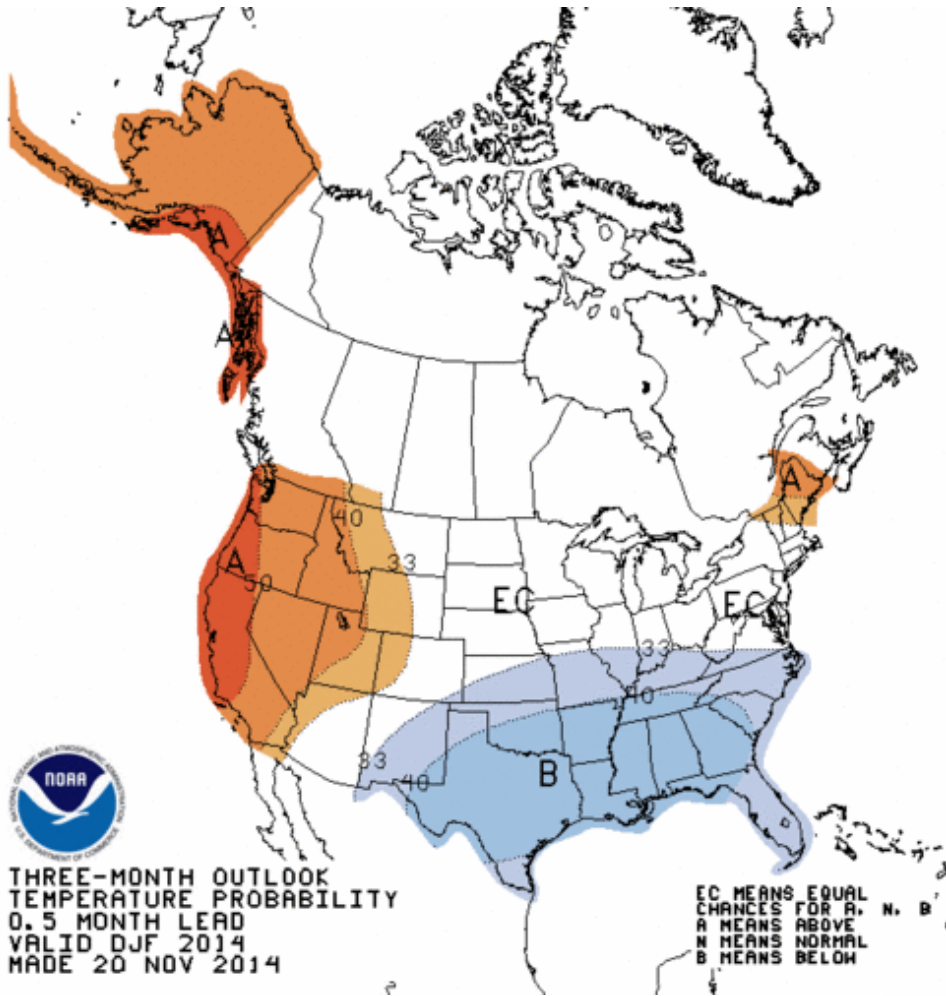


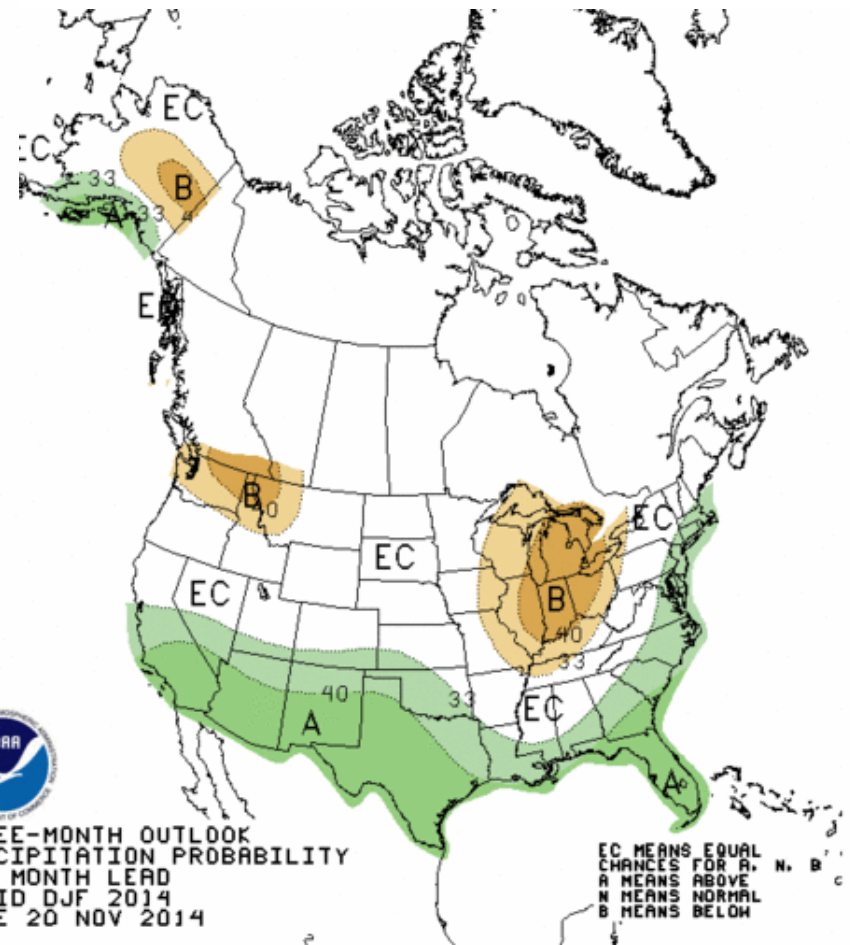
Figure 1. Cooling of the Pacific Ocean and setting up of the PDO. Sea surface tem

2014/2015 Forecasts

Three-Month Outlooks OFFICIAL Forecasts Dec-Jan-Feb 2014-15

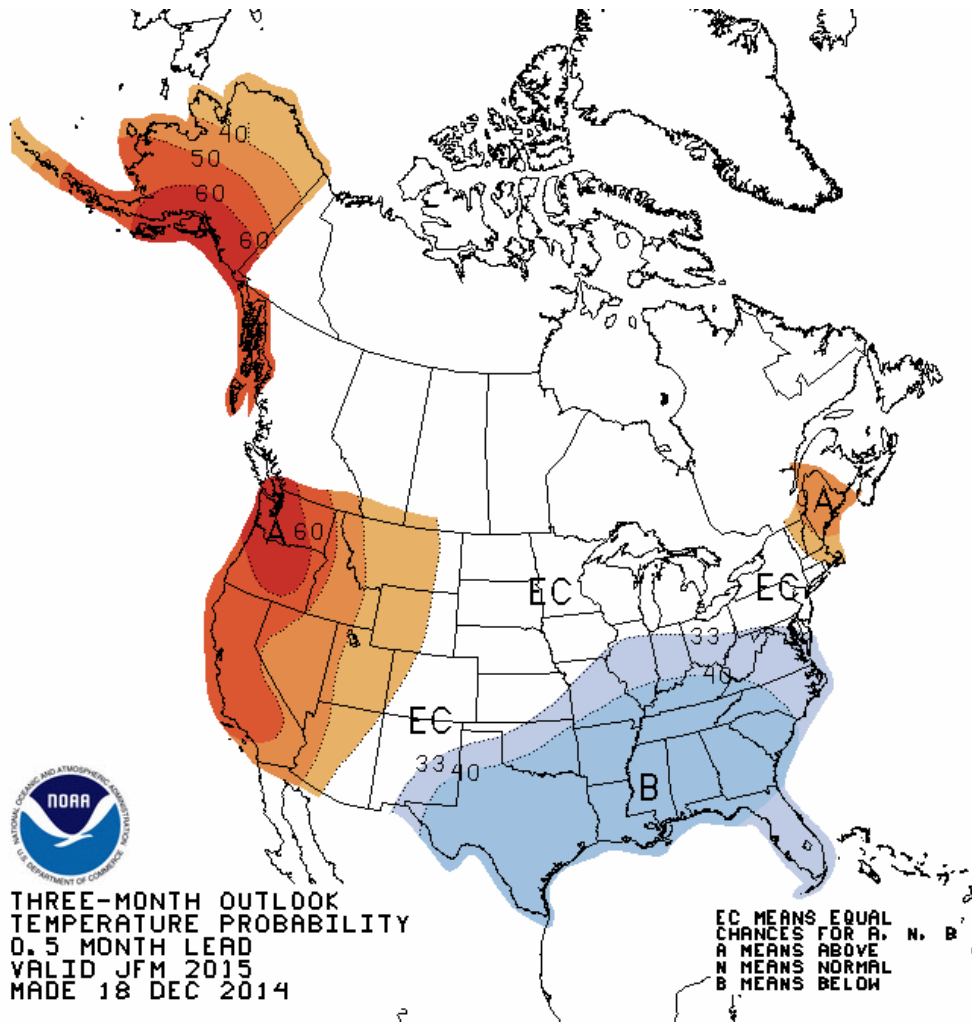


Dec-Jan-Feb Temperature
Forecast made Nov 20, 2104



Dec-Jan-Feb Precipitation
Forecast made Nov 20, 2104

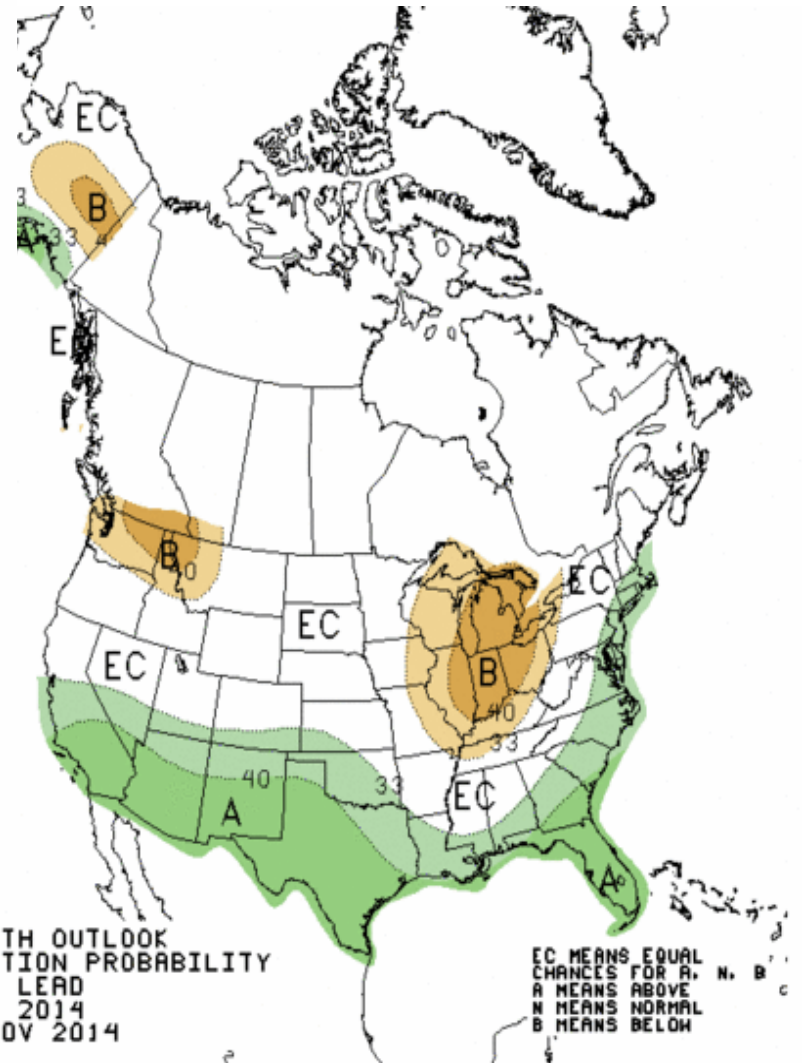
2014/2015 Forecasts



**Jan-Feb-Mar Temperature Forecast
made Today Dec 18, 2104**

**Jan-Feb-Mar Precipitation
Forecast made Today Dec 18, 2104**

Three-Month Outlooks OFFICIAL Forecasts Jan-Feb-Mar 2015



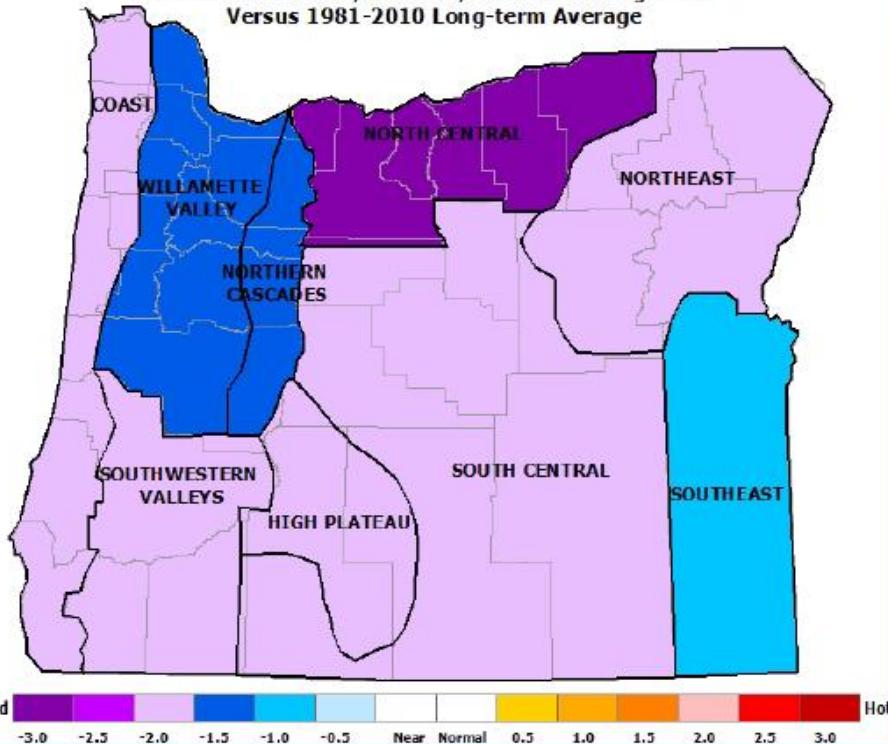
Rule #1

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

Dec. 2014 – Feb. 2015 Forecast

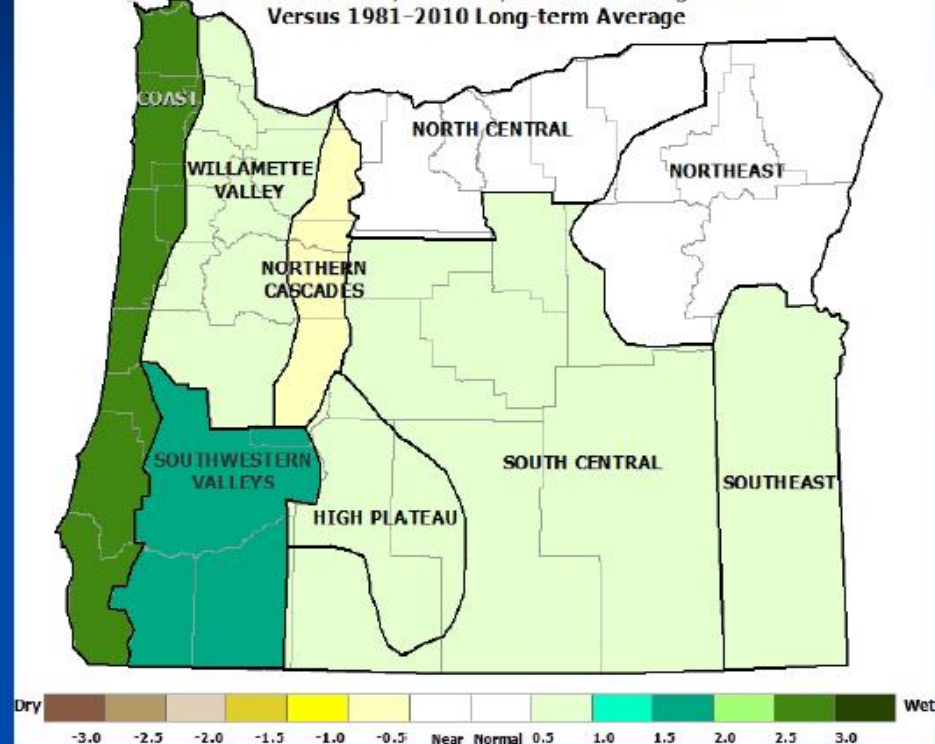
Temperatures

December 2014 - February 2015 Forecast Temperature Anomalies (°F)
Based on 1951-52, 1968-69, 2009-10 Analog Years
Versus 1981-2010 Long-term Average



Precipitation

December 2014 - February 2015 Forecast Precipitation Anomalies (Inches)
Based on 1951-52, 1968-69, 2009-10 Analog Years
Versus 1981-2010 Long-term Average



■ Tremendous variation among analog years for December and January increases forecast uncertainty. A “classic” El Niño produces warmer and drier than average weather, but the opposite extremes can occur...

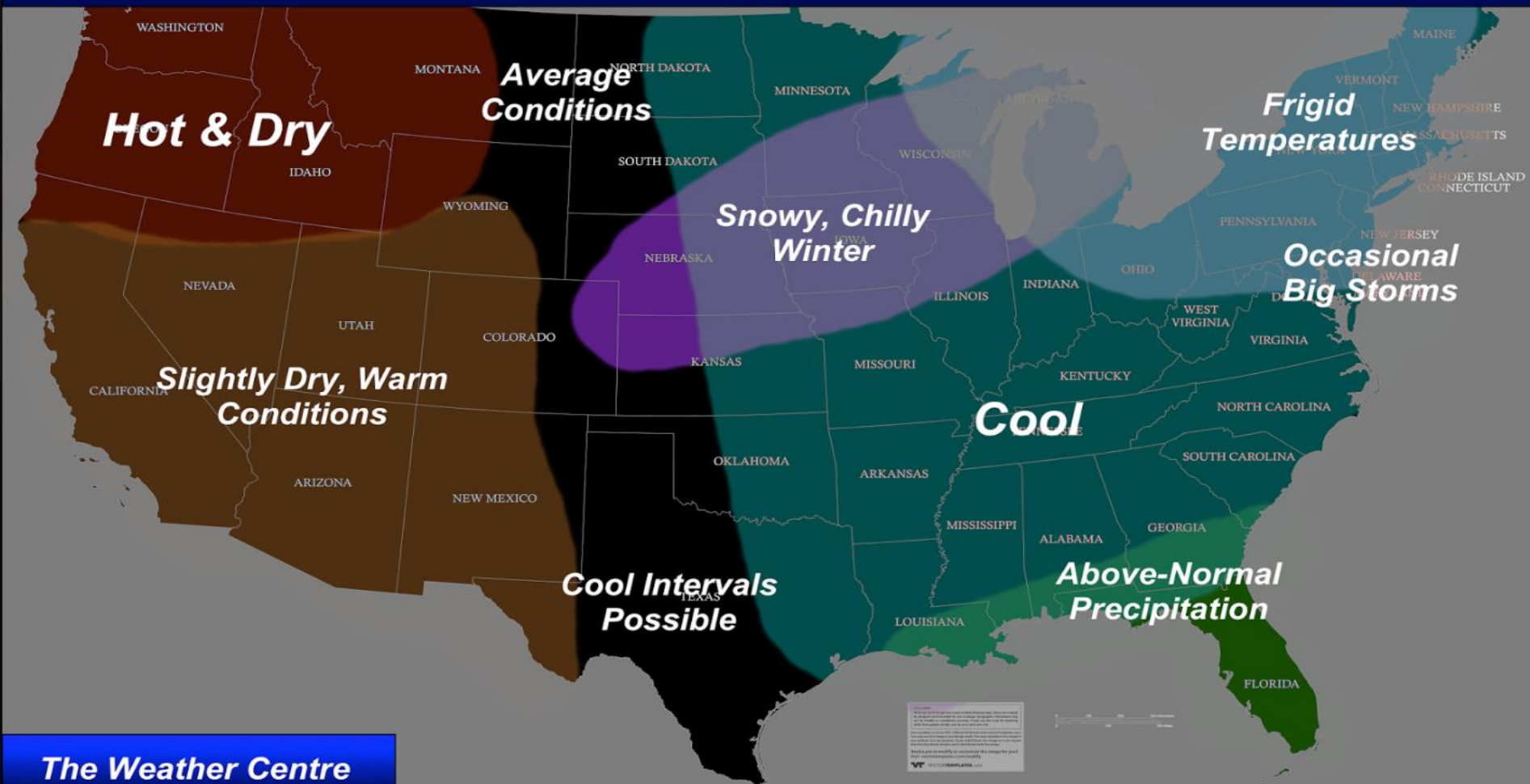
Dec. 2014 – Feb. 2015 Highlights

- A weak or moderate **El Niño** is likely this winter, which commonly produces cool and stormy conditions in late-autumn, but relatively mild and dry weather in mid-winter.
- Mountain snowfall (relative to average) is typically greater across southern Oregon than across northern Oregon.
- **However, there are other possibilities...**
- In stark contrast to the current Climate Prediction Center (CPC) Forecasts, the analog method used here shows that extremely cold and wet weather can't be ruled out for December and January.
- Dec. 1968 – Jan. 1969, (one of the top analog years) produced multiple Arctic outbreaks with heavy snowfall across much of the state, especially for northern Oregon.
- Extremely cold weather becomes unlikely after January, but generally cool temperatures may prevail into February.

The Weather Centre

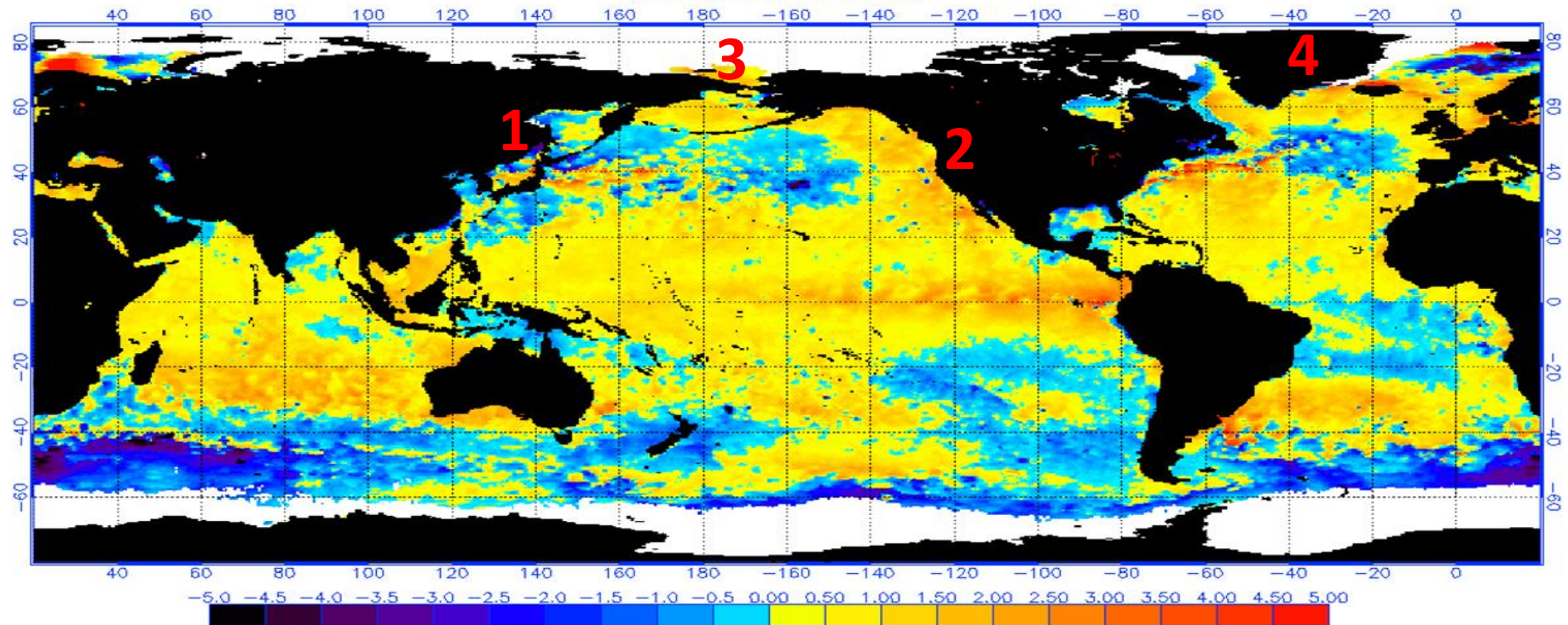
EXPECT THE UNEXPECTED

Official 2014-2015 Winter Forecast





NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 11/20/2014
(white regions indicate sea-ice)



1. Below Normal SST Anomalies in the Sea of Japan

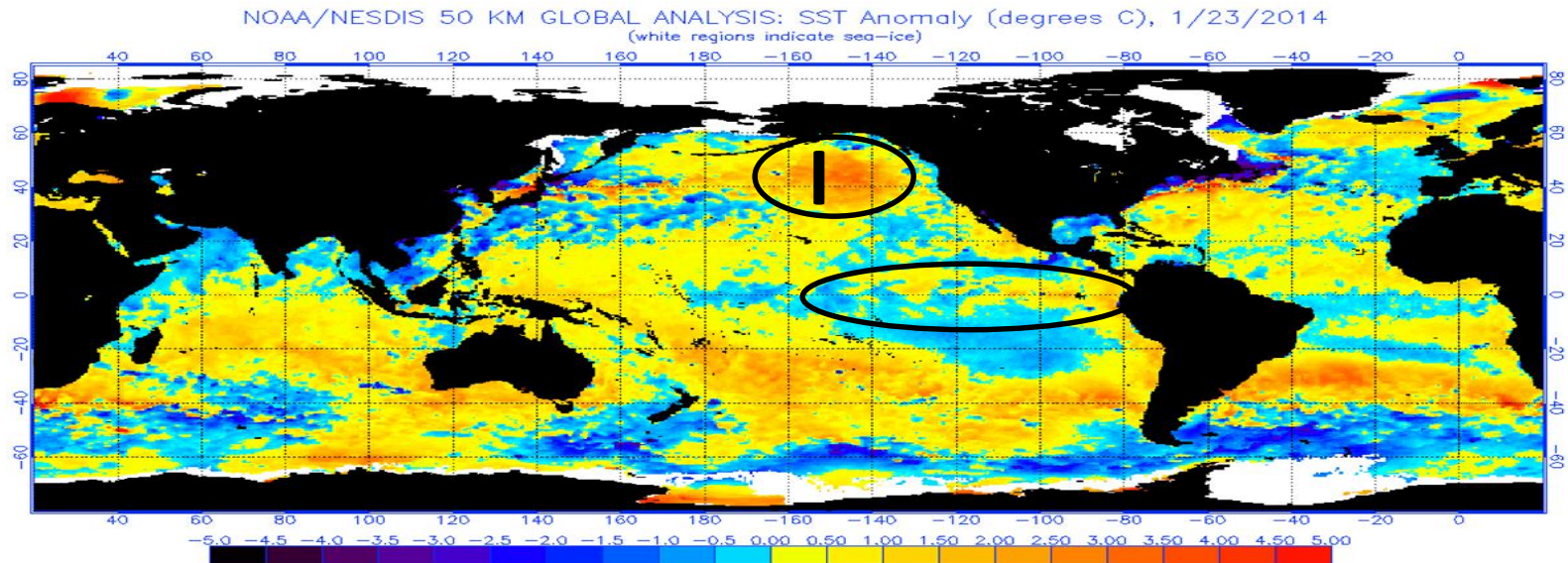
In the Sea of Japan, located to the west of Japan, we see a swath of below-normal to well below-normal sea surface temperature anomalies (henceforth abbreviated as SSTAs). These below-normal water temperatures were recently stirred up by the passage of a Typhoon Halong in early August, making quick work of what had previously been a rather

2. Well Above-Normal Water Temperatures in the Gulf of Alaska

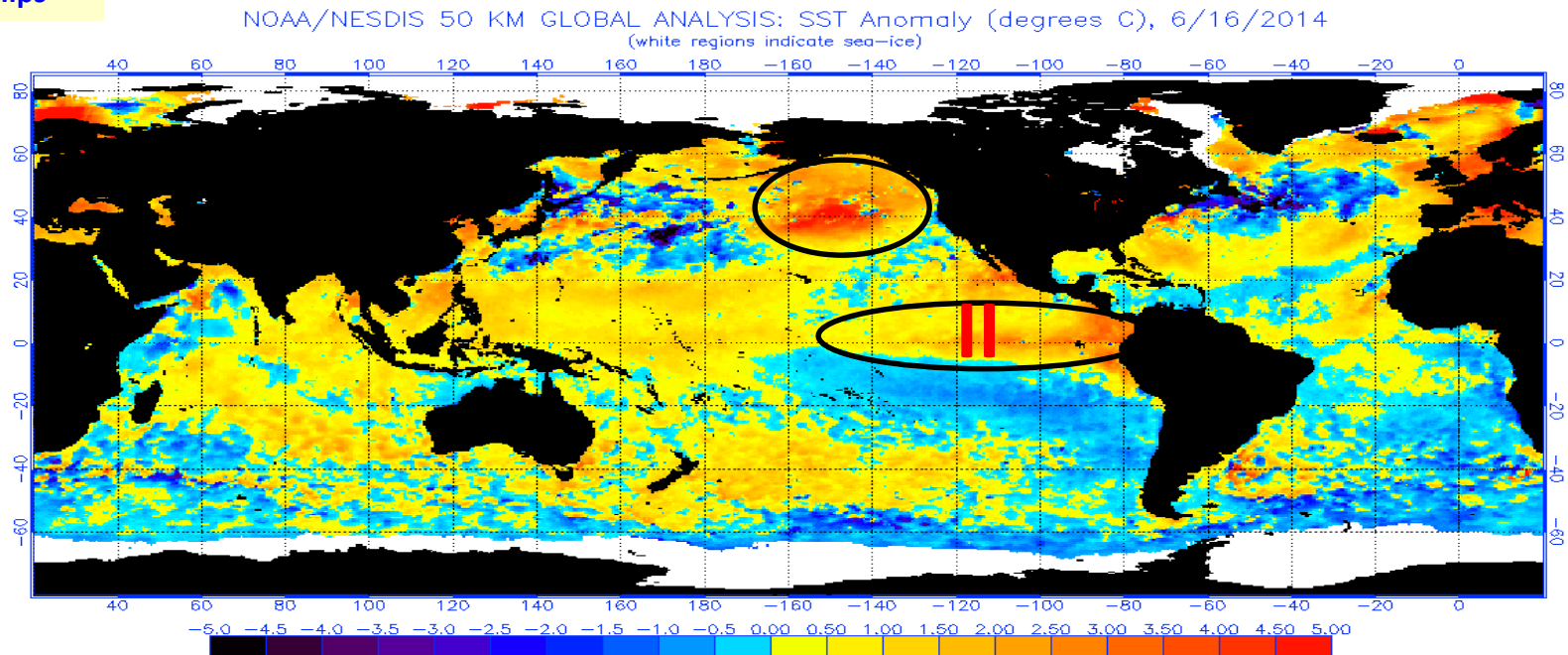
3. Well-Above Normal SST Anomalies in the Bering Sea

4. Above-Normal SST Anomalies Near Greenland

January 23, 2014 – warm water in northeast Pacific developing I



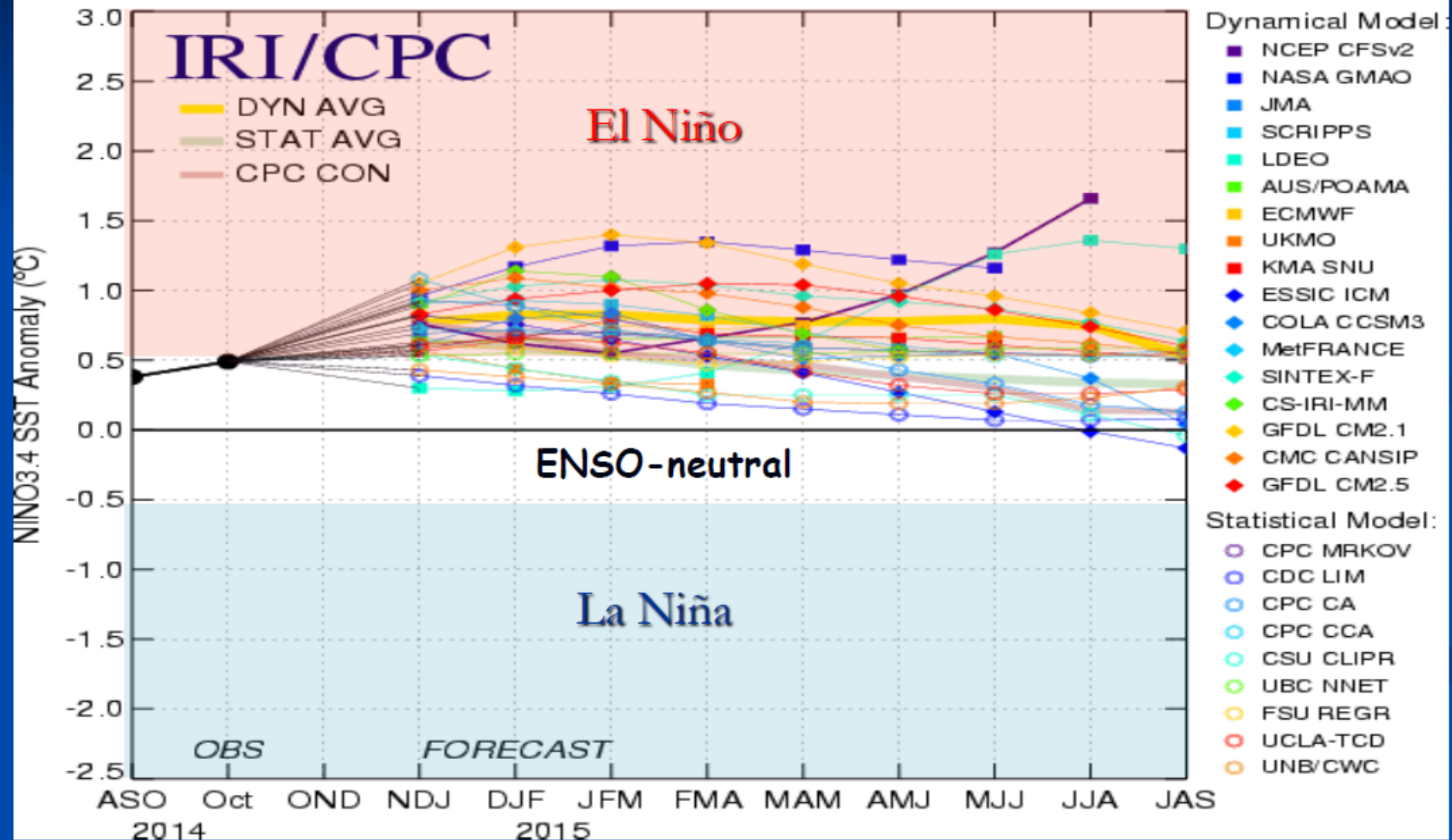
June 16, 2014 – El Nino Brewing II



ENSO Predictive Models

Computer models favor a weak **El Niño** this winter

Mid-Nov 2014 Plume of Model ENSO Predictions

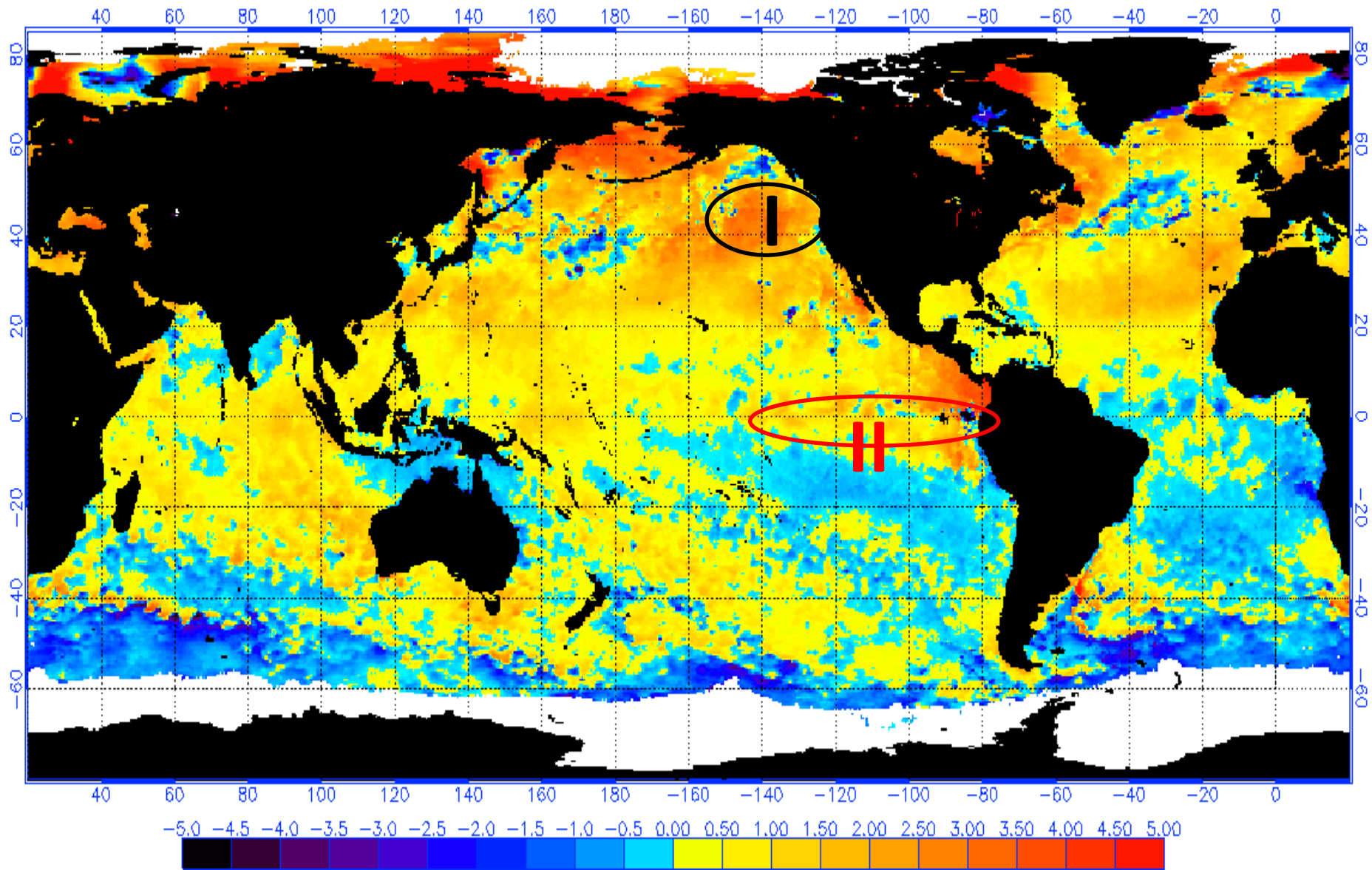


Courtesy: http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

Sept 8, 2014 – Sea Surface Temperatures Map

Strong Typhoons may have influenced change in SST

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 9/8/2014
(white regions indicate sea-ice)

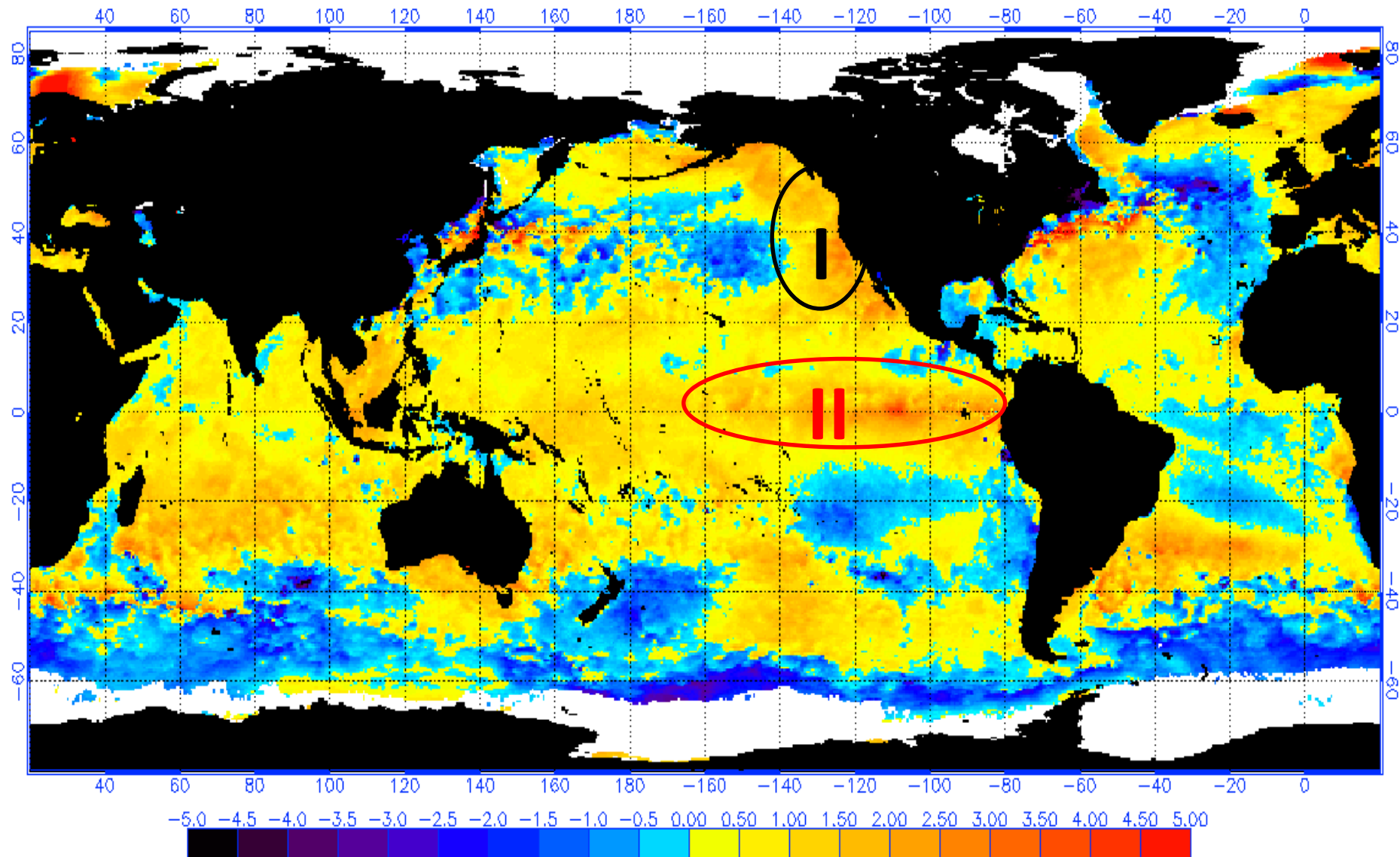


Dec 15, 2014 – warm water still present in northeast Pacific I

Week to Moderate El Nino present II

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 12/15/2014

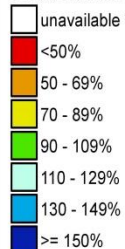
(white regions indicate sea-ice)



Westwide SNOTEL Water Year (Oct 1) to Date Precipitation % of Norm

Dec 15, 2014

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



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

Provisional data
subject to revision



The water year to date precipitation percent of normal represents the accumulated precipitation 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>

SNOTEL Water Year (Oct 1) to Date Precipitation Records

Dec 17, 2014

Water Year
(Oct 1) to Date
Precipitation
Records



Analysis includes sites with more
than 20 years of historical data.
"Near" record means that one other year
of the period of record is more extreme.



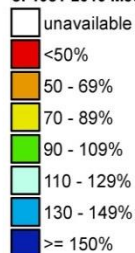
Provisional Data
Subject to Revision

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

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

Dec 15, 2014

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>

SNOTEL Current Snow Water Equivalent (SWE) Records

Dec 17, 2014

Current Snow Water (SWE) Equivalent Records



Analysis includes sites with more than 20 years of historical data. "Near" record means that one other year of the period of record is more extreme.

Provisional Data
Subject to Revision



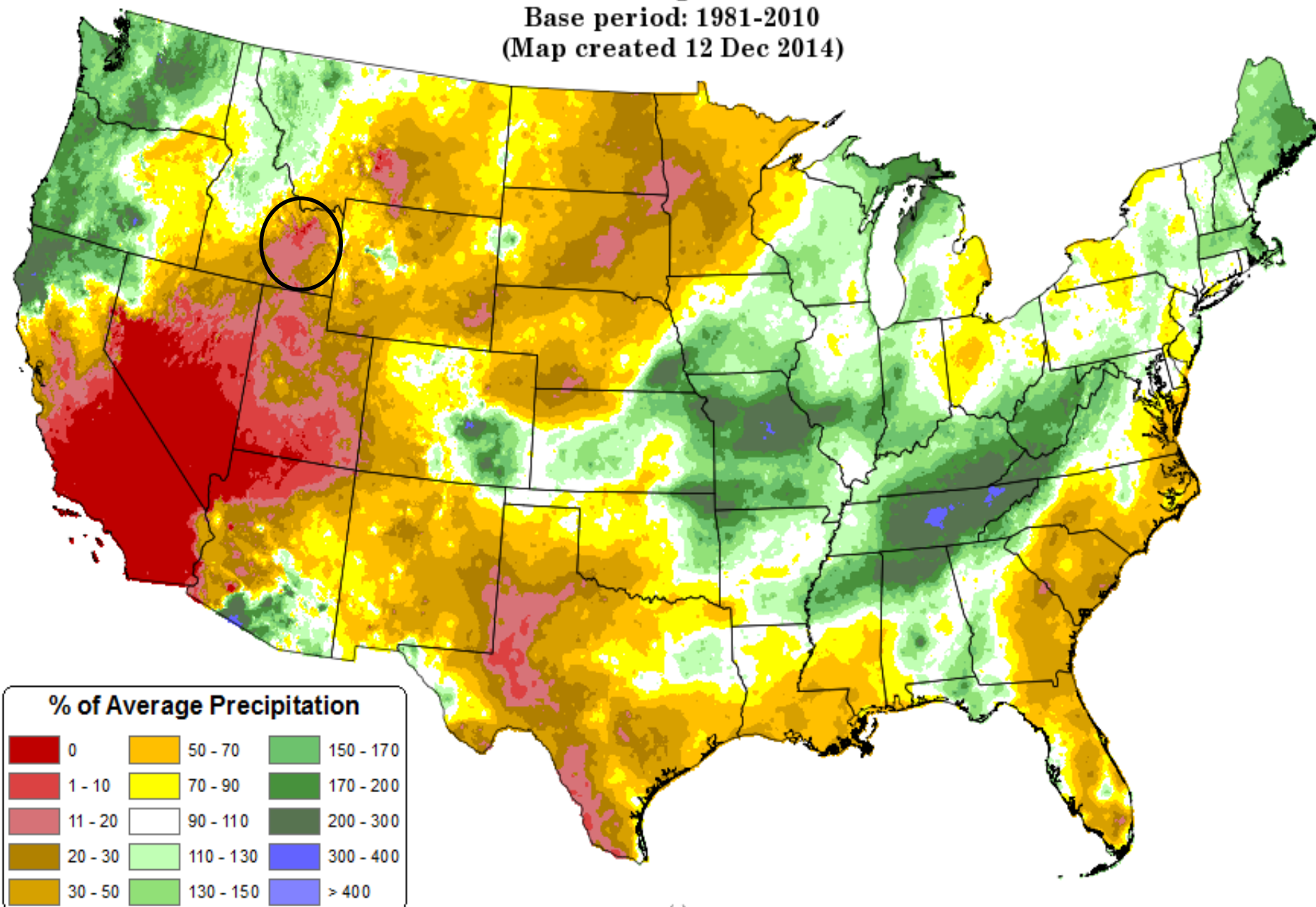
Prepared by:
USDA/NRCS National Water and Climate Center
Portland, Oregon
<http://www.wcc.nrcs.usda.gov>

Total Precipitation Anomaly: October 2014

Period ending 31 Oct 2014

Base period: 1981-2010

(Map created 12 Dec 2014)

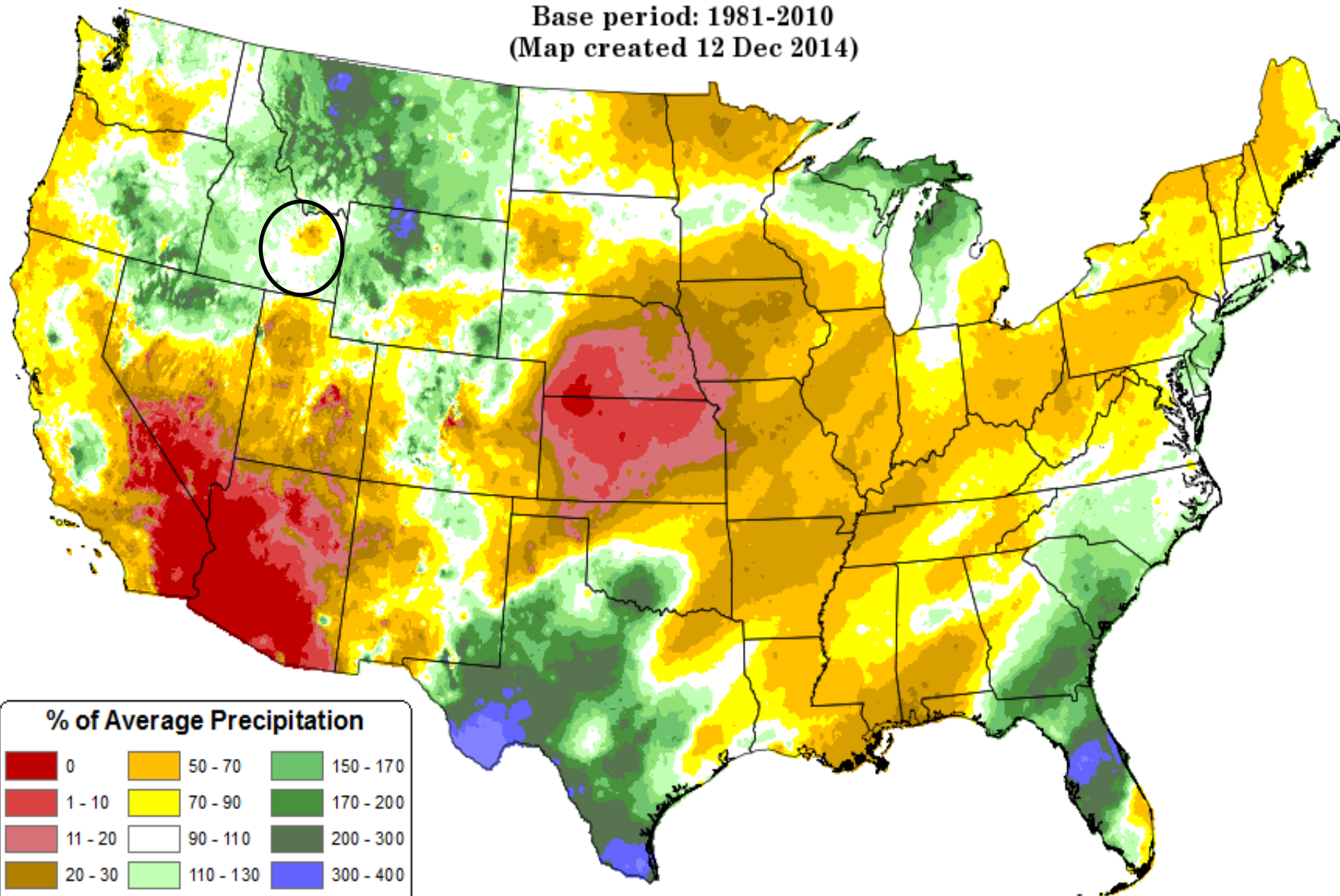


Total Precipitation Anomaly: November 2014

Period ending 30 Nov 2014

Base period: 1981-2010

(Map created 12 Dec 2014)

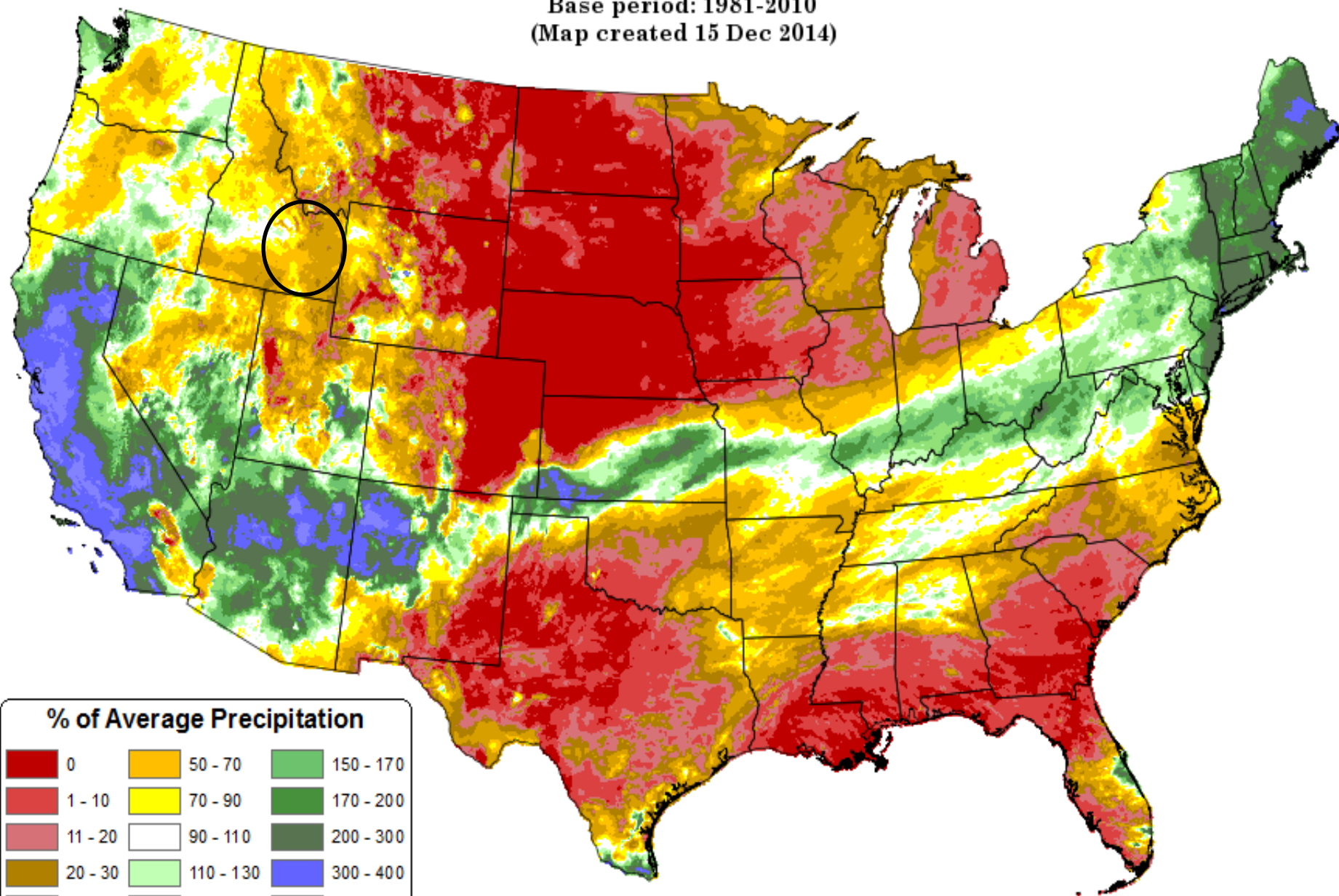


Total Precipitation Anomaly: 01 December 2014 - 14 December 2014

Period ending 7 AM EST 14 Dec 2014

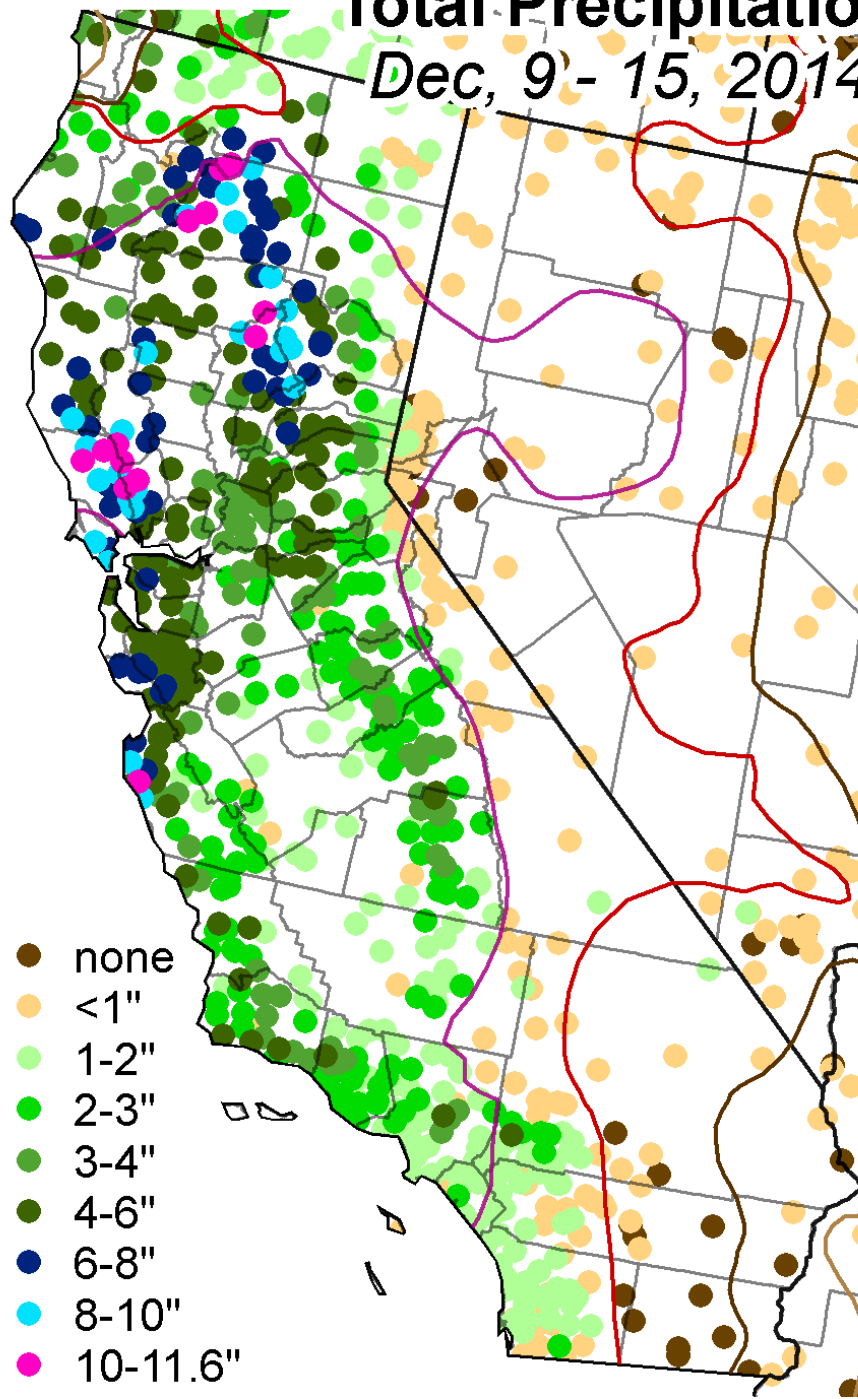
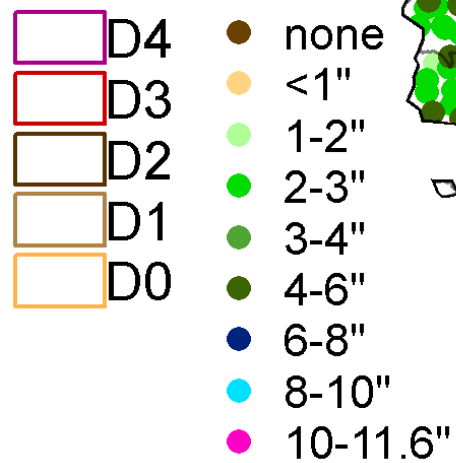
Base period: 1981-2010

(Map created 15 Dec 2014)



Total Precipitation

Dec, 9 - 15, 2014



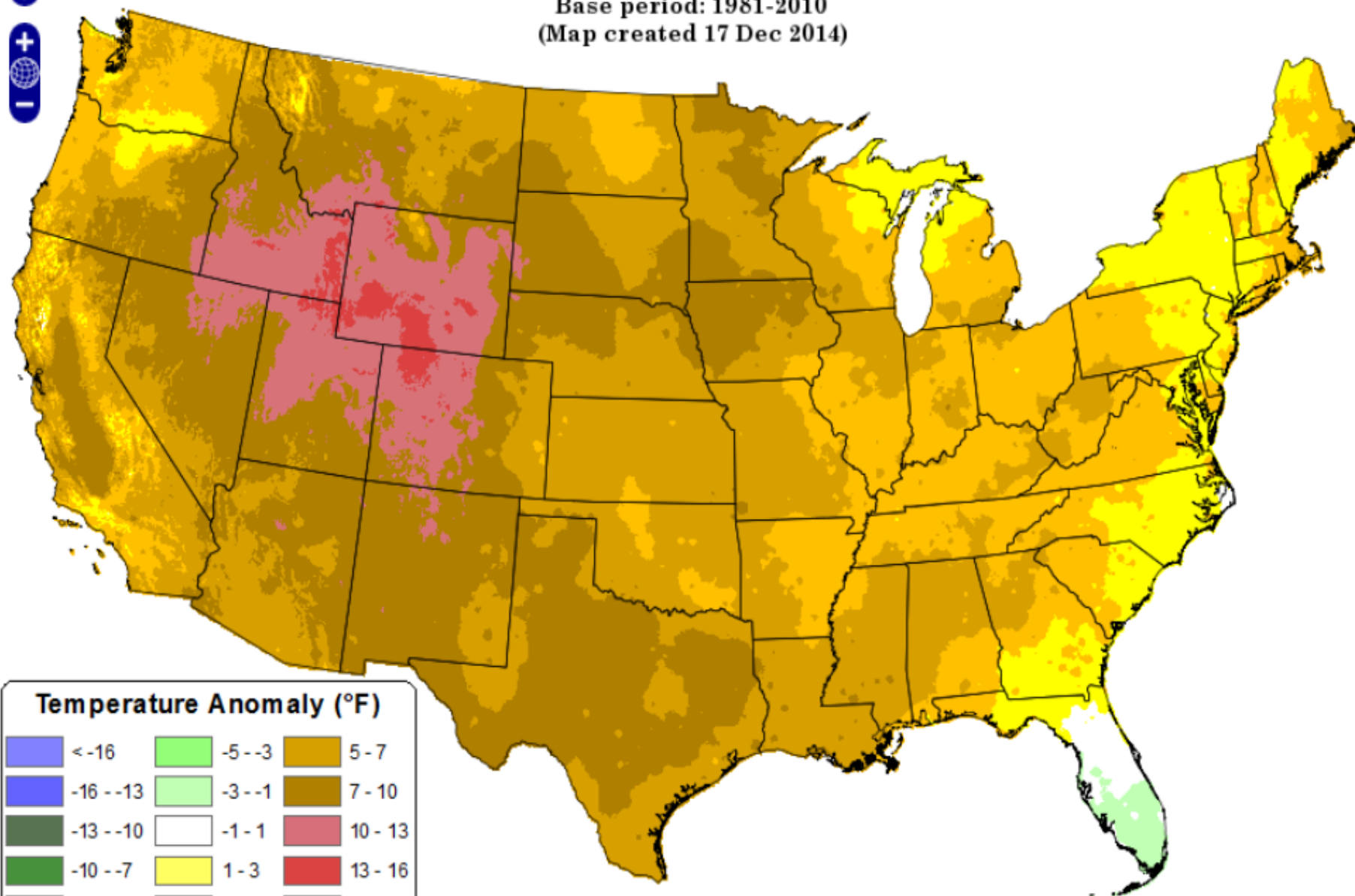


Daily Mean Temperature Anomaly: 01 December 2014 - 16 December 2014

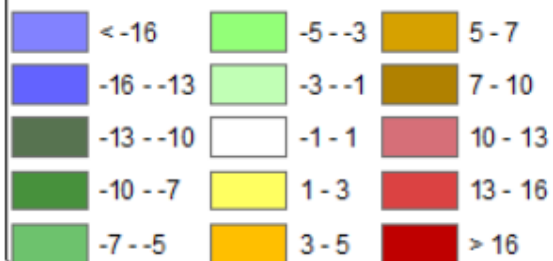
Period ending 7 AM EST 16 Dec 2014

Base period: 1981-2010

(Map created 17 Dec 2014)



Temperature Anomaly (°F)

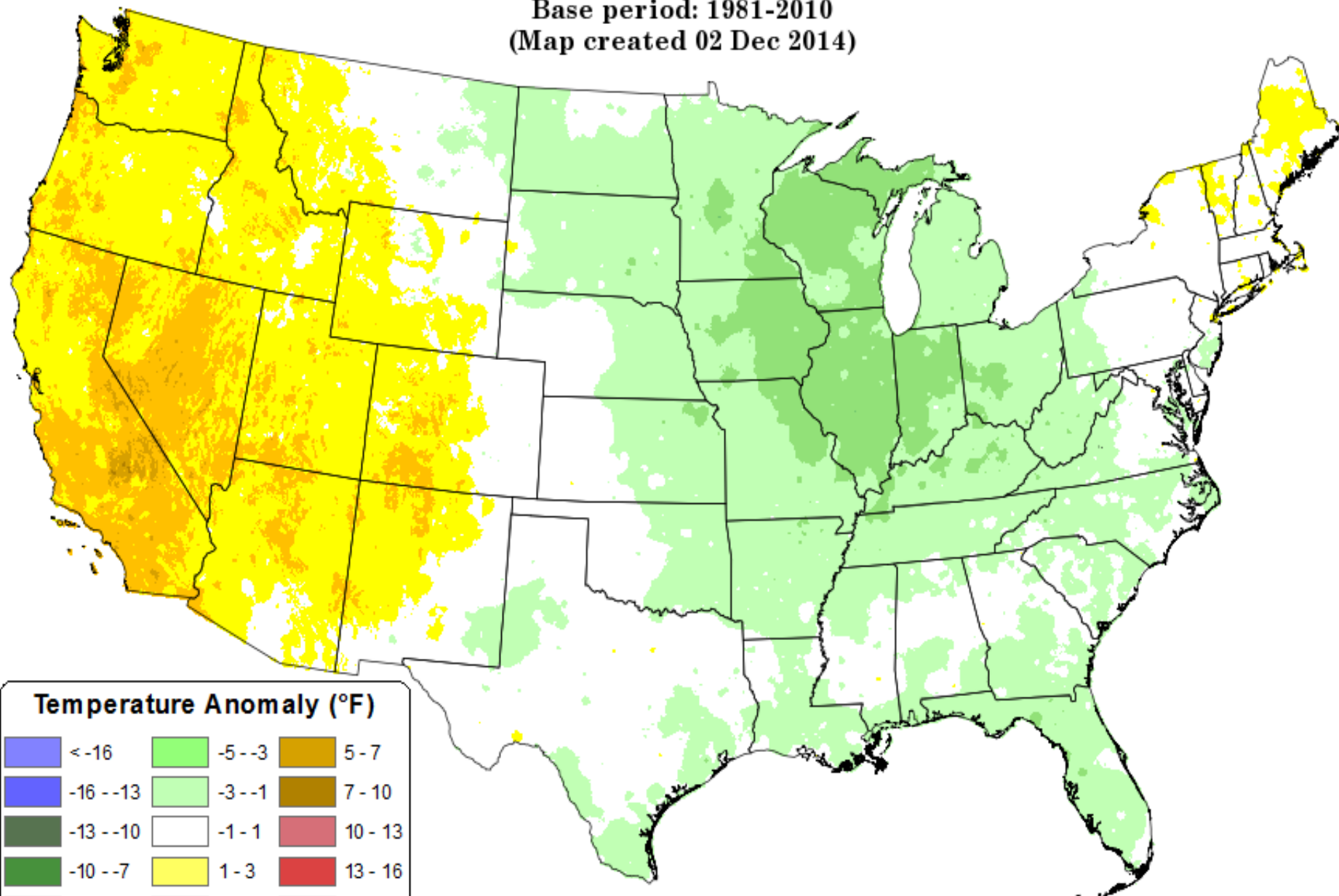


Daily Mean Temperature Anomaly: September 2014 - November 2014

Period ending 7 AM EST 30 Nov 2014

Base period: 1981-2010

(Map created 02 Dec 2014)





What's Needed in 2015?

Owyhee Reservoir

April 19, 2009

&

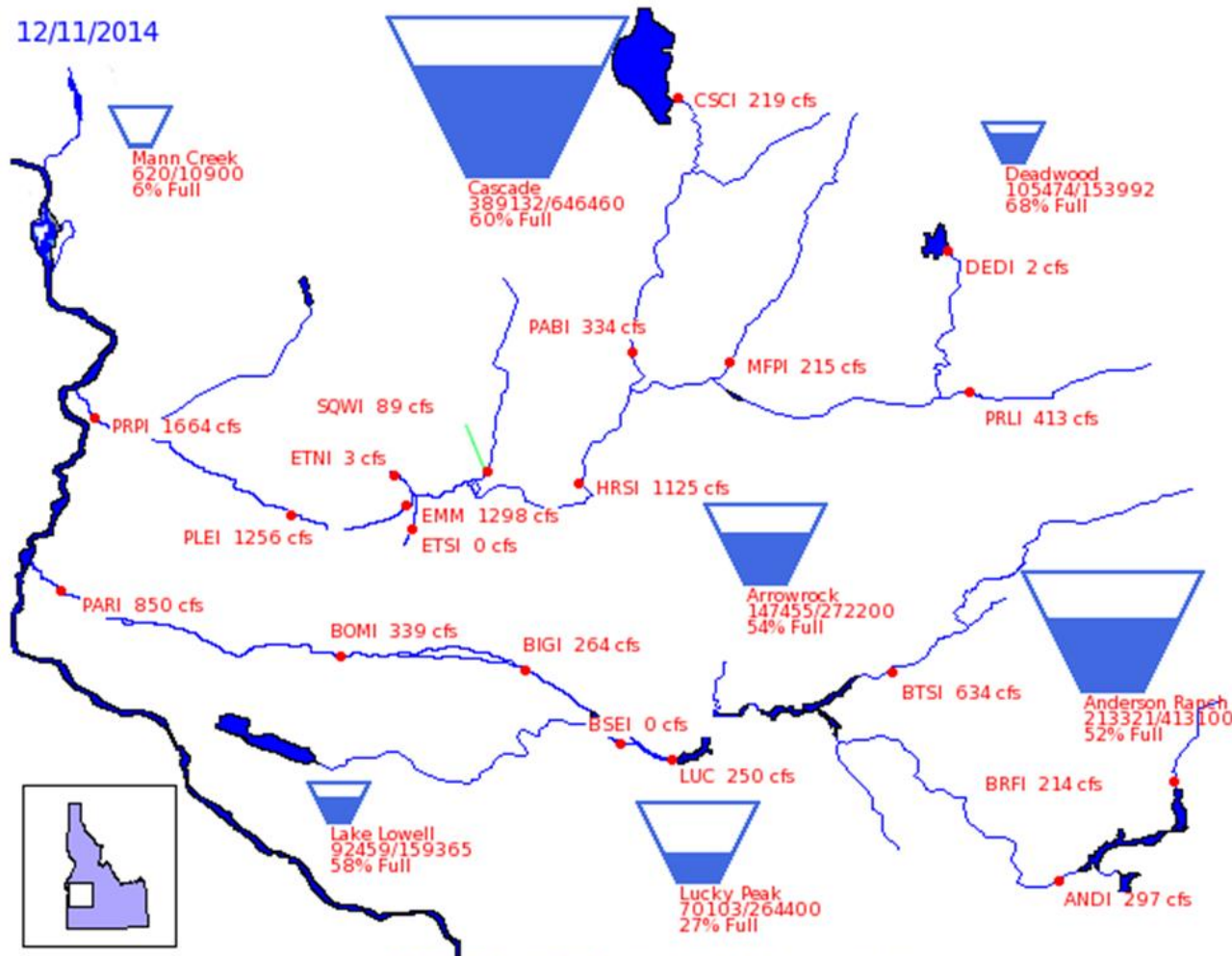
Owyhee River below Dam

April 19, 2009 & April 7, 2006



**Bureau of Reclamation, Pacific Northwest Region
Major Storage Reservoirs in the Boise & Payette River Basins**

12/11/2014



PROVISIONAL DATA - SUBJECT TO CHANGE!

**Payette
Reservoir System
62% of capacity**

**Boise Reservoir
System for Nov 30**

Boise River system (Anderson Ranch, Arrowrock, Lucky Peak) is at 45 % of capacity.

Total space available: 518821 AF
Total storage capacity: 949700 AF
Natural Flow: 1193 CFS

Payette River system (Cascade, Deadwood) is at 62 % of capacity.

Total space available: 305846 AF
Total storage capacity: 800452 AF
Natural Flow: 1700 CFS

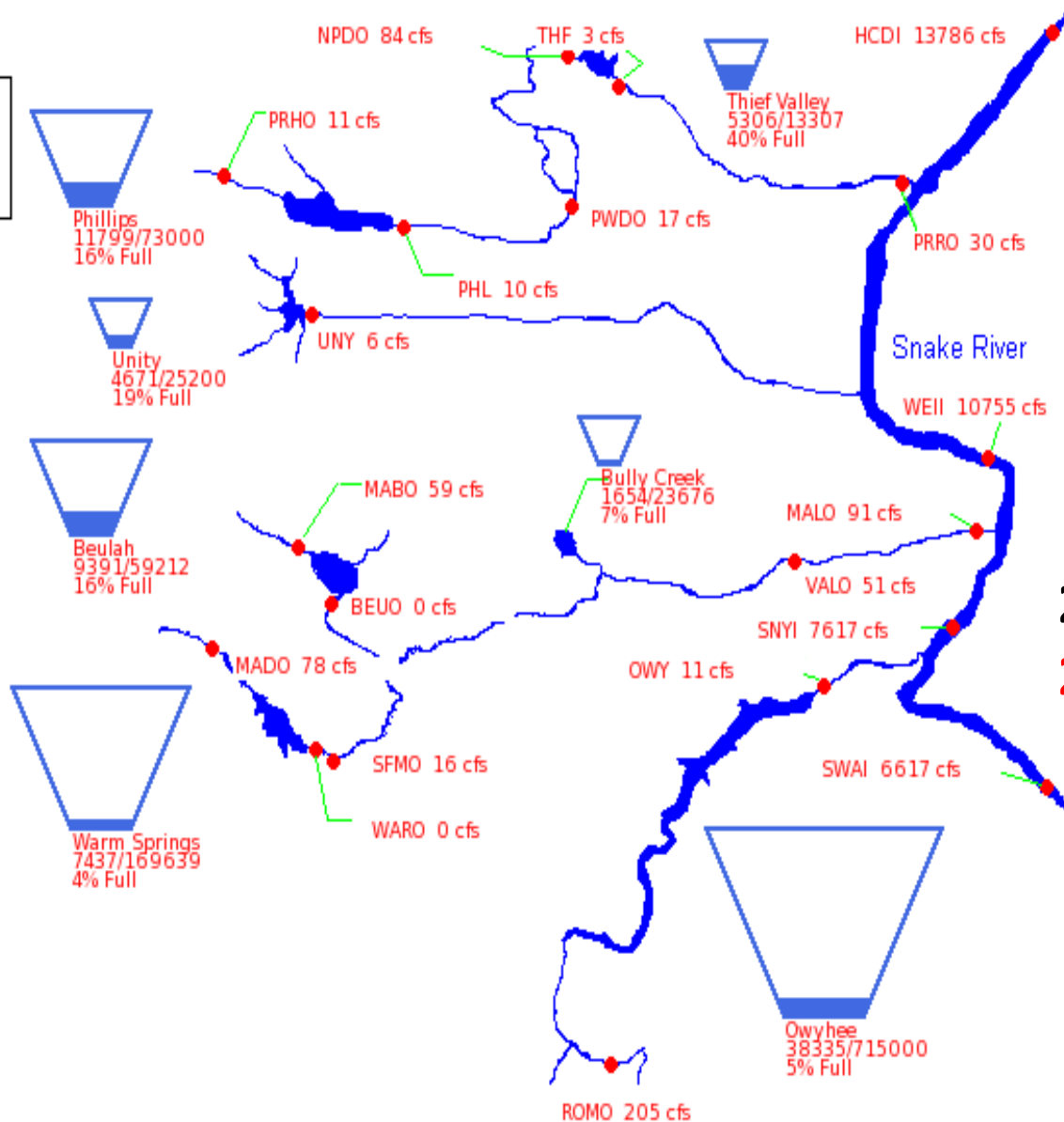
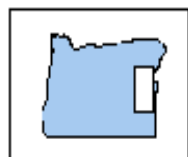
2013 463.4 KAF

2014 396.0

2015 474.1

US Bureau of Reclamation, Pacific Northwest Region Major Storage Reservoirs in Southeastern Oregon

12/11/2014



**Nov 30 Owyhee
Storage**

2013 44.9 KAF

2014 30.8 KAF

5% full

**Nov 30 Owyhee
storage is
lowest since
1993**

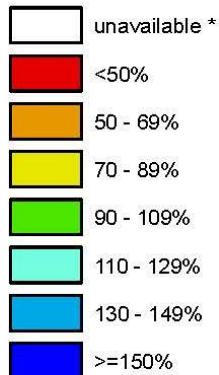
NOTE: This graphic does not depict 400,000 acre-feet of water that is maintained in Owyhee reservoir.

PROVISIONAL DATA - SUBJECT TO CHANGE!

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

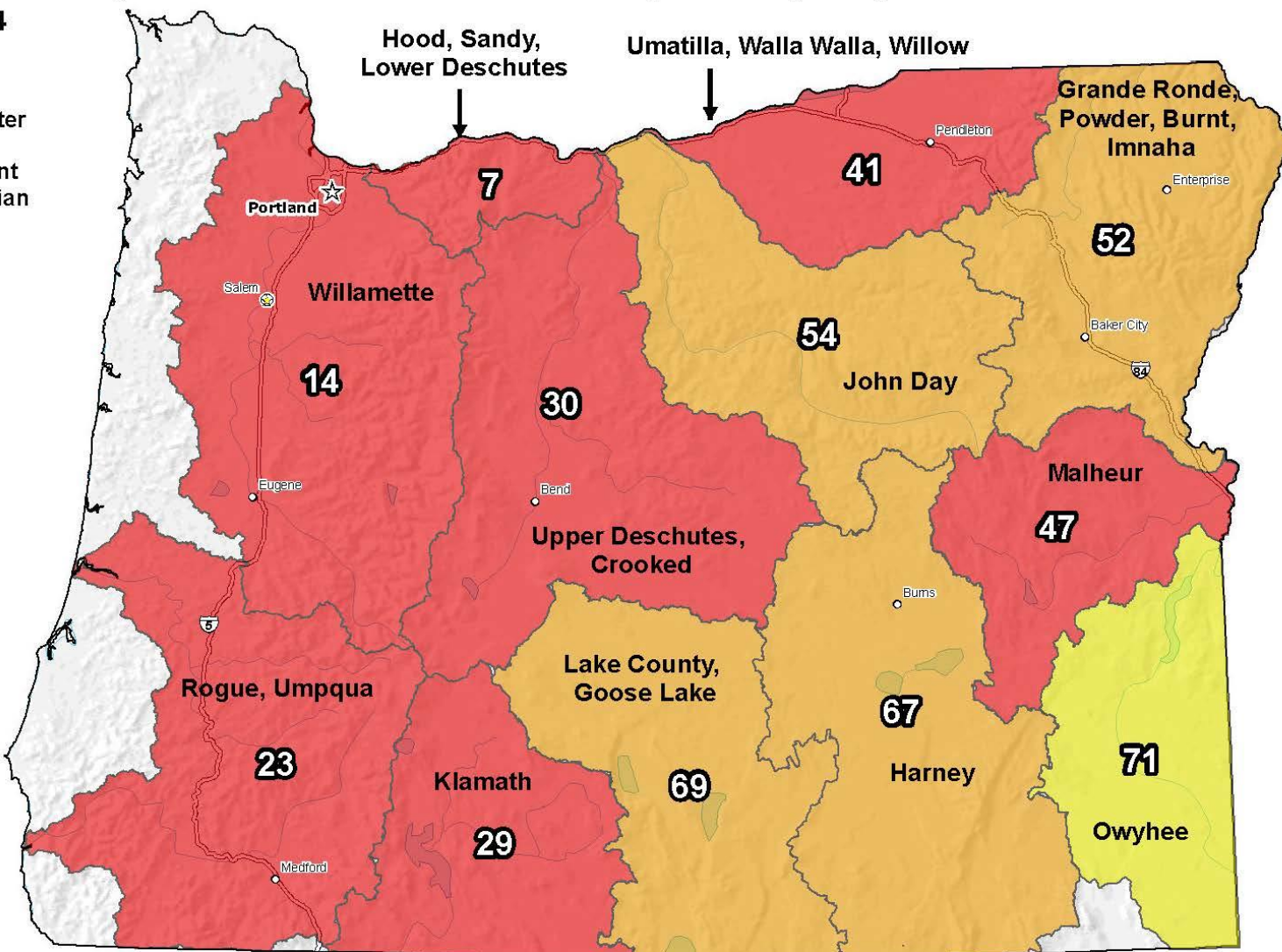
Dec 16, 2014

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**



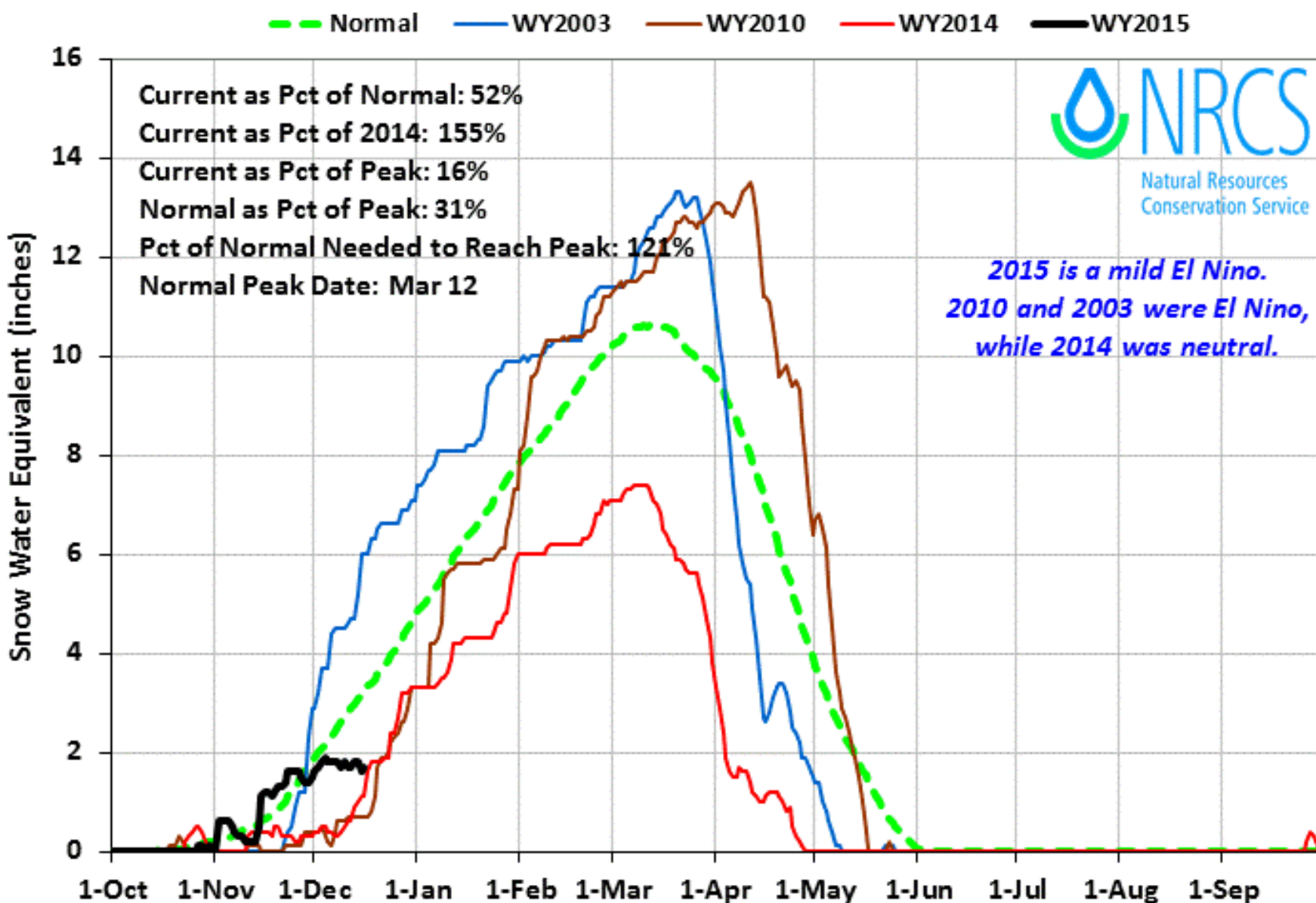
The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

0 10 20 40 60 80 100 Miles

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

Owyhee Basin 2015 Snowpack Comparison Graph (7 sites)

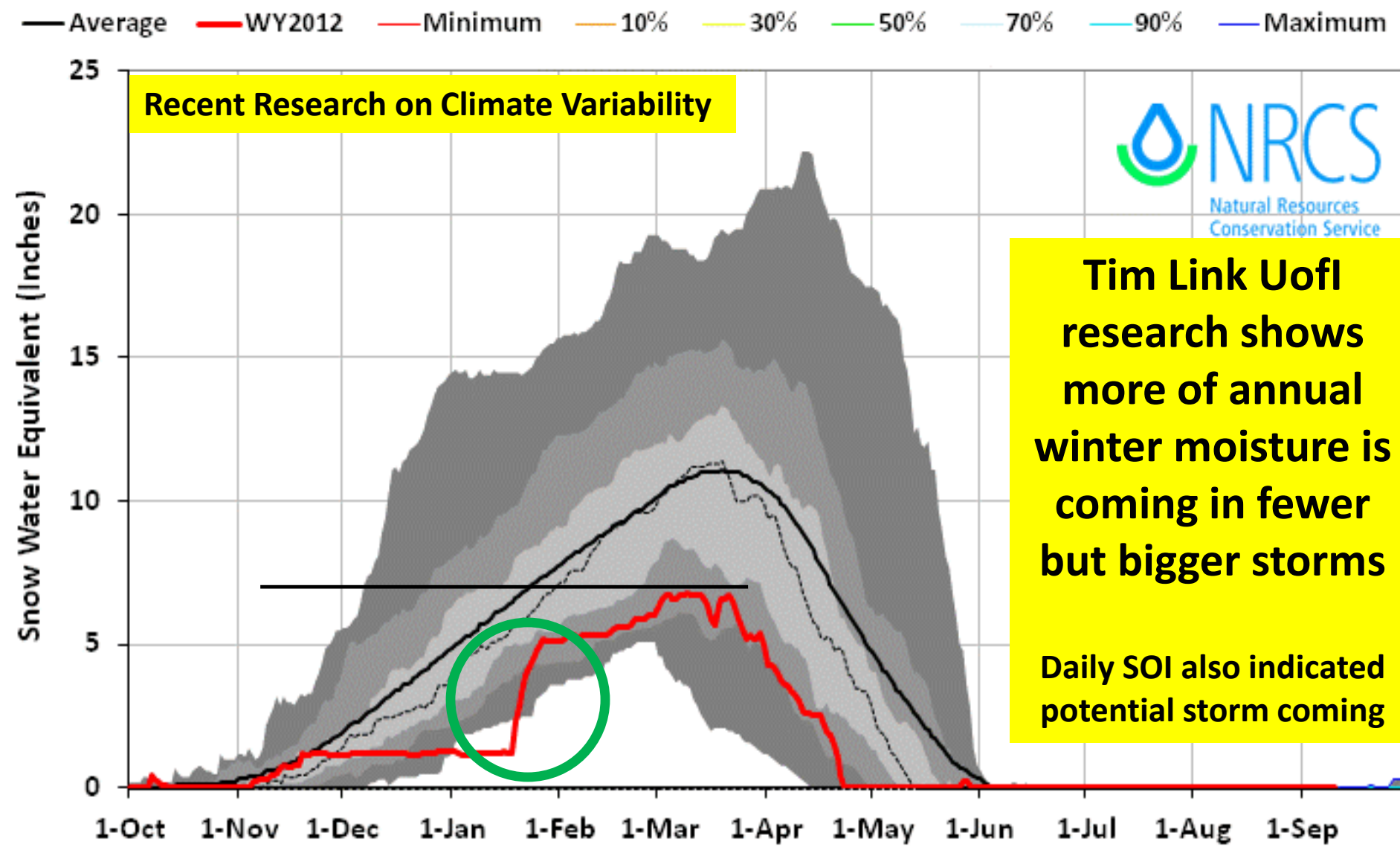
Based on Provisional SNOTEL data as of Dec 16, 2014



Jan 2012 Owyhee Basin 7 Station Snow Index were Record Low

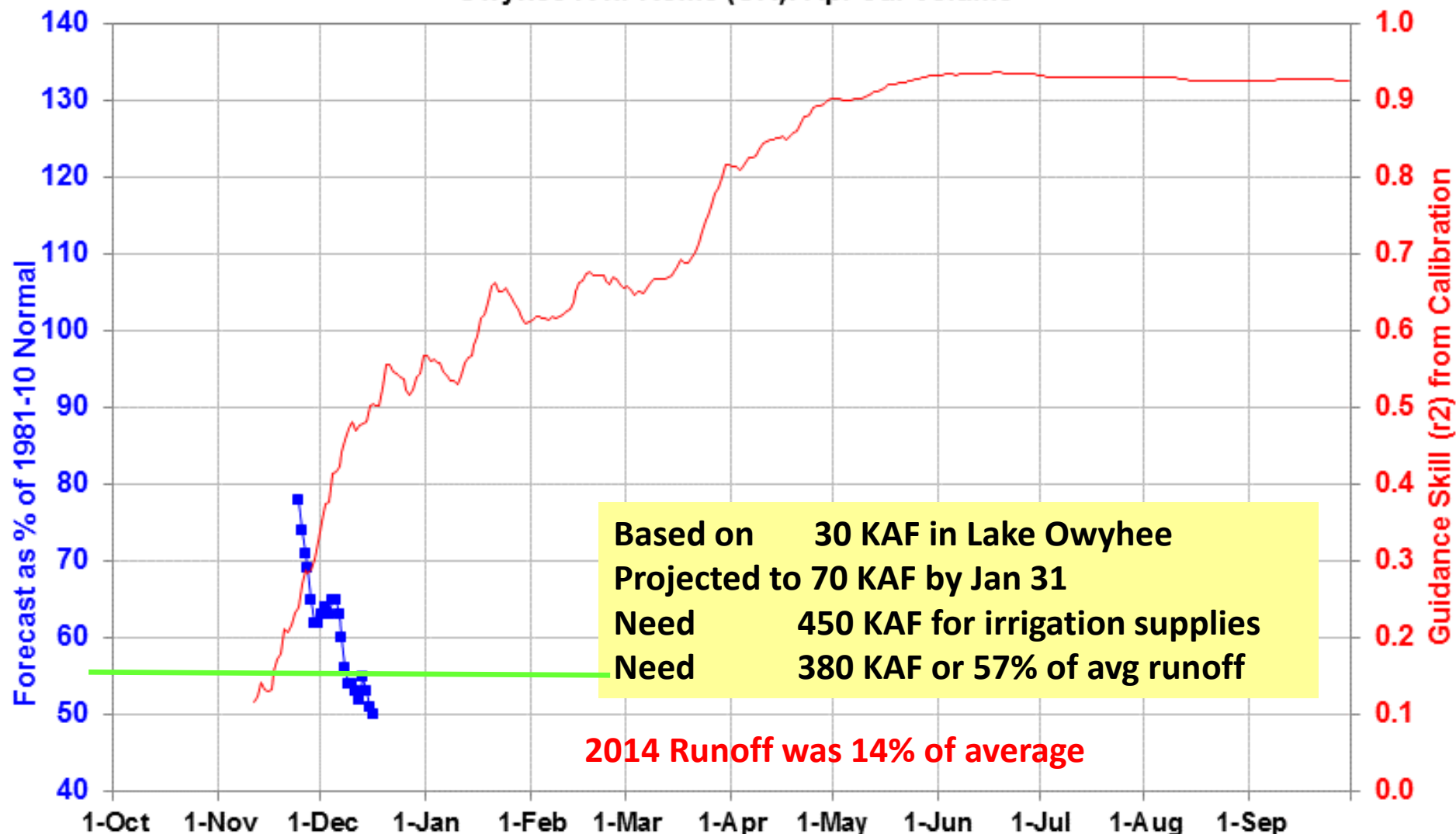
Owyhee Basin 2012 Snow Water with Non-Exceedence Projections (7 sites)

Based on Provisional SNOTEL data as of Sep 10, 2012



Created 7:14 Dec 16 2014

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



Based on 30 KAF in Lake Owyhee
Projected to 70 KAF by Jan 31
Need 450 KAF for irrigation supplies
Need 380 KAF or 57% of avg runoff

2014 Runoff was 14% of average

■ Guidance fcst % norm
— Guidance Skill (r^2)



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/wsf/daily_forecasts.html

Based on Provisional SNOTEL data as of Dec 15, 2014

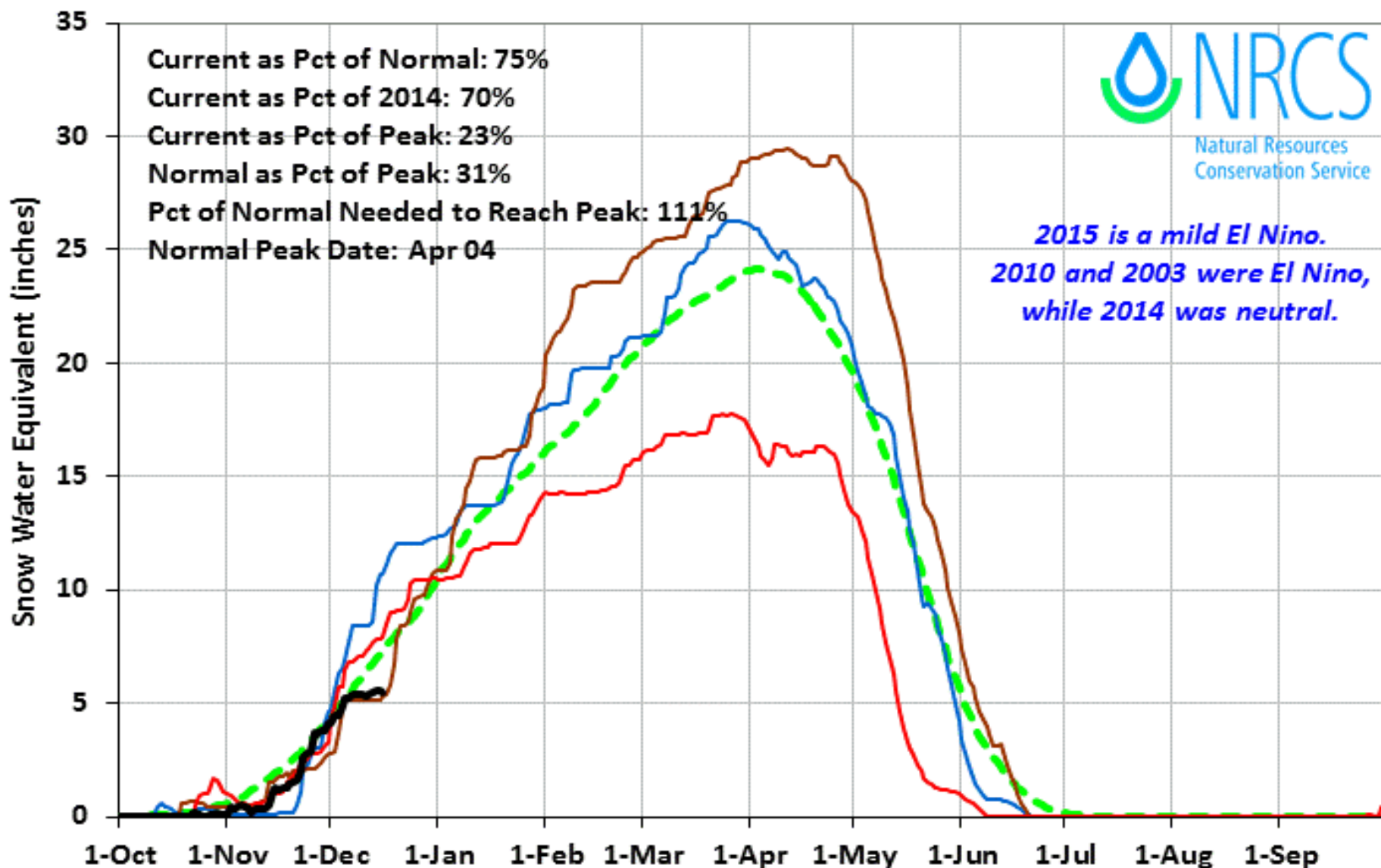
Based on Provisional SNOTEL data as of Dec 15, 2014



Payette Basin 2015 Snowpack Comparison Graph (11 sites)

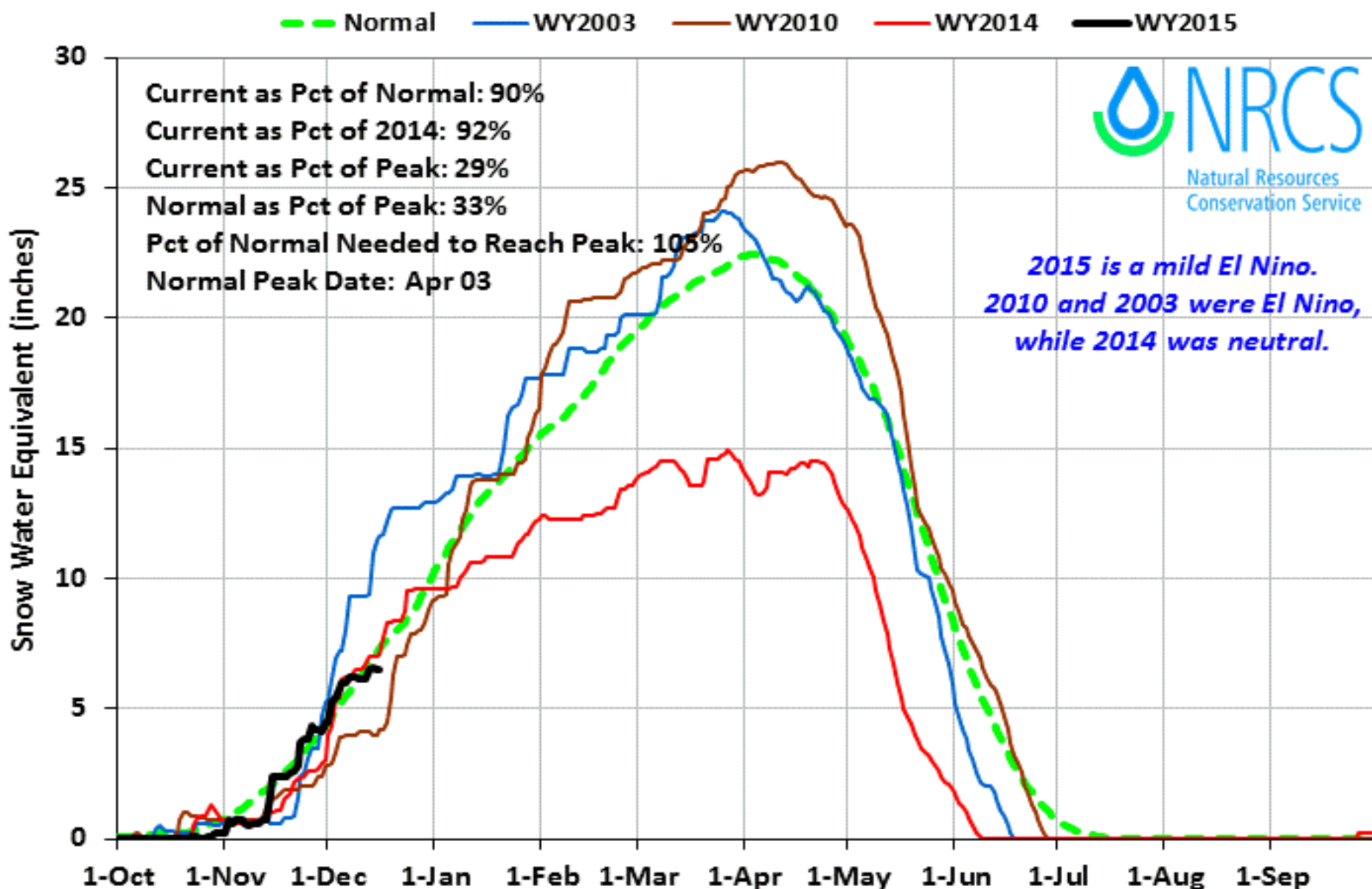
Based on Provisional SNOTEL data as of Dec 16, 2014

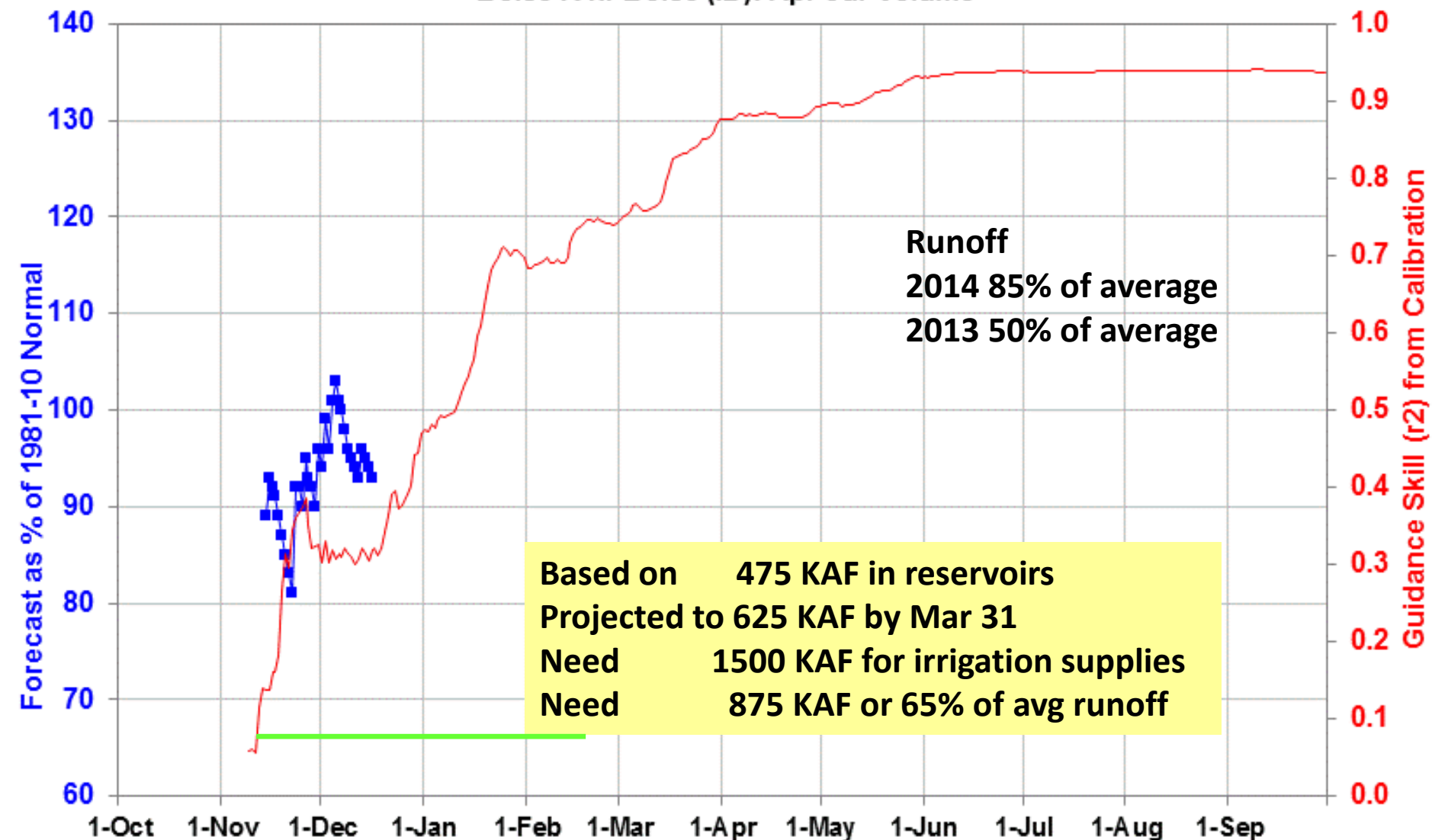
Normal WY2003 WY2010 WY2014 WY2015



Boise Basin 2015 Snowpack Comparison Graph (10 sites)

Based on Provisional SNOTEL data as of Dec 16, 2014





■ Guidance fcst % norm
 — Guidance Skill (r^2)



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/wsf/daily_forecasts.html

2015 Streamflow Needed for Adequate Irrigation Supplies

Fall reservoir carryover storage is used to project spring storage levels. By knowing the adequate irrigation water supply level in your basin, spring reservoir volumes are subtracted from the adequate irrigation supply to determine the volume of streamflow needed to meet marginally adequate surface irrigation supplies for 2015.

Basin	Adequate irrigation water supply KAF	Projected End of Mar, Feb or Jan reservoir storage KAF	2015 Streamflow volume needed for adequate water supply KAF	Percent of average streamflow needed to meet an adequate irrigation supply in 2015	1981-2010 streamflow average KAF	Streamflow period	2014 runoff as percent of average
Boise	1,500	624	876	64%	1360	apr-sep	86%
Big Wood	275	68	207	78%	265	apr-sep	31%
Little Wood	60	17	43	53%	82	mar-sep	32%
Big Lost	180	32	148	98%	150	apr-sep	45%
Little Lost	40	---	40	118%	34	apr-sep	67%
Teton	85	---	85	44%	193	apr-sep	107%
Snake (Heise)	4,400	1792	2,608	69%	3780	apr-sep	121%
Oakley	50	19	31	100%	31	mar-sep	62%
Salmon Falls	110	20	90	106%	85	mar-sep	49%
Owyhee	450	70	380	57%	665	feb-sep	14% (at Rome)
Bear River	400	---	0	0%	205	apr-sep	57%



[Home](#) [Weather Models](#) [Current Weather](#) [Winter Weather Wall](#) [Snow Day Formula](#) [2013-2014 Winter Forecast Directory](#)

[2013-2014 Official Winter Forecast](#) [**Final 2013-2014 Winter Forecast**](#)

December 22-26/Christmas Potential Winter Storm

From Dec 10

Posted: 10 Dec 2014 03:19 PM PST

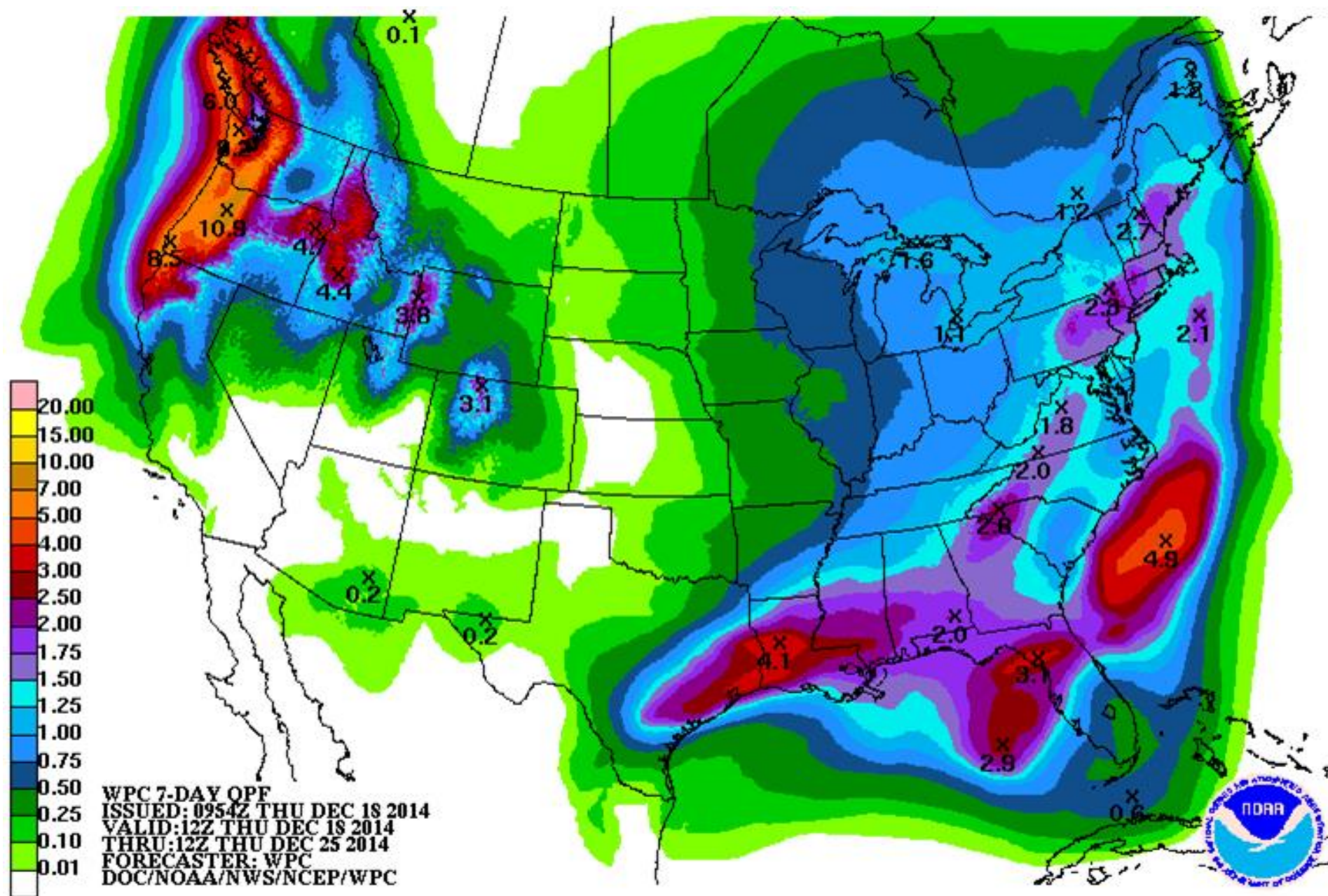
I'm watching the potential for a winter storm in the December 22-26 timeframe.

To summarize:

- A winter storm may be in the cards for December 22-26th, likely impacting Christmas travel plans.
- A second storm system may need to be watched for the Northern Plains.
- The primary threat here may become a storm favorable for heavy snow, either in the Central/East US (ideally the Ohio Valley/Midwest) or along the Eastern Seaboard.
- Relatively low confidence still exists due to the long-range nature of this threat.

Andrew

Total Precipitation Dec 18 - 25

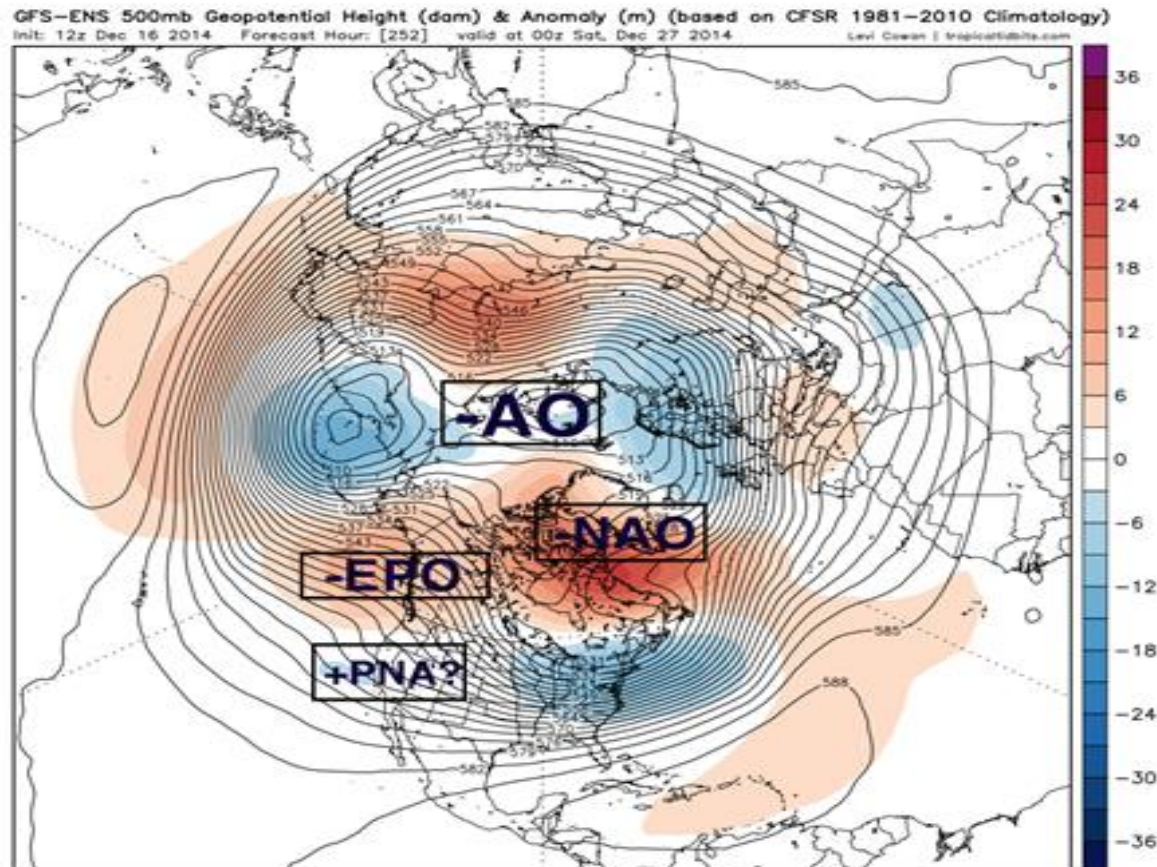


Atmospheric Trifecta Preparing to Deliver Cold, Snowy January

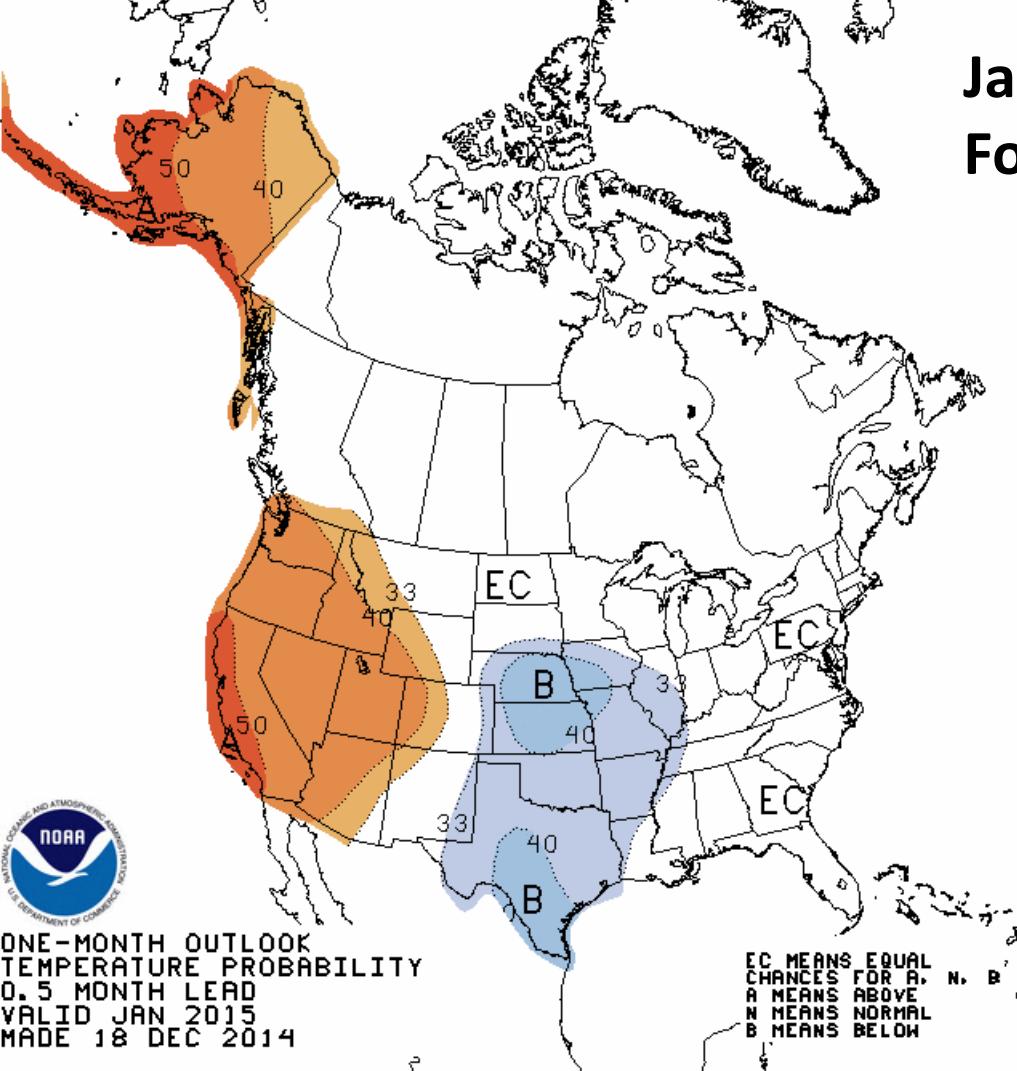
Posted: 16 Dec 2014 02:25 PM PST

A trio of atmospheric signals are gearing up for what could be a rather cold, snowy January.

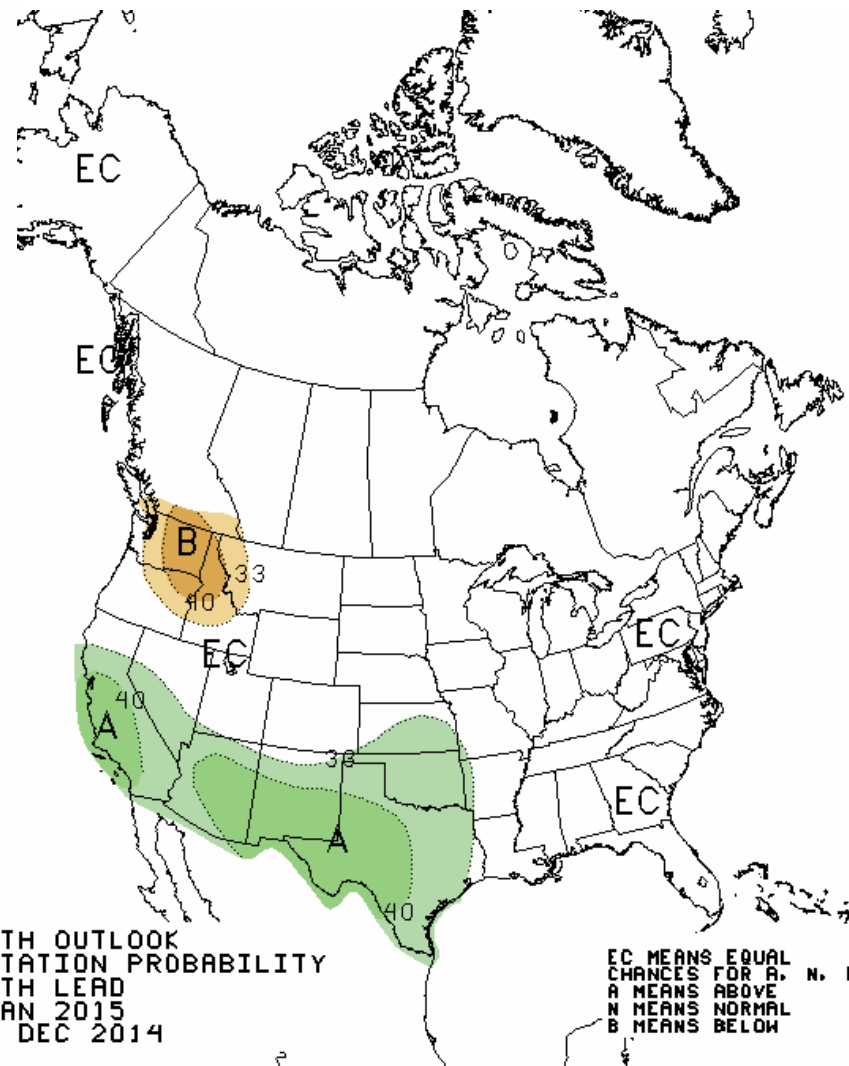
Research I completed last night showed significant (10"+) snowstorms in the Midwest are most favored under the negative phase of the Arctic Oscillation, the negative phase of the East Pacific Oscillation, the negative phase of the North Atlantic Oscillation, and the positive phase of the Pacific-North American index. **We look to have at least three of these factors locking down the atmosphere to round out December and kick off 2015.**



January's Temperature Forecast



January's Precipitation Forecast





**Replacing Emigration
Summit's flat snow
pillow Dec 11, 2014**

**Questions / Comments
Corrections???**