



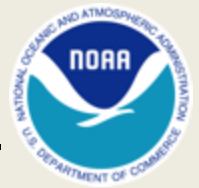
# Call Agenda

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- Welcome
- El Niño and Regional Climate brief (D. McEvoy)
- Climatology Application (NANOOS)
- Environmental conditions and impacts reporting update (T. Vann)
- NOAA West Watch Update (T. Vann/D. McEvoy)
- Discussion

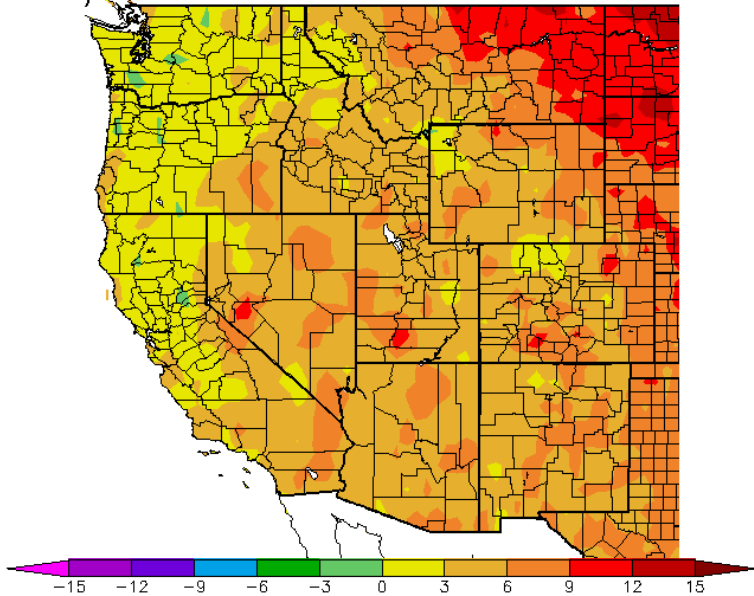
# Temperature



**Mar 1 – Mar 19, 2016**

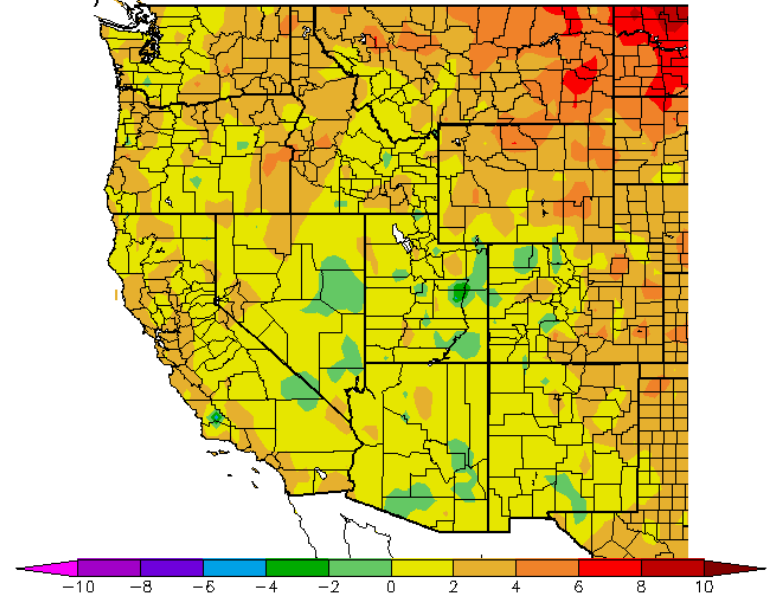
**Oct 1, 2015 – Mar 19, 2016**

Ave. Temperature dep from Ave (deg F)  
3/1/2016 – 3/19/2016



Generated 3/20/2016 at WRCC using provisional data.  
NOAA Regional Climate Centers

Ave. Temperature dep from Ave (deg F)  
10/1/2015 – 3/19/2016

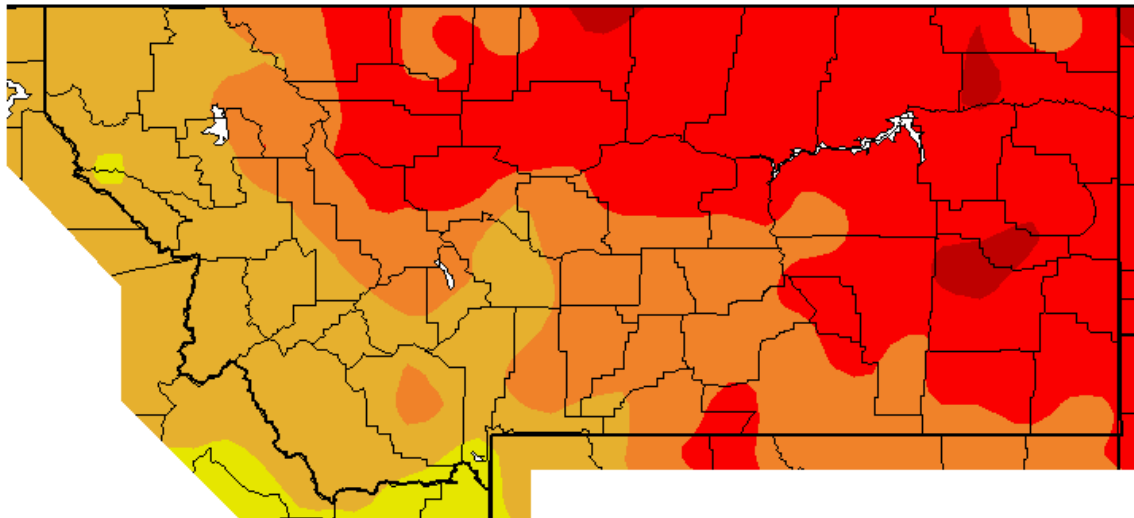


Generated 3/20/2016 at WRCC using provisional data.  
NOAA Regional Climate Centers

**water year to date**

## Montana Jan 20 – Mar 19, 2016

Ave. Temperature dep from Ave (deg F)  
1/20/2016 – 3/19/2016



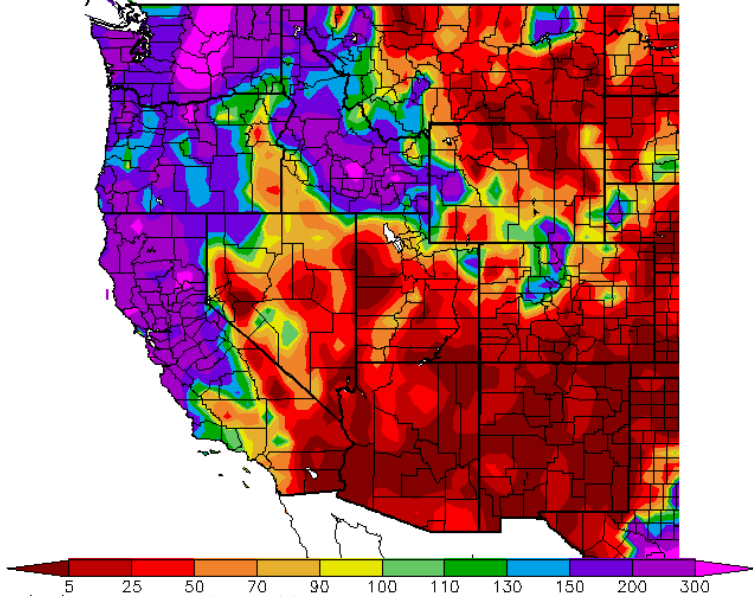
Generated 3/20/2016 at WRCC using provisional data.  
NOAA Regional Climate Centers

# Precipitation



## Mar 1 – Mar 19, 2016

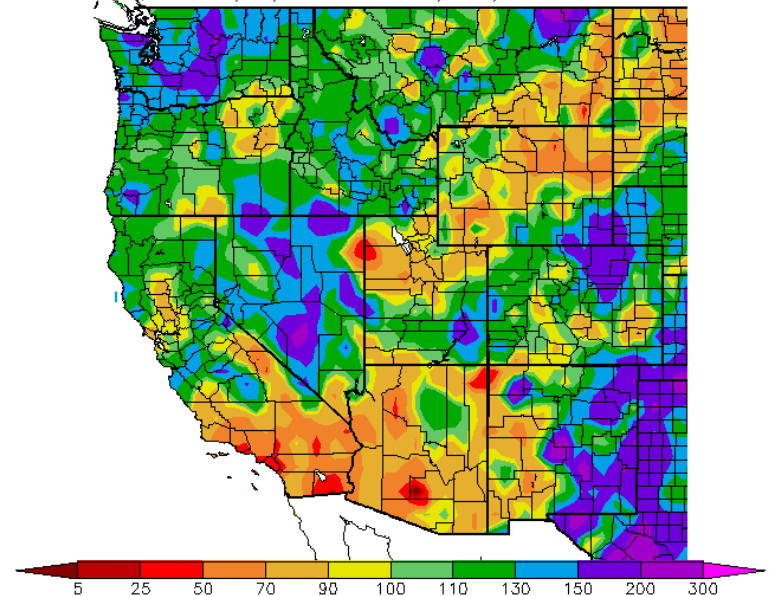
Percent of Average Precipitation (%)  
3/1/2016 – 3/19/2016



Generated 3/20/2016 at WRCC using provisional data.  
NOAA Regional Climate Centers

## Oct 1, 2015 – Mar 19, 2016

Percent of Average Precipitation (%)  
10/1/2015 – 3/19/2016

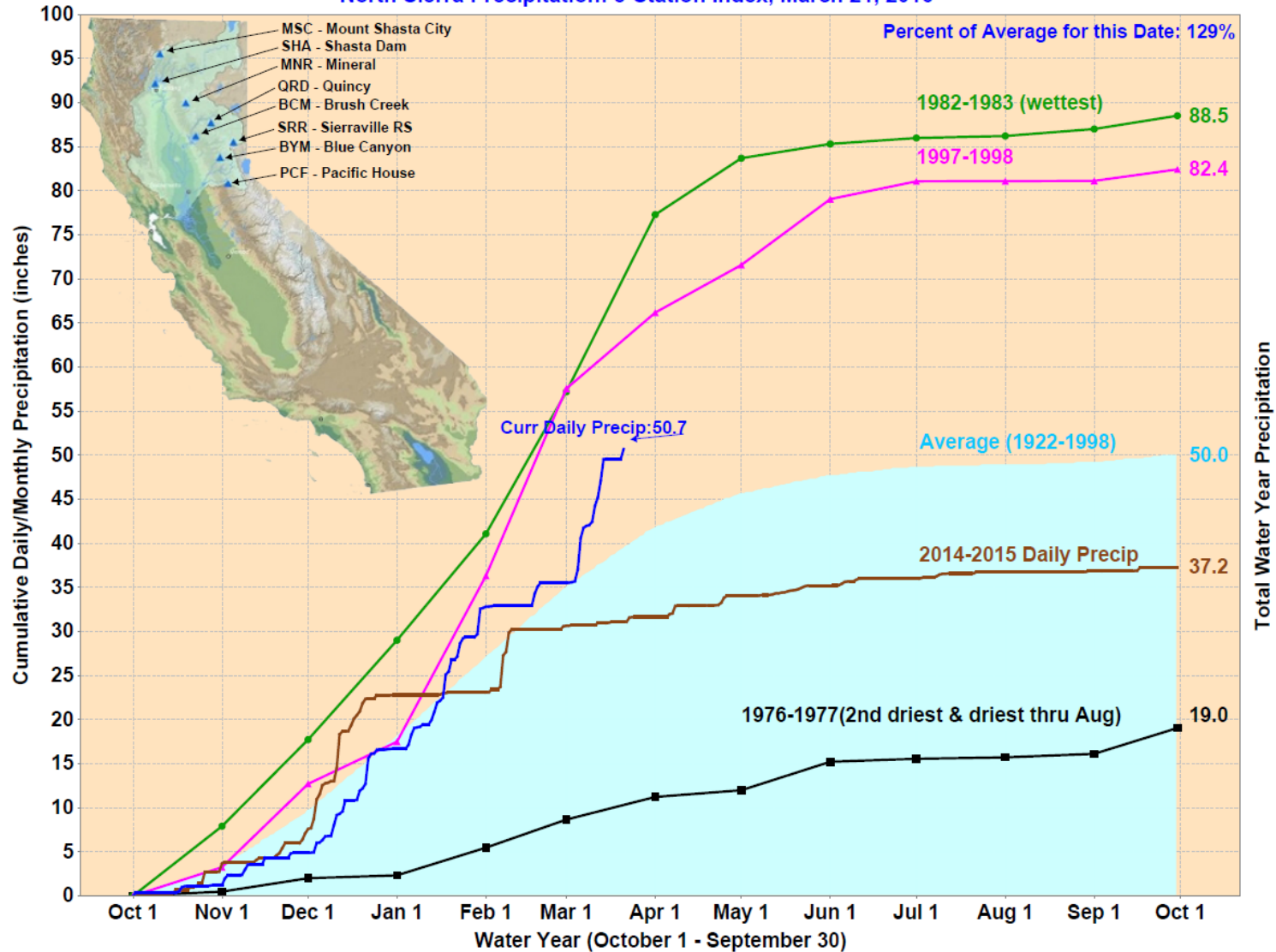


Generated 3/20/2016 at WRCC using provisional data.  
NOAA Regional Climate Centers

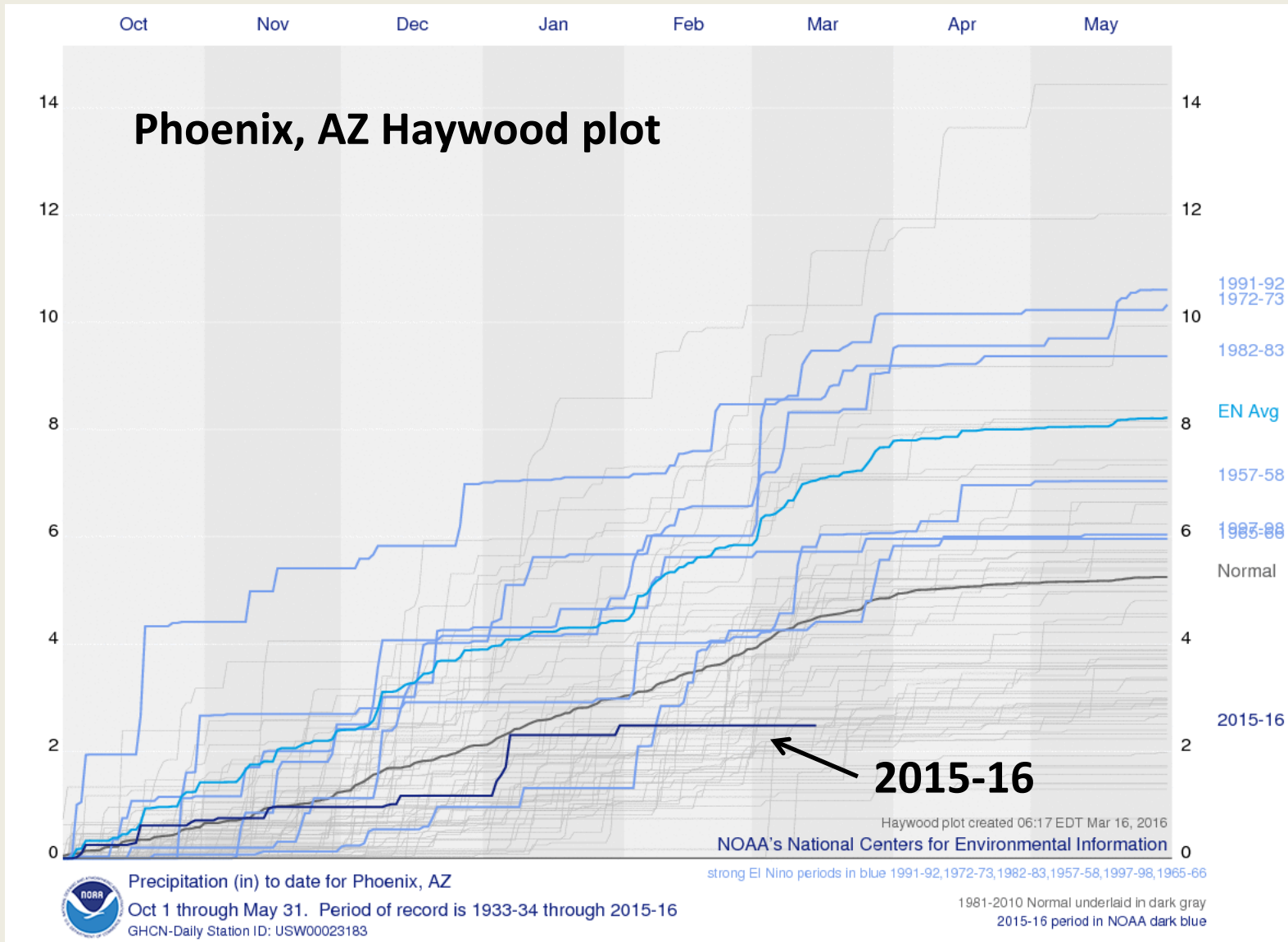
# Precipitation



North Sierra Precipitation: 8-Station Index, March 21, 2016



# Precipitation



# Snow Water Equivalent



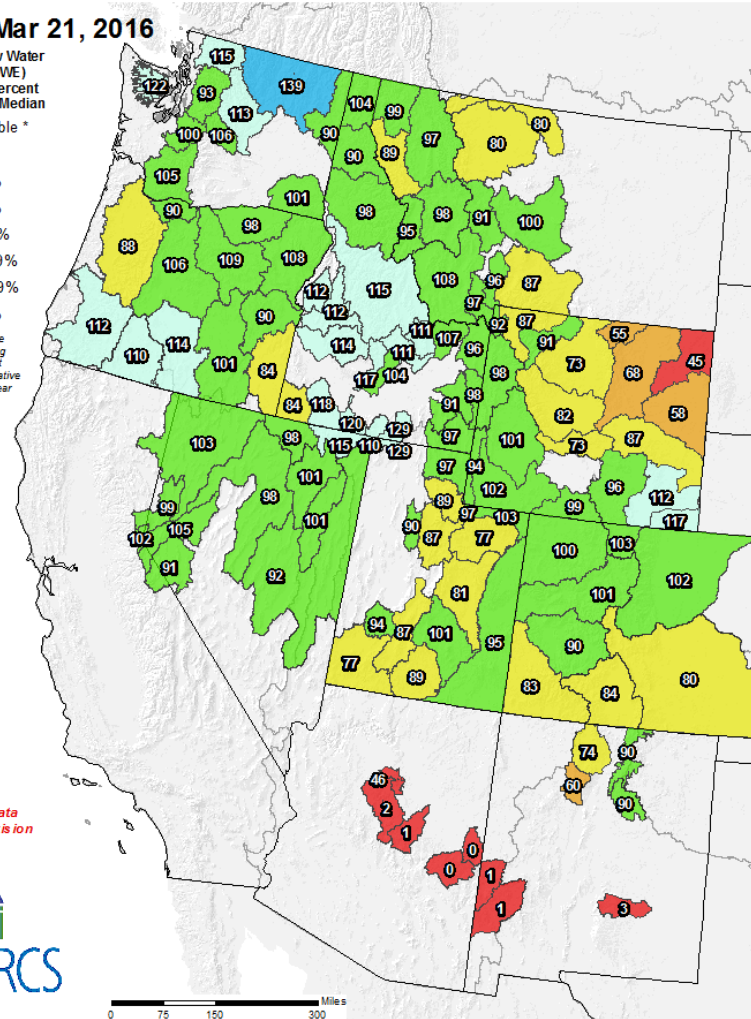
Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Mar 21, 2016

Current Snow Water Equivalent (SWE) 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



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>



# Snow Water Equivalent



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



Statewide Average: 87% / 88%

NORTH	
Data as of March 21, 2016	
Number of Stations Reporting	27
Average snow water equivalent (Inches)	27.5
Percent of April 1 Average (%)	96
Percent of normal for this date (%)	96

CENTRAL	
Data as of March 21, 2016	
Number of Stations Reporting	38
Average snow water equivalent (Inches)	25.9
Percent of April 1 Average (%)	89
Percent of normal for this date (%)	90

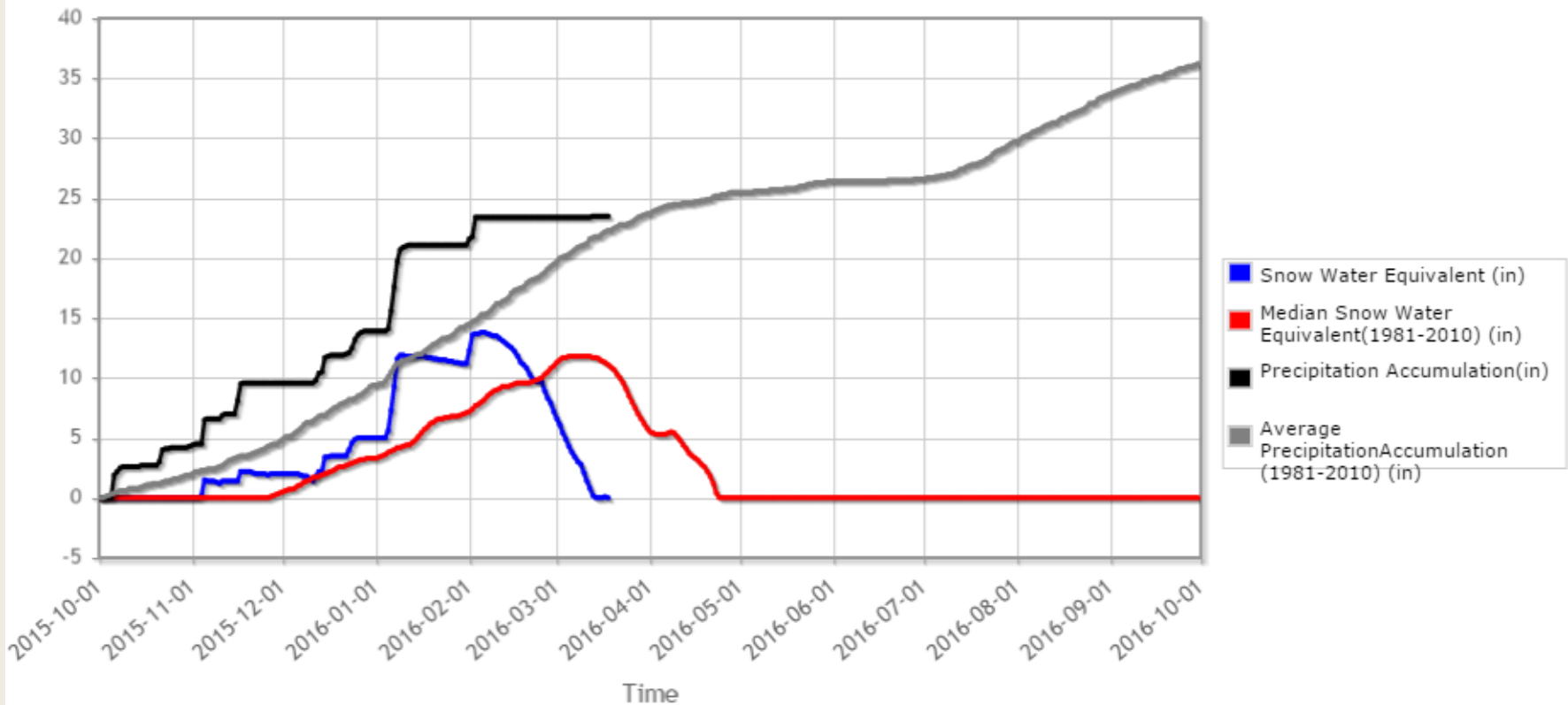
SOUTH	
Data as of March 21, 2016	
Number of Stations Reporting	26
Average snow water equivalent (Inches)	19.6
Percent of April 1 Average (%)	74
Percent of normal for this date (%)	75

STATE	
Data as of March 21, 2016	
Number of Stations Reporting	91
Average snow water equivalent (Inches)	24.6
Percent of April 1 Average (%)	87
Percent of normal for this date (%)	88

# Snow Water Equivalent

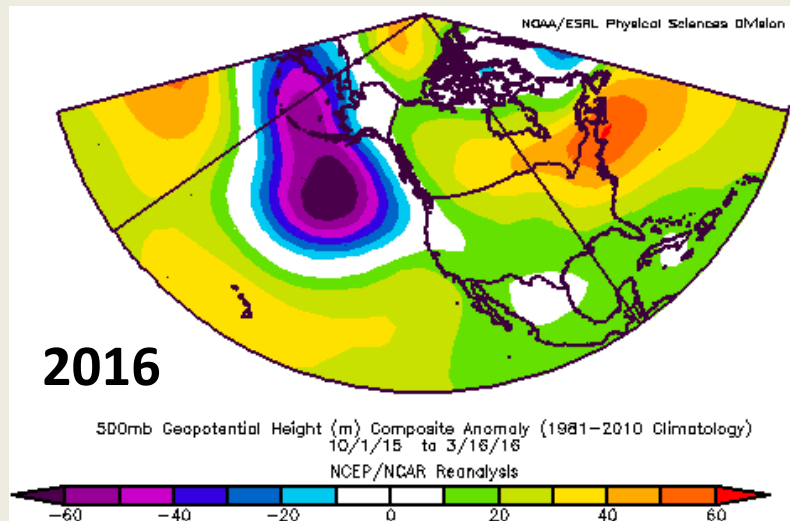
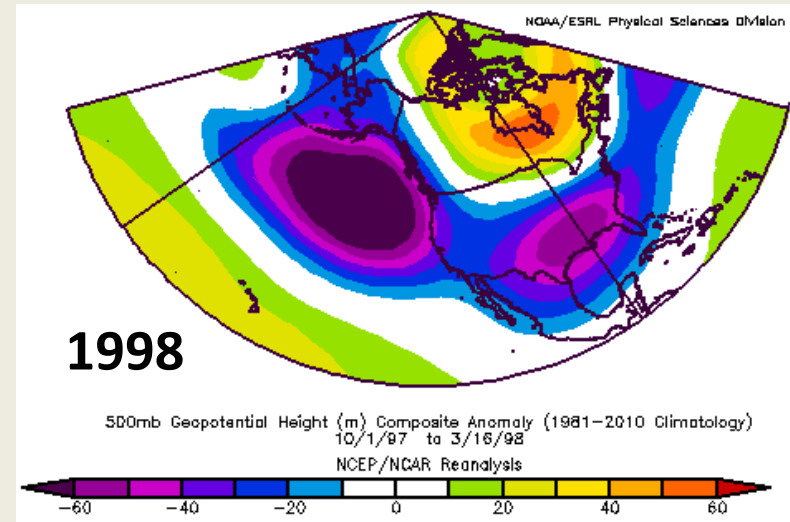
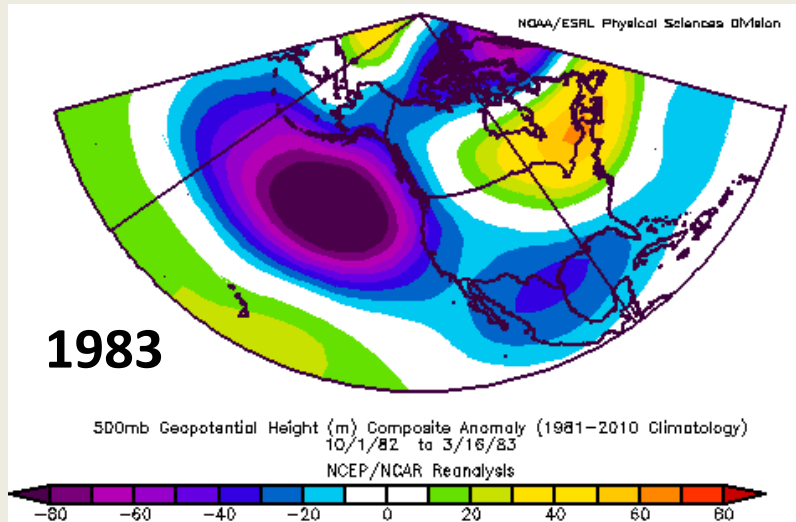
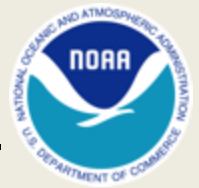


Promontory (705) Arizona SNOTEL Site - 7930 ft



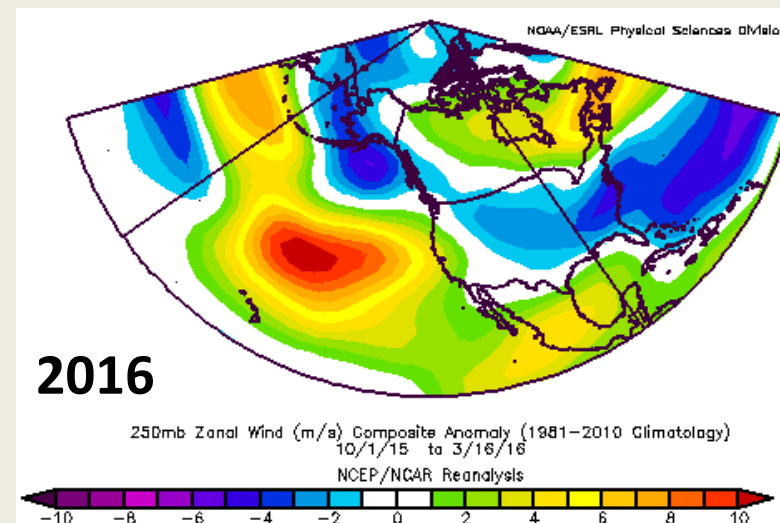
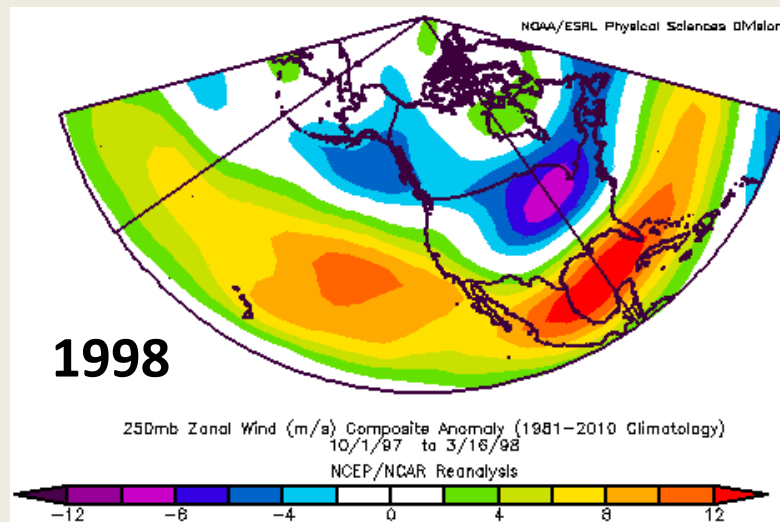
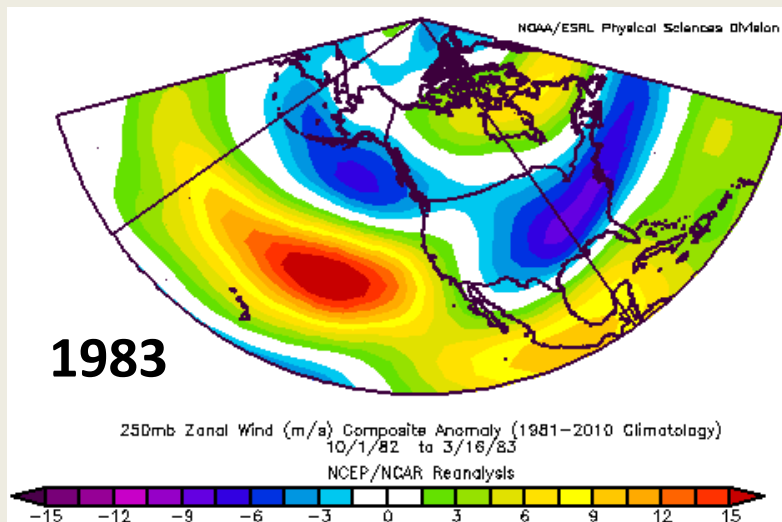
Source: NRCS

# Very Strong El Nino Flow Patterns



- 500 mb geopotential height anomalies
- Mid-troposphere high and low pressure
- Oct 1, 2015 – Mar 16, 2016 mean

# Very Strong El Nino Flow Patterns



- 250 mb zonal wind anomalies
- West to east jet stream level winds
- Oct 1, 2015 – Mar 16, 2016 mean

# El Nino Status

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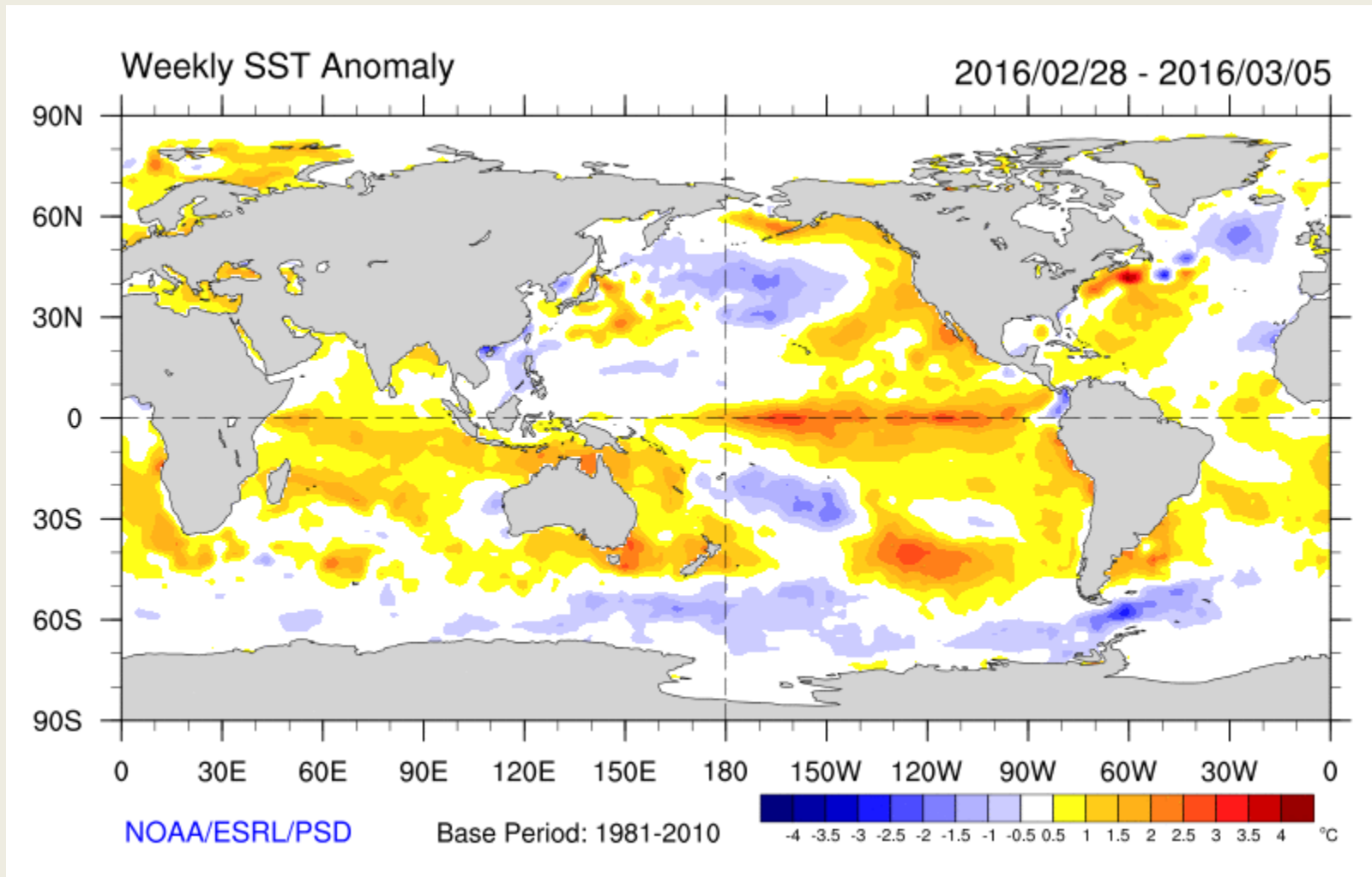
- ENSO Alert System Status: El Niño Advisory
- A strong El Niño is present and weakening
- Positive equatorial sea surface temperature (SST) anomalies continue across most of the Pacific Ocean.
- A transition to ENSO-neutral is likely during late Northern Hemisphere spring or early summer 2016, **with close to a 50% chance for La Niña conditions to develop by the fall.\***

Credit: CPC

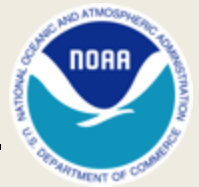
\* Note: These statements are updated once a month (2<sup>nd</sup> Thursday) in association with the ENSO Diagnostics Discussion, which can be found here:

[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/enso\\_advisory/](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/).

# Current Sea Surface Temperatures

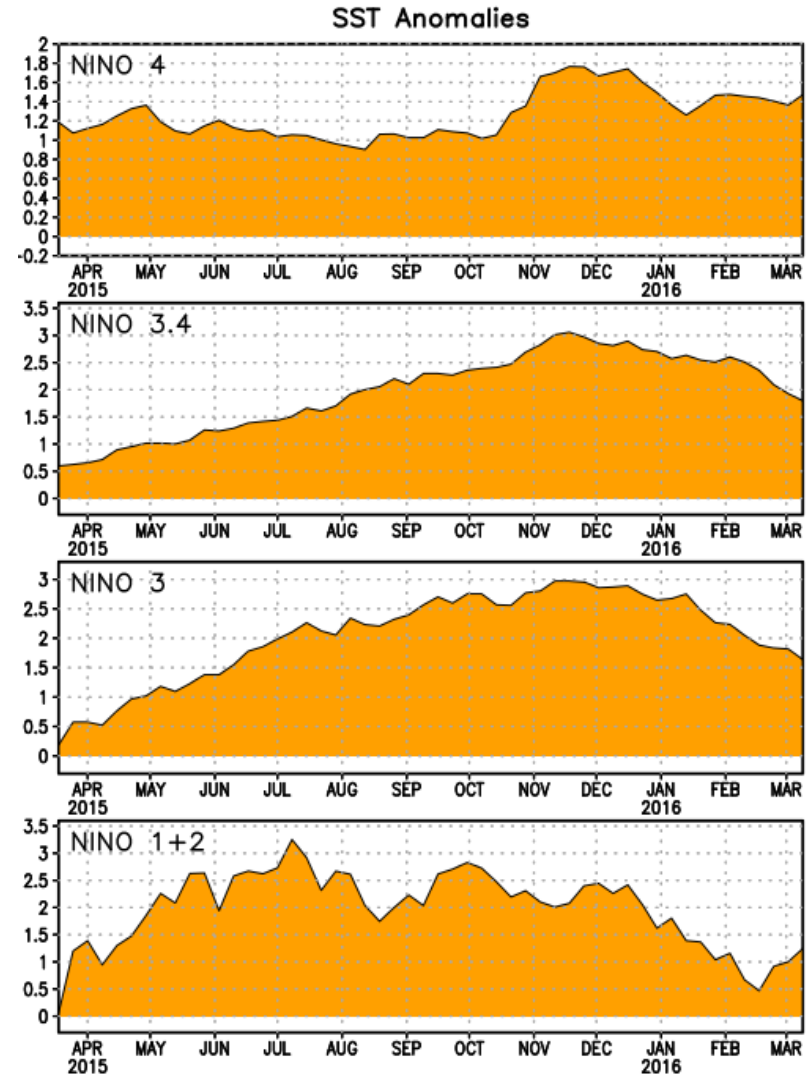
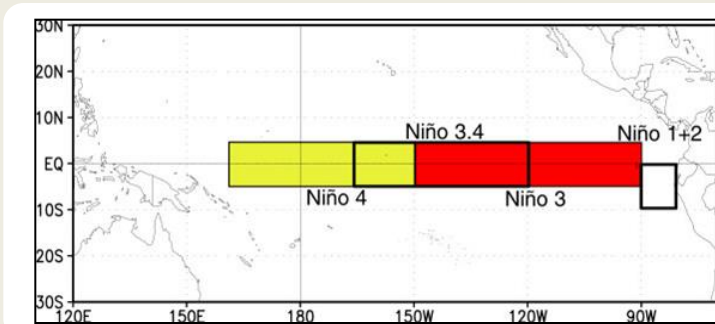


# Niño Region SST Departures (°C) Recent Evolution



The latest weekly SST departures are:

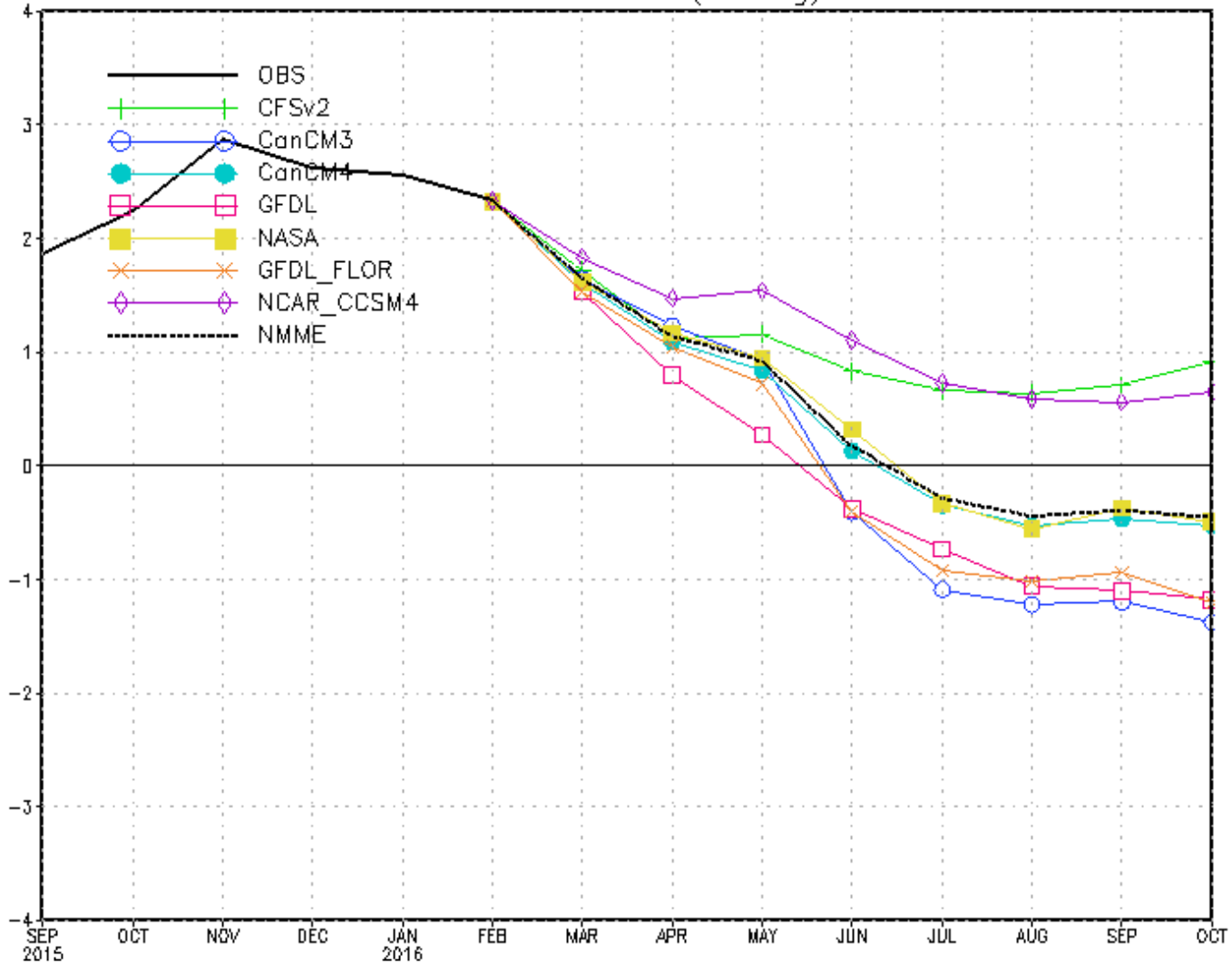
Niño 4	1.5°C
Niño 3.4	1.8°C
Niño 3	1.6°C
Niño 1+2	1.2°C



# ENSO Forecasts



NMME Forecast for Nino 3.4 (scaling) IC= 201603



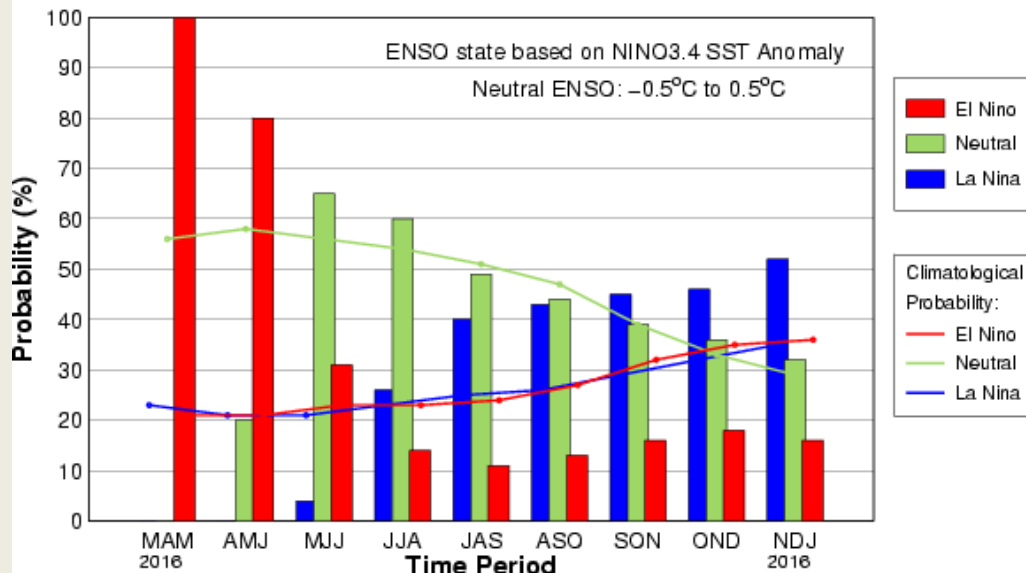
Source: NOAA/CPC



# ENSO Forecasts



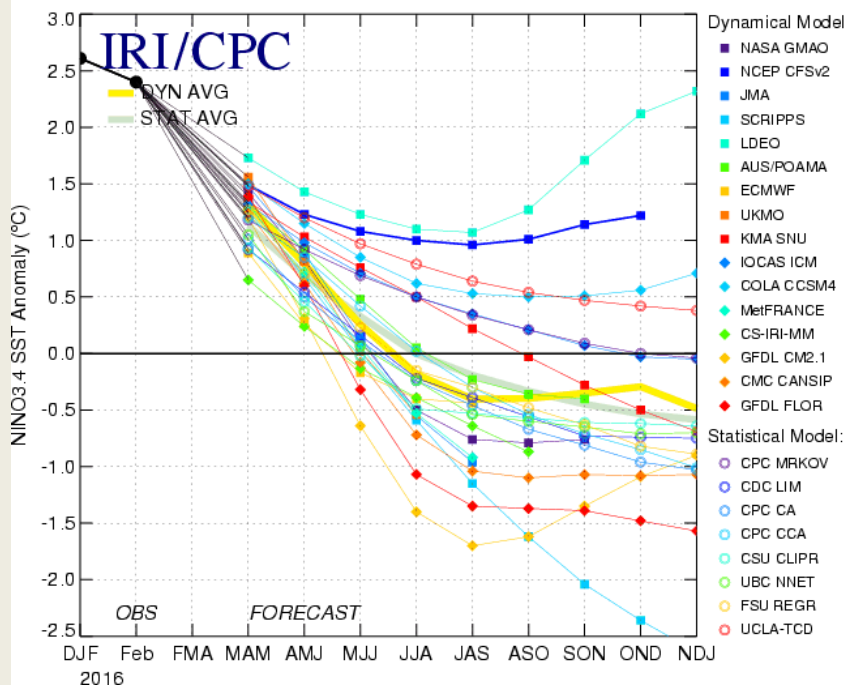
Mid-Mar IRI/CPC Model-Based Probabilistic ENSO Forecast



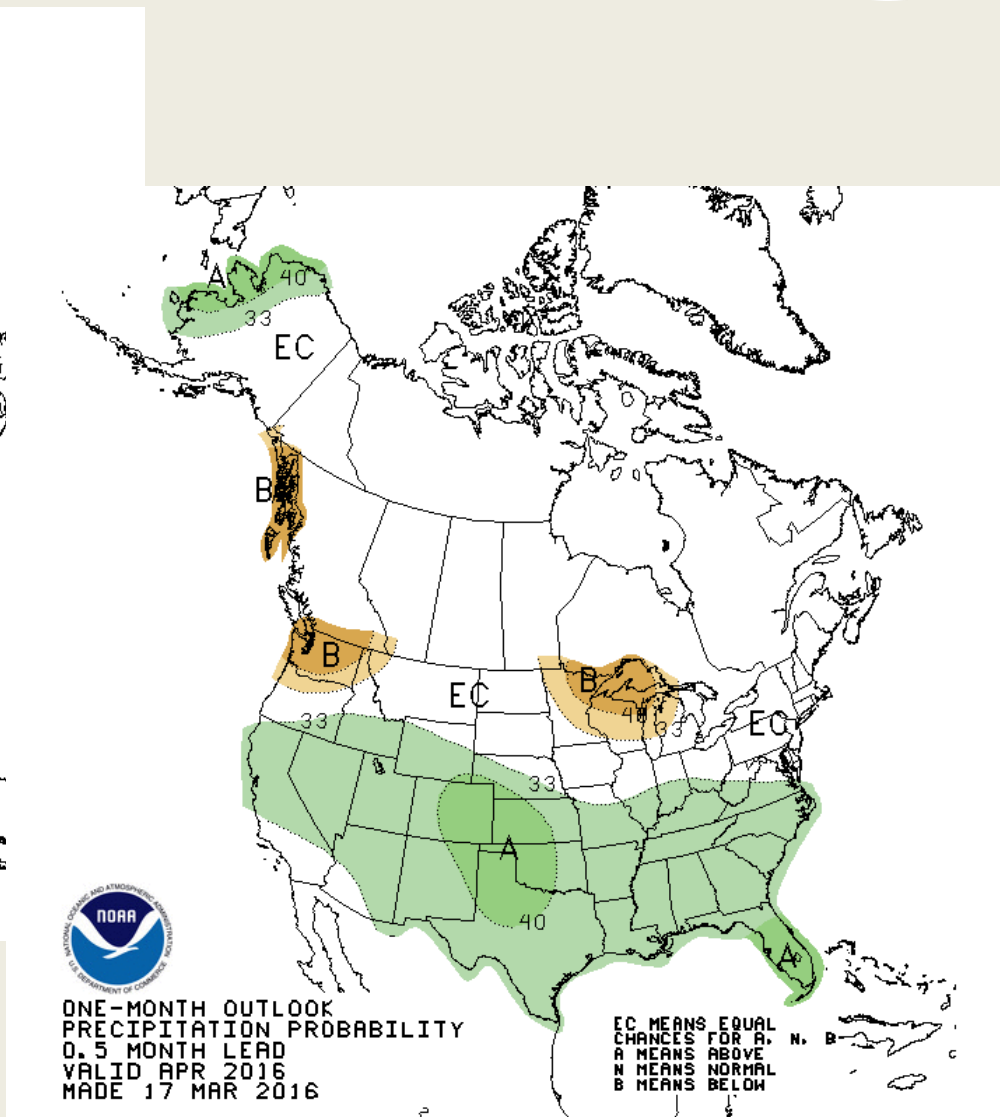
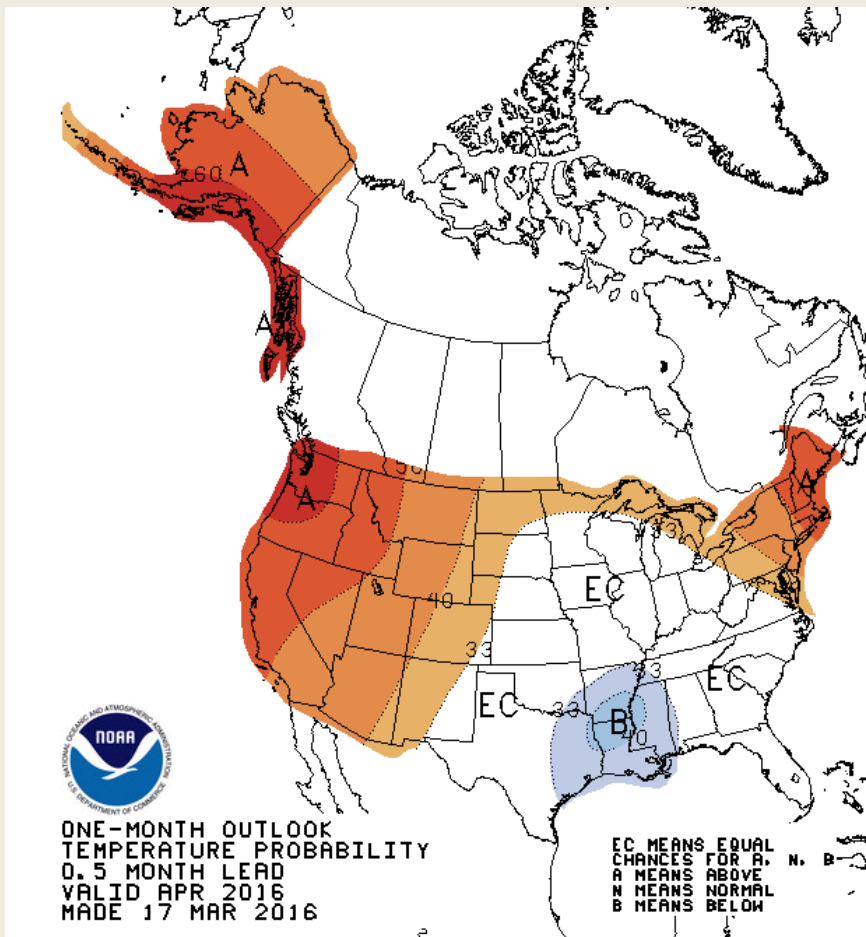
CPC/IRI El Nino forecast:

NMME models + other dynamical models + statistical models

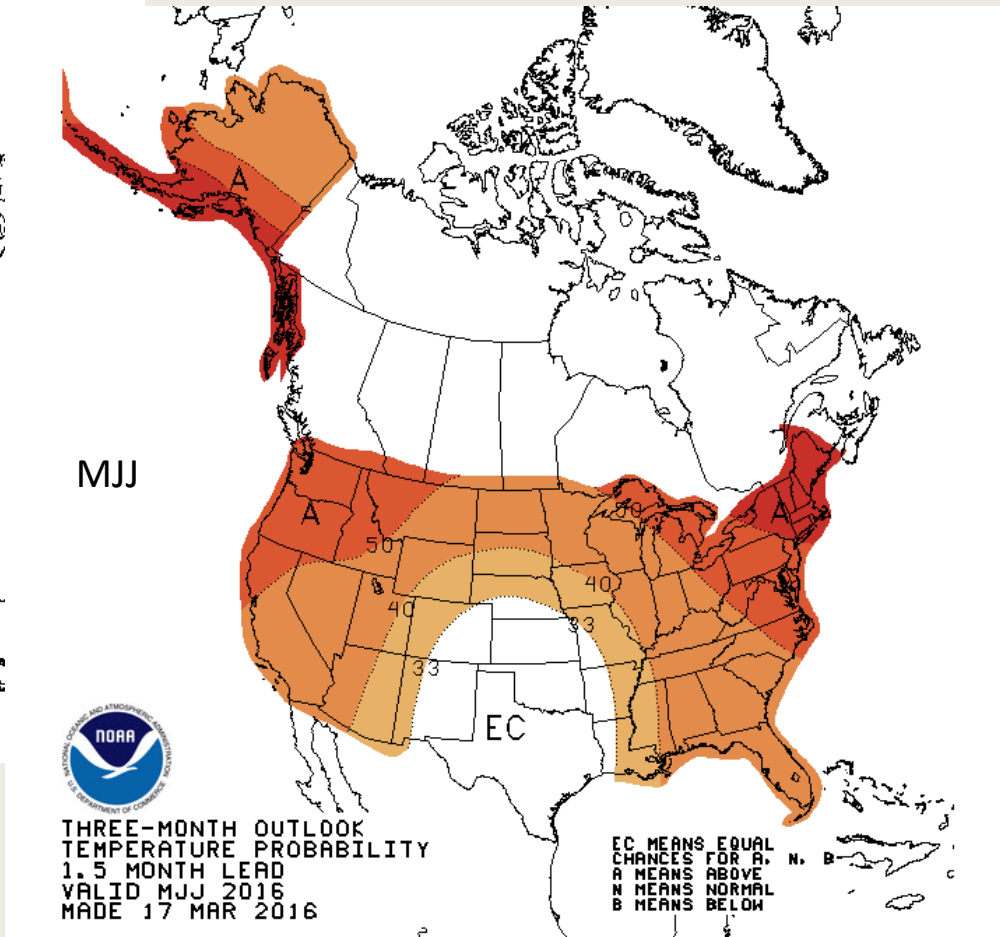
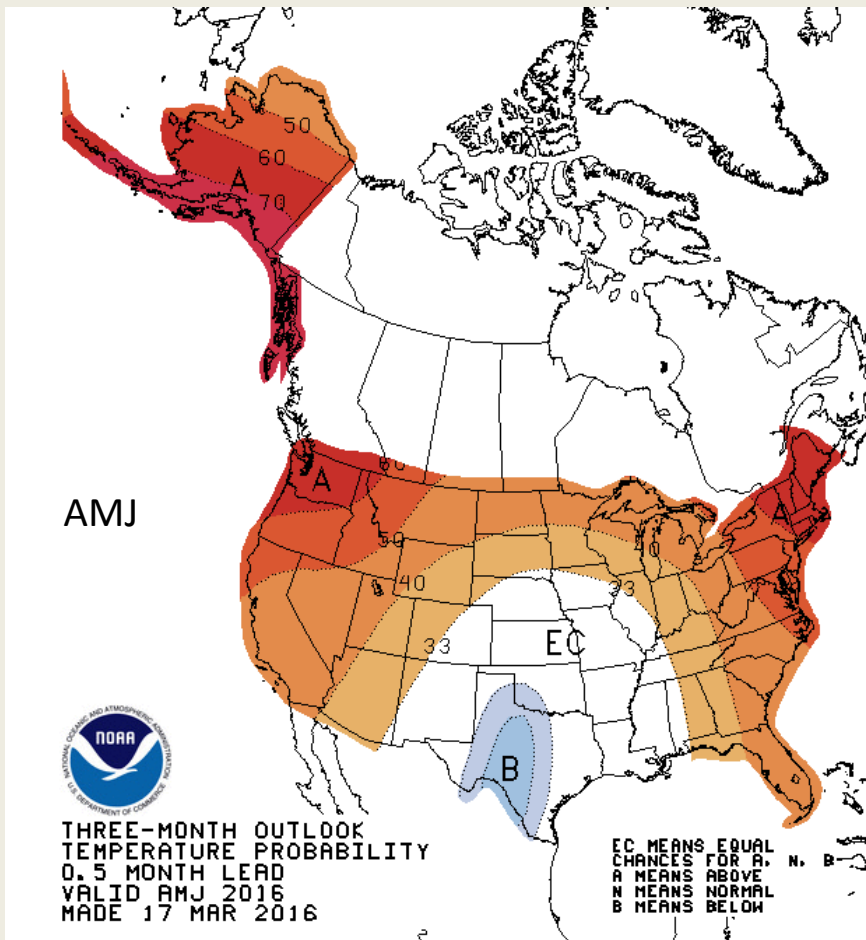
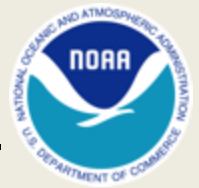
Mid-Mar 2016 Plume of Model ENSO Predictions



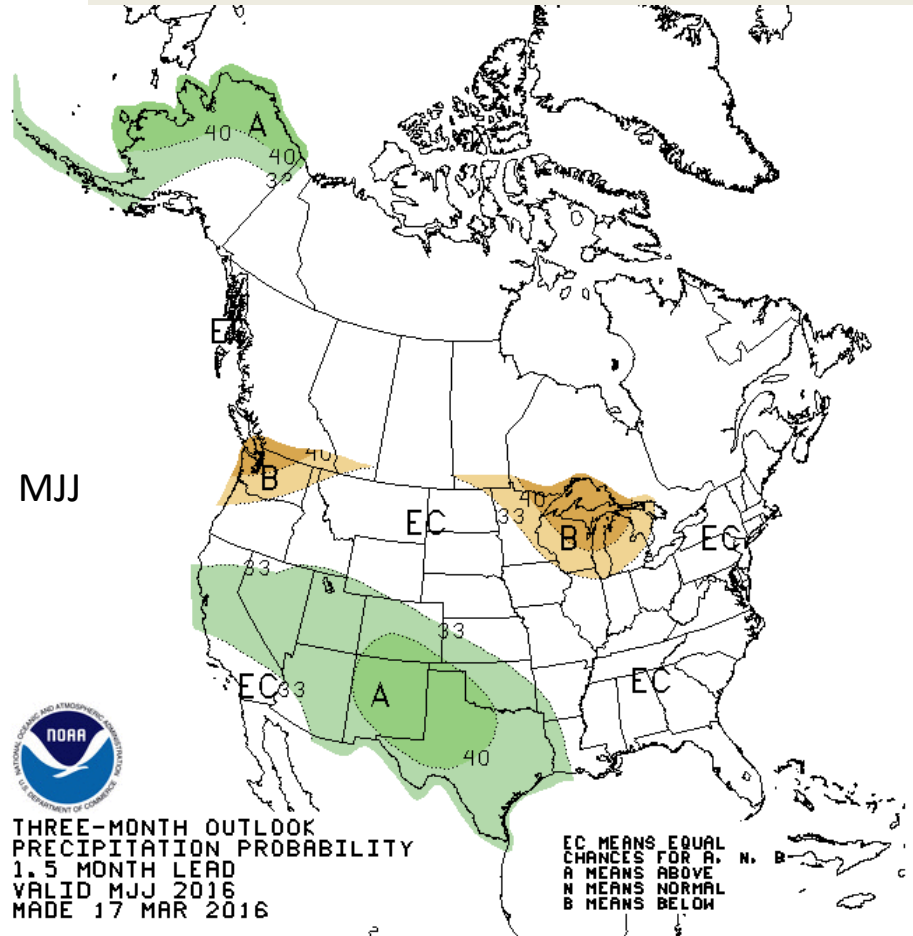
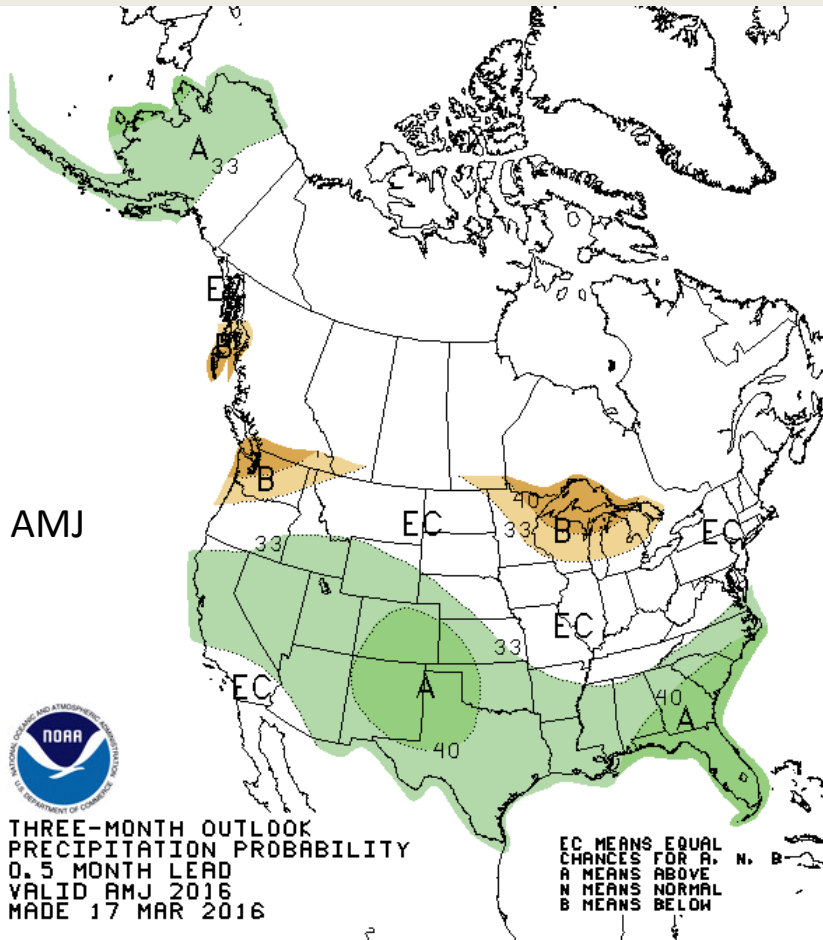
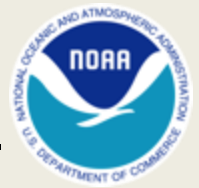
# April U.S. Forecasts



# U.S. Temperature Forecasts



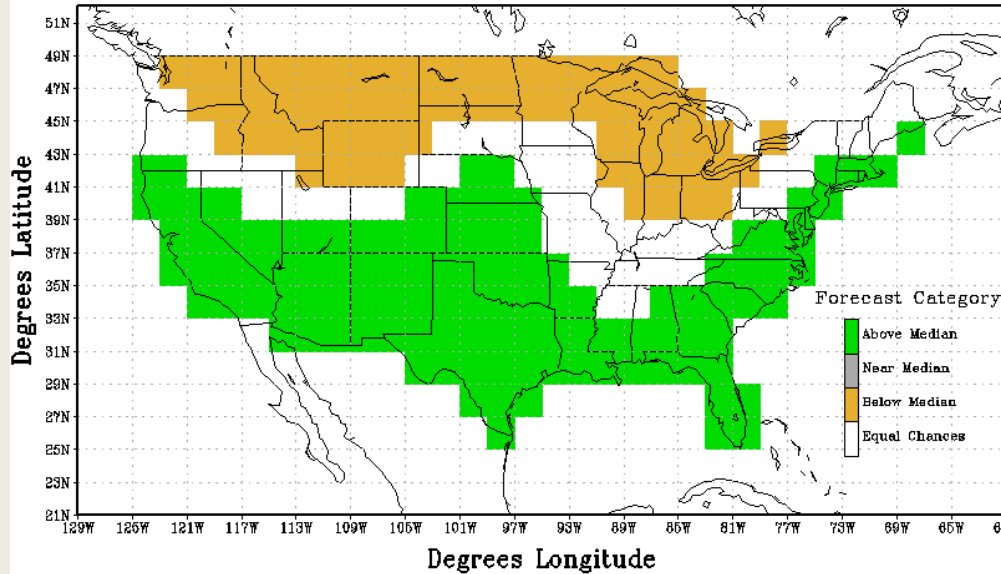
# U.S. Precipitation Forecasts



# CPC Winter Precipitation Forecast Verification



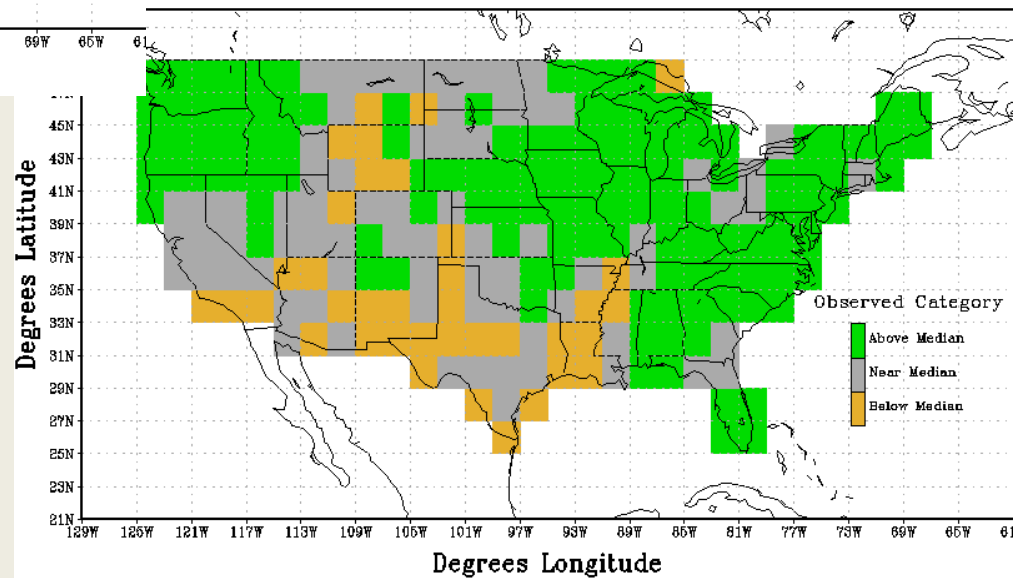
Categorical Precipitation Official Forecast  
 Issued: Nov 2015 Valid: Dec-Jan-Feb 2015-16



Forecast

Observations

Categorical Precipitation Observations  
 Valid: Dec-Jan-Feb 2015-16



Source: NOAA/CPC

Heidke Skill Score (HSS) = -6.03

Max = 100 (perfect forecast)

Min = -50

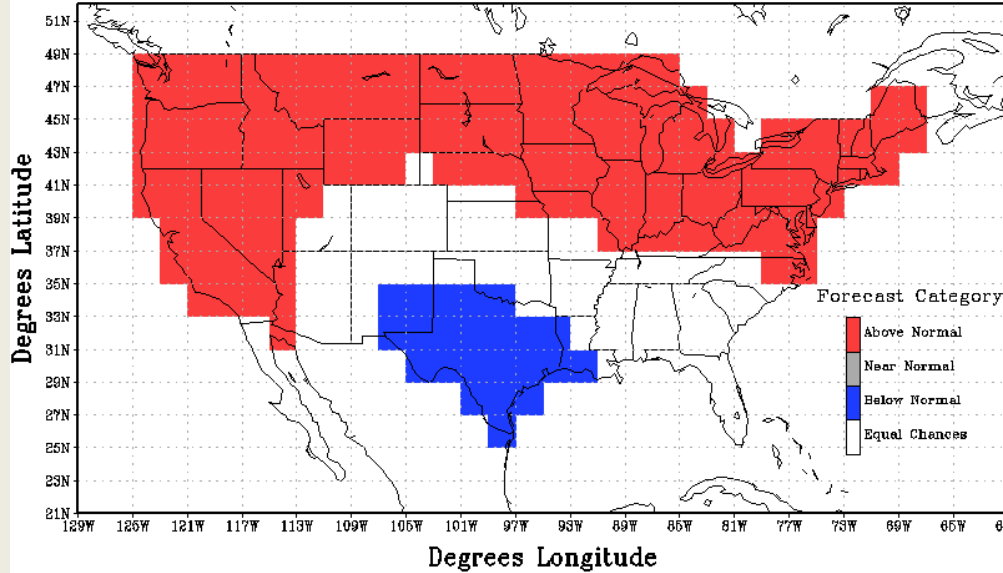
Positive HSS = skillful forecast

Negative HSS = no skill in forecast

# CPC Winter Temperature Forecast Verification



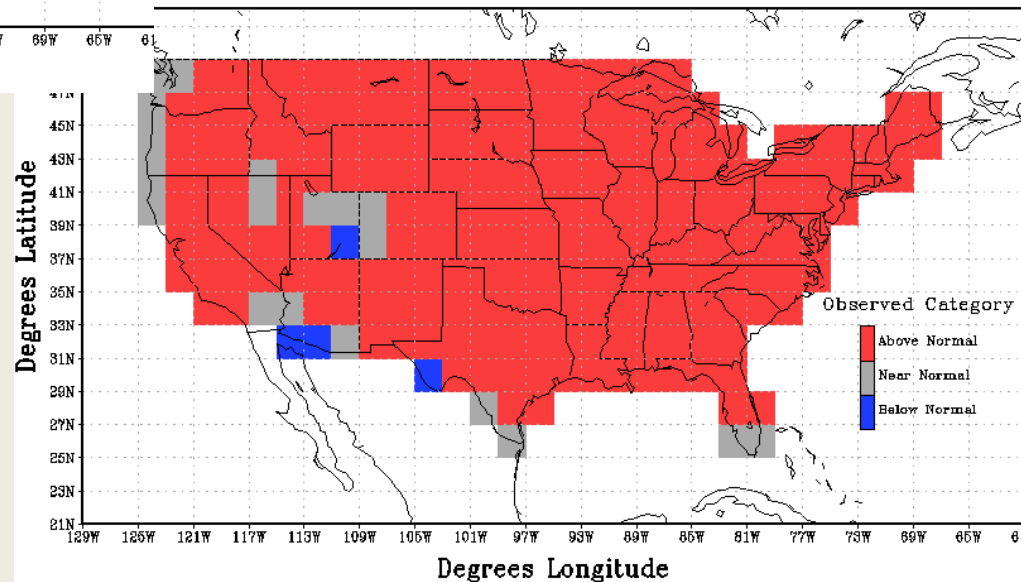
**Categorical Temperature Official Forecast**  
 Issued: Nov 2015 Valid: Dec-Jan-Feb 2015-16



Forecast

Observations

**Categorical Temperature Observations**  
 Valid: Dec-Jan-Feb 2015-16



Heidke Skill Score (HSS) = 49.14

Max = 100 (perfect forecast)

Min = -50

Positive HSS = skillful forecast

Negative HSS = no skill in forecast

Map

Overview

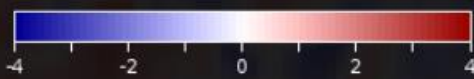
Help

Lat: 36.8656

Lon: -164.3555

**WC SST is warmer than normal,  
but not extreme**

OSU NOAA OI



Water Temperature (°C)



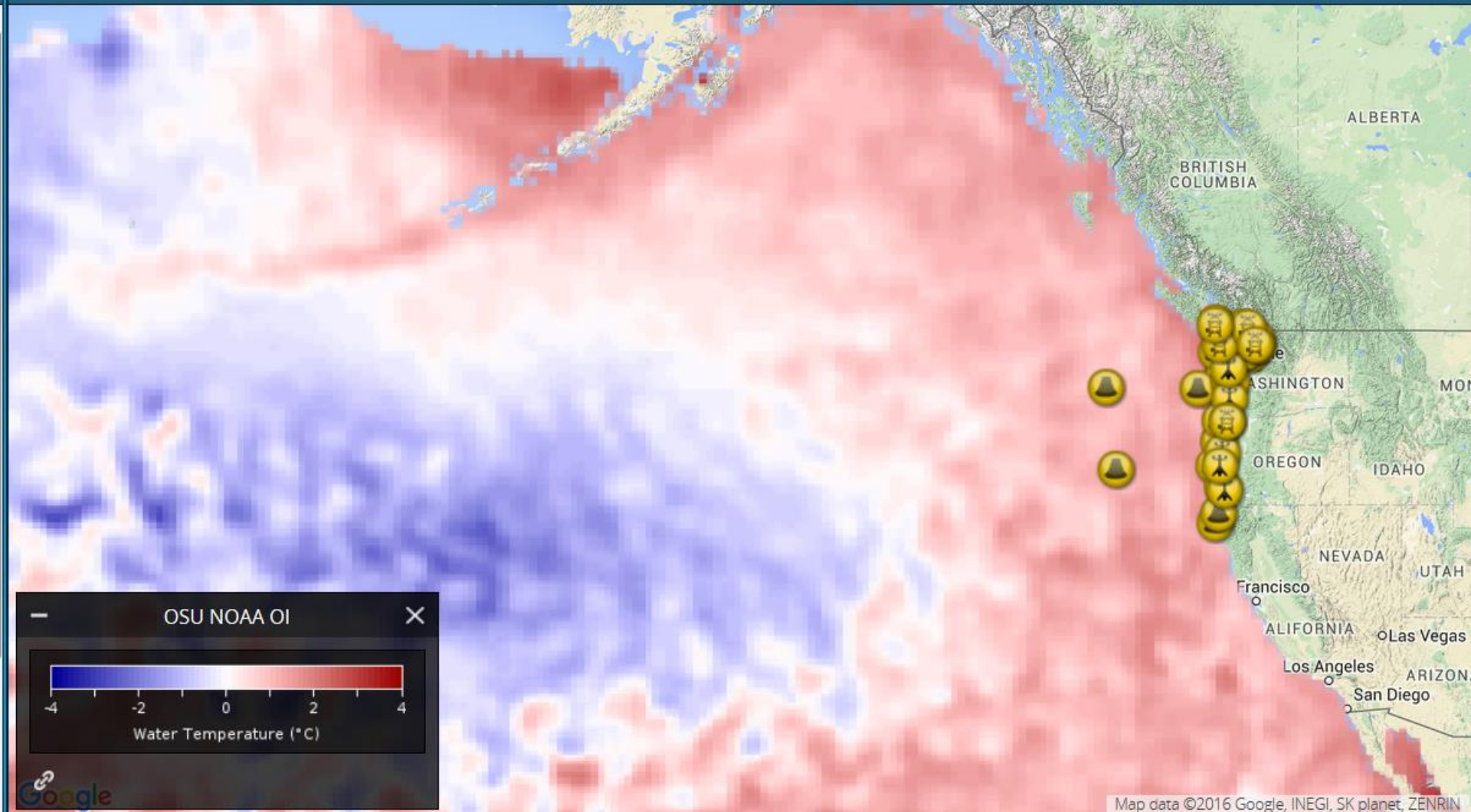
Map

Overview

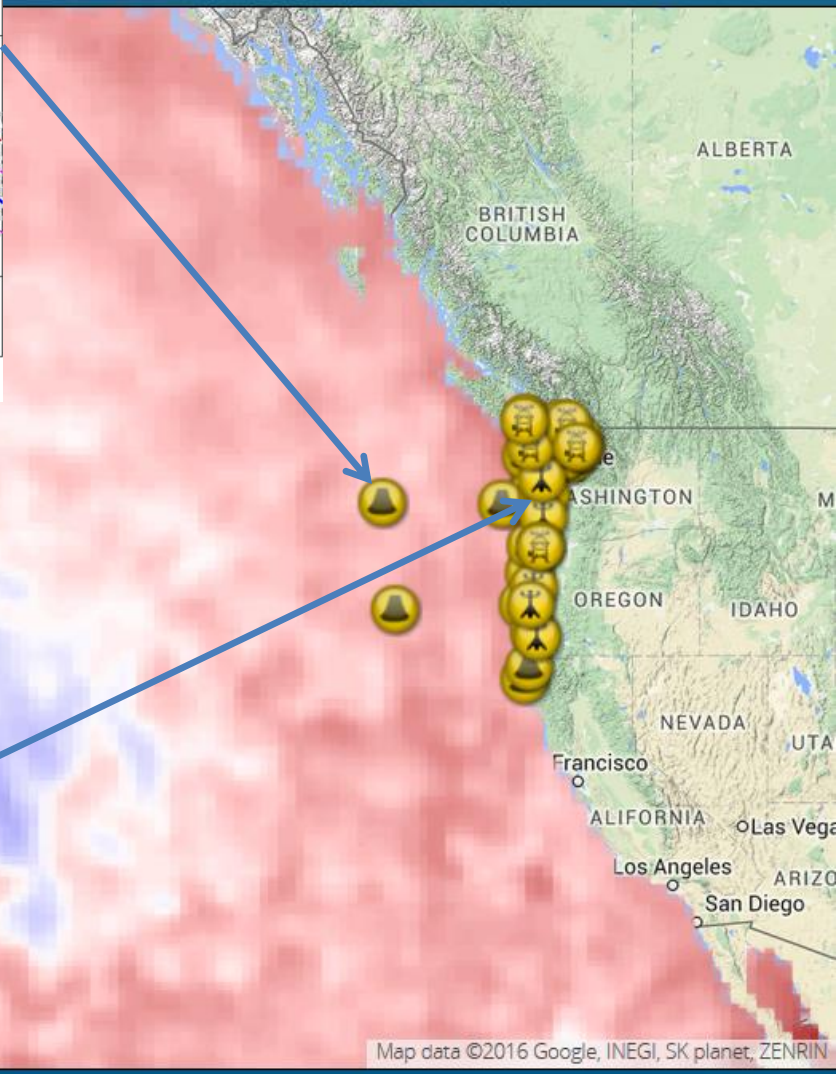
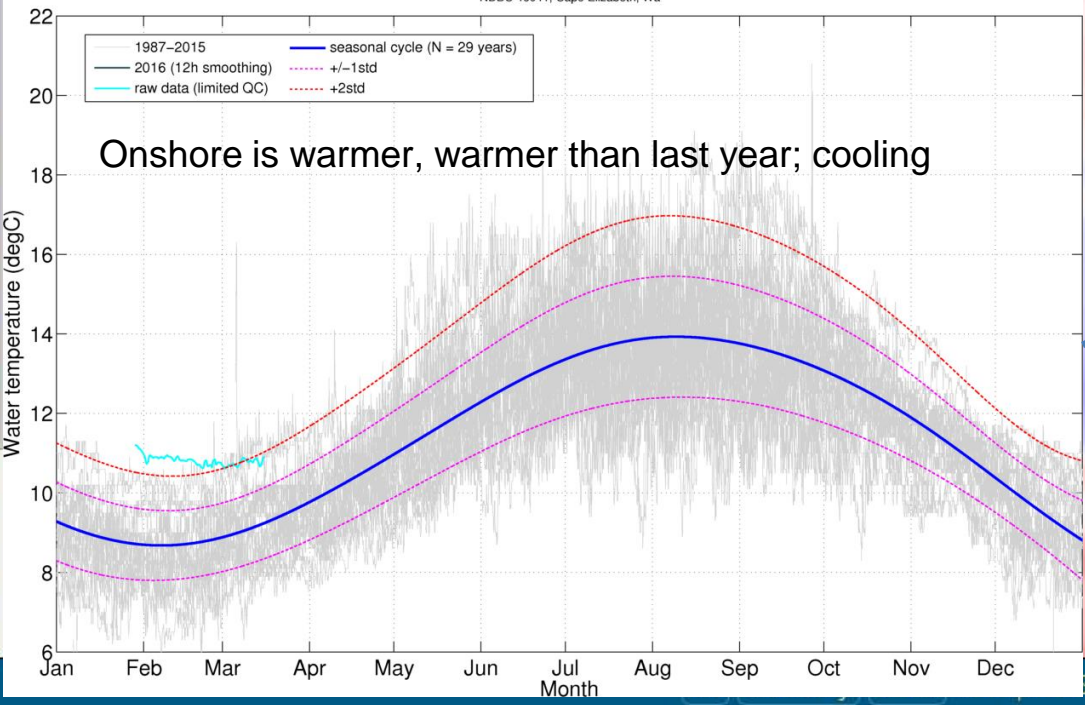
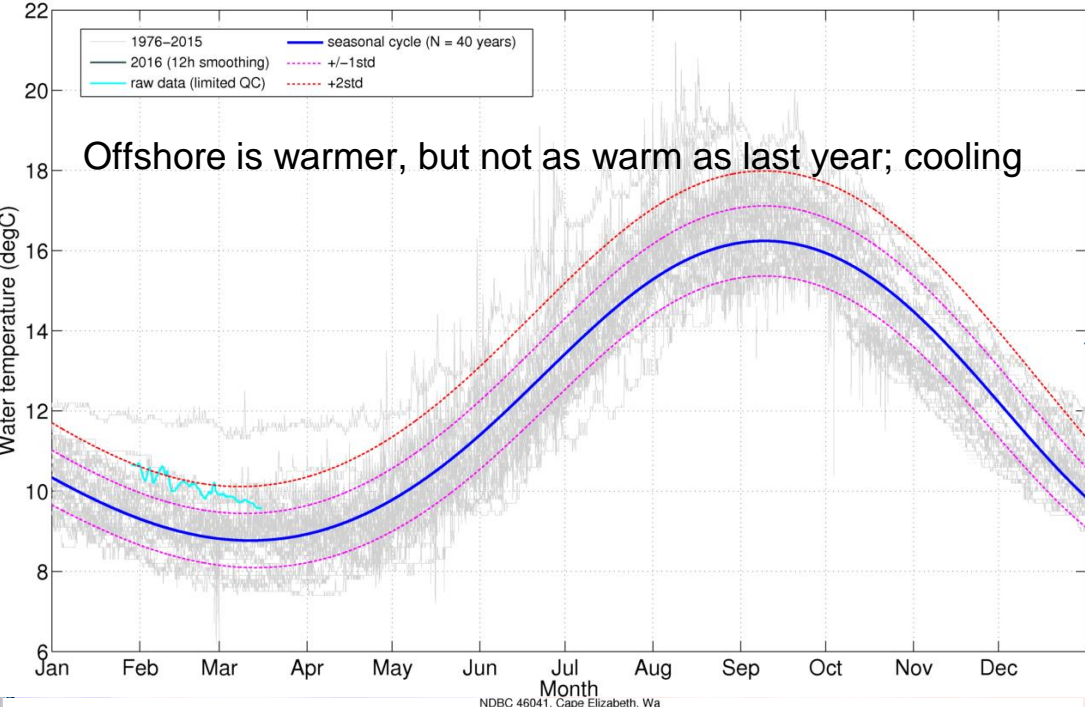
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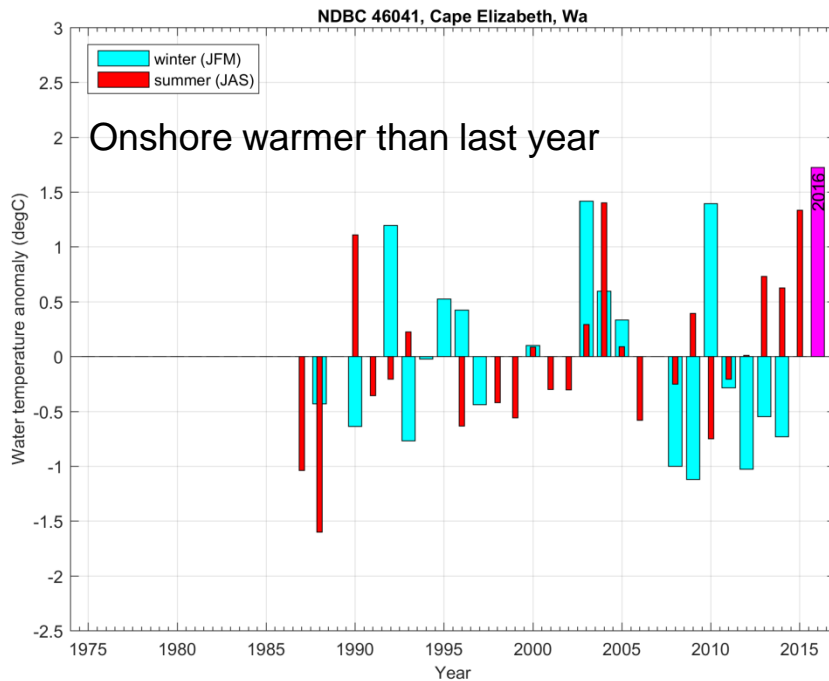
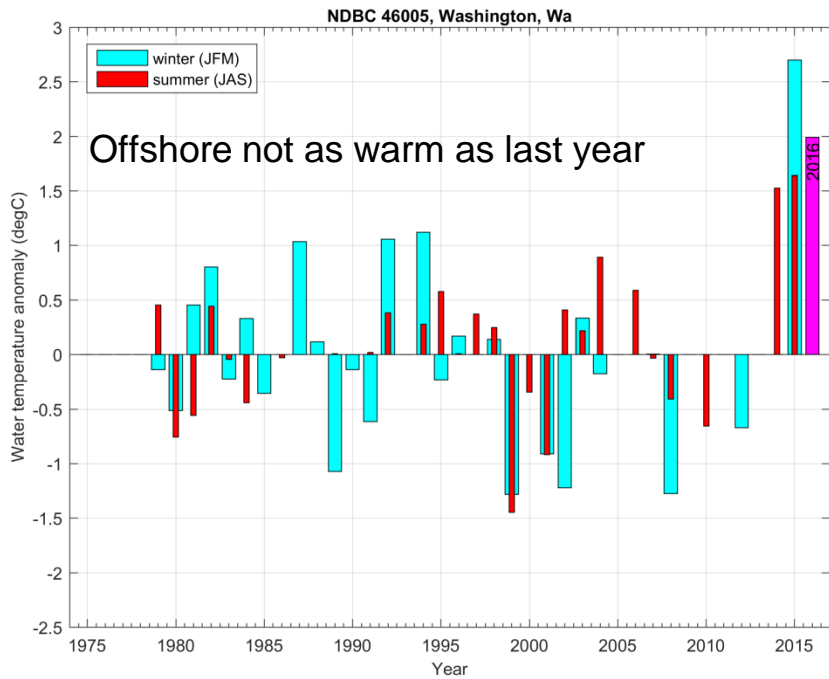
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Lon: -176.8359





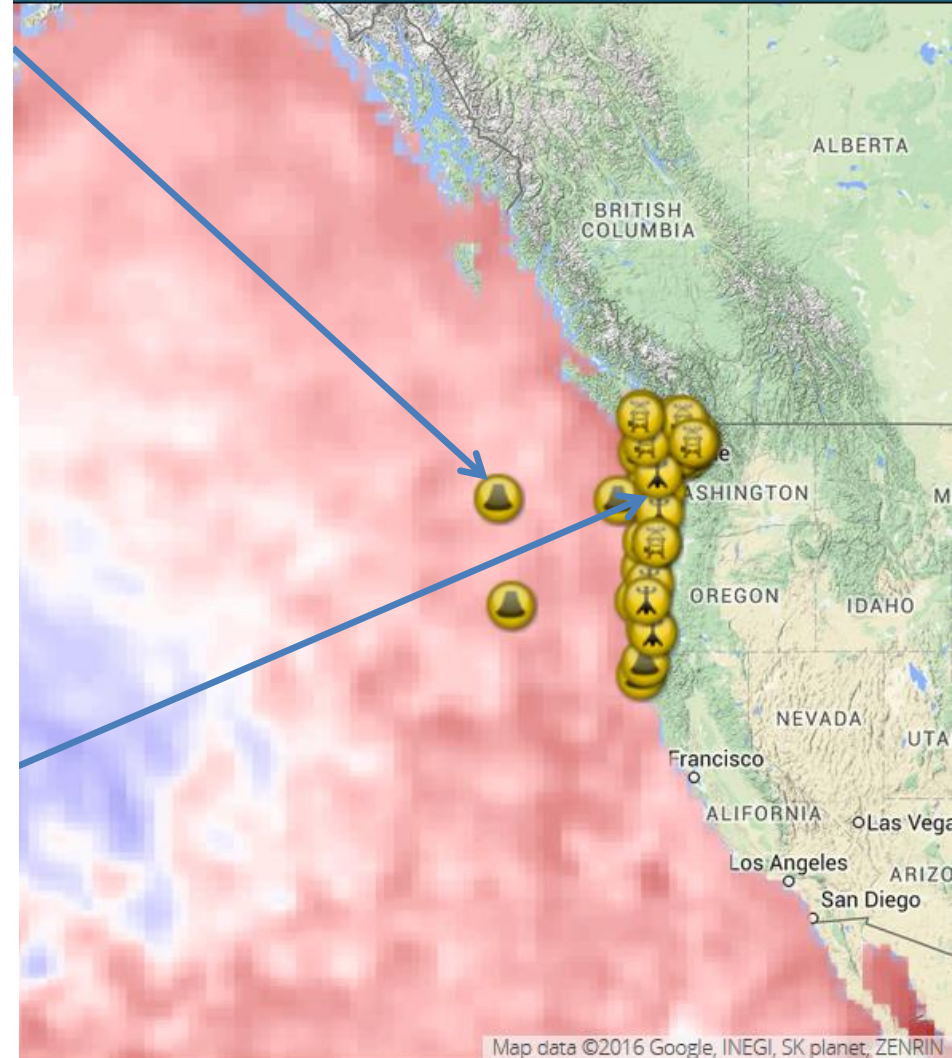




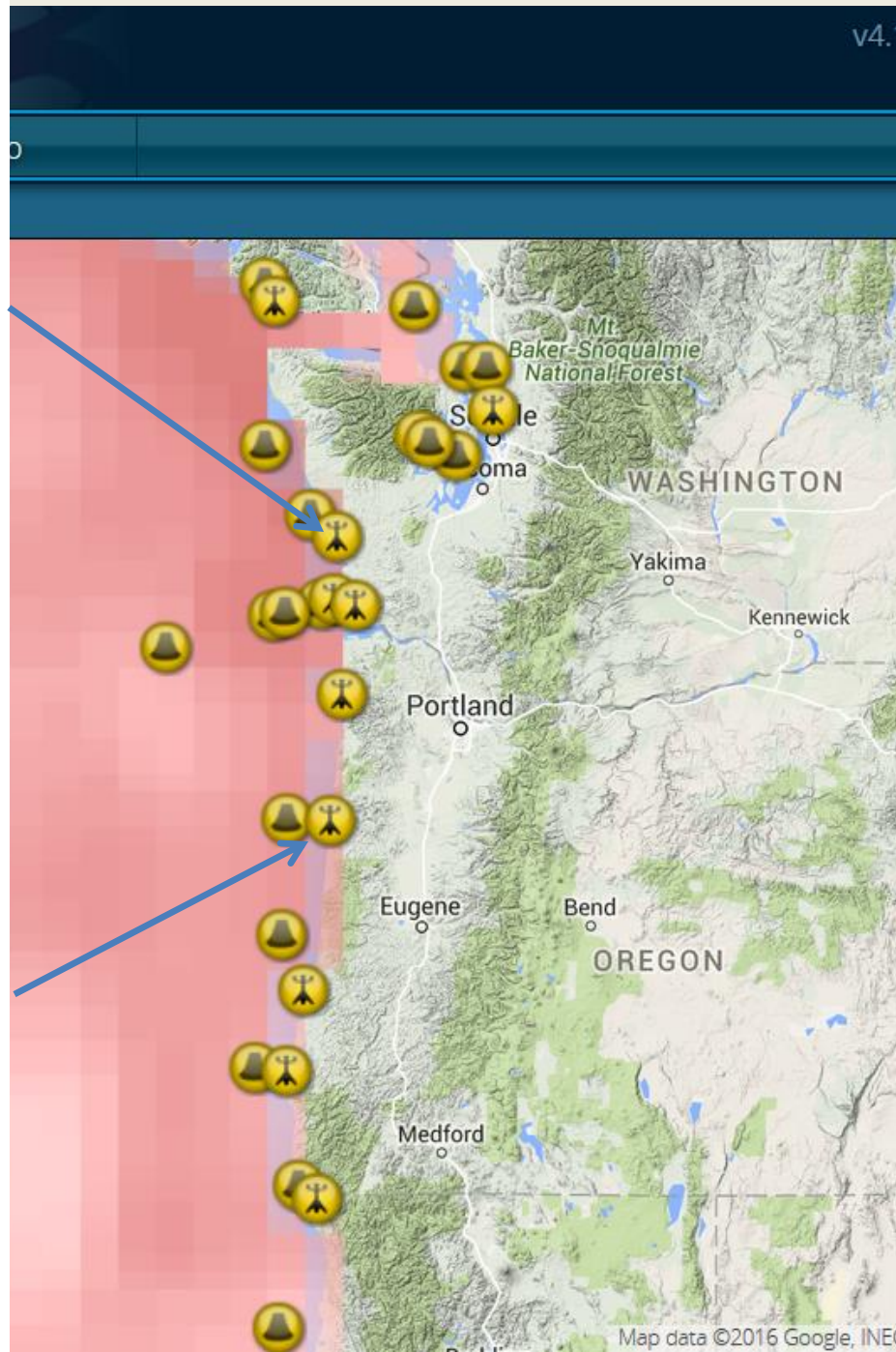
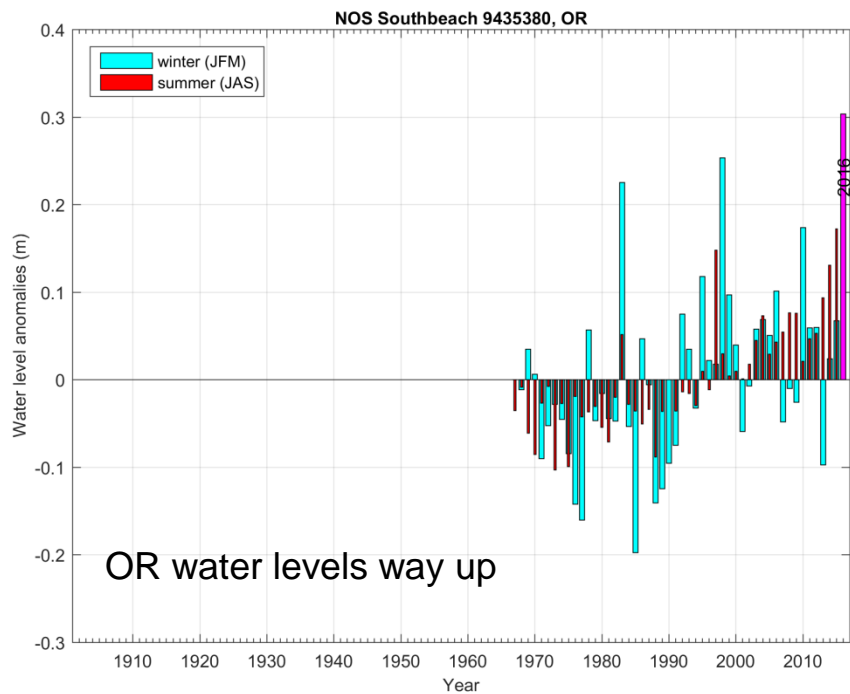
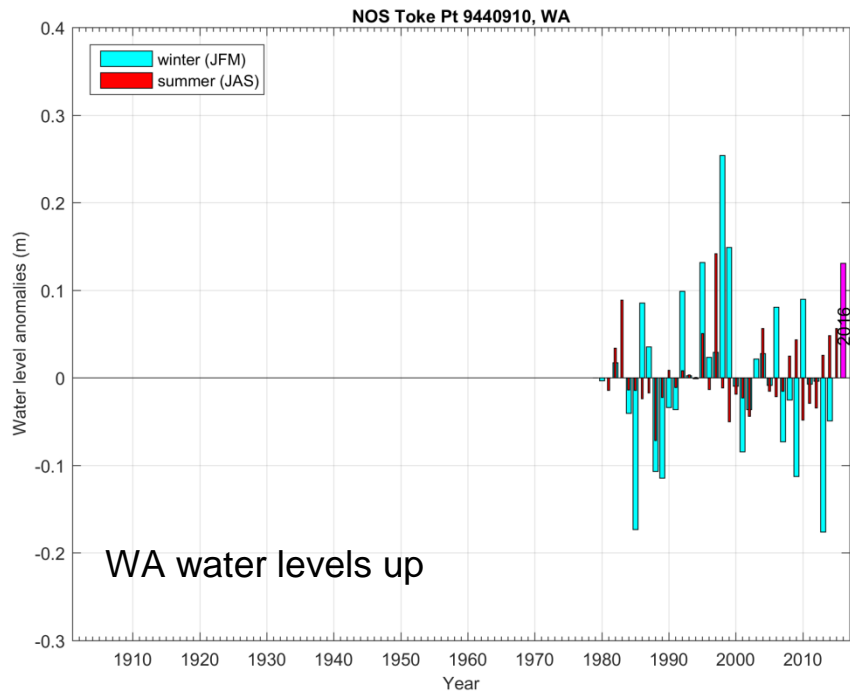
*This may matter to biology...*

v4.1

Help



00 pm PST



# Regional Impacts Summary – 02/27 to 03/18

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## Reporting Status:

- 231 entries since July 1, 2015
- Last reporting period: 35 environmental conditions & regional impacts reported

*Reminder:* To report an impact email Timi Vann or Michael Milstein

## Environmental Conditions Capture:

- Changing ocean conditions
- Warm ocean temperatures
- El Niño
  - CA dry & hot February but wet March
- Flooding
- Drought

## Human & Ecosystem Impacts:

- Adverse marine food web (forage fish) impacts
- Commercial fishery harvests down or closed (sardines, coho, squid)
- Marine mammal strandings & reproduction
- Species displacement
- Water supply; reservoir storage improvements
- train derailments, road closures)
- Flooding & transportation
- Tribal subsistence impacts:
  - Fallon Paiute-Shoshone (NV) – drought & water supply impacts on hunting & fishing
  - Stillaguamish (WA) – ocean conditions & fishery harvest

# Headlines



## **WEATHER:**

L.A. sees record heat, not rains, in February

## **DROUGHT:**

Western tribes struggle to adapt as reservoirs shrivel

Reservoirs are getting a big boost from 'Miracle March' — but the drought isn't over yet

**Holy El Niño! It's possible Shasta Lake will fill up this month**

**California storms send billions of gallons of water into reservoirs**

**'Atmospheric river' running through Marin**

Drought Update: California water concerns continue despite filling reservoirs

**S. California Fisheries Hit Hard By Warming Water**

**Northern California highway crumbles as storm-soaked hillside collapses**

West Coast sardine populations, long sinking, look even worse in forecast

**Low numbers of ocean salmon raise specter of no commercial fishing in 2016**

**California Sardine Fishery Continues Collapse, Likely Won't Reopen This Year**

Stillaguamish Tribe calls for coho protection

Sea Lion Strandings Remain Above Average

Officials consider drastic step to boost coho: no fishing this year

Sea lion pups are starving because their moms are eating 'junk food'

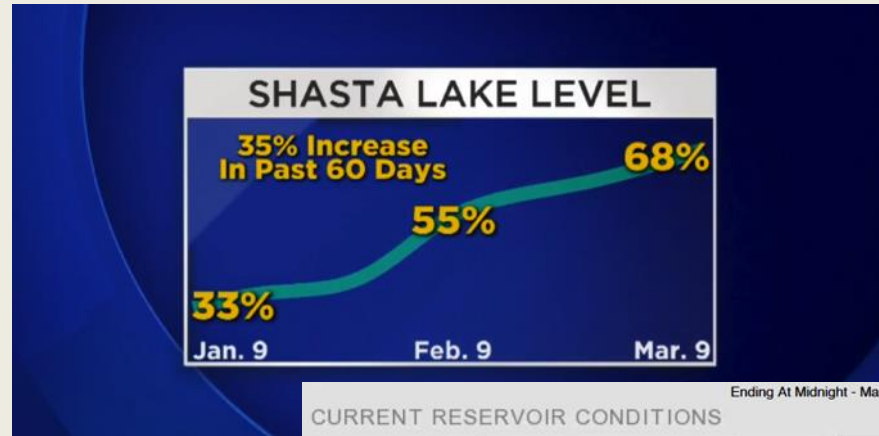
**California sea lion strandings down because warming coast has already killed pups**

**Did El Nino bring this rare Pacific seahorse to Long Beach waters?**

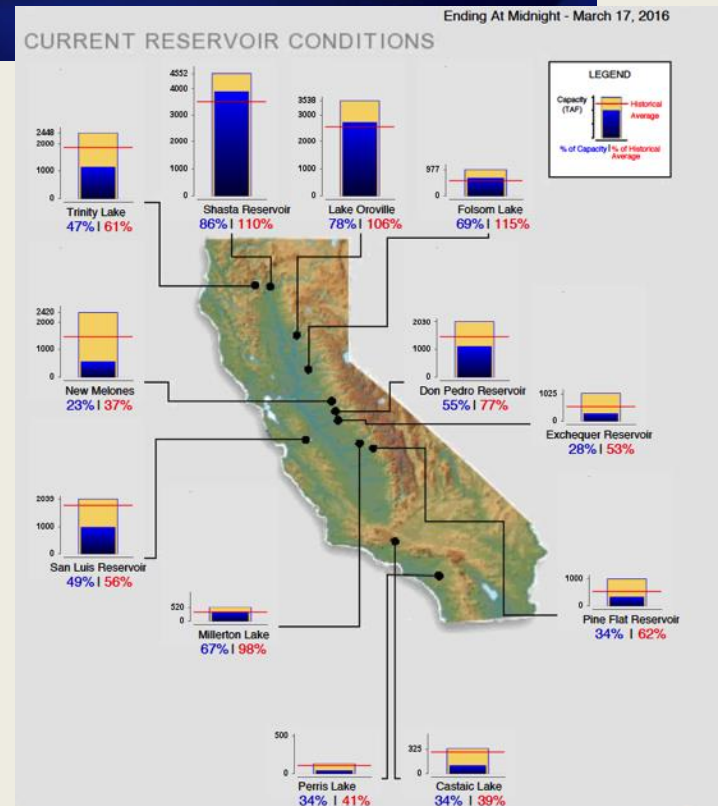
# Impacts in Pictures



Shasta Lake after El Niño rains on February 25, 2016. Photo: Florence Low, California Department Of Water Resources



The shore of Lake Shasta behind Shasta Dam in Lake Shasta, Calif., is seen Sunday, March 13, 2016.



# Impacts in Pictures



March 10: Sonoma County slides and floods/Press Democrat.



March 11: A Caltrans employee and his dump truck were hit by a mudslide on Highway 1 in Mendocino while responding to an earlier mudslide. Photo, SF Gate



March 16: Northern California highway crumbles as storm-soaked hillside collapses. Highway 3 near Rush Creek Road just north of Weaverville in Trinity County. Photo: LA Times

# Impacts in Pictures



The sardine population is continuing to collapse, according to a new assessment by NOAA



Pacific sea horse out of its usual range, north of San Diego. Press-Telegram



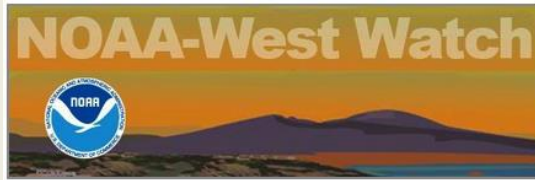
For the second year, the Stillaguamish Tribe is willing to give up fishing coho in order to protect the future. (Photo: KING5 TV)



Adult coho salmon spawning in the Tillamook State Forest. (Oregon Department of Forestry).



# Telling Regional Stories – NOAA West Watch #2



## Second issue

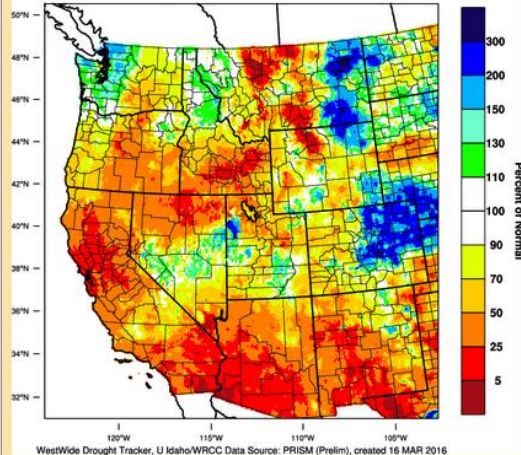
This is the second edition of NOAA-West Watch, a periodic collection of stories documenting how environmental change is affecting people and places in the western United States. If you have a story suggestion, please contact Michael Milstein (michael.milstein@noaa.gov) or Timi Vann (timi.vann@noaa.gov).

### In this issue:

- [Western Climate Update](#)
- [El Nino storms boost California ski areas](#)
- [Record waves batter West Coast shorelines](#)
- [Rough conditions slow Columbia ship traffic](#)
- [Distant algae bloom drives up salmon prices](#)

## WESTERN CLIMATE UPDATE

Western United States - Precipitation  
February 2016 Percent of 1981-2010 Normal



An abrupt transition from active, wet weather in December and January to mild and dry in February was found over much of the western United States. This change was most dramatic over central and northern California, the northern Great Basin, and parts of the northern Rockies where there was less than 25% of normal precipitation occurred in February (see above). In southern California and Arizona winter dryness persisted.



## El Nino storms boost California ski areas

Western ski areas are cheering the best ski season they have recorded in three to four years, with crowds early on boosted by the buzz of El Nino-fueled snowpack and subsequently by some of the greatest snowfall totals for this point in the season in several years. California's Mammoth Mountain recorded more than eight feet of snow in less than a week in early March, and has already attracted more skiers than it did in all of last season. Skiing is expected to last into the June or even July.

The nine largest ski resorts in the Lake Tahoe area contribute \$564 million to the economy in a good year, according to a 2014 assessment, and California ski areas together generate more than \$1.3 billion in economic activity each year, a statewide assessment found. A good snow year boosts California ski area business by more than \$100 million, according to a 2012 study.



Heavy snow falls at Mount Rose, at 8,290 feet near Lake Tahoe. Photo courtesy Mount Rose Ski Tahoe.

Just as important as precipitation to ski areas is the level of the snow line - the elevation of freezing temperatures - which appears to have gradually shifted uphill during many recent winters, said John Gifford, president of the Pacific Northwest Ski Areas Association. "Freezing levels are definitely higher than they used to be," he said. "For ski areas and the lower the snow level the better," said Michael Reitzell, president of the California Ski

Industry Association. Higher elevation resorts such as Mount Bachelor in Oregon, Mount Rose in the Lake Tahoe area or most reliable snow because the resorts at lower elevations have invested in sophisticated snowmelt visitors throughout the winter, s

## Record waves batter West Coast shorelines

Some of the largest waves recorded on the West Coast have battered and flooded shorelines, including some populated areas and homes, and eroded beaches in the last few months. The waves are riding on elevated sea levels that remnant heat from the "warm blob" combined with El Nino temperatures already pushed roughly a third to a half-foot higher than usual, with the sea level increase especially pronounced off California.

That has translated into approximately 45 percent more wave energy than normal hitting West Coast beaches, with about 40 percent more erosion than the average for the similar winter time frame, said Patrick Barnard, a U.S. Geological Survey researcher who tracks erosion on the West Coast. "Everything is in line with what we expect during strong El Nino conditions like we're experiencing," he said. In a few anecdotal cases a few beaches have largely been swept clean of much of their sand.

Barnard is leading an interagency effort to survey the entire Pacific Coast from the Mexican border north to Canada with Lidar, a precision mapping system that uses airborne lasers to very finely measure elevations. NOAA, USGS and the U.S. Army Corps of Engineers are helping to fund the effort. The goal is to document the topography of West



High waves at La Jolla Shores, Calif., March 8, 2016. Photo courtesy Randy Bucciarelli.

## Rough conditions slow Columbia ship traffic

Strong December storms powered by El Nino repeatedly shut down commercial shipping traffic into and out of the Columbia River west of Portland, according to the pilots that guide ships across the treacherous Columbia River Bar where the river meets the sea near Astoria, Oregon.

"The frequency of the fronts through December was really something," said Dan Jordan of the [Columbia River Bar Pilots](#) and a pilot himself. "They just kept coming day after day. It seemed like every other day we'd have to suspend service because the bar was so rough." He said the pilots suspended shipping traffic across the Columbia River Bar nearly 10 times in the month of December, among the most closures in a single month that most pilots could remember. Conditions were not nearly as rough in January and February, with only a few scattered closures.



A cargo ship crosses the Columbia River Bar in high seas. Courtesy Columbia River Bar Pilots.

All large commercial ships crossing into or out of the Columbia River must be guided between the open sea and Astoria by a Columbia River Bar pilot, and pilots have the authority to suspend service when conditions become too rough for a safe transit across the Columbia Bar. At times when the weather forced the pilots to suspend service in December, as many as eight large ships remained in a holding

pattern offshore while they waited for a pilot to guide them inland, Jordan said. About \$24 billion worth of cargo transits the Columbia each year, and past estimates have put the cost of river closures at about \$10 million for three days.

Ships traveling down the river from Portland may take close to eight hours to reach Astoria, and conditions on the bar can change so quickly that bar pilots sometimes have to close the bar while the ships are still in transit. Jordan said the pilots often consult with National Weather Service forecasters and use NOAA's online weather, real-time buoy data and other forecasting resources to advise departing ships whether they should start the trip downriver or hold back in Portland if threatening conditions are likely to close the bar before they can cover the distance to the river mouth.

## Distant algae bloom drives up U.S. salmon prices

A long-distance impact of the unusually warm ocean conditions associated with El Nino is driving up salmon prices in the United States.

El Nino warmth has fueled an especially severe algae bloom that is wreaking havoc on salmon farms in Chile, killing more than 27 million fish at an estimated cost of close to \$500 million and putting pressure on salmon prices worldwide. A Nordic bank predicted the losses will lead to a "global supply shock" in salmon. Chile is by far the largest source of salmon imported to the United States, accounting for more than a third of U.S. salmon imports worth more than \$1 billion last year.

Salmon farming officials in Chile estimate that the bloom will depress salmon production in Chile by 20 percent or more, depending on how long the algae bloom lasts. Seafood wholesalers in the United States said prices for both farmed and wild salmon have risen as much as 20 percent in recent weeks as the impacts of the Chilean algae bloom became increasingly apparent.

# Announcements & Open Discussion

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1. Next WRECIC call: **April 25, 1pm – 2pm (Pacific)**.
2. Open Discussion or Parting Comments