

# 2015 as 2070

*Learning from recent extreme weather*

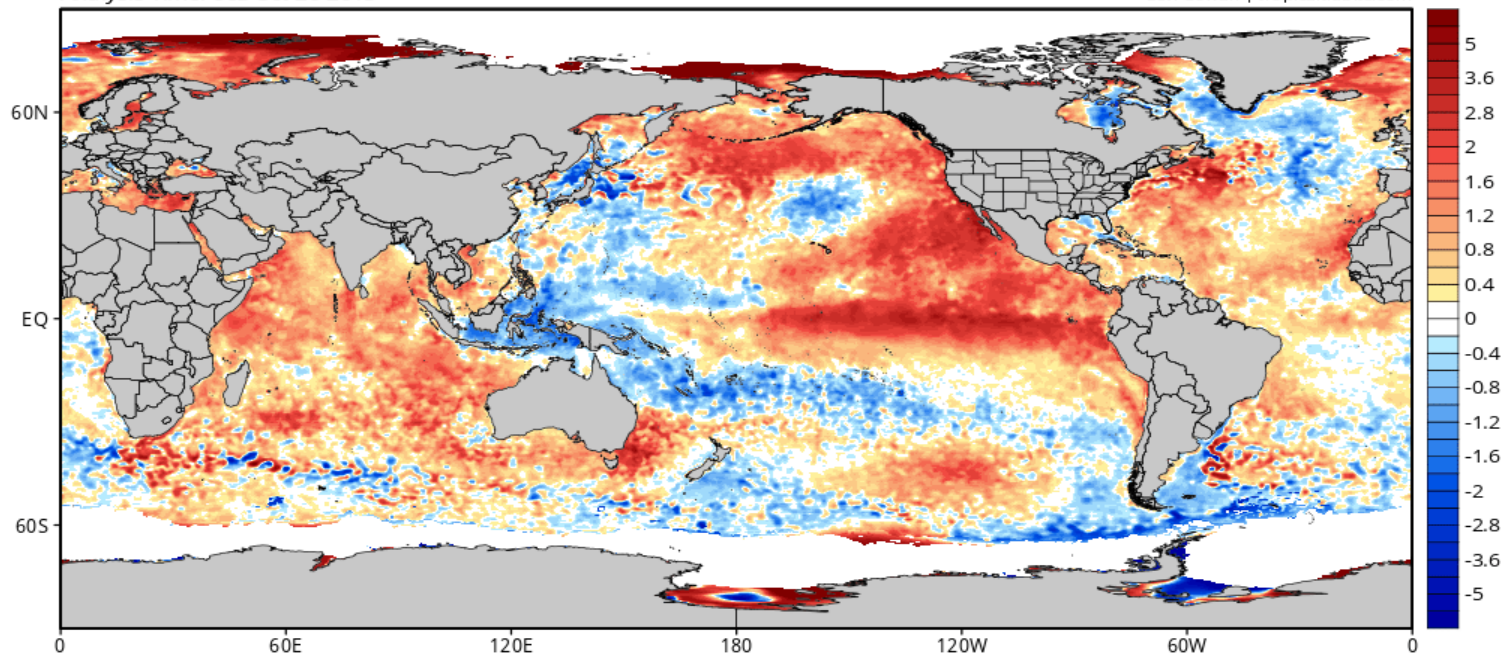




CDAS Sea Surface Temperature Anomaly (°C) (based on CFSR 1981-2010 Climatology)

Analysis Time: 06z Oct 20 2015

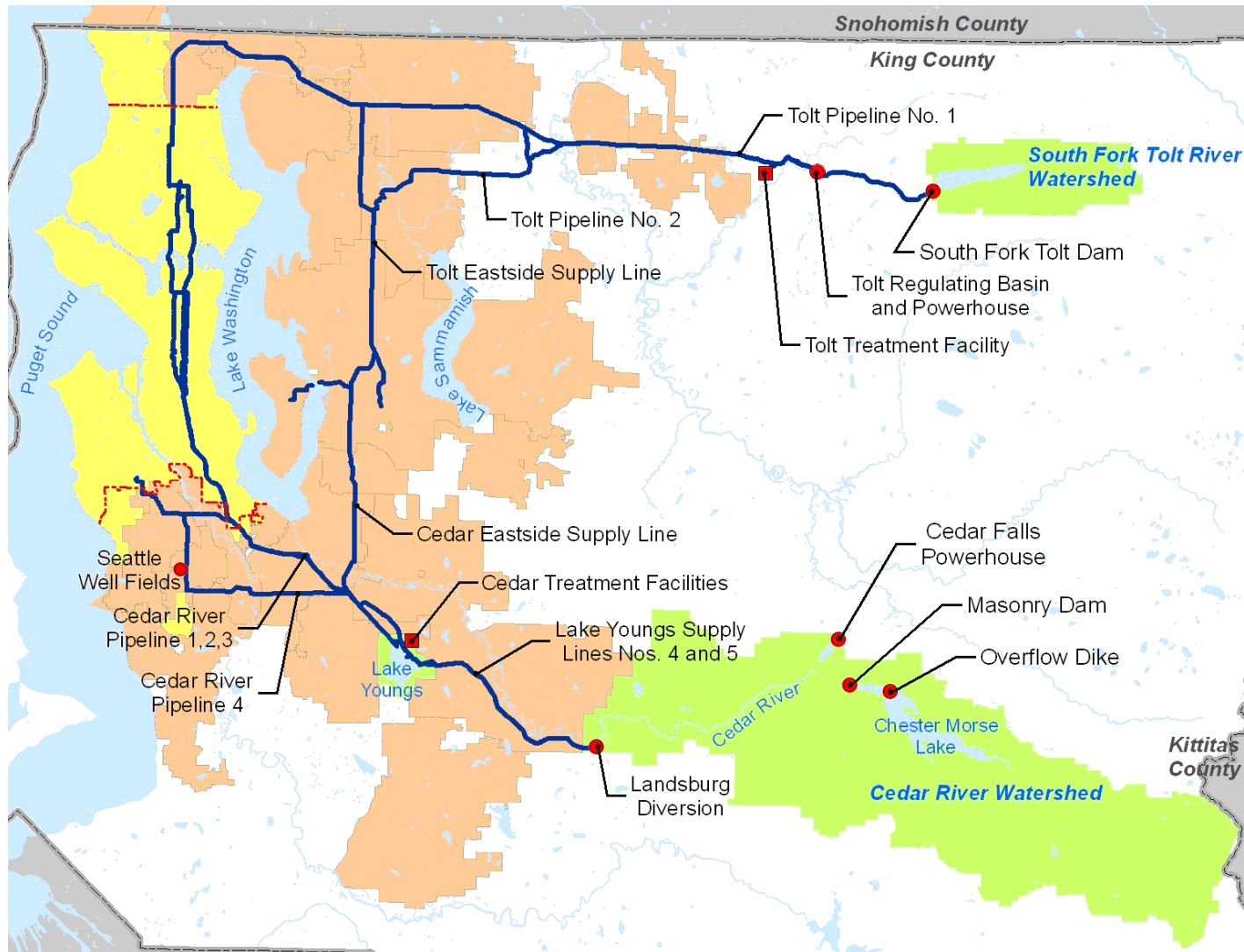
Levi Cowan | tropicaltidbits.com

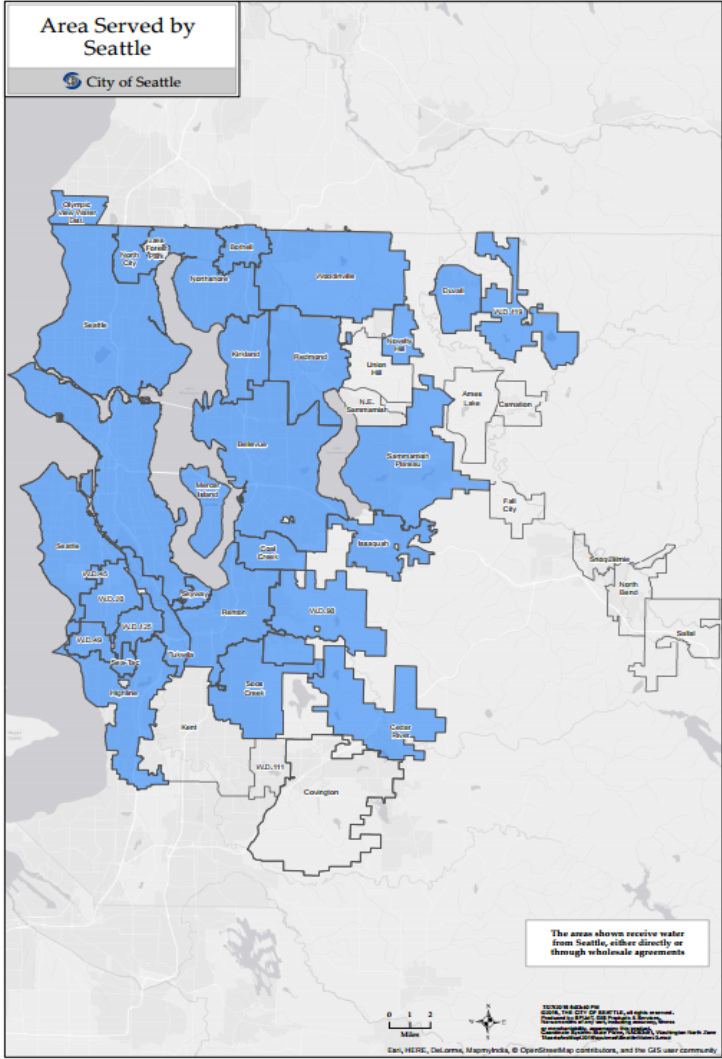







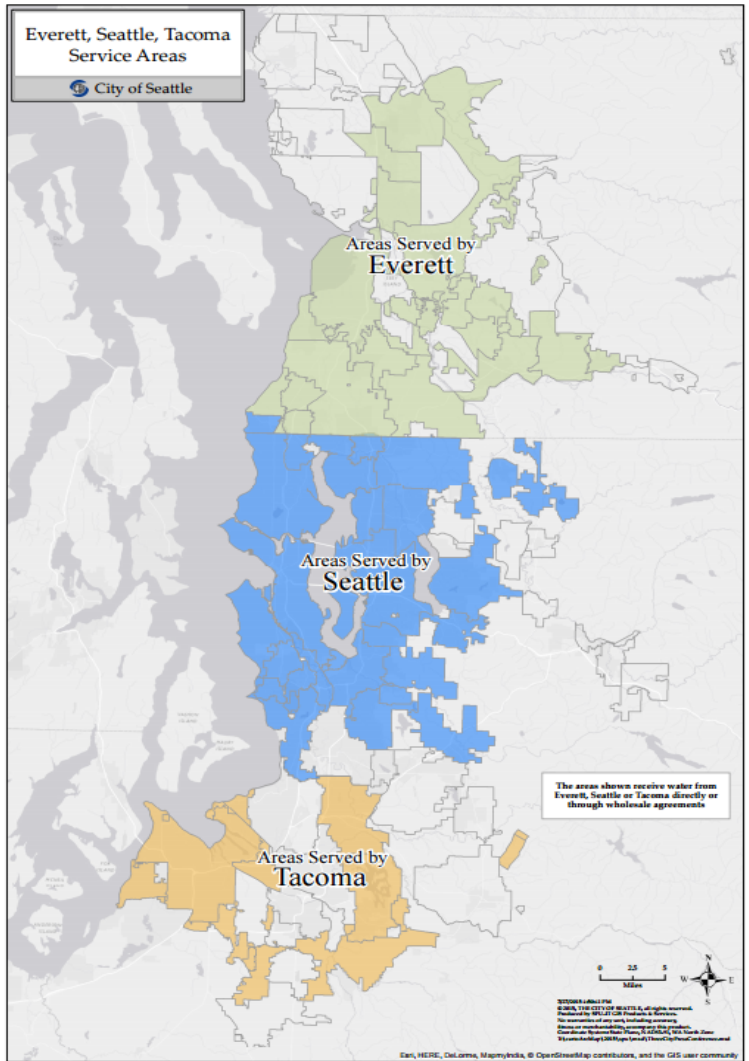
*Providing efficient and forward-looking utility services that keep Seattle the best place to live*





Everett, Seattle, Tacoma  
Service Areas

 City of Seattle



The areas shown receive water from  
Everett, Seattle or Tacoma directly or  
through wholesale agreements

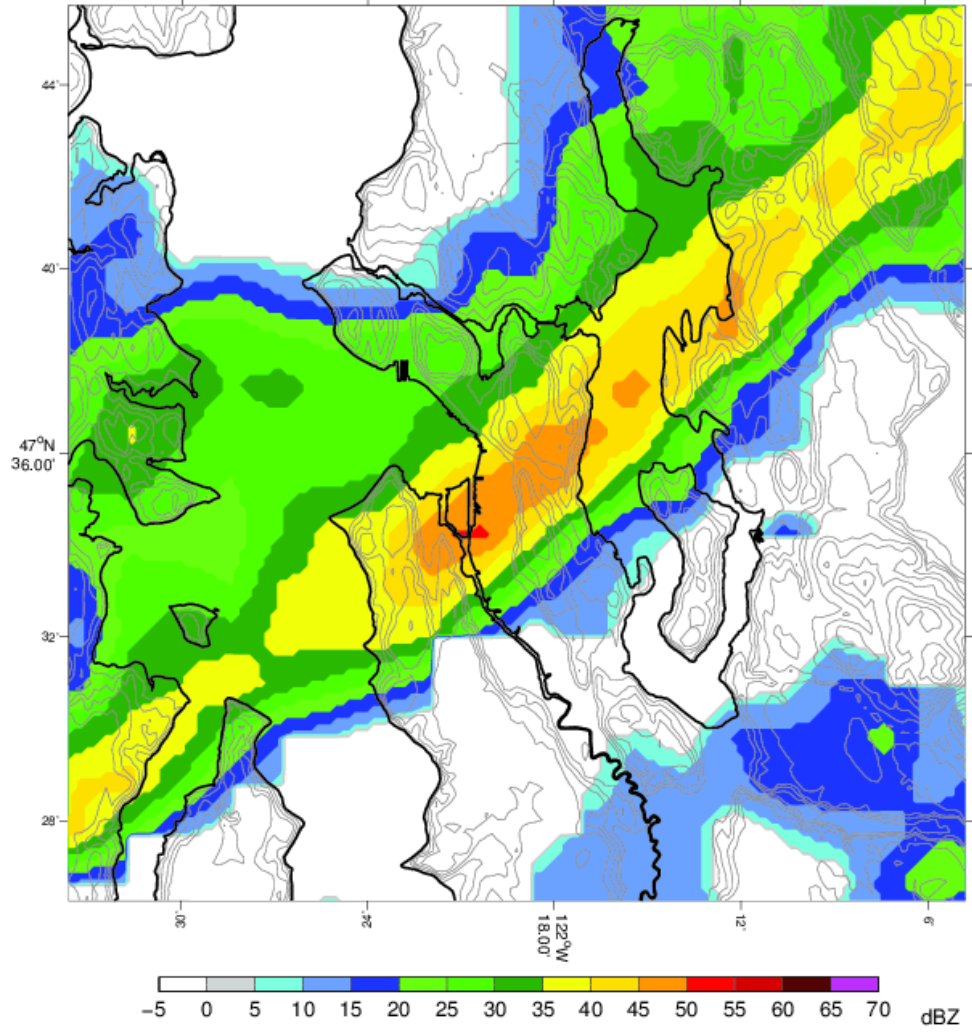
© 2018 THE CITY OF SEATTLE. All rights reserved.  
This map is for informational purposes only.  
The map is not intended to be used for legal purposes.  
The map is not intended to be used for legal purposes.  
The map is not intended to be used for legal purposes.  
The map is not intended to be used for legal purposes.

Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

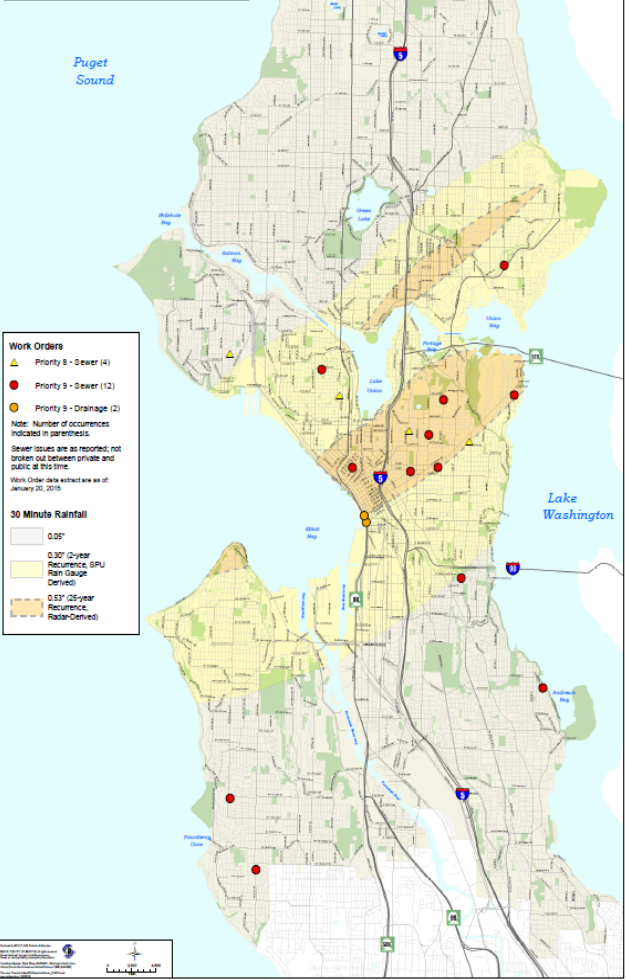




Camano Island Radar (Valid: 2015-Jan-18 10:19 AM Local)



**Preliminary System Assessment**  
January 18, 2015



**Work Orders**

- ▲ Priority 8 - Sewer (4)
- Priority 9 - Sewer (12)
- Priority 9 - Drainage (2)

Note: Number of occurrences indicated in parenthesis.

Sewer issues are as reported, not broken out between private and public at this time.

Work Order data extracted as of January 20, 2015.

**30 Minute Rainfall**

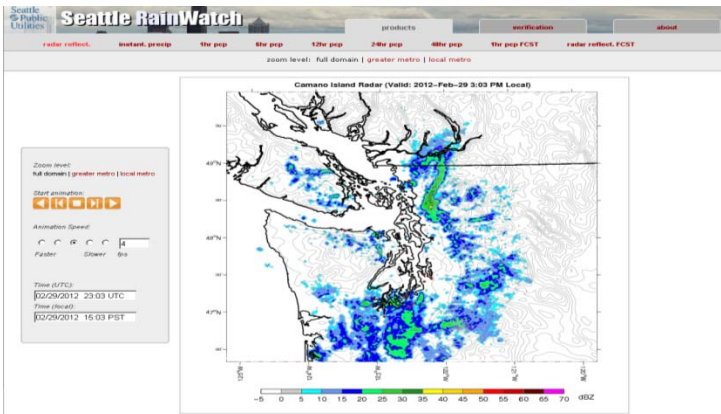
- 0.05"
- 0.30" (2-year Recurrence, SPU Rain Gauge Derived)
- 0.63" (25-year Recurrence, Radar-Derived)



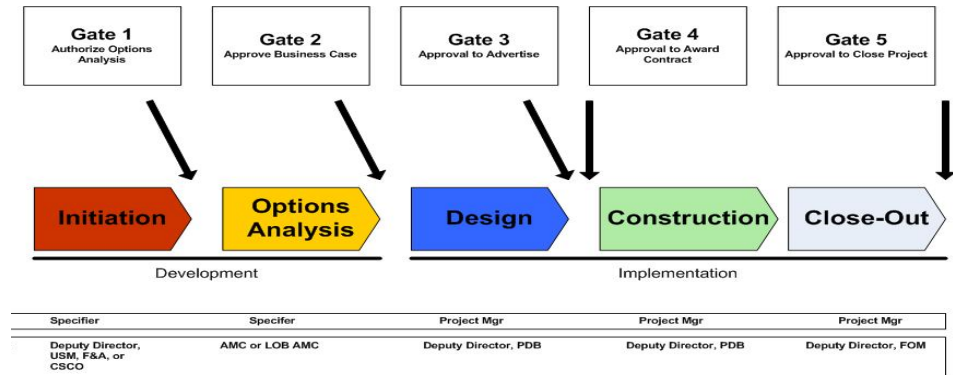








Seattle RainWatch



Stage Gates Asset Management Process

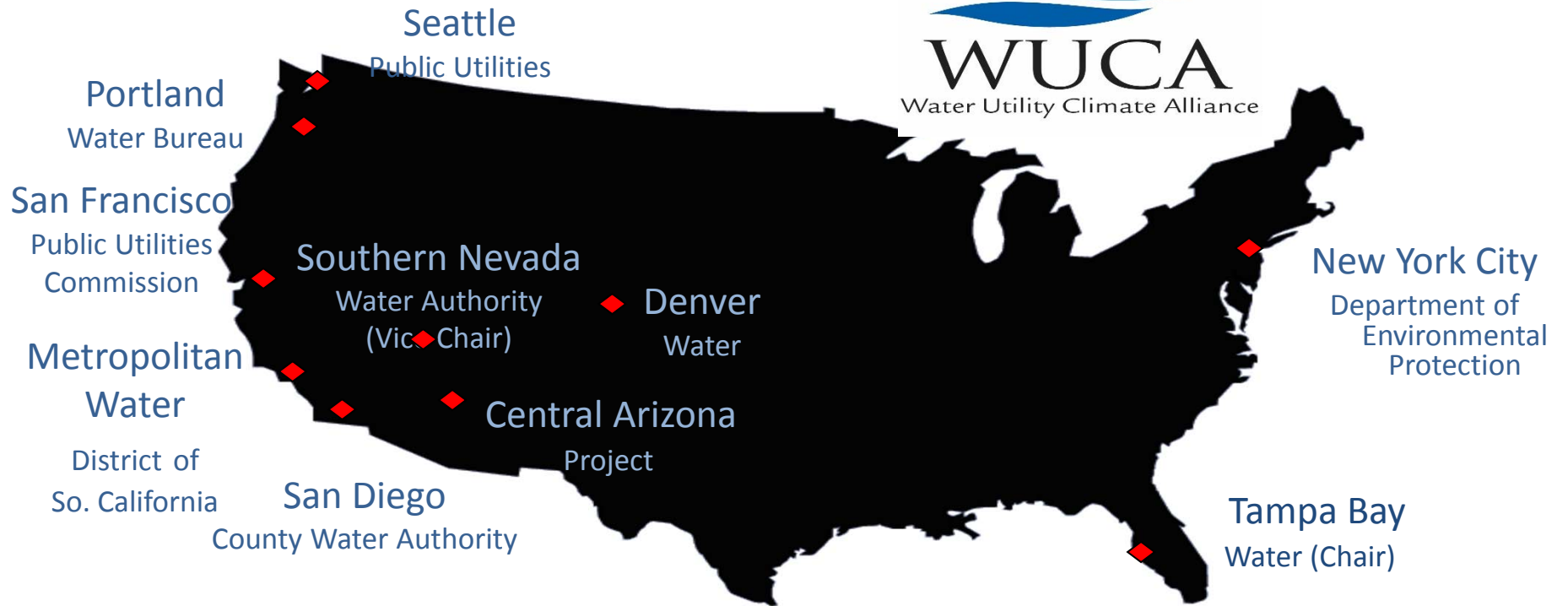
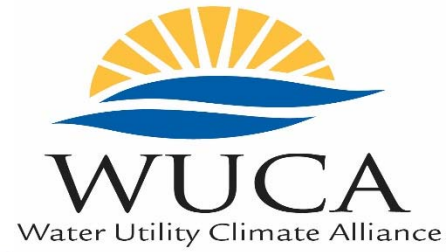
## Seattle Water System Plan

**2013 Water System Plan**  
*Our Water. Our Future.*

Volume I  
July 2012

## 2015-2020 Strategic Business Plan







U.S. Global Change Research Program  
**National Climate  
Assessment**



Climate Change Impacts in the United States

## CHAPTER 3 WATER RESOURCES

### Convening Lead Authors

Anis Georgakakos, Georgia Institute of Technology  
Paul Fleming, Seattle Public Utilities

### Lead Authors

Michael Dettinger, U.S. Geological Survey  
Christa Peters-Lidard, National Aeronautics and Space Administration  
Terese (T.C.) Richmond, Van Ness Feldman, LLP  
Ken Reckhow, Duke University  
Kathleen White, U.S. Army Corps of Engineers  
David Yates, University Corporation for Atmospheric Research

### Recommended Citation for Chapter

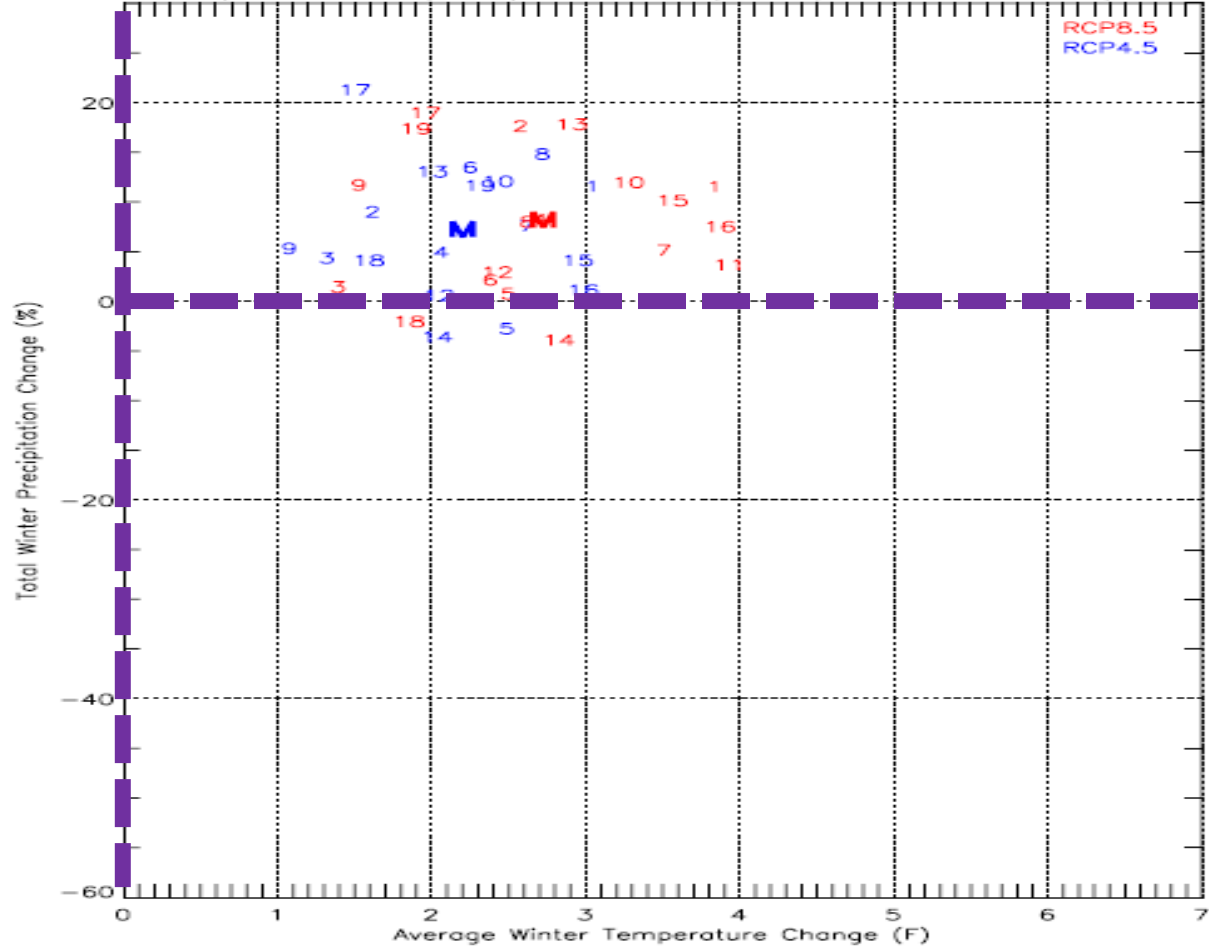
Georgakakos, A., P. Fleming, M. Dettinger, C. Peters-Lidard, Terese (T.C.) Richmond, K. Reckhow, K. White, and D. Yates, 2014: Ch. 3: Water Resources. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 69-112. doi:10.7930/J0G44N6T.

**On the Web:** <http://nca2014.globalchange.gov/report/sectors/water>



INFORMATION DRAWN FROM THIS CHAPTER IS INCLUDED IN THE HIGHLIGHTS REPORT AND IS IDENTIFIED BY THIS ICON

Winter (2040–2069) – (1950–2005) Temperature vs Precipitation



- |                |                  |                  |                   |
|----------------|------------------|------------------|-------------------|
| 1=bcc-csm1-1   | 6=CSIRO-Mk3-6-0  | 11=HadGEM2-ES365 | 16=MIROC-ESM-CHEM |
| 2=bcc-csm1-1-m | 7=CanESM2        | 12=IPSL-CM5A-LR  | 17=MIROC5         |
| 3=inmcm4       | 8=GFDL-ESM2G     | 13=IPSL-CM5A-MR  | 18=MRI-CGCM3      |
| 4=CCSM4        | 9=GFDL-ESM2M     | 14=IPSL-CM5B-LR  | 19=NorESM1-M      |
| 5=CNRM-CM5     | 10=HadGEM2-CC365 | 15=MIROC-ESM     | M=Ensemble Mean   |



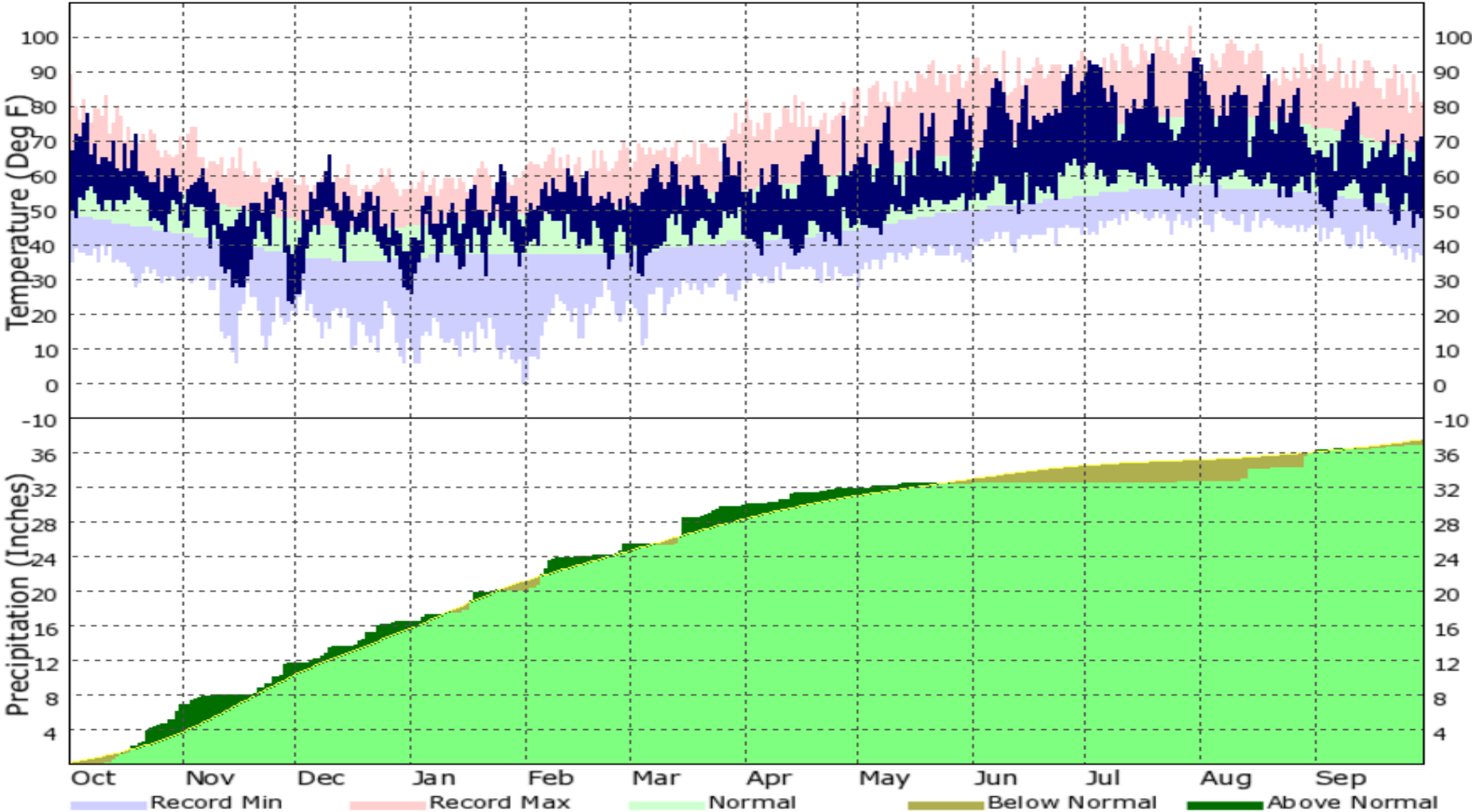
*Providing efficient and forward-looking utility services that keep Seattle the best place to live*



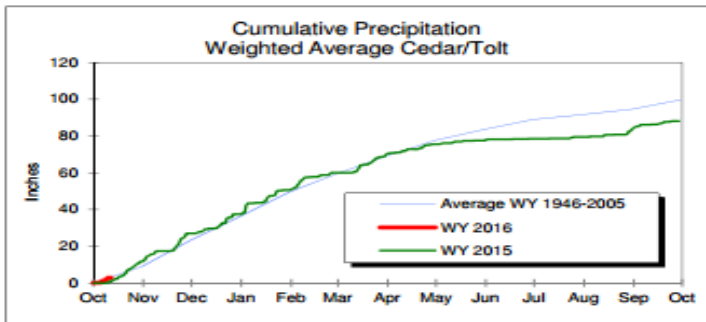




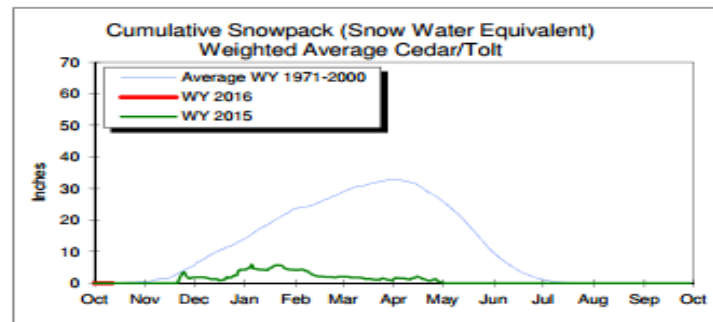
# Sea-Tac Water Year 2015



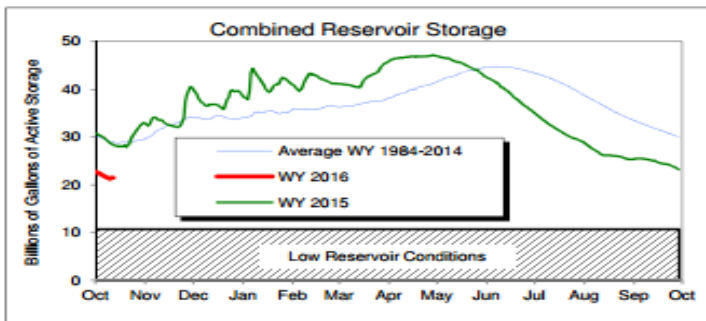
## Seattle Public Utilities Water System Synopsis as of October 12, 2015



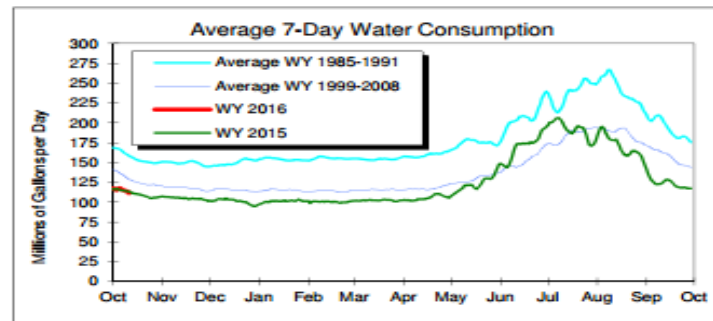
Precipitation was recorded in the Cedar River and South Fork Tolt River Watersheds over the past week.



The average snow accumulation across the sites that we monitor is estimated to be about 0.0 inches snow water equivalent which is at the long term average for this time of the year.



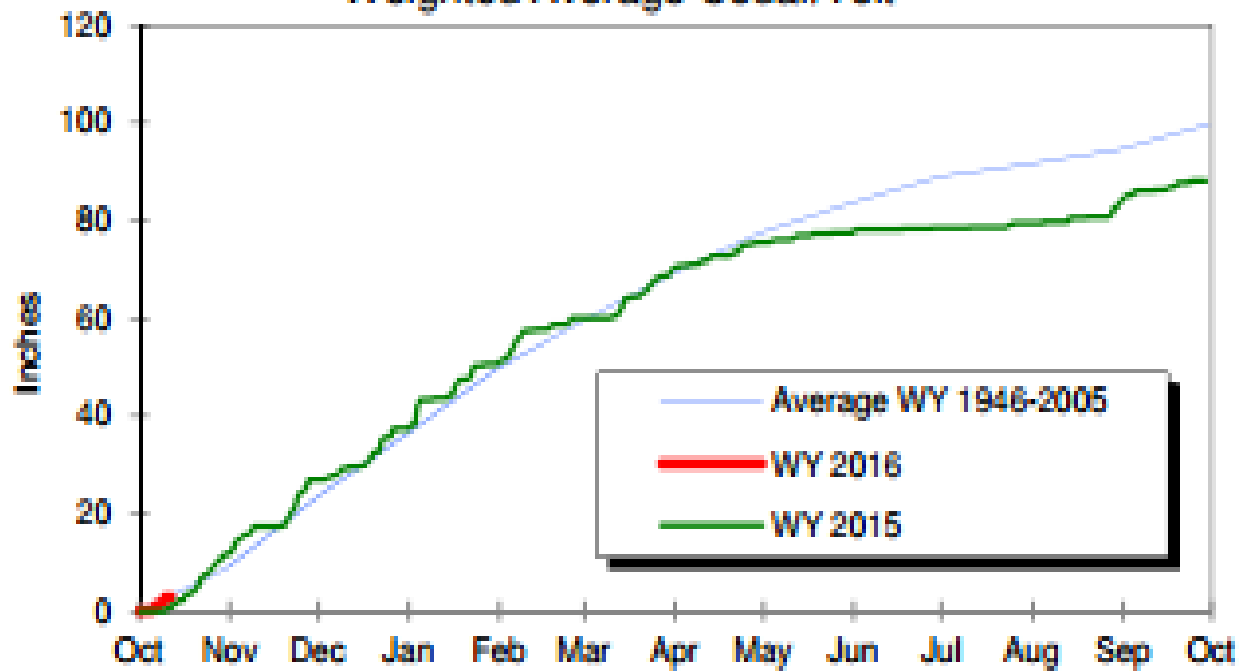
The combined reservoir storage of Chester Morse Lake, Masonry Pool, Lake Youngs and South Fork Tolt Reservoir is below the long term average for this time of the year.



Water use over the past week averaged about 111 million gallons per day (mgd), which is less than the 129 mgd used during the same period over the years 1999-2008.

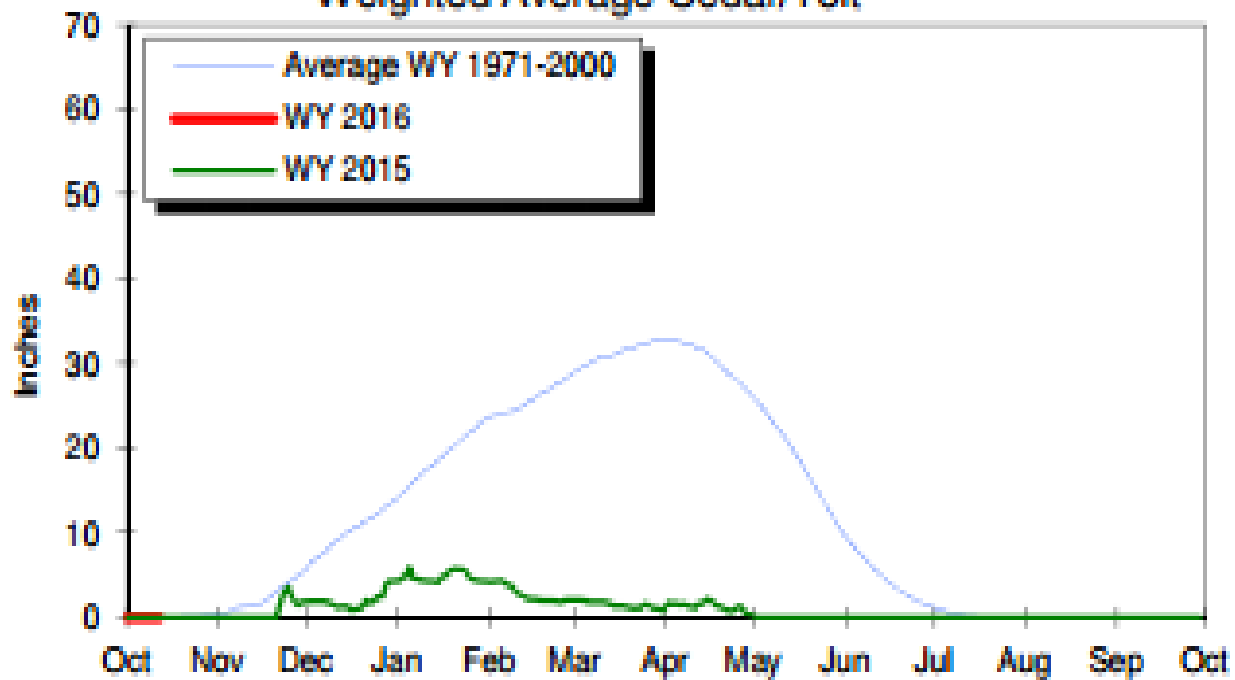
All data is provisional and subject to revision.

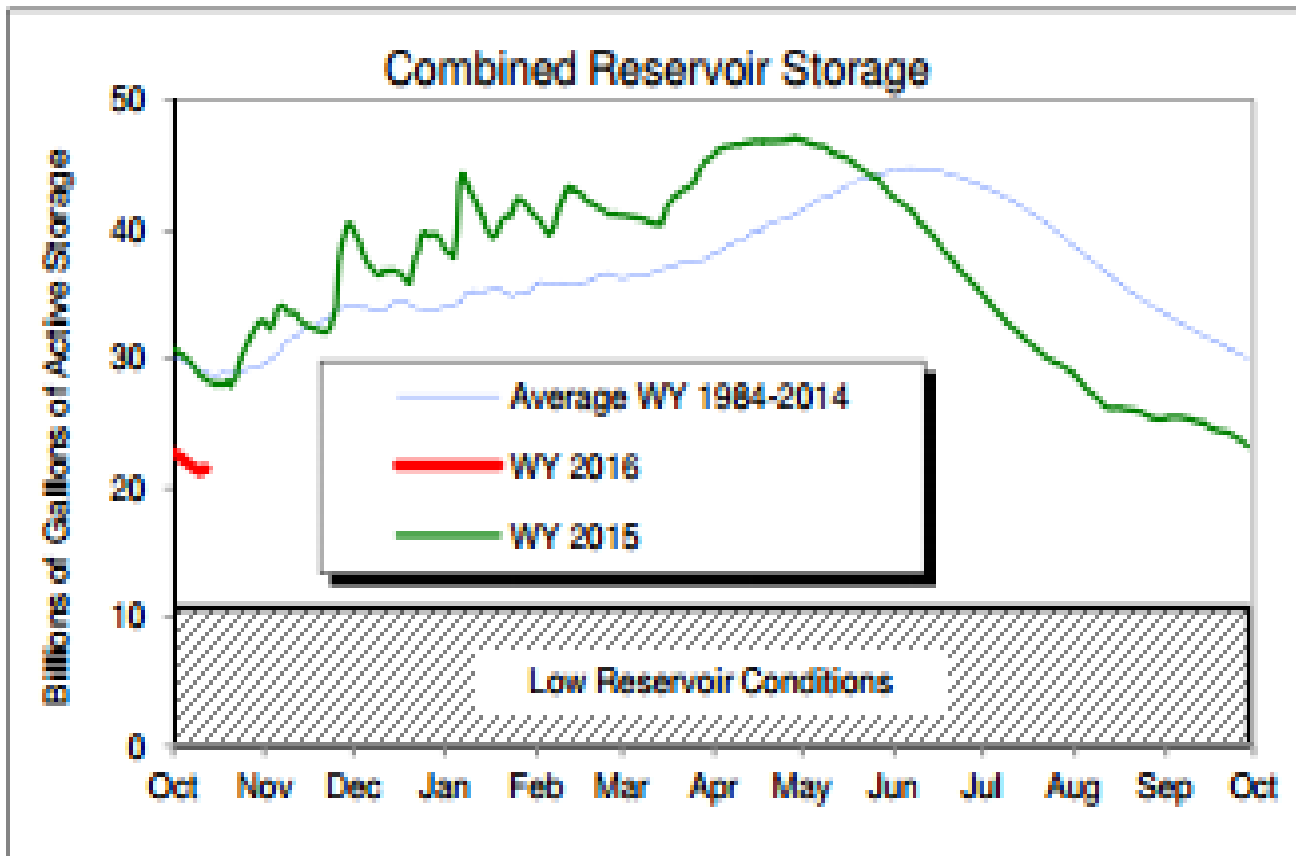
### Cumulative Precipitation Weighted Average Cedar/Tolt



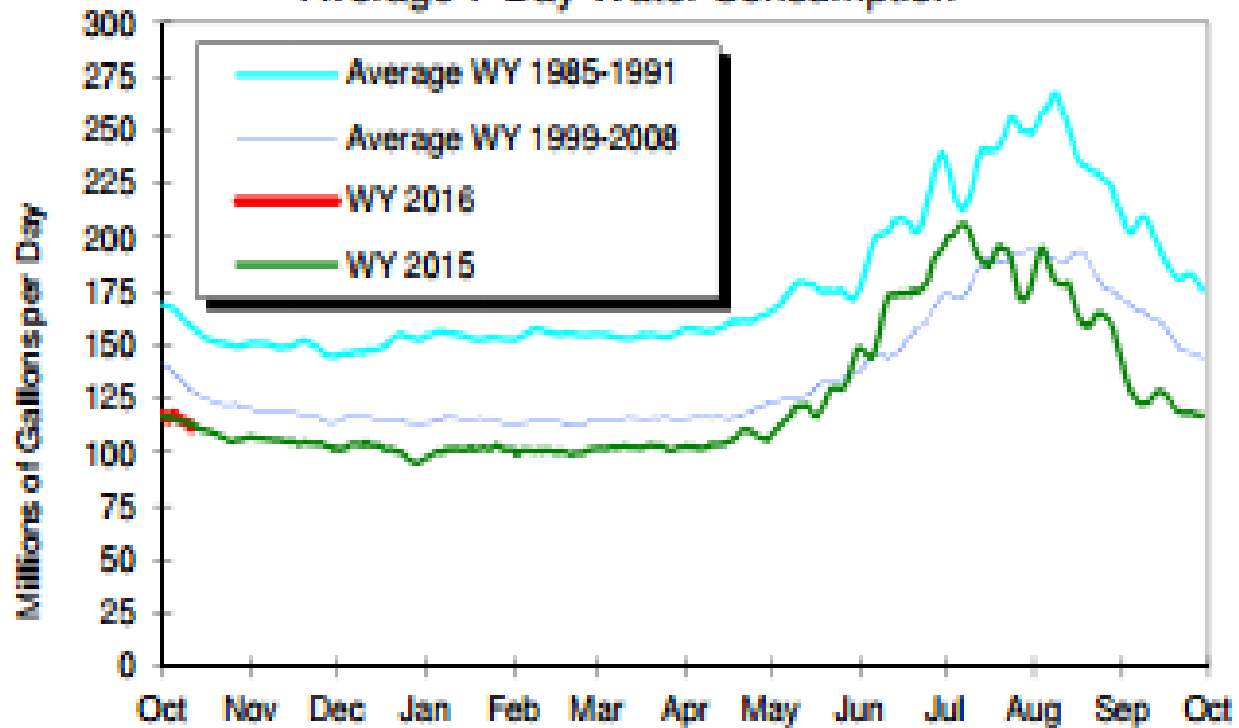


### Cumulative Snowpack (Snow Water Equivalent) Weighted Average Cedar/Tolt





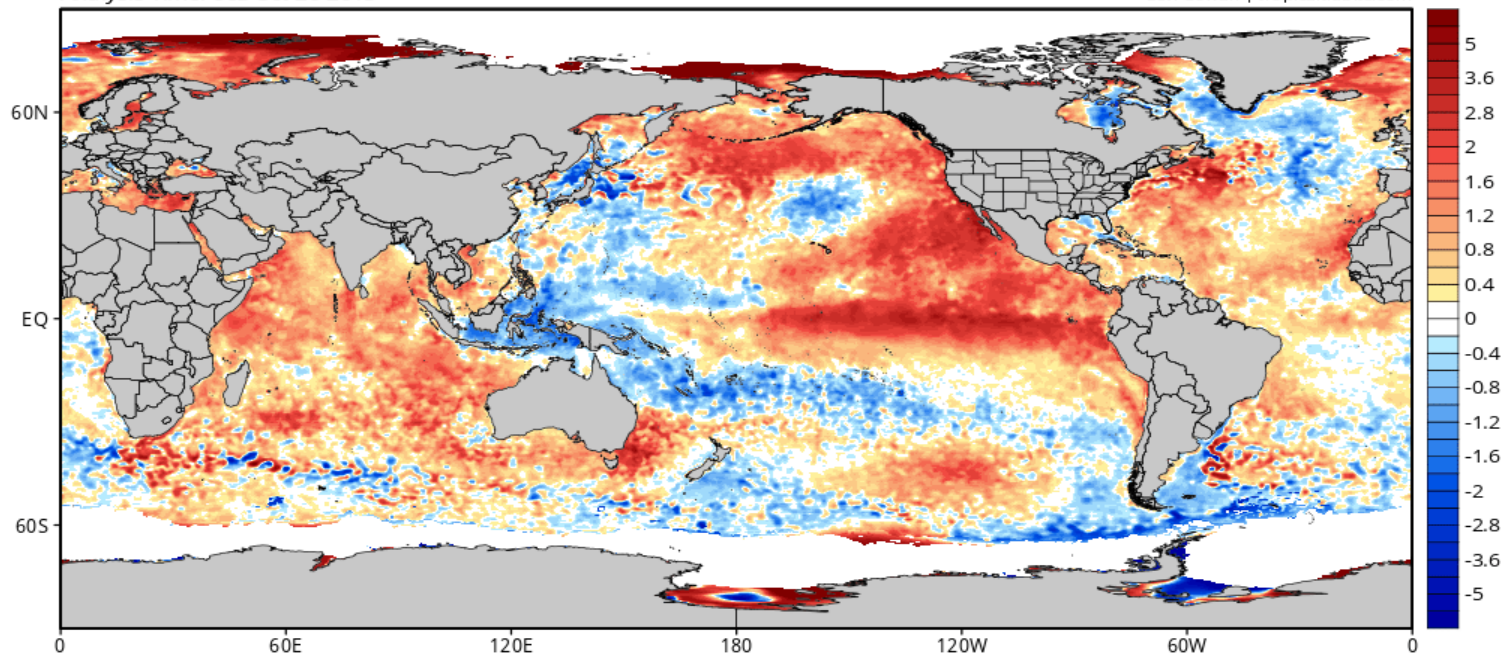
### Average 7-Day Water Consumption

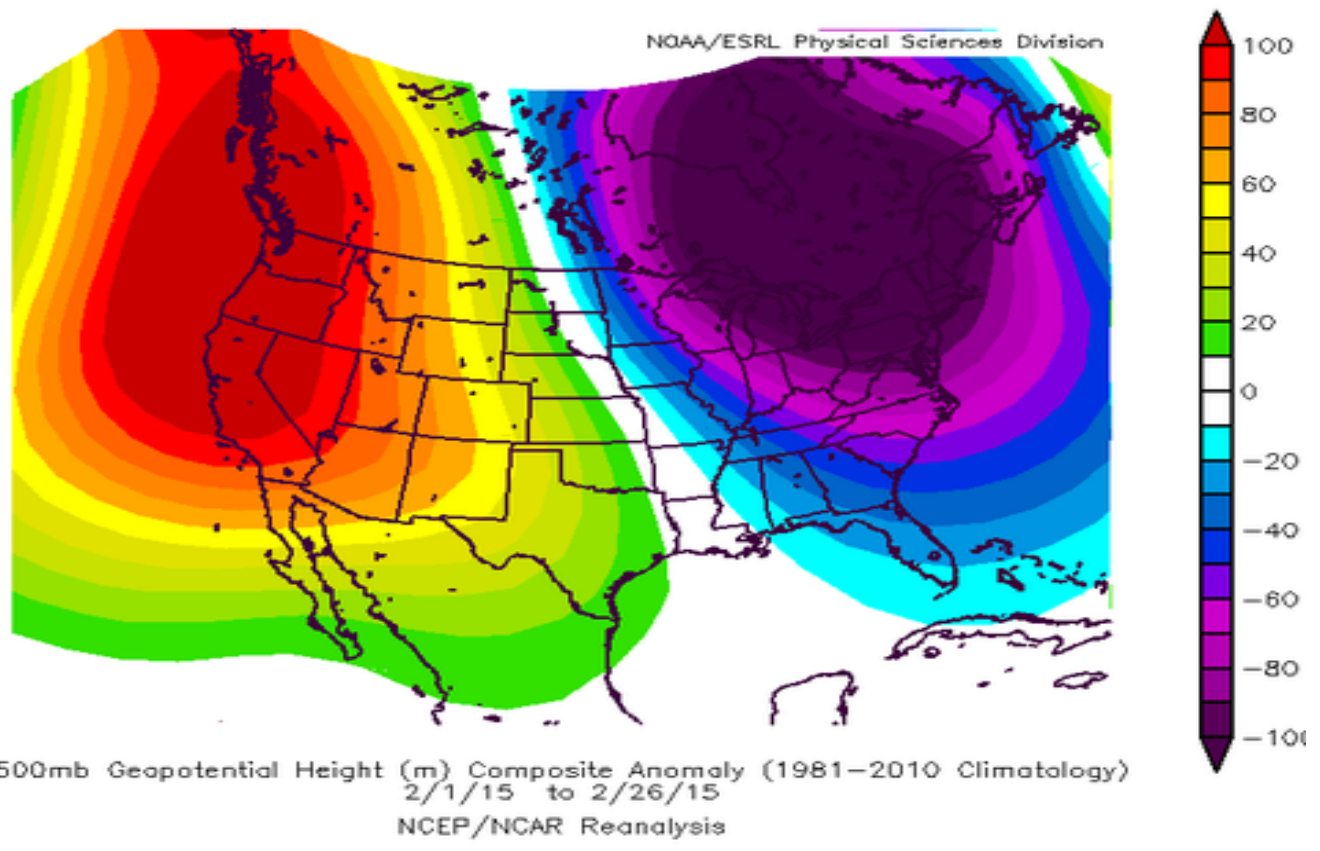


CDAS Sea Surface Temperature Anomaly (°C) (based on CFSR 1981-2010 Climatology)

Analysis Time: 06z Oct 20 2015

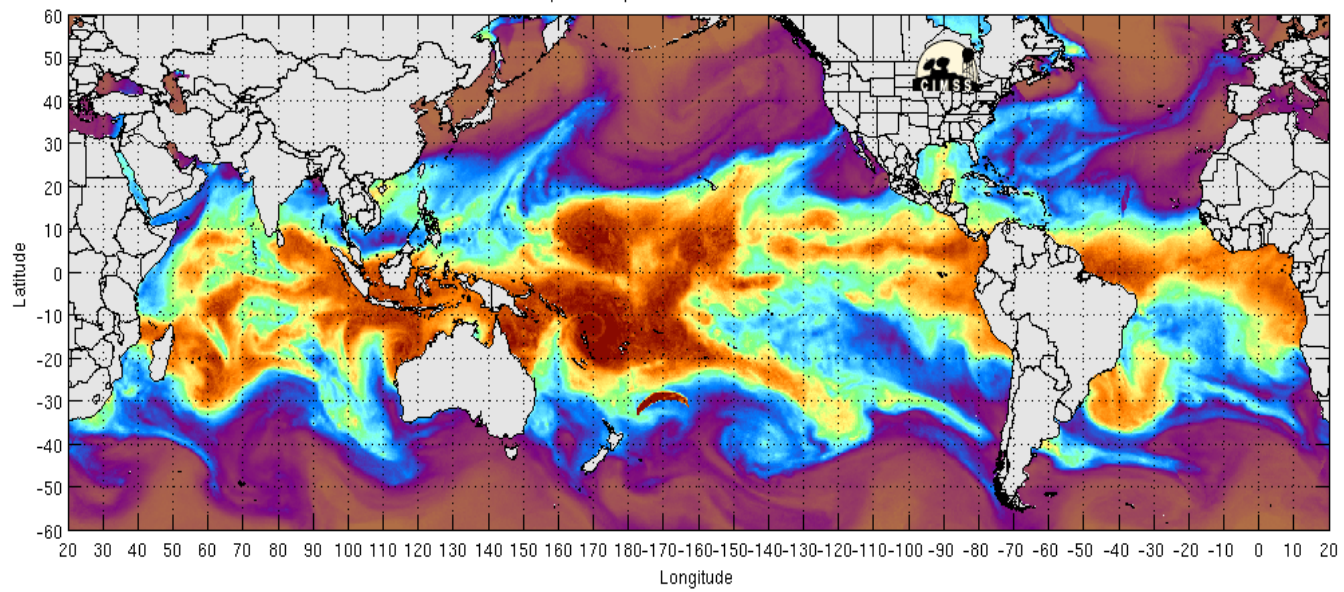
Levi Cowan | tropicaltidbits.com

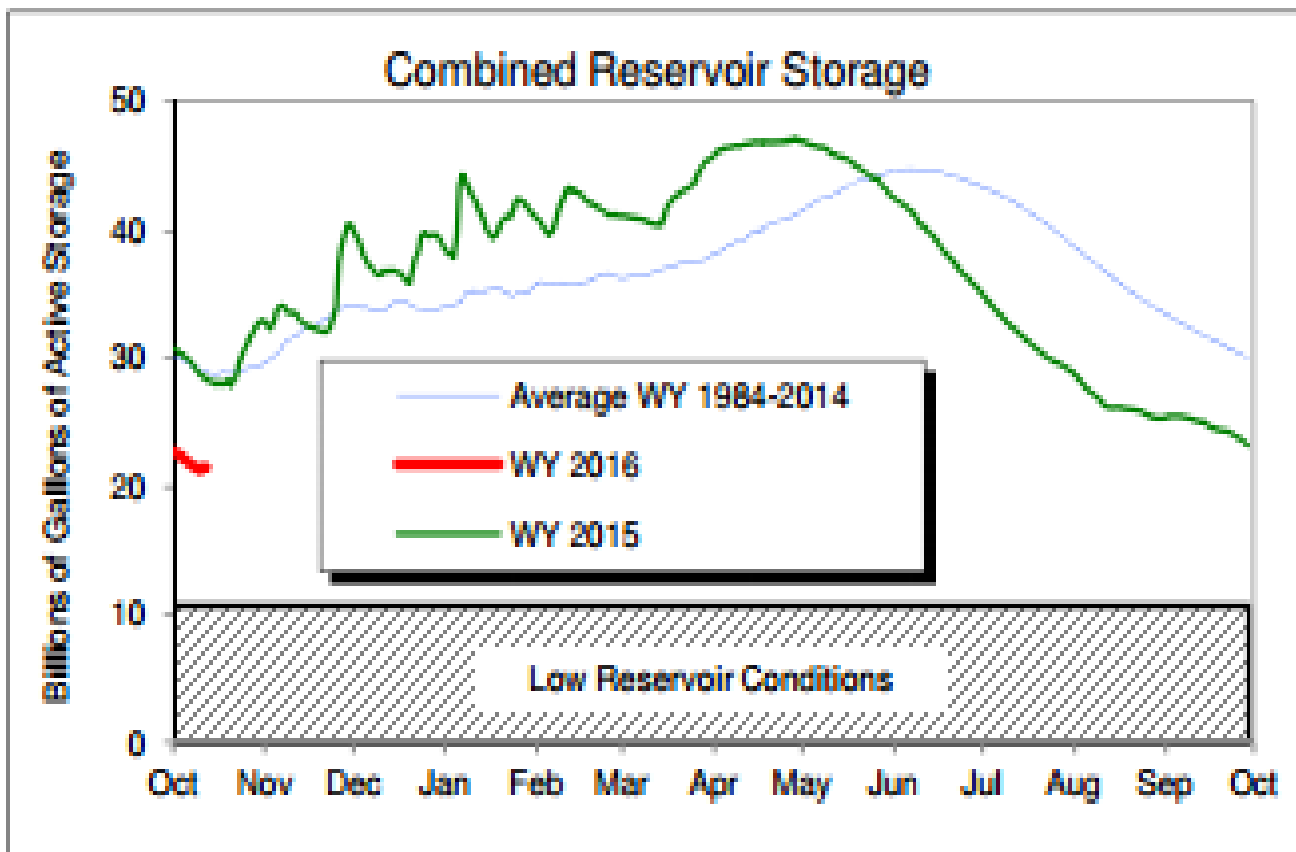






Morphed composite: 2015-03-12 00:00:00 UTC





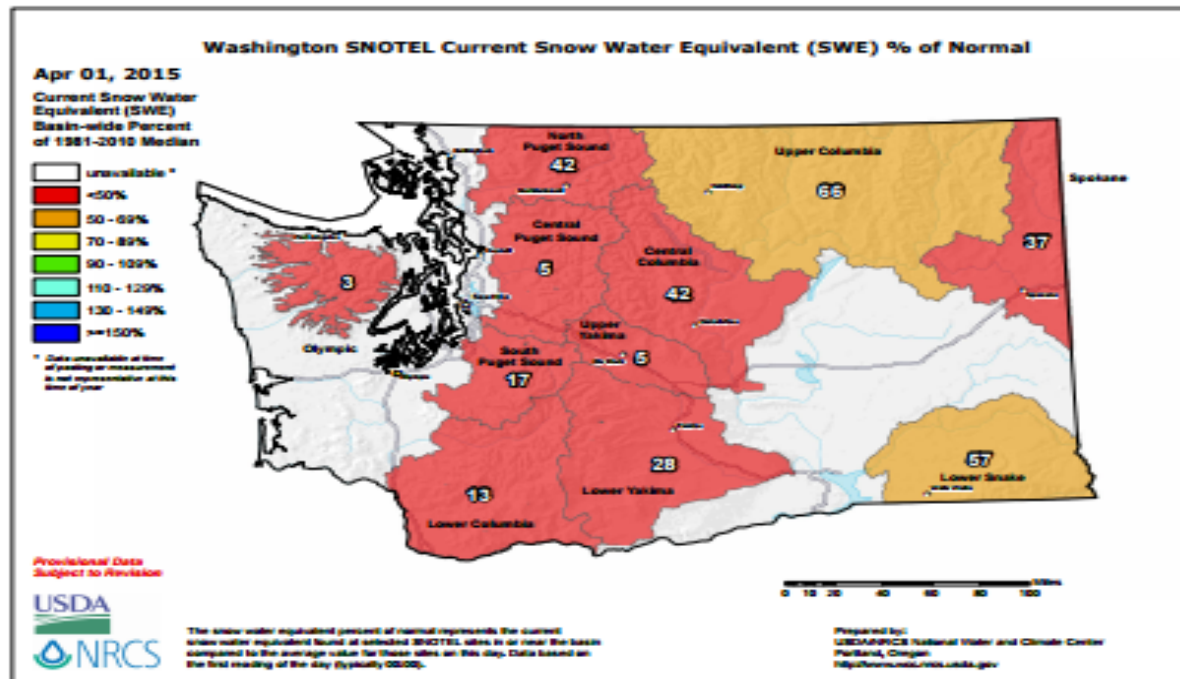
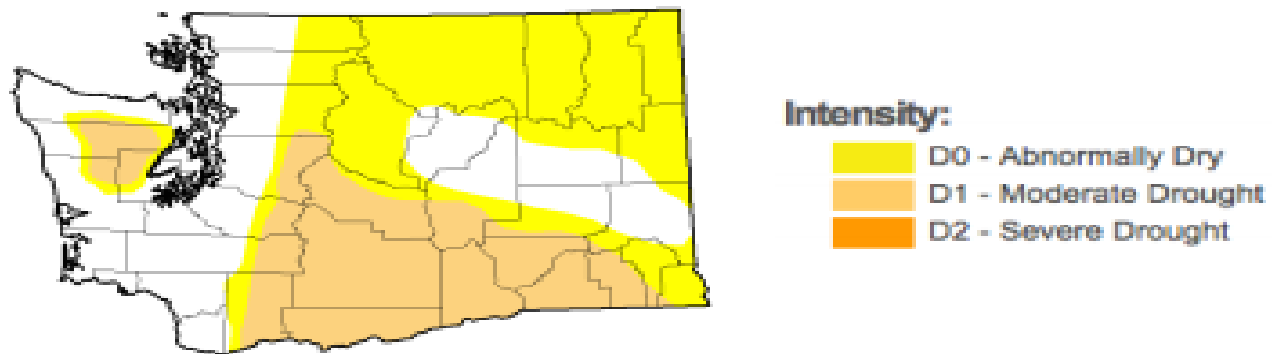
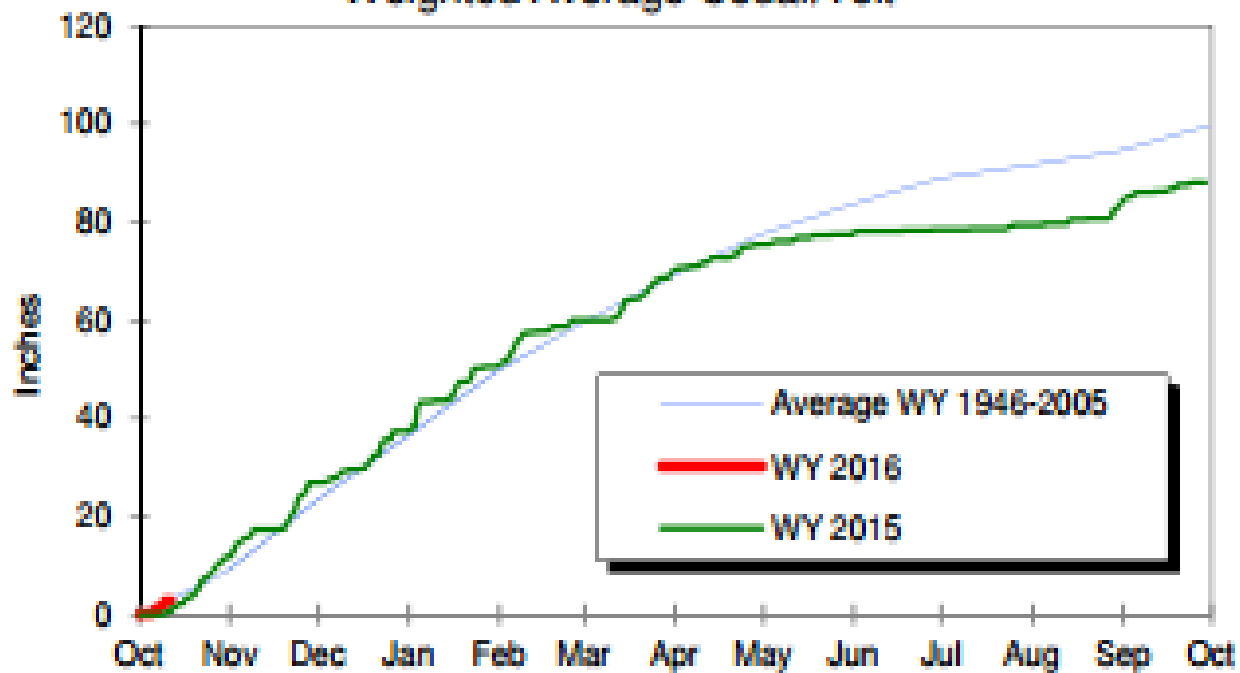


Figure 2: Snowpack (in terms of snow water equivalent) percent of normal for Washington as of 1 April 2015 (from the National Resources Conservation Service).

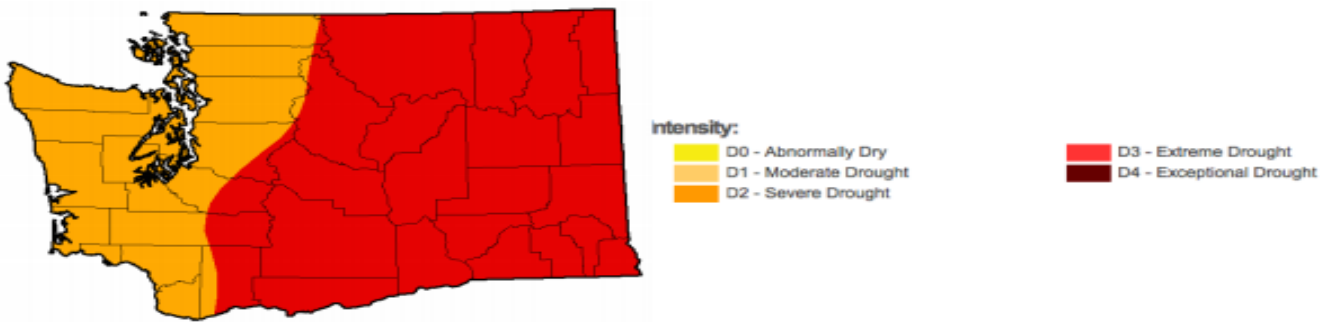


**Figure 3: The 31 March 2015 edition of the US Drought Monitor (<http://droughtmonitor.unl.edu/>).**

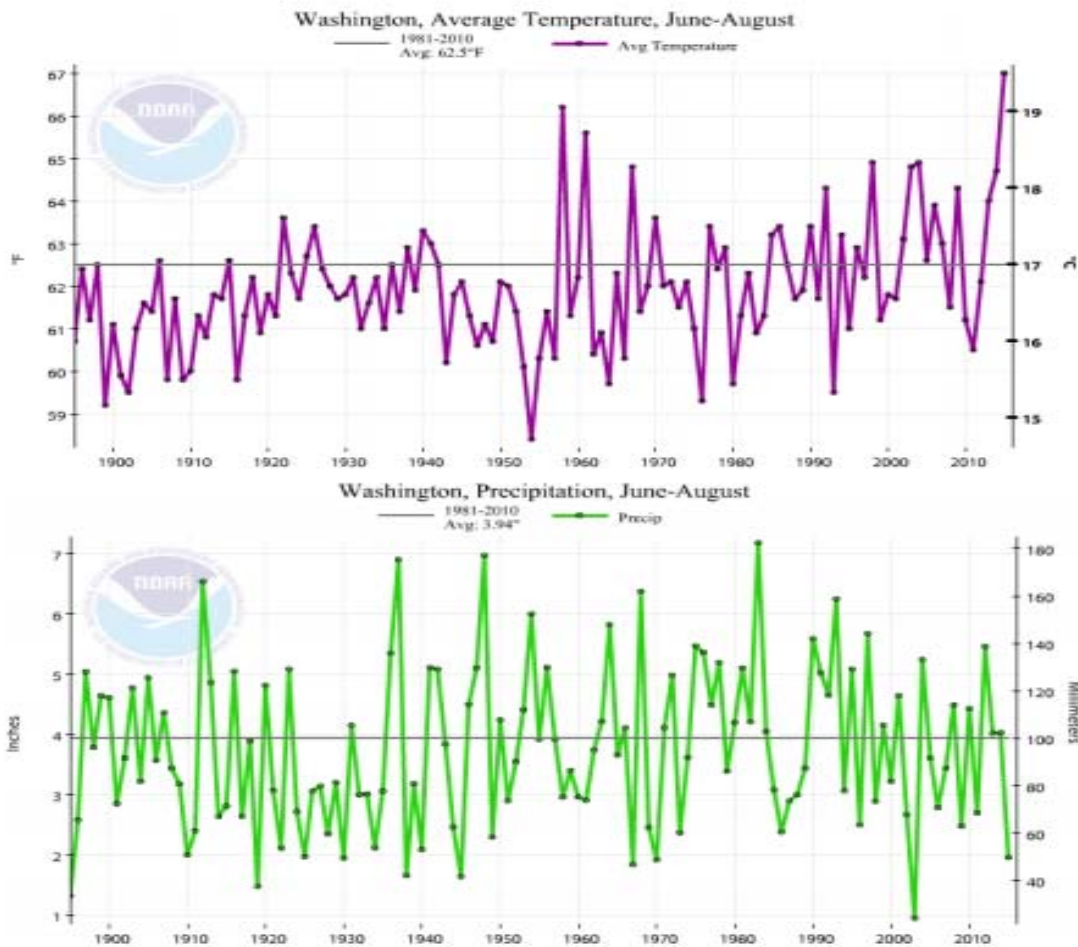
### Cumulative Precipitation Weighted Average Cedar/Tolt







**Figure 2: The 29 September 2015 edition of the US Drought Monitor**  
**(<http://droughtmonitor.unl.edu/>).**



**Figure 3: Statewide average temperature (top) and total precipitation (bottom) for June through August from 1895 to 2015 (NCEI).**

### Water Shortage Response Plan



#### Voluntary water use reduction

We are asking customers to reduce their water use.

Seattle, Tacoma, and Everett collectively reduced water use by 14% since asking customers to help.



#### Top water-saving tips

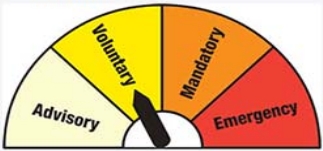
- [Stop watering](#) — If you haven't already, now is the time. As temperatures cool and days get shorter, lawns and plants enter the initial phase of dormancy when no water is needed.
- [Weed and mulch](#) — Add 2-3 inches of mulch to the soil surface.
- [Reduce showering time](#) — Save 2.5 gallons of water every minute less you spend in the shower.
- [Fix leaks](#) — Fix obvious leaks such as at faucets, hose bibs, and sprinkler spray heads. Check for less obvious leaks such as silent toilet leaks.
- [Wash full loads](#) — Wait until your clothes washer and dishwasher are full before starting.

#### Saving water helps salmon

See salmon in local streams this fall. We're partnering with Salmon SEEson because saving water keeps water in the rivers for salmon, people, and wildlife. View [sighting dates and locations](#).



#### Stages of Water Shortage Contingency Plan



#### Best ways to save water

- [English](#) (pdf)
- [Arabic / Aribiyva](#) (pdf)
- [Chinese \(Traditional\) / 中文 \(繁體\)](#)

### gardening videos

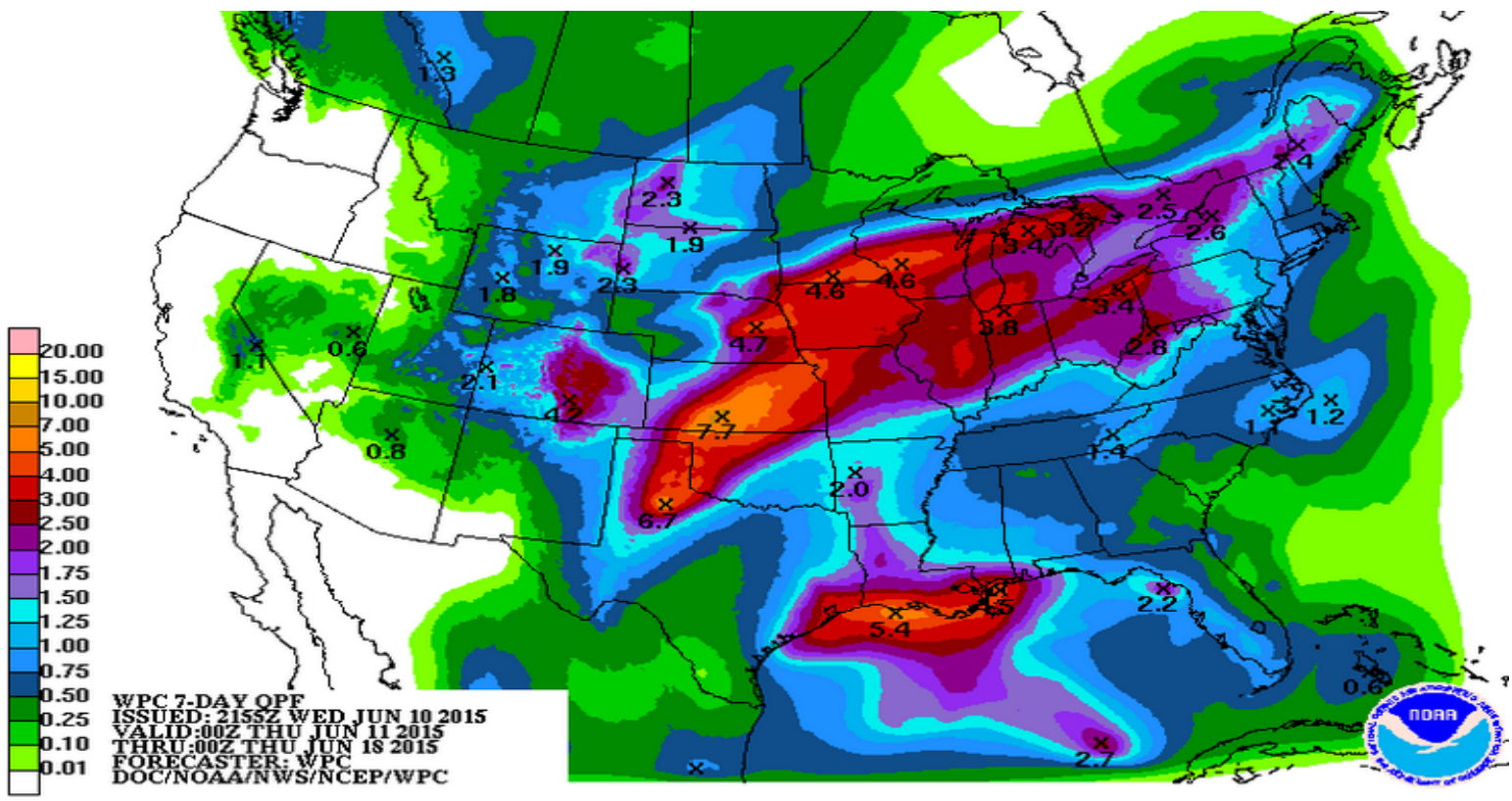
- [Mulch](#)
- [Use a soaker hose correctly](#)
- [Go natural with your lawn](#)
- [Plant in Fall](#)

### online tools

- [Sprinkler calculator](#)
- [Water budget calculator](#)
- [Compost calculator](#)

### participating utilities

- [View Partner Map](#)
- [Cedar River Water and Sewer District](#)
- [City of Bothell](#)
- [City of Duvall](#)
- [City of Mercer Island](#)
- [City of Renton](#)
- [Coal Creek Utility District](#)
- [Highline Water District](#)



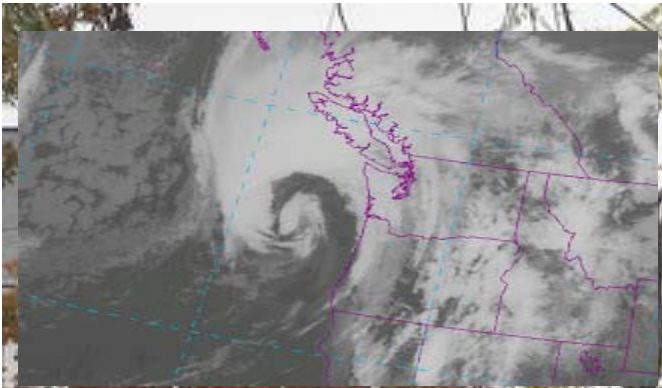




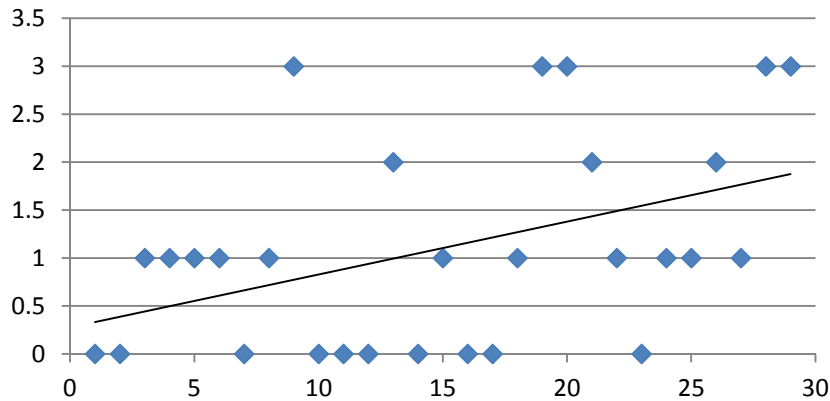




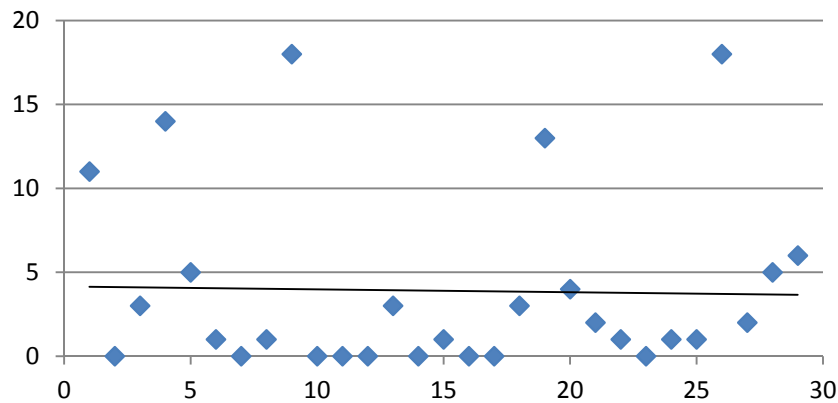




## 1978-2006



Extreme events have increased over the 29-year record...



...with a decreasing trend in spatial extent and number of gages affected.

“There is 31% chance of a 100-year event of some duration being recorded somewhere within the City in any given year. That makes the annual recurrence interval of a 100-year event of some duration at some location within the City a scant 3.2 years.”





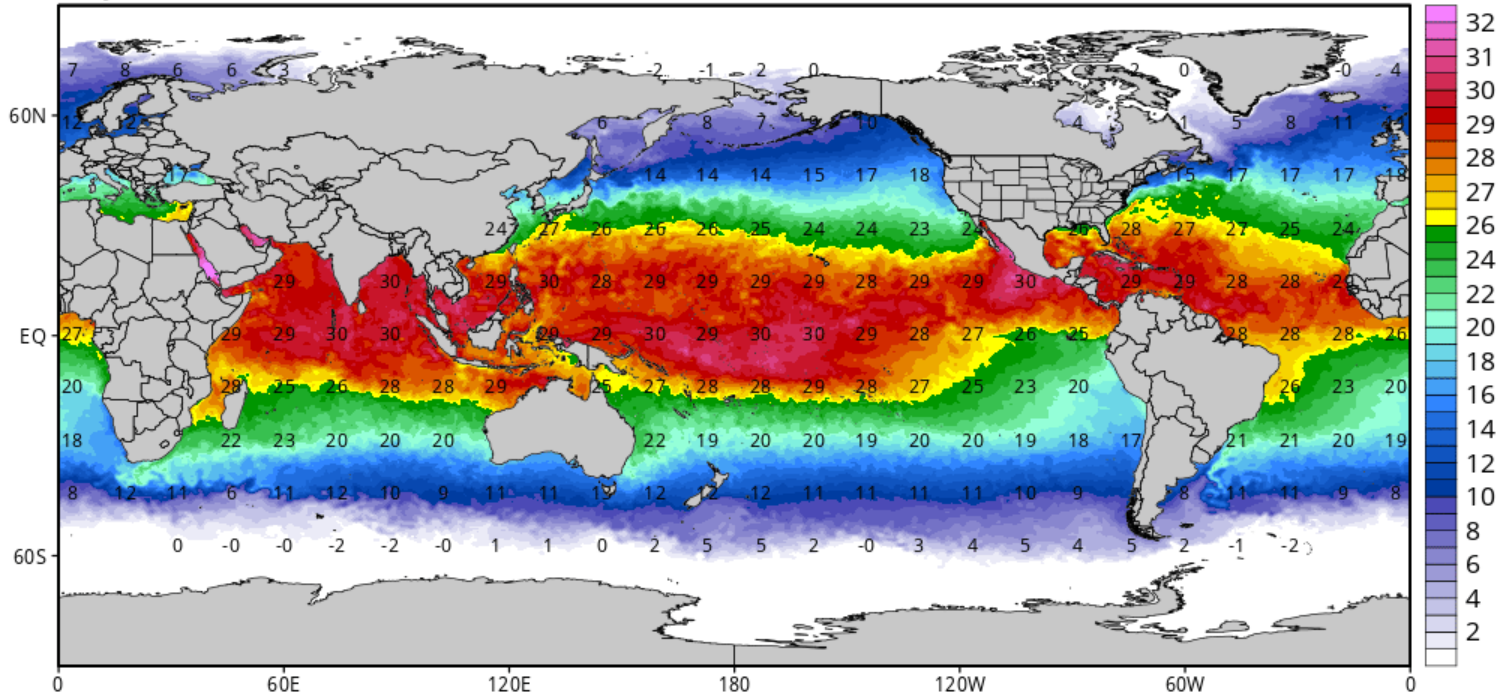




# CDAS Sea Surface Temperature (°C)

Analysis Time: 12z Oct 20 2015

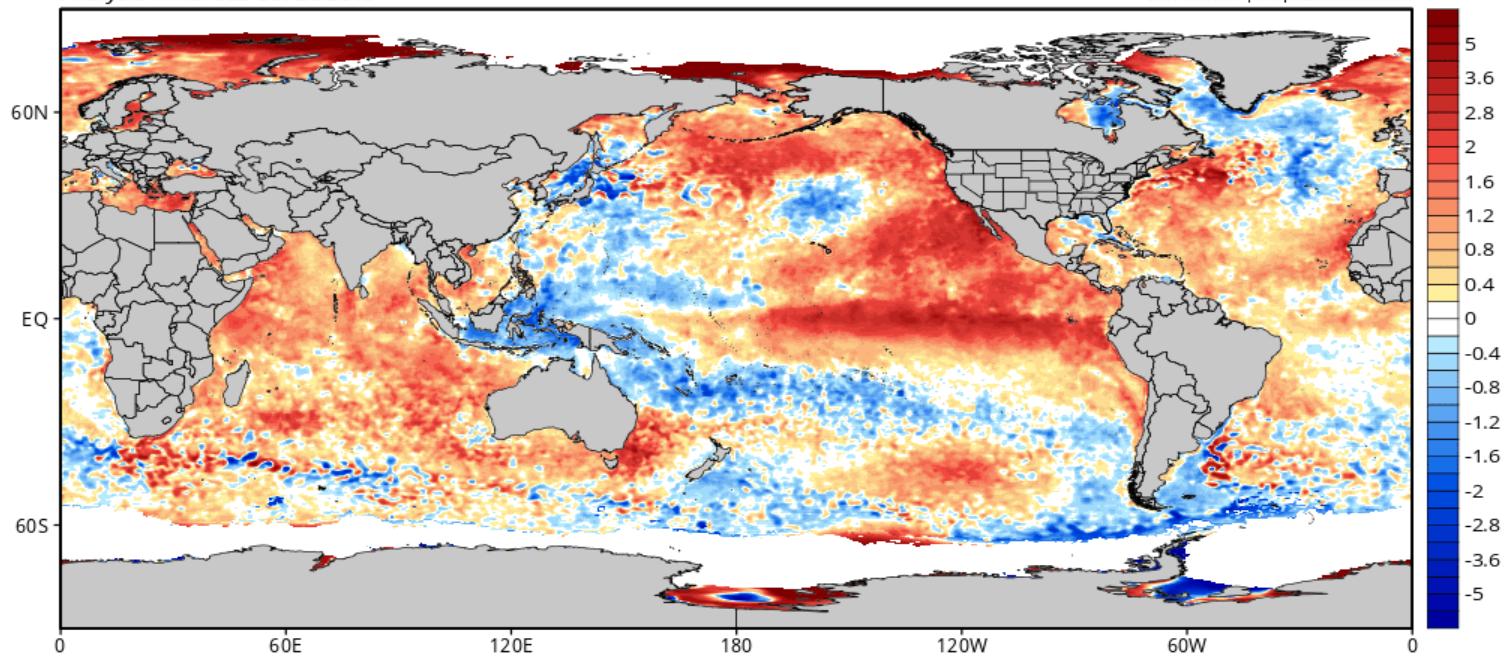
Levi Cowan | tropicaltidbits.com

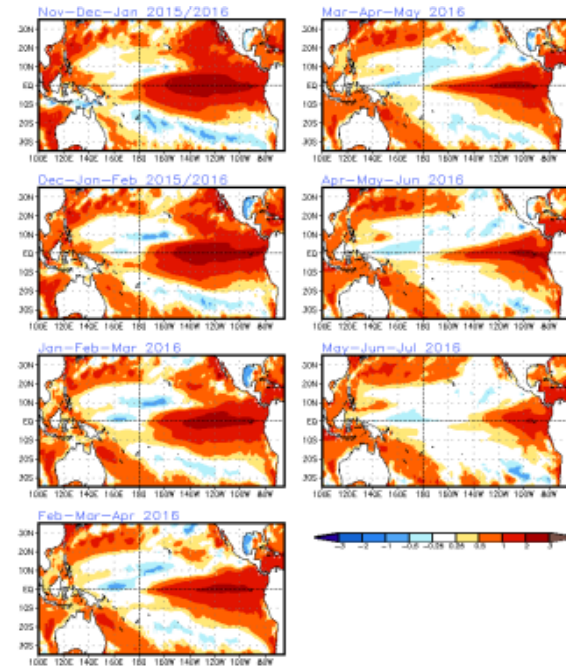
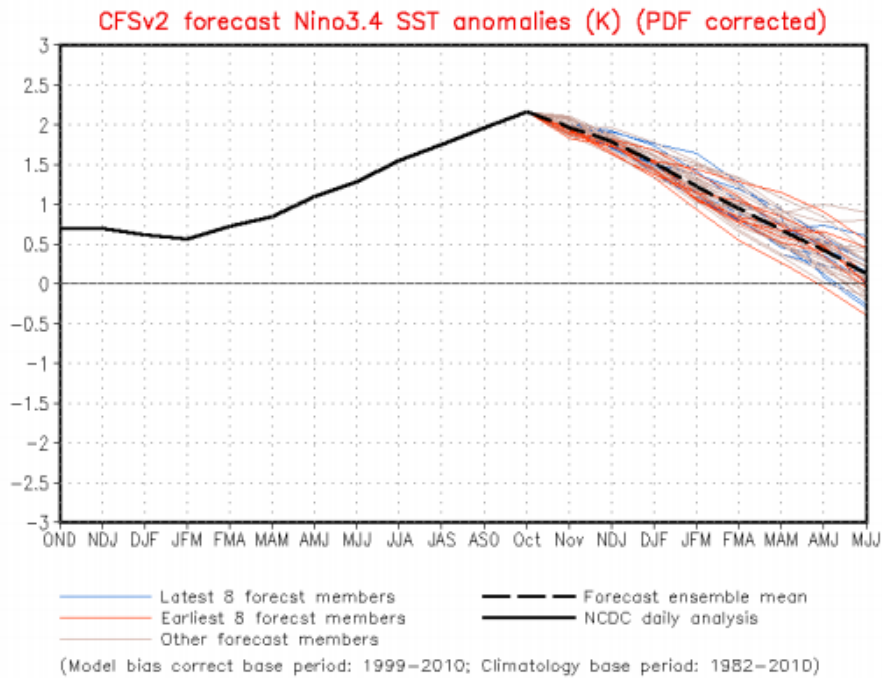


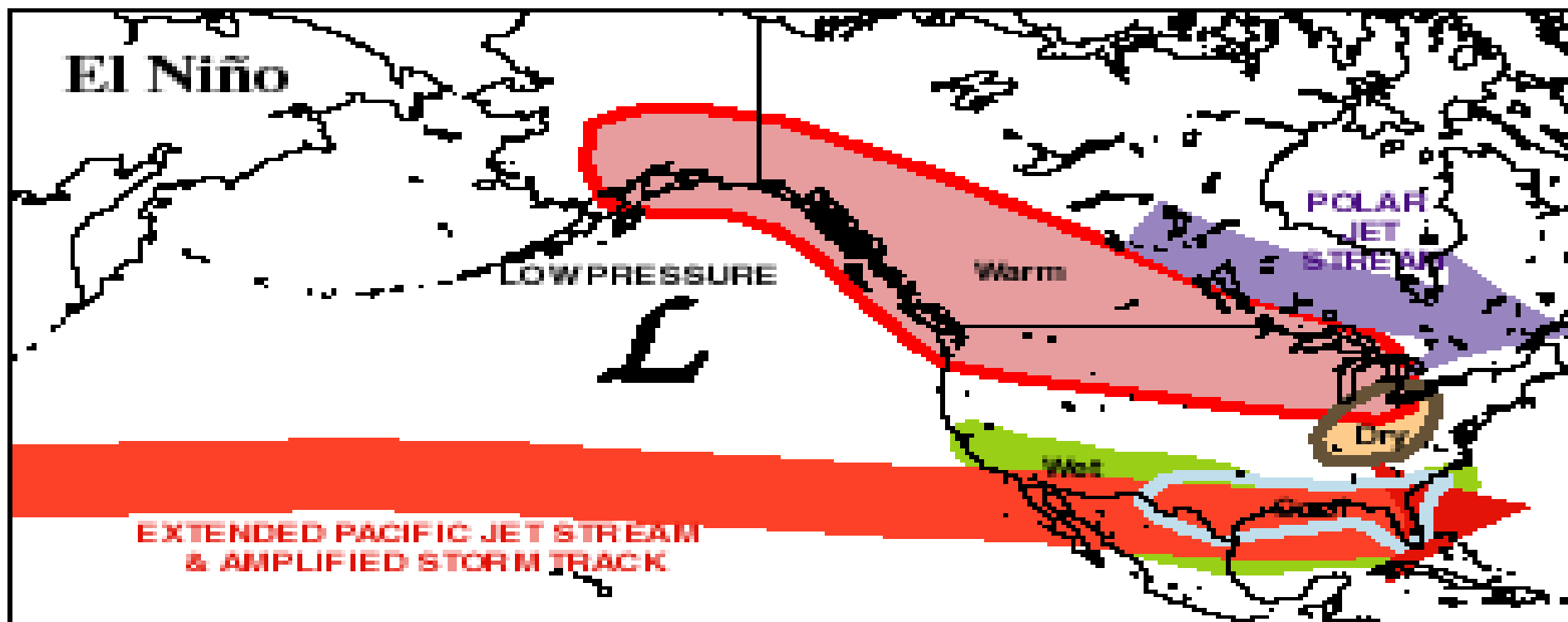
CDAS Sea Surface Temperature Anomaly (°C) (based on CFSR 1981-2010 Climatology)

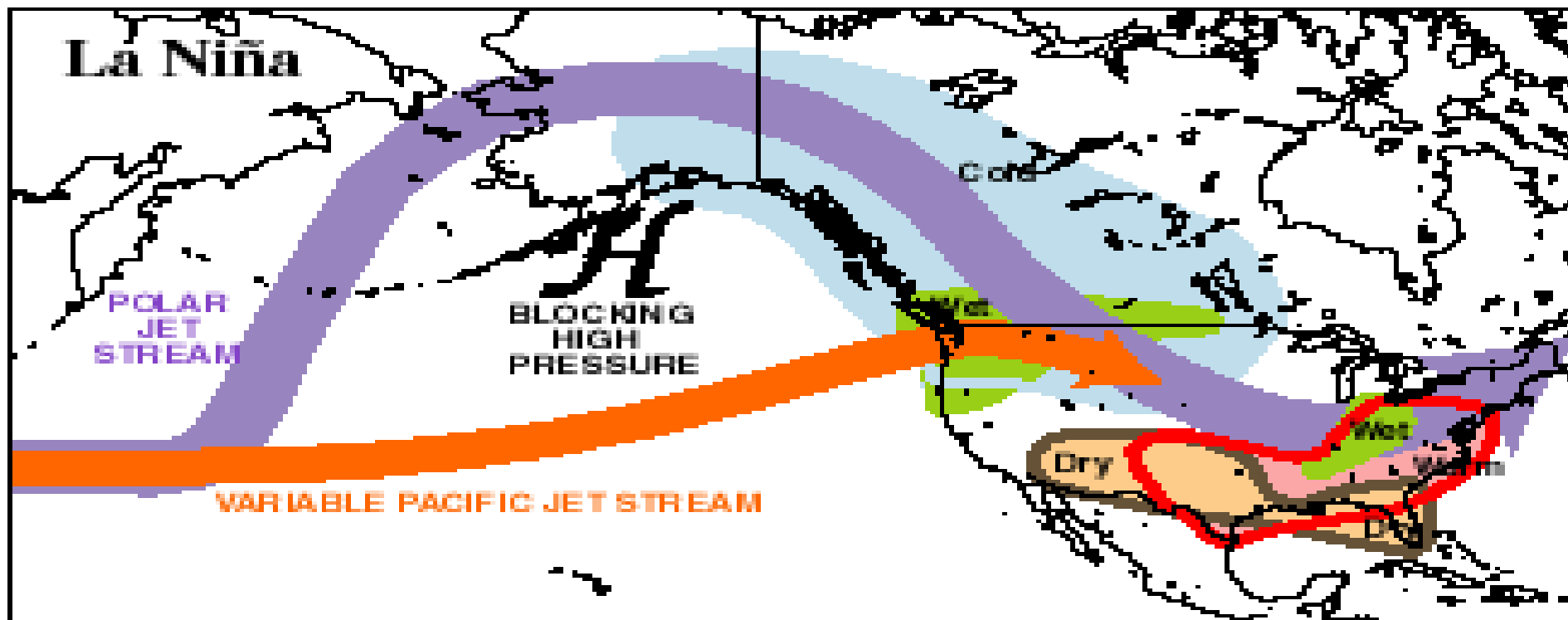
Analysis Time: 06z Oct 20 2015

Levi Cowan | tropicaltidbits.com



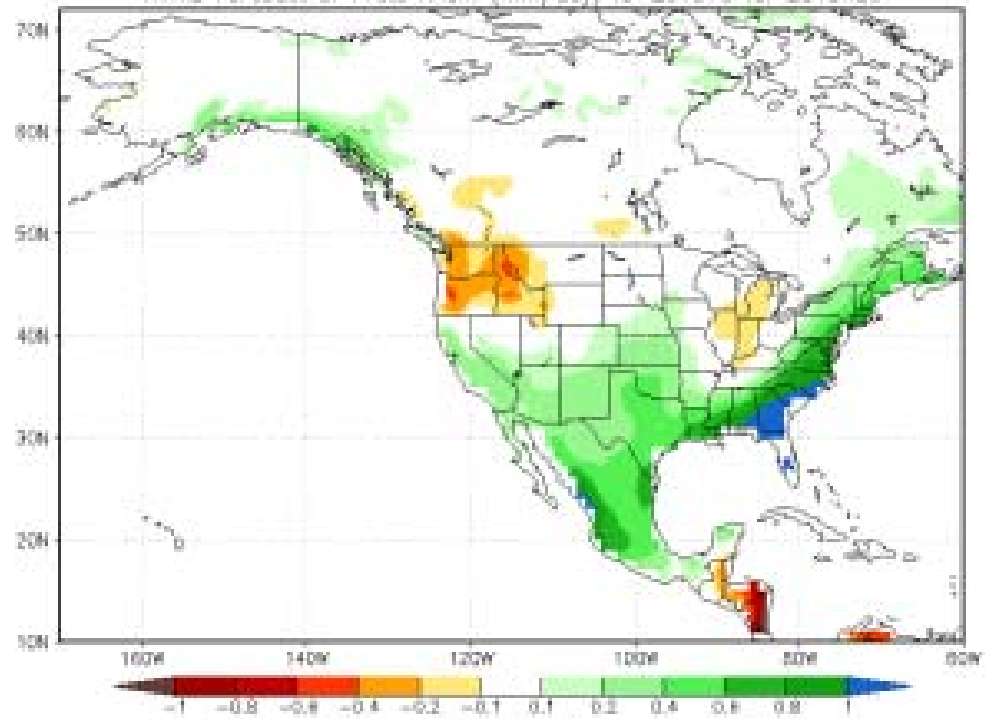




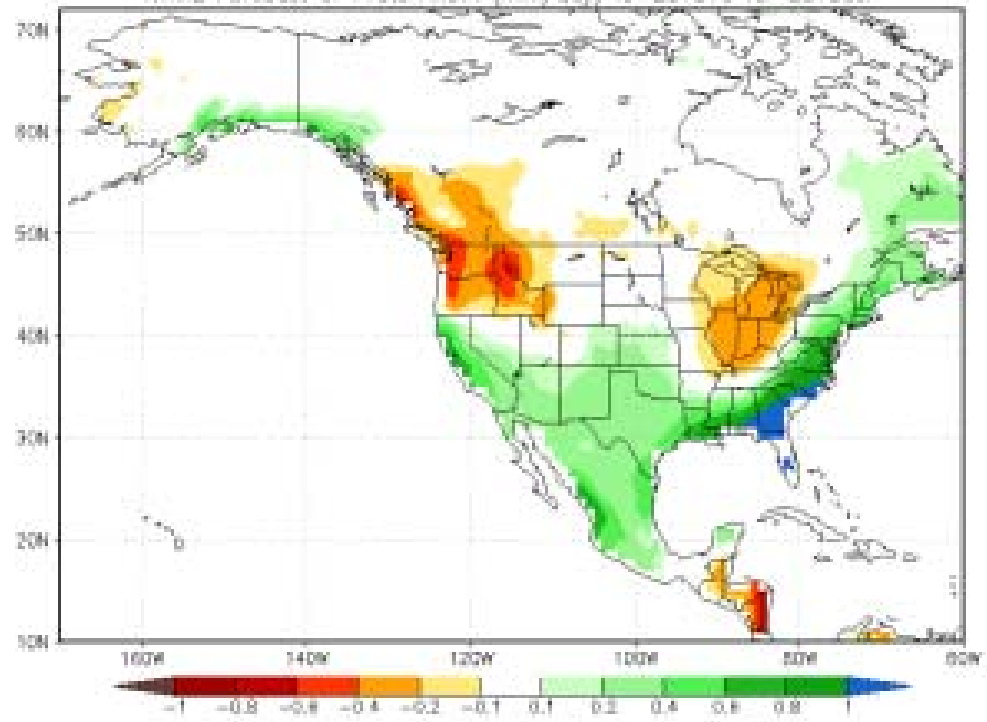




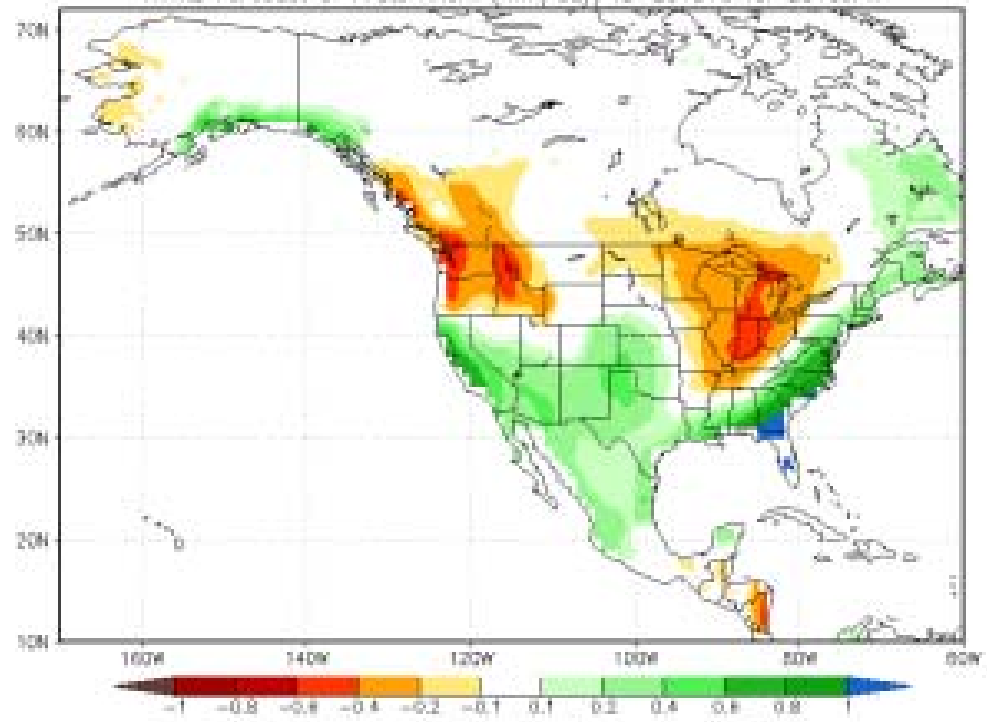
NMME Forecast of Prate Anom (mm/day) IC=201510 for 2015NDJ



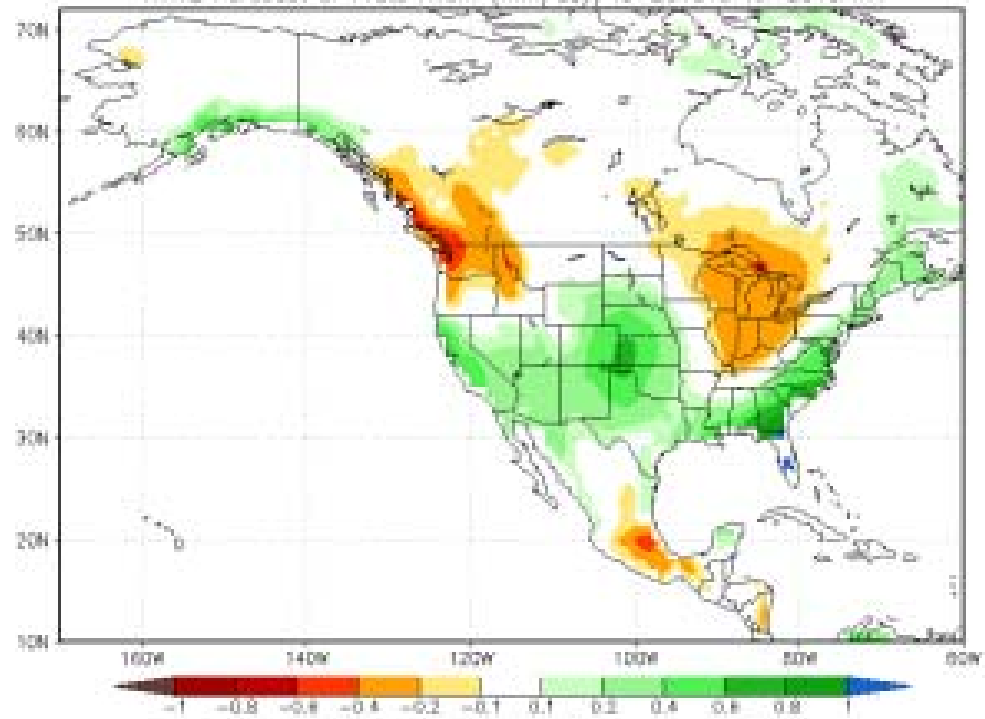
NMME Forecast of Prcp Anom (mm/day) IC=201510 for 2015DAF



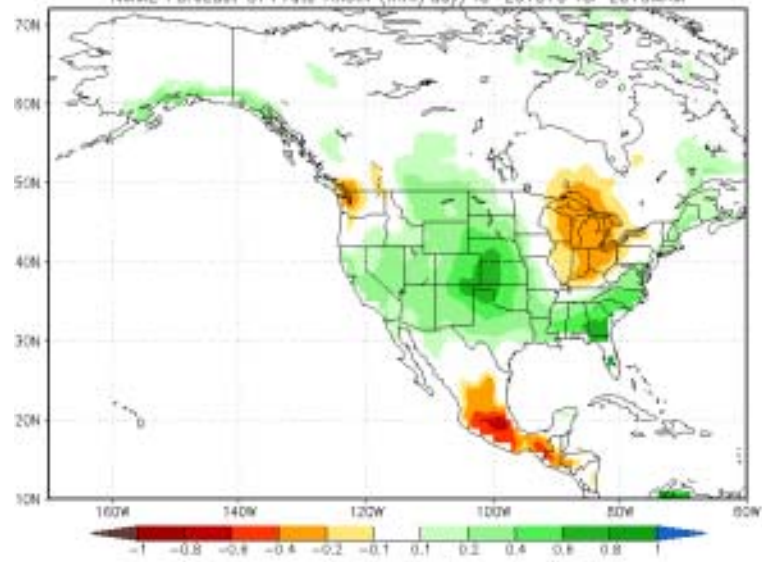
NMME Forecast of Prota Area (mm/day) IC=201510 for 2016JFM



NMME Forecast of Progn. Anom. (mm/day) IC=201510 for 2016FMA

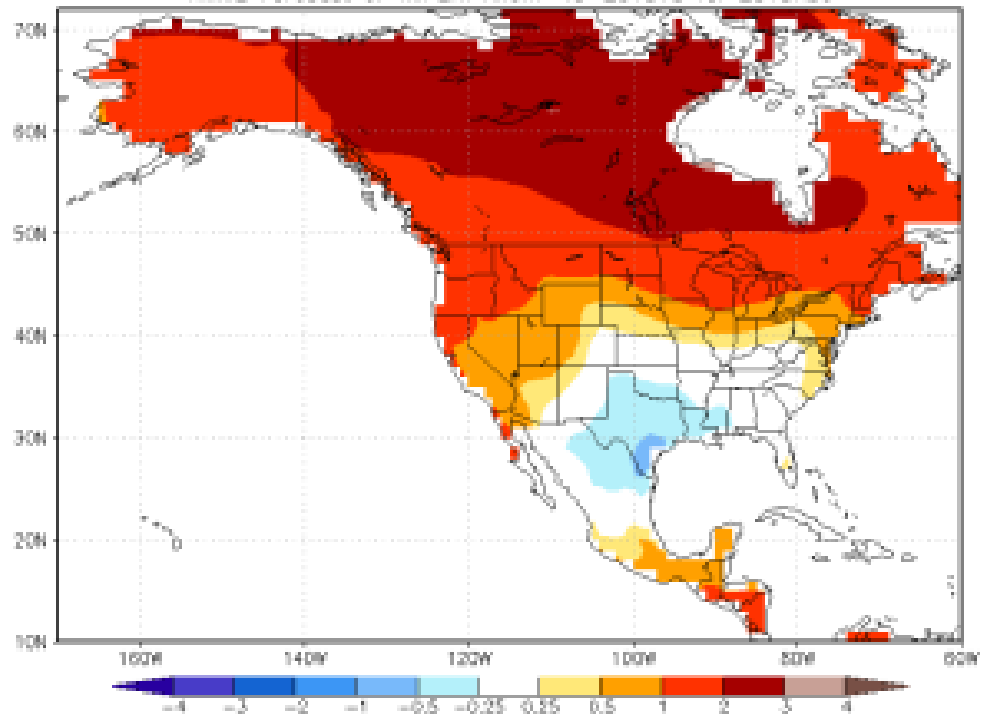


NMME Forecast of Prate Anom (mm/day) IC=201510 for 2016MAM

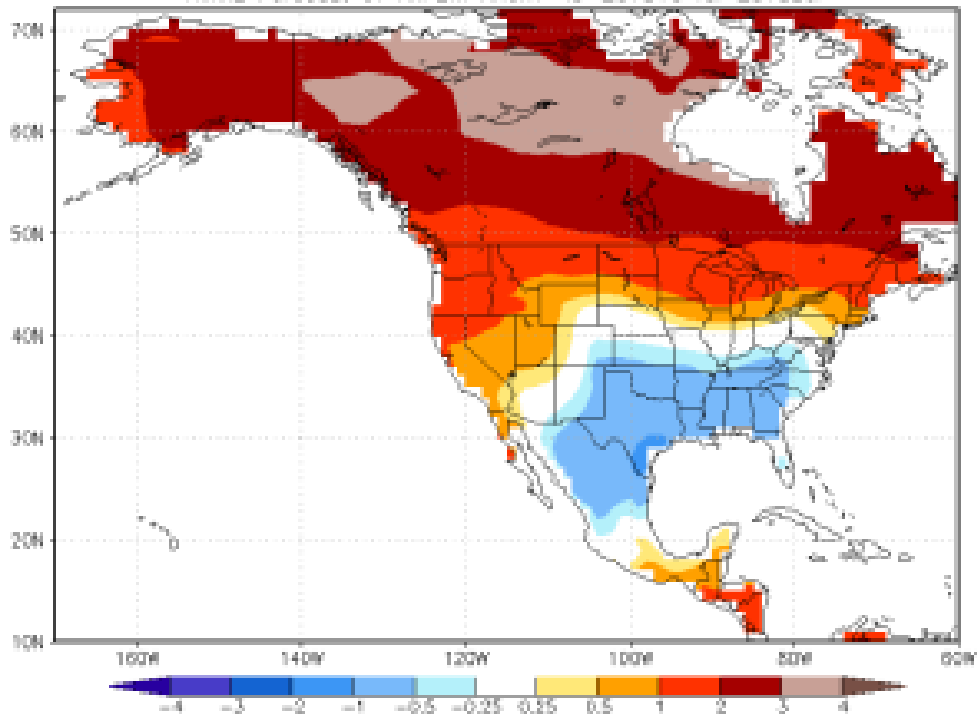




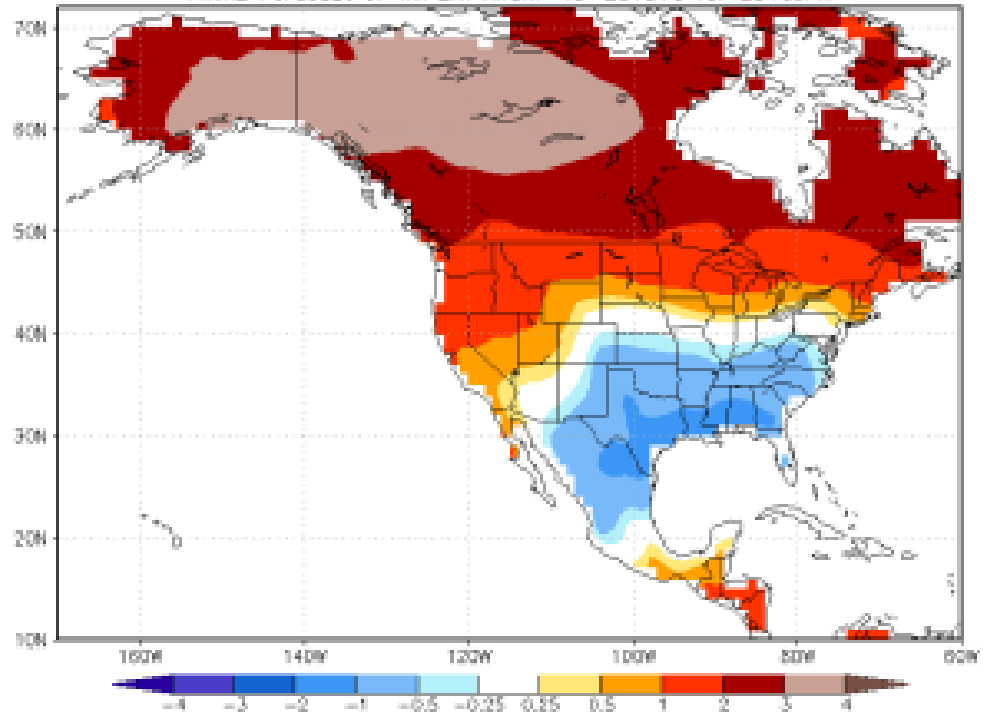
NMME Forecast of TMP2m Anom IC=201510 for 2015NDJ



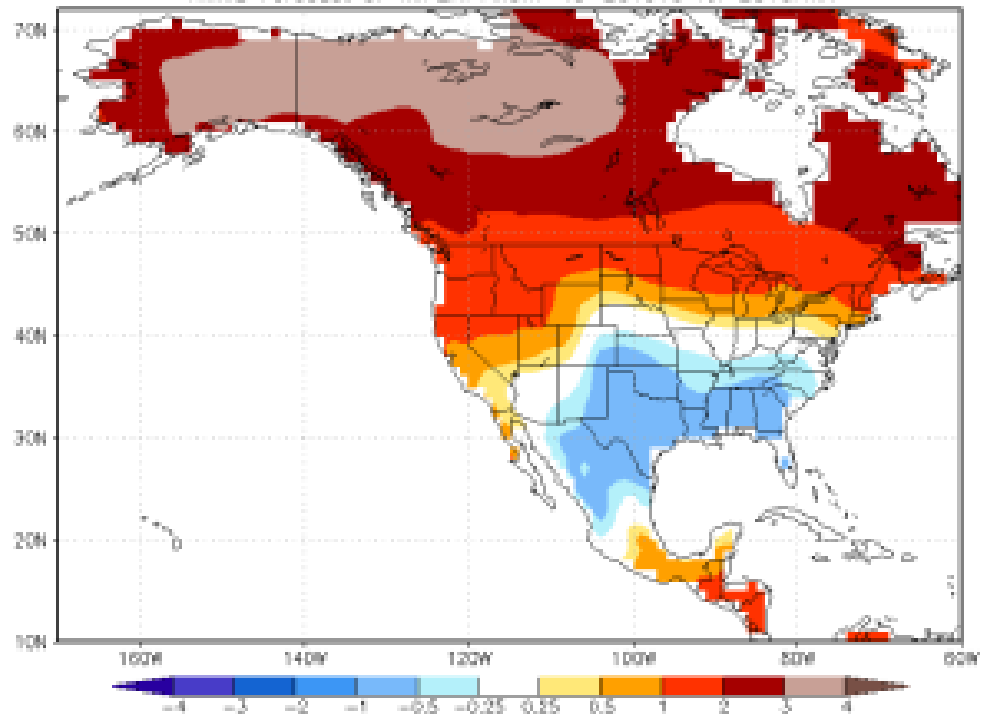
NMME Forecast of TMP2m Anom IC=201510 for 2015DJF



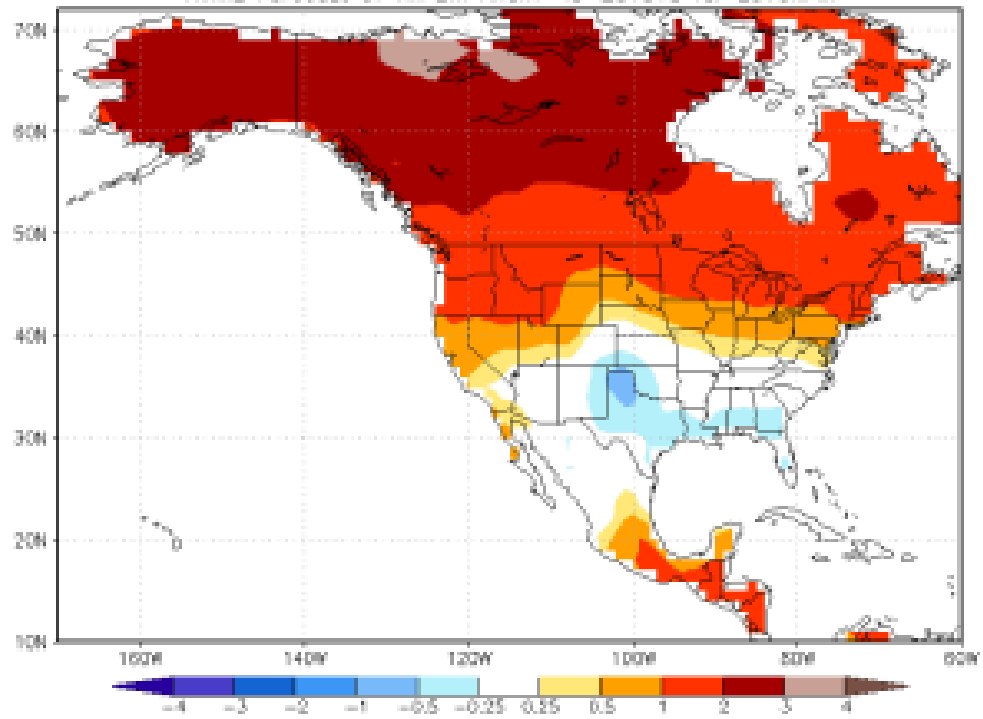
NMME Forecast of TMP2m Anom IC=201510 for 2016JFM



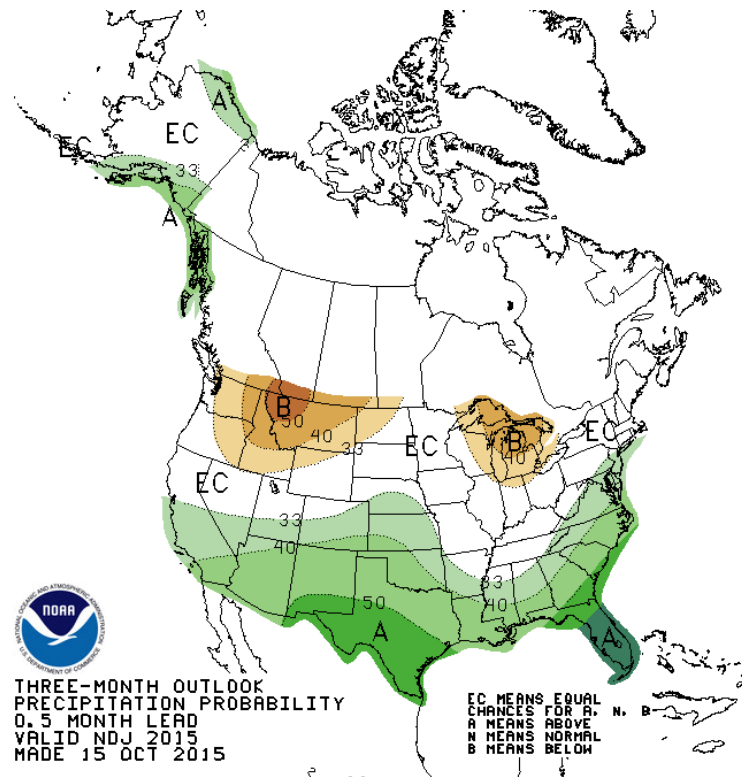
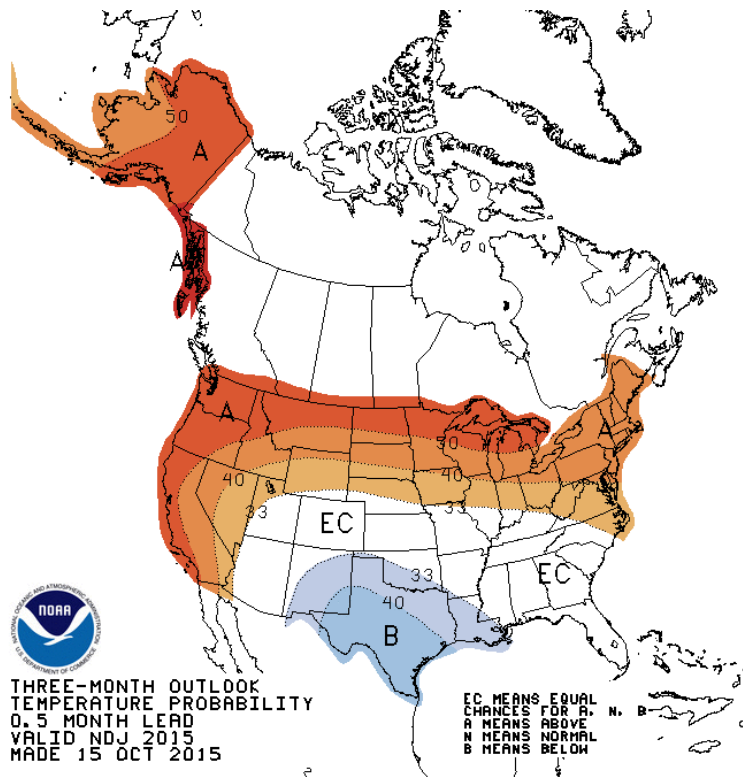
NMME Forecast of TMP2m Anom IC=201510 for 2016FMA



NMME Forecast of TMP2m Anom. IC=201510 for 2016MAM











# 2015 as 2070

*Learning from recent extreme weather*

James Rufo-Hill  
Seattle Public Utilities  
Climate Resiliency Group  
[james@rufohill@seattle.gov](mailto:james@rufohill@seattle.gov)