



# **NOAA West Watch**

*Reporting Regional Environmental  
Conditions & Impacts in the West*

**March 20, 2018**

# Call Agenda

---



- **Project Recap & Updates (Polly Hicks)**
- El Niño and Regional Climate brief (Dan McEvoy)
- Guest Speaker: Debris-Flow Hazards Following Wildfire (Dennis M. Staley, USGS)
- IOOS Nearshore Conditions brief (Julie Thomas, Marine Lebrec, Alex Harper)
- Environmental conditions and impacts reporting and discussion (Polly Hicks)
- Discussion

# Project Recap and Updates

---



- NOAA West Watch bi-monthly webinars are a project of the NOAA West Regional Coordination Team
- Goals of the project:
  - **Document and share** environmental conditions information and impacts on human systems and NOAA mission at the regional scale
  - **Improve awareness** of environmental observations and human system impacts across NOAA mission lines
  - **Improve regional communication and coordination**
  - **Improve external communication** of regional impacts
- Next webinar: May 22<sup>nd</sup>, 1-2PM PDT/ 2-3PM MDT

# Call Agenda

---

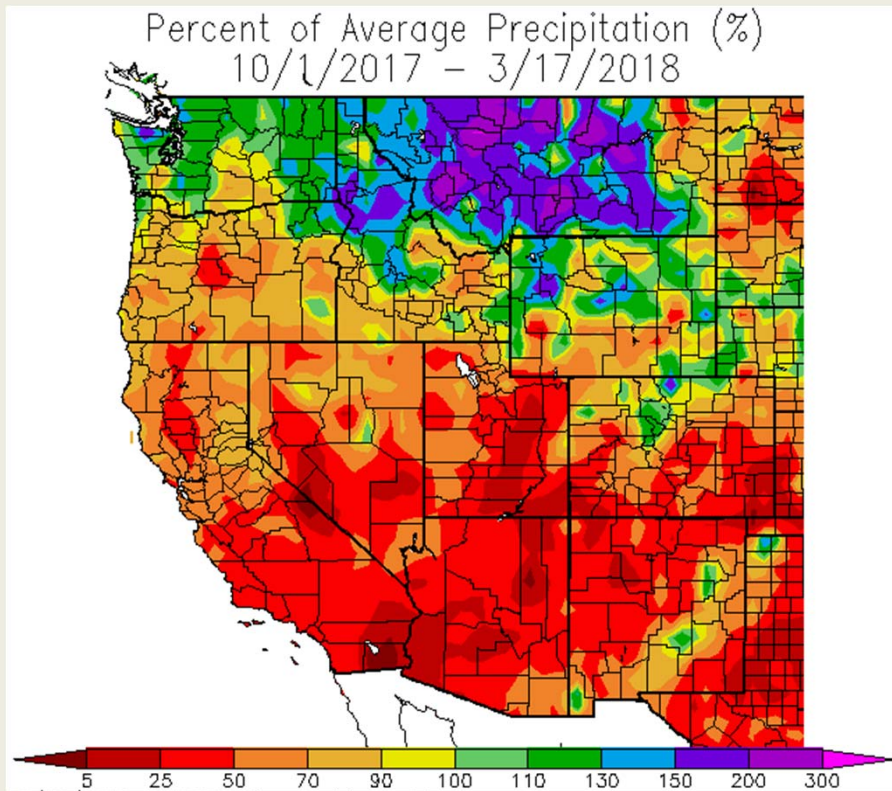


- Project Recap & Updates (Polly Hicks)
- **El Niño and Regional Climate brief (Dan McEvoy)**
- Guest Speaker: Debris-Flow Hazards Following Wildfire (Dennis M. Staley, USGS)
- IOOS Nearshore Conditions brief (Julie Thomas, Marine Lebrech, Alex Harper)
- Environmental conditions and impacts reporting and discussion (Polly Hicks)
- Discussion

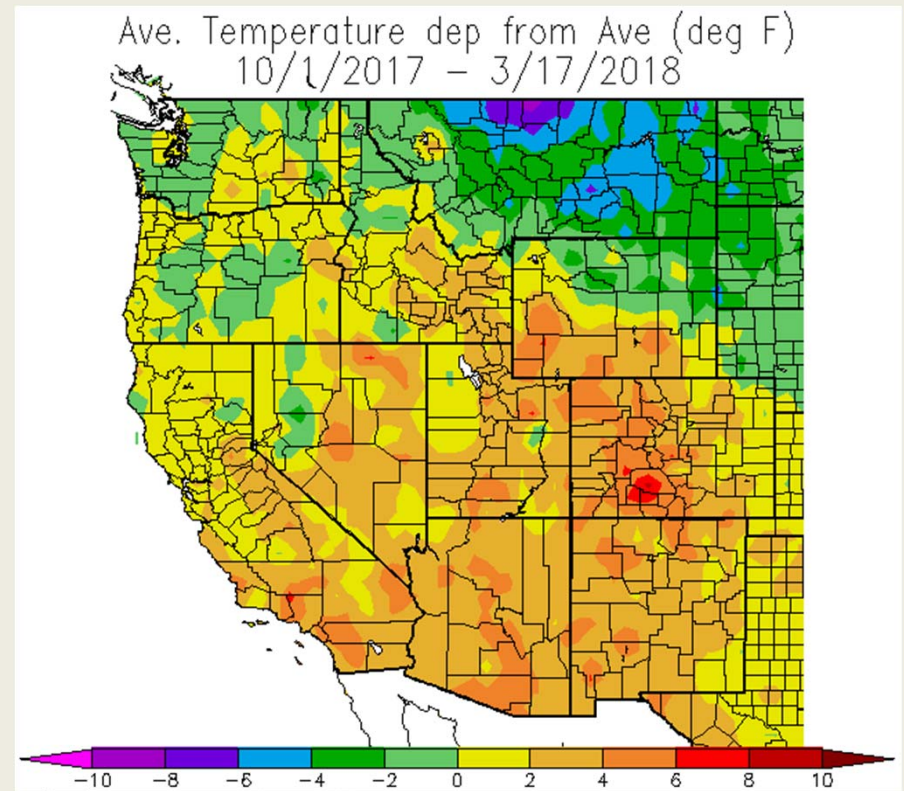
# Precipitation and Temperature



**Water Year To Date**  
**% of Average Precipitation**



**Water Year To Date**  
**Mean Temperature Departure From Average**

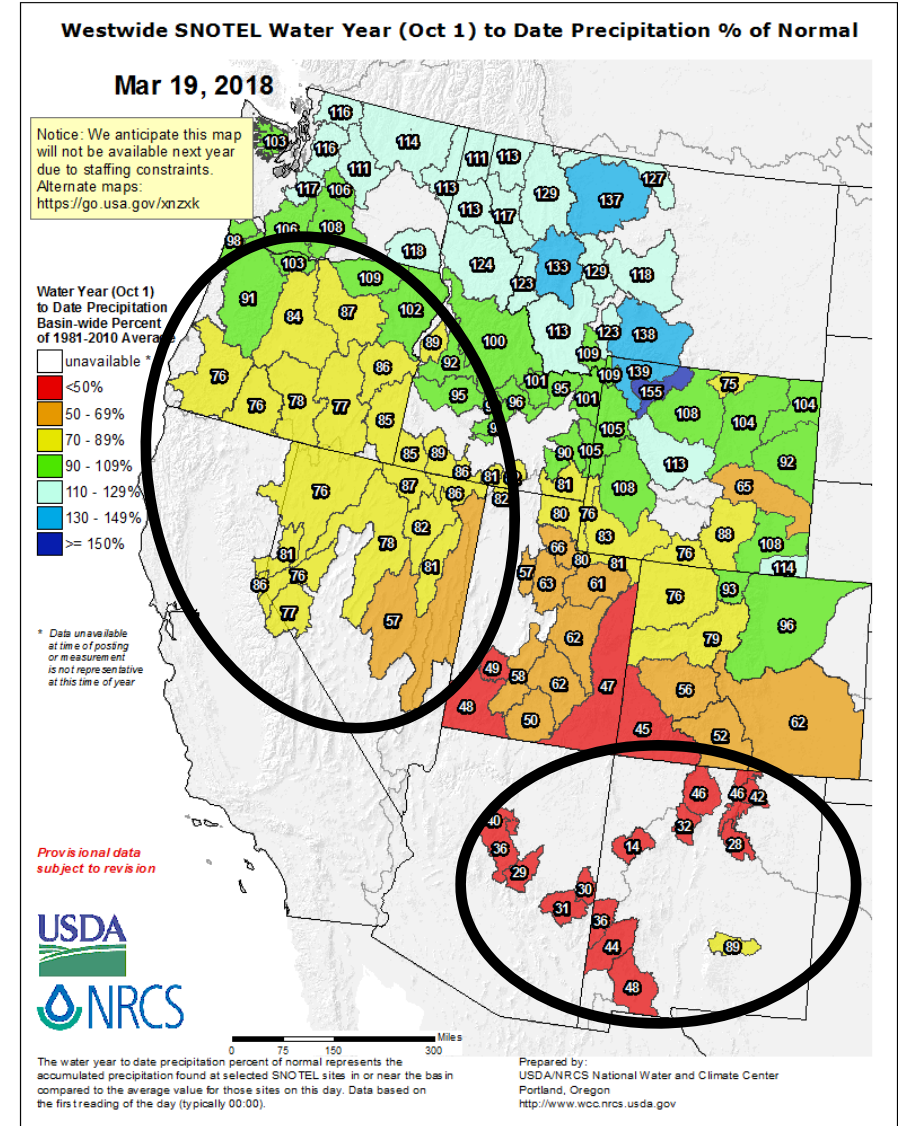
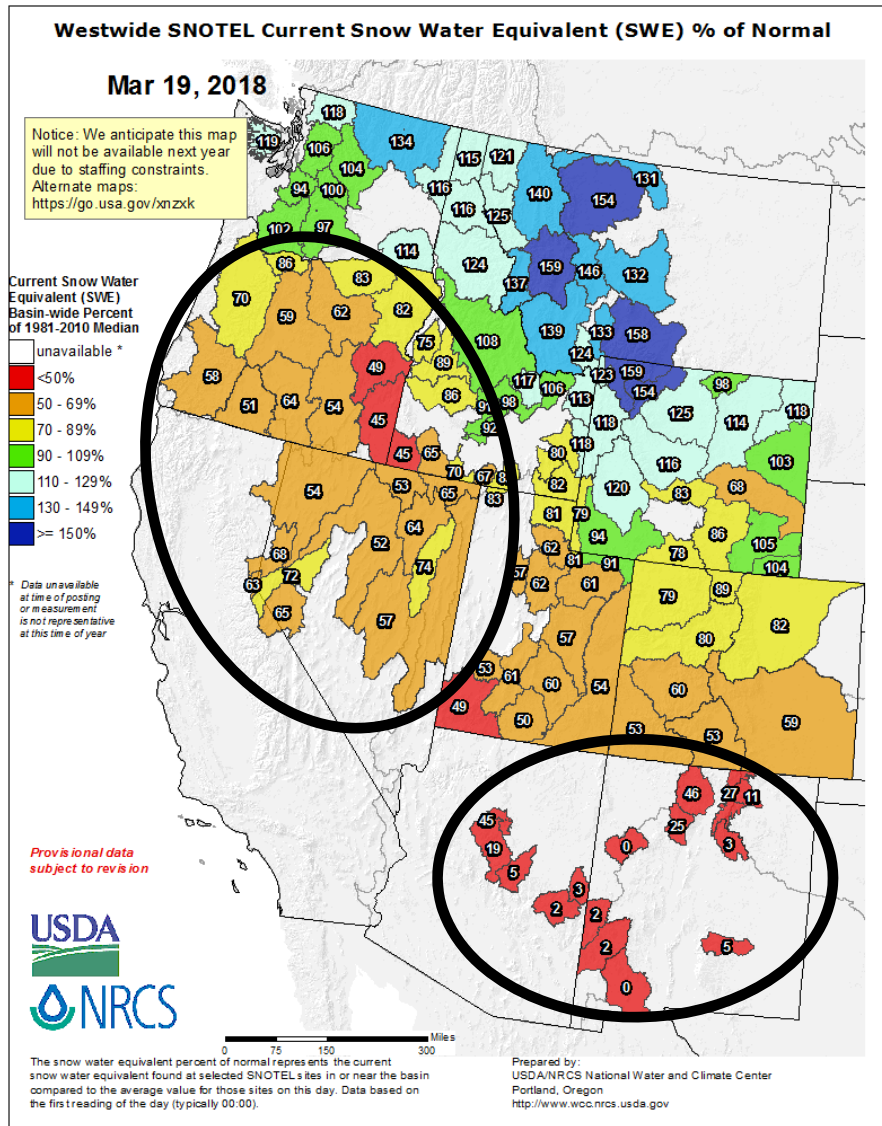


# Snow drought continues, with some improvements

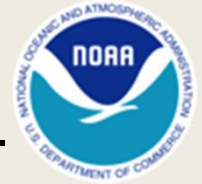


## Snow Water Equivalent

## Precipitation

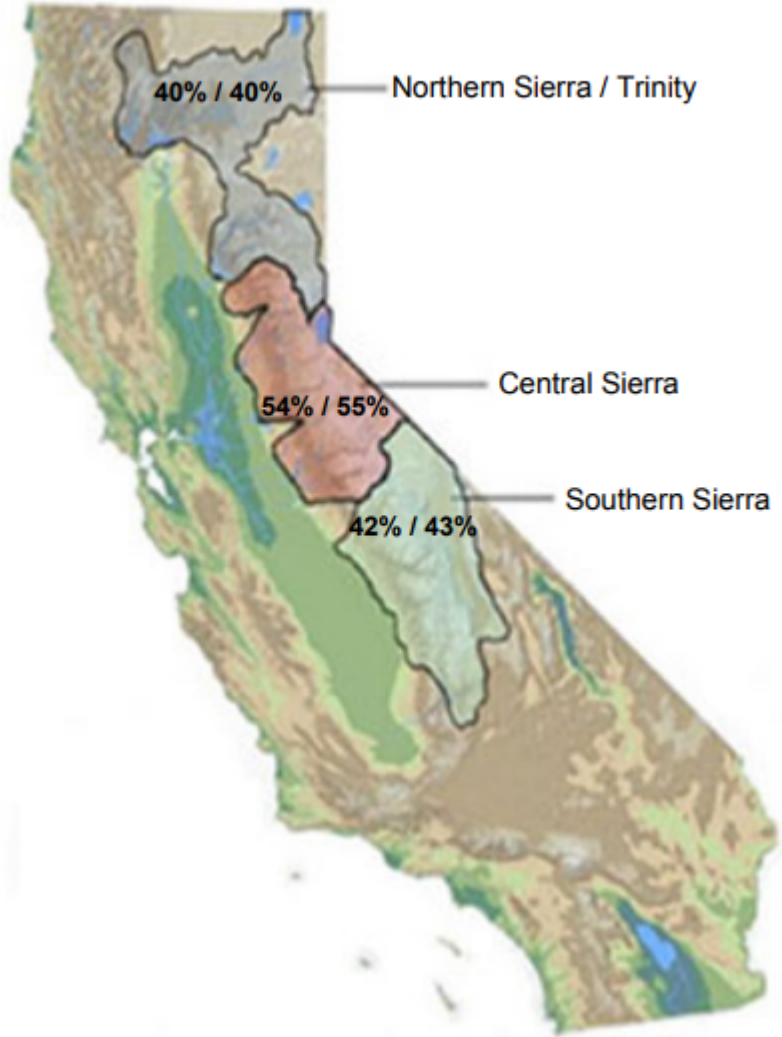


# Snow Drought: California



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

**Statewide Average: 48% of Average**



NORTH	
Data as of March 19, 2018	
Number of Stations Reporting	30
Average snow water equivalent (Inches)	11.2
Percent of April 1 Average (%)	40
Percent of normal for this date (%)	40

CENTRAL	
Data as of March 19, 2018	
Number of Stations Reporting	39
Average snow water equivalent (Inches)	16.0
Percent of April 1 Average (%)	54
Percent of normal for this date (%)	55

SOUTH	
Data as of March 19, 2018	
Number of Stations Reporting	28
Average snow water equivalent (Inches)	10.9
Percent of April 1 Average (%)	42
Percent of normal for this date (%)	43

STATE	
Data as of March 19, 2018	
Number of Stations Reporting	97
Average snow water equivalent (Inches)	13.1
Percent of April 1 Average (%)	47
Percent of normal for this date (%)	48

# Sierra Nevada Snow Bot

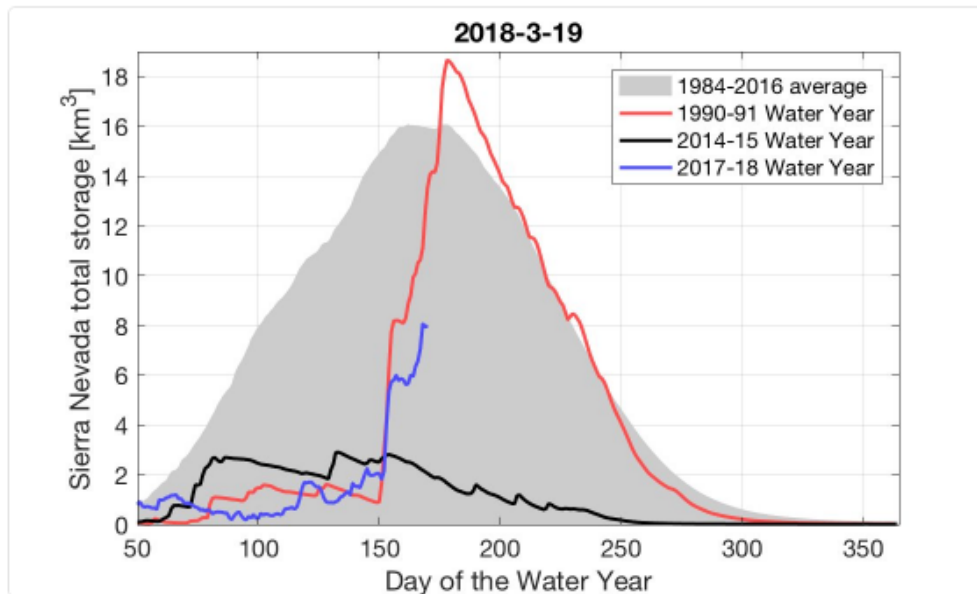


Sierra Nevada Snow Bot

@snowbot\_SN

Following

Sierra Nevada SWE as of 2018-3-19: 8 km<sup>3</sup>. This is 50.1% of normal for this date. Model by @gcortes @UCLACivil #Snow #California #Water #Drought



9:21 AM - 19 Mar 2018



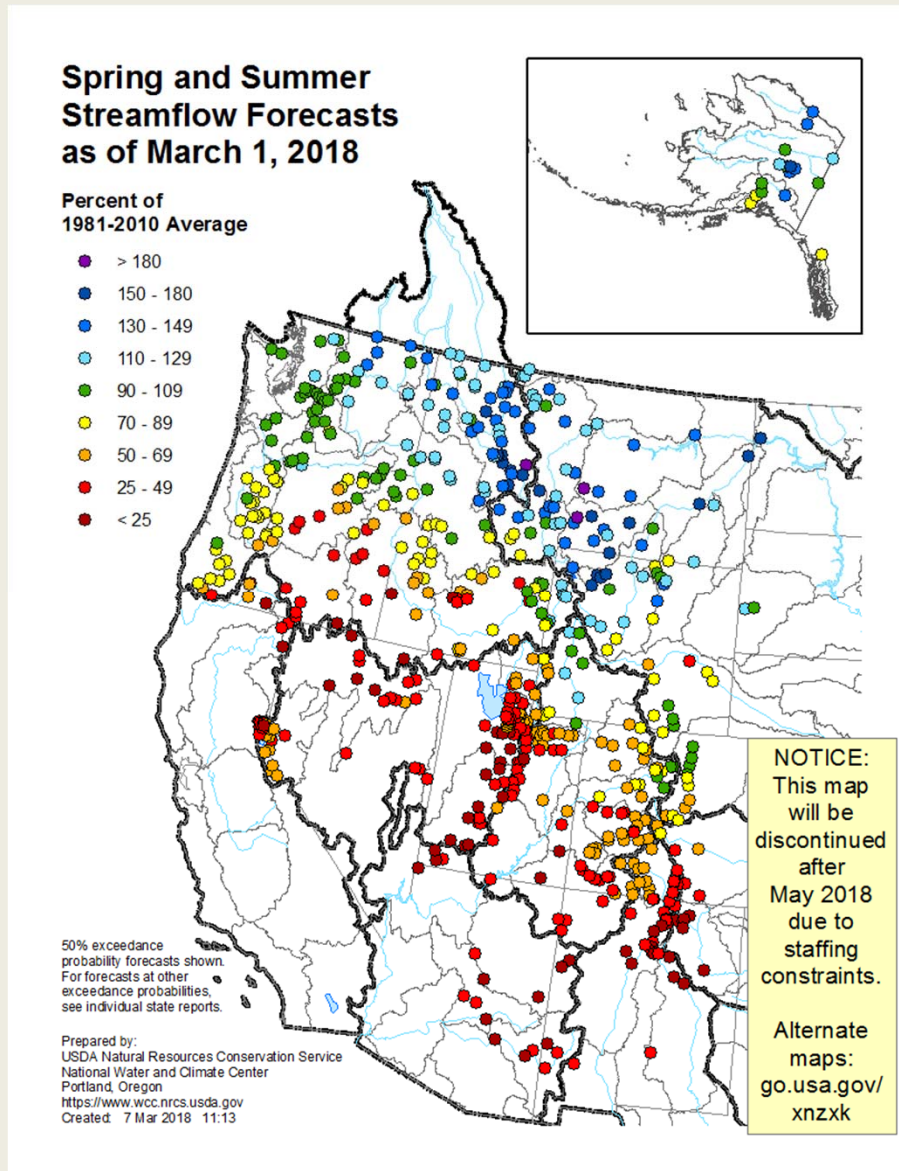
1



- “Miracle March”: 1991
- Sierra Nevada was on pace with 2015, lowest snowpack on record
- March has been wet and snowy helping to mitigate the drought conditions

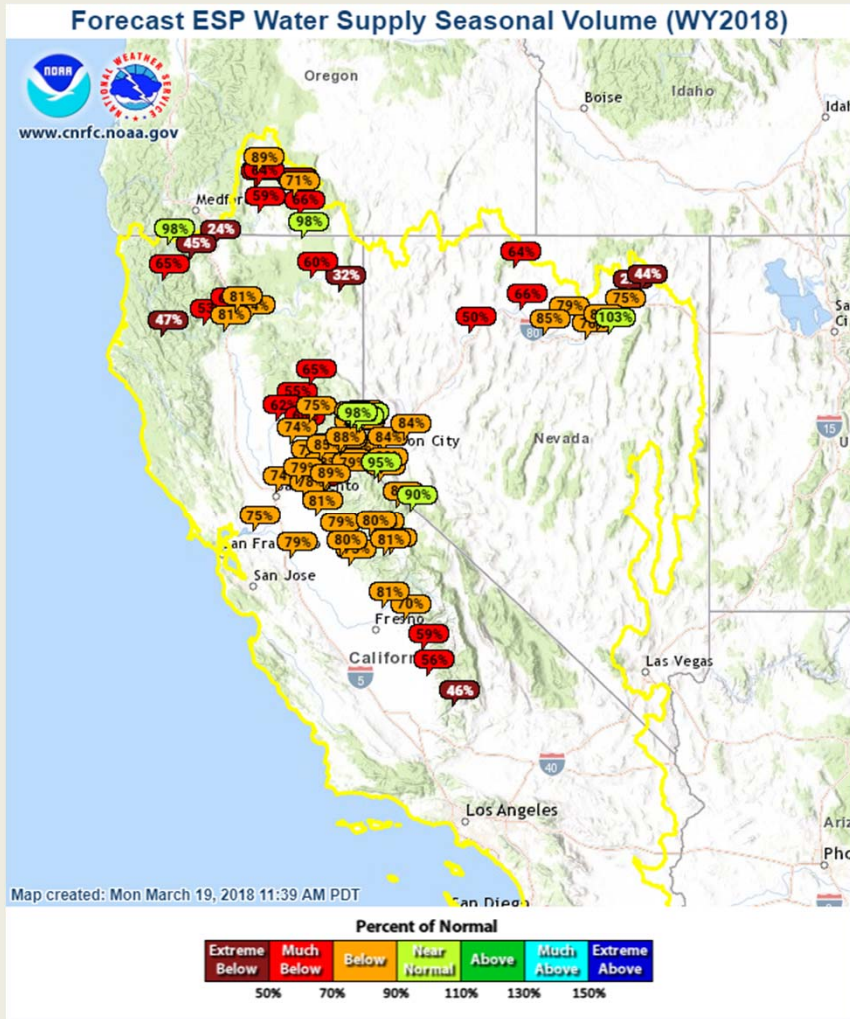


# Seasonal Streamflow Forecasts, March 1



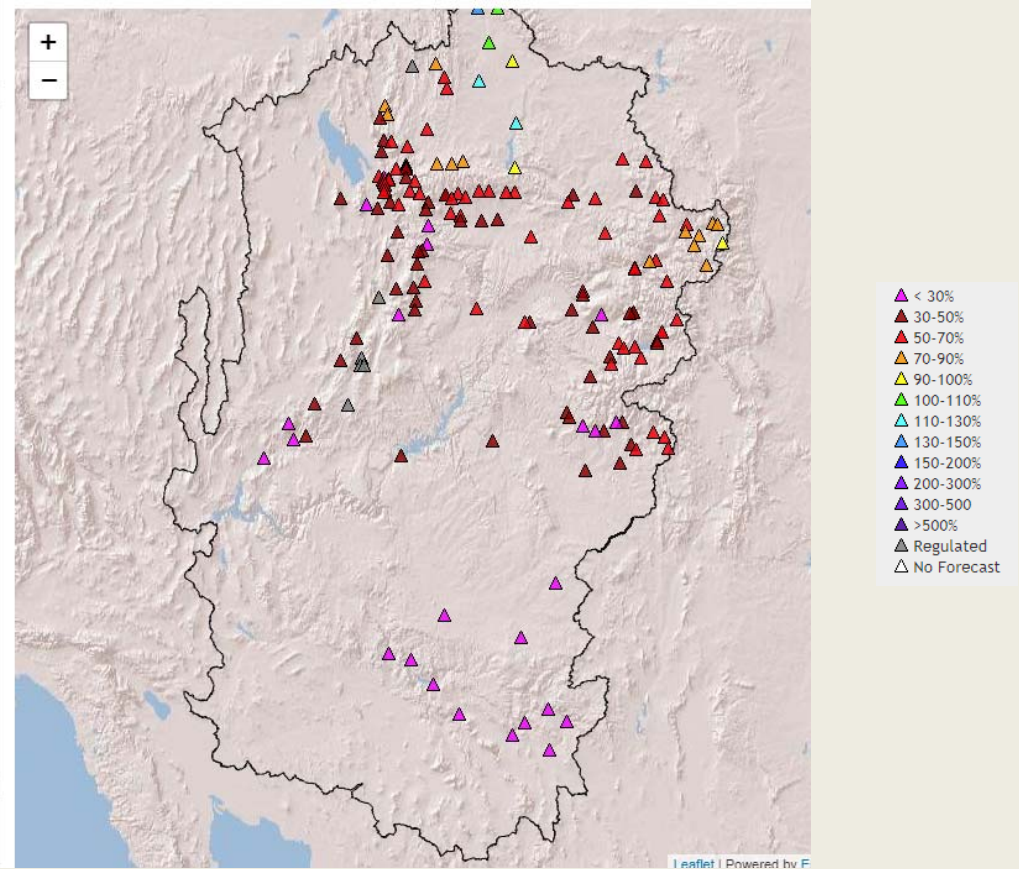
- Issued March 1, 2018
- % of average forecast runoff volume

# Seasonal Streamflow Forecasts, March 19



<https://www.cnrfc.noaa.gov/>

## Colorado River Basin



<https://www.cbrfc.noaa.gov/>

# ENSO Status

---



- ENSO Alert System Status: **La Niña Advisory**
- La Niña conditions are present. \*
- Equatorial sea surface temperatures (SSTs) are below average across the central and eastern Pacific Ocean.
- A transition from La Niña to ENSO-neutral is most likely (~55% chance) during the March-May season, with neutral conditions likely to continue into the second half of the year.

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:

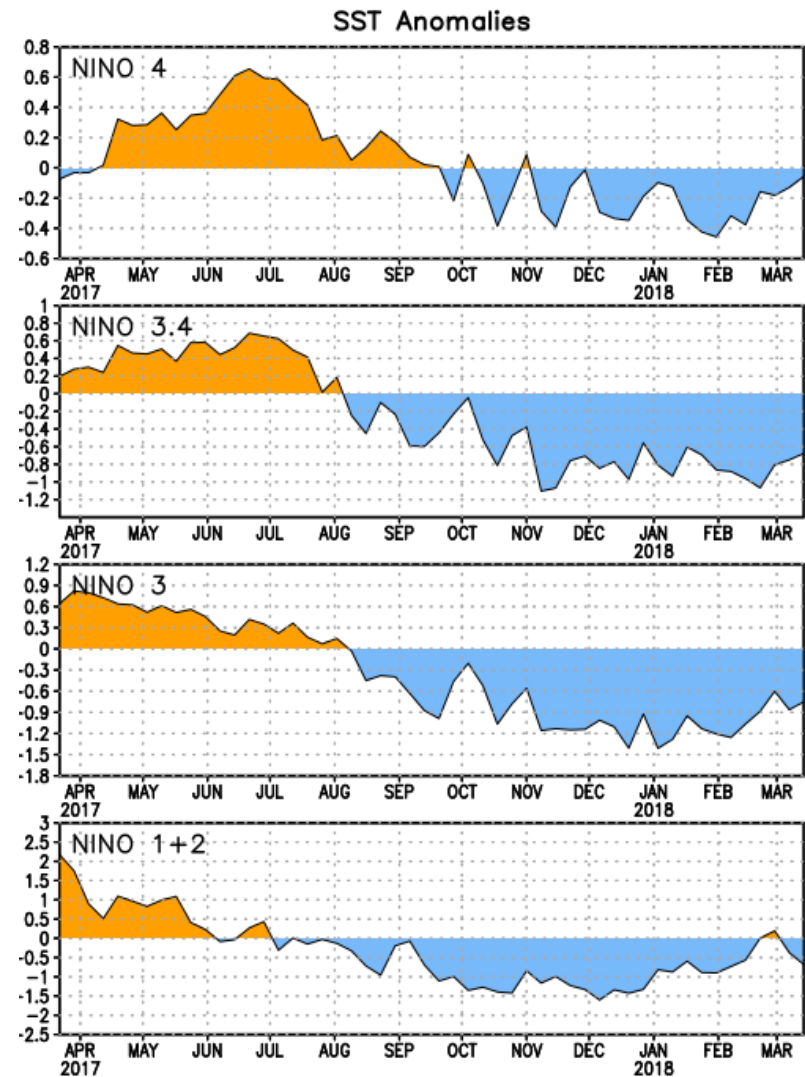
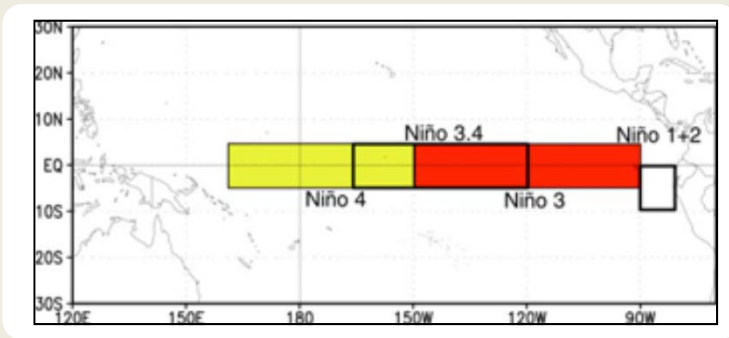
[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/enso\\_advisory/](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/).

# Niño Region SST Departures (°C) Recent Evolution

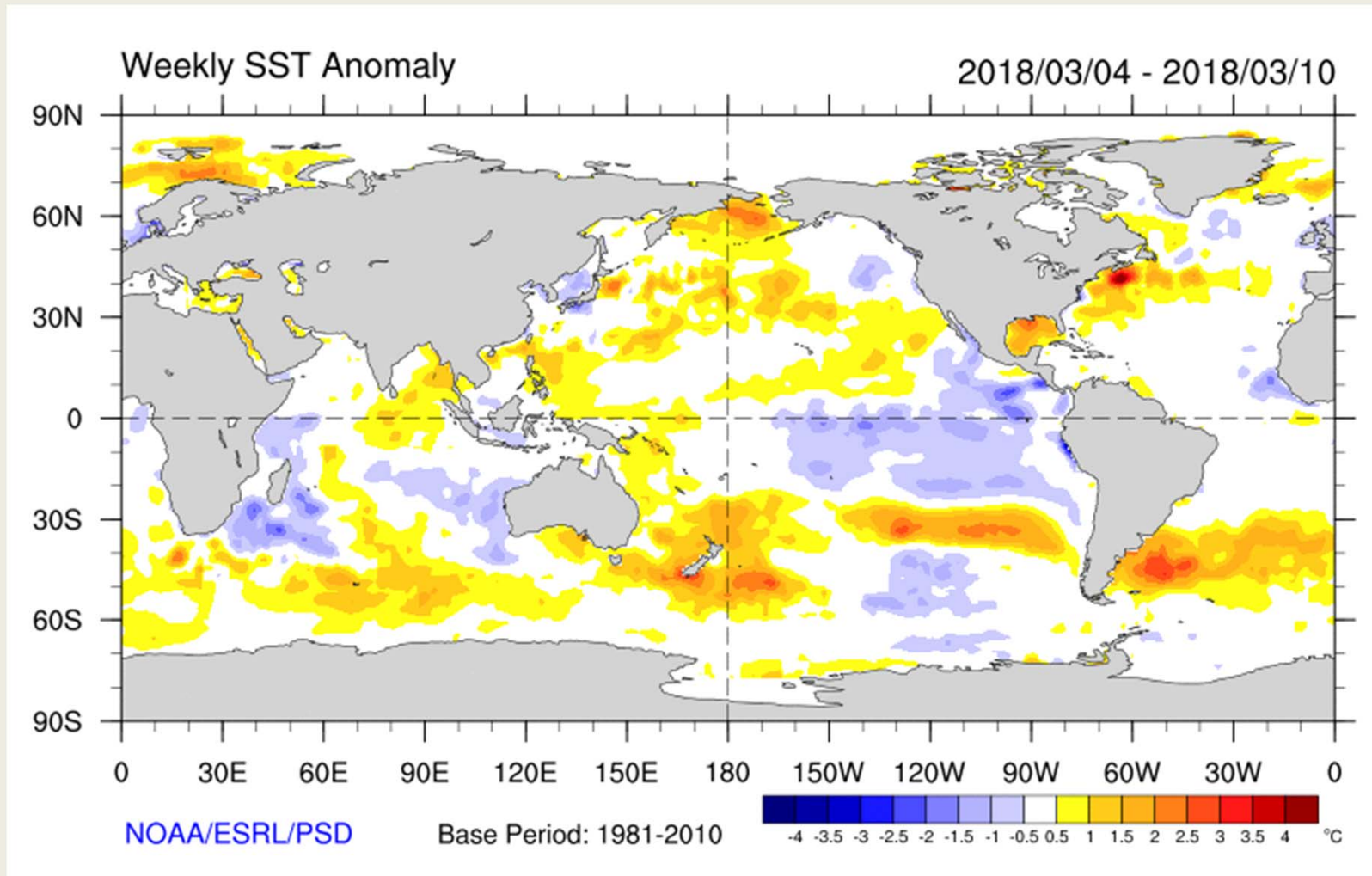


The latest weekly SST departures are:

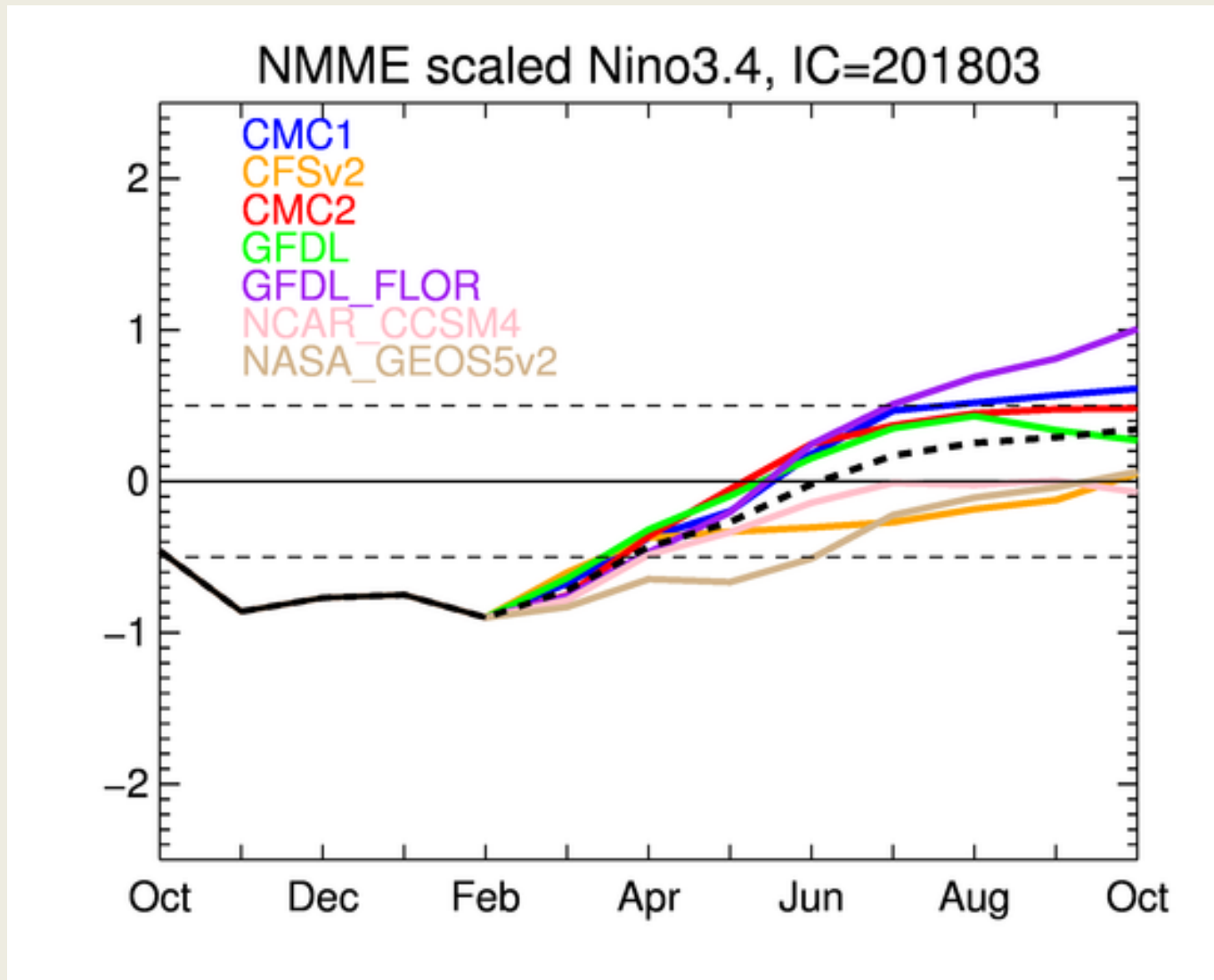
Niño 4	-0.1°C
Niño 3.4	-0.7°C
Niño 3	-0.7°C
Niño 1+2	-0.7°C



# Current Sea Surface Temperatures

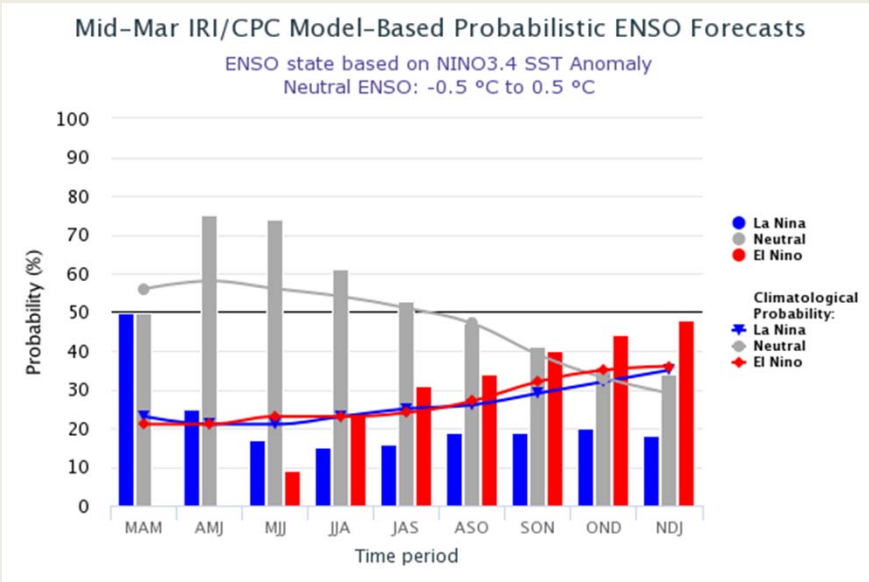


# ENSO Forecasts



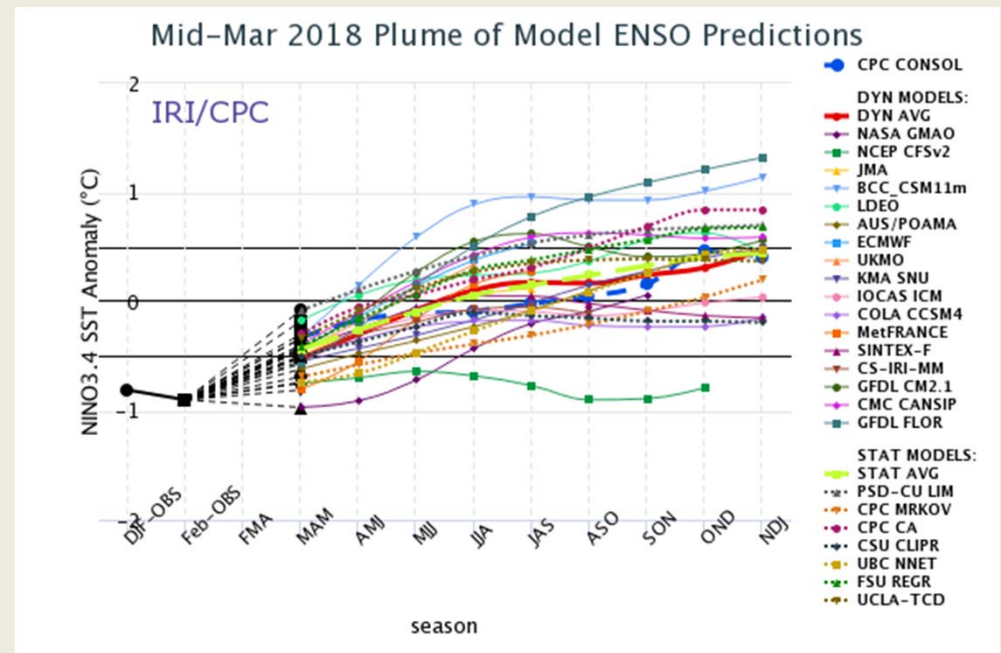
Source: NOAA/CPC

# ENSO Forecasts



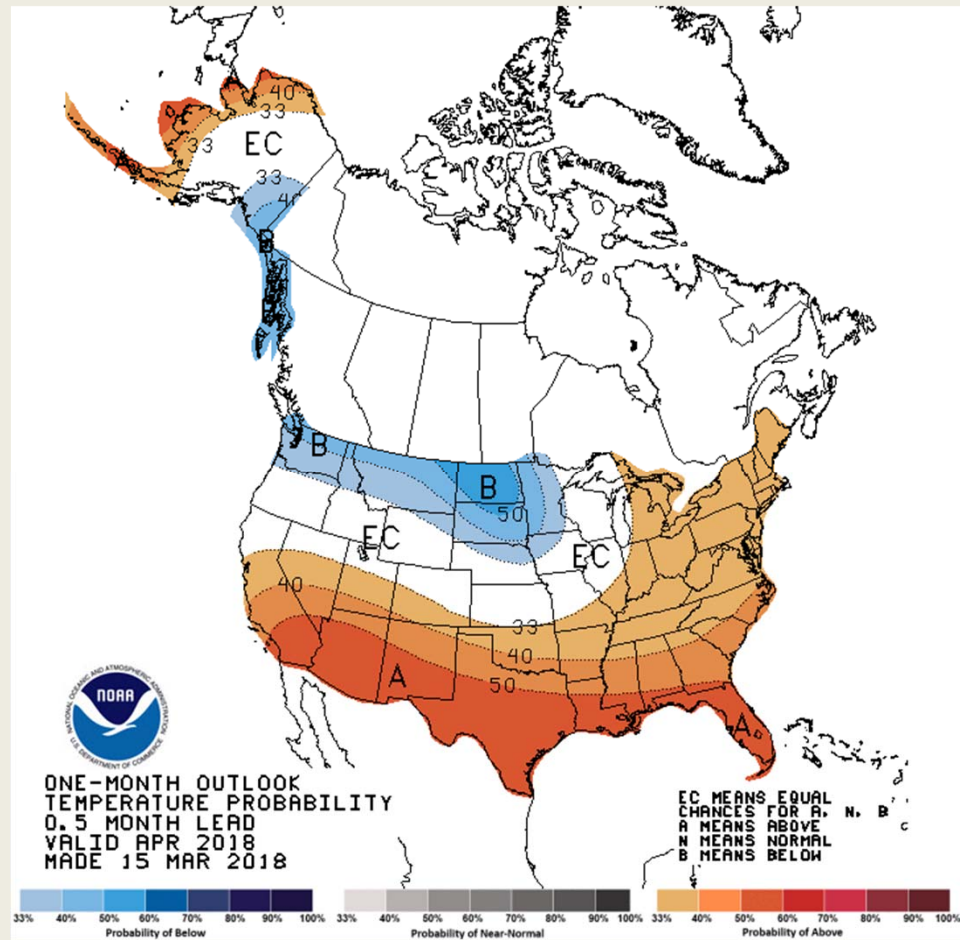
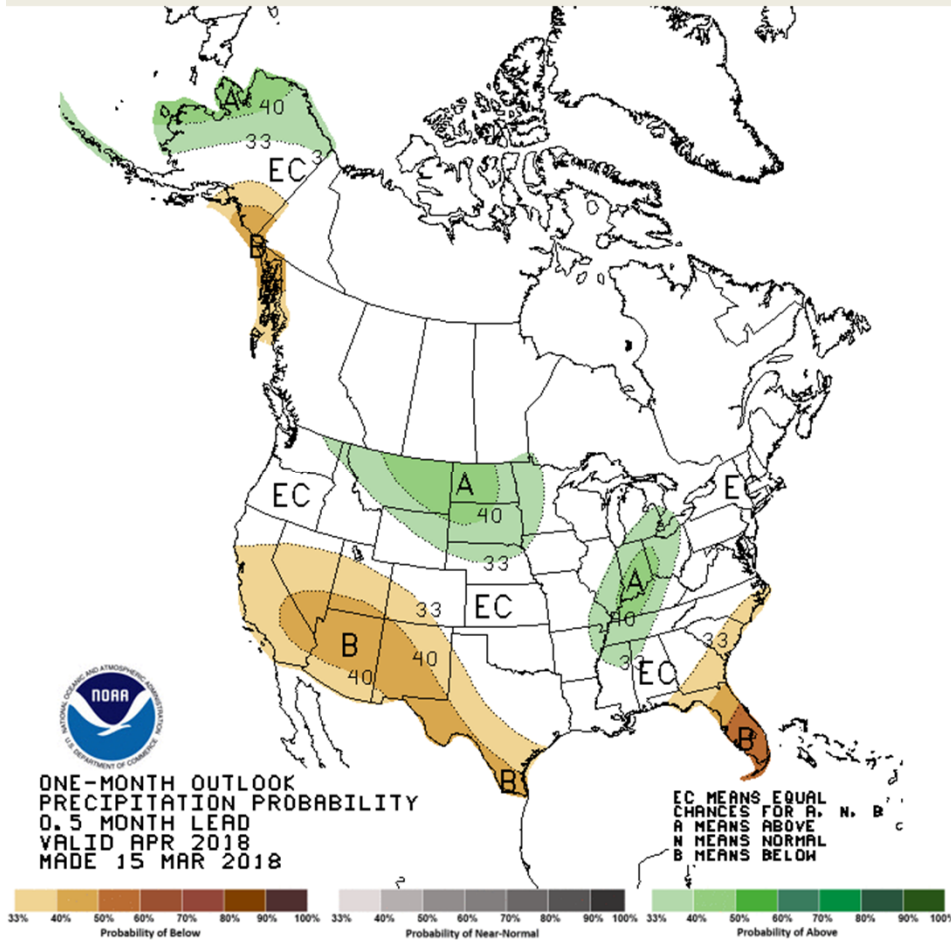
CPC/IRI El Nino forecast:

NMME models + other dynamical models + statistical models



Source: CPC/IRI

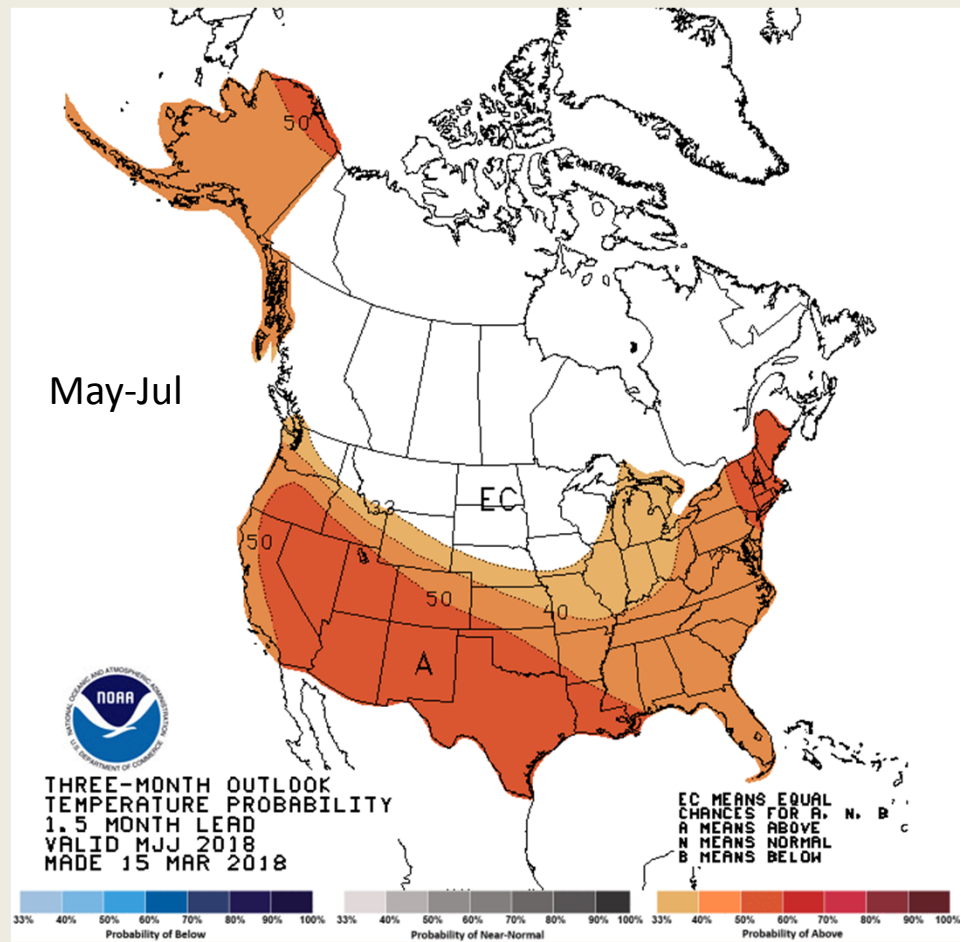
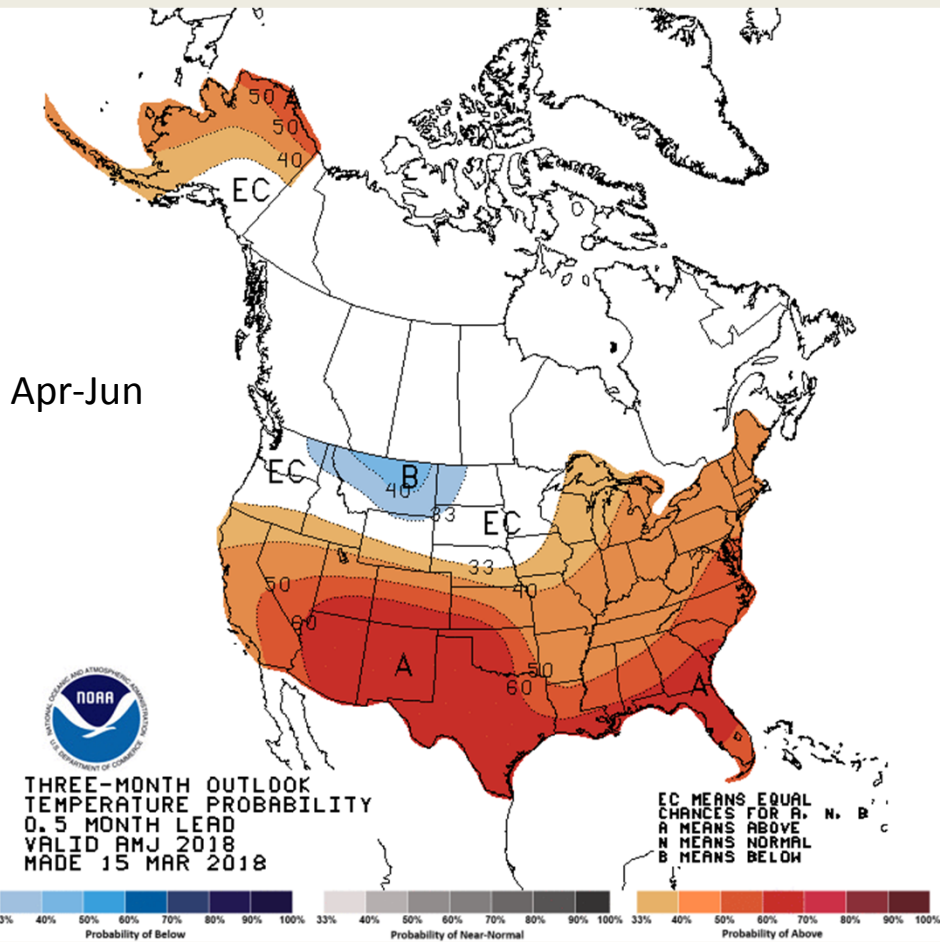
# April U.S. Forecasts



Source: NOAA/CPC

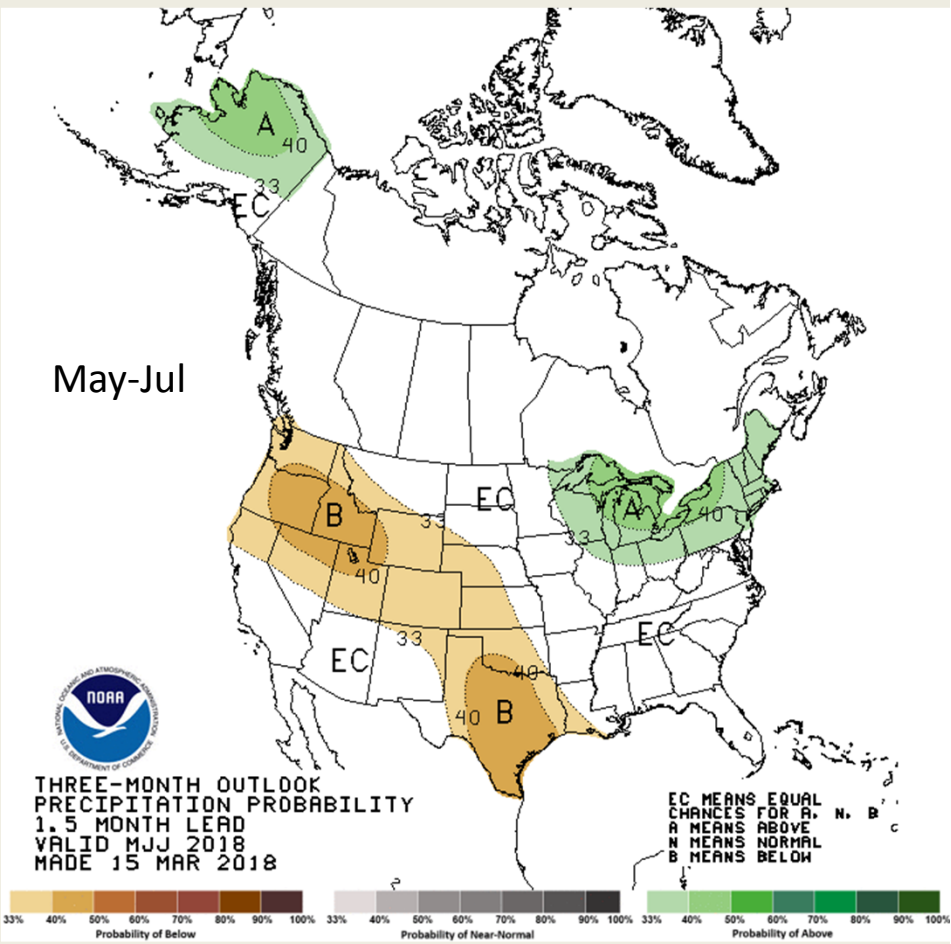
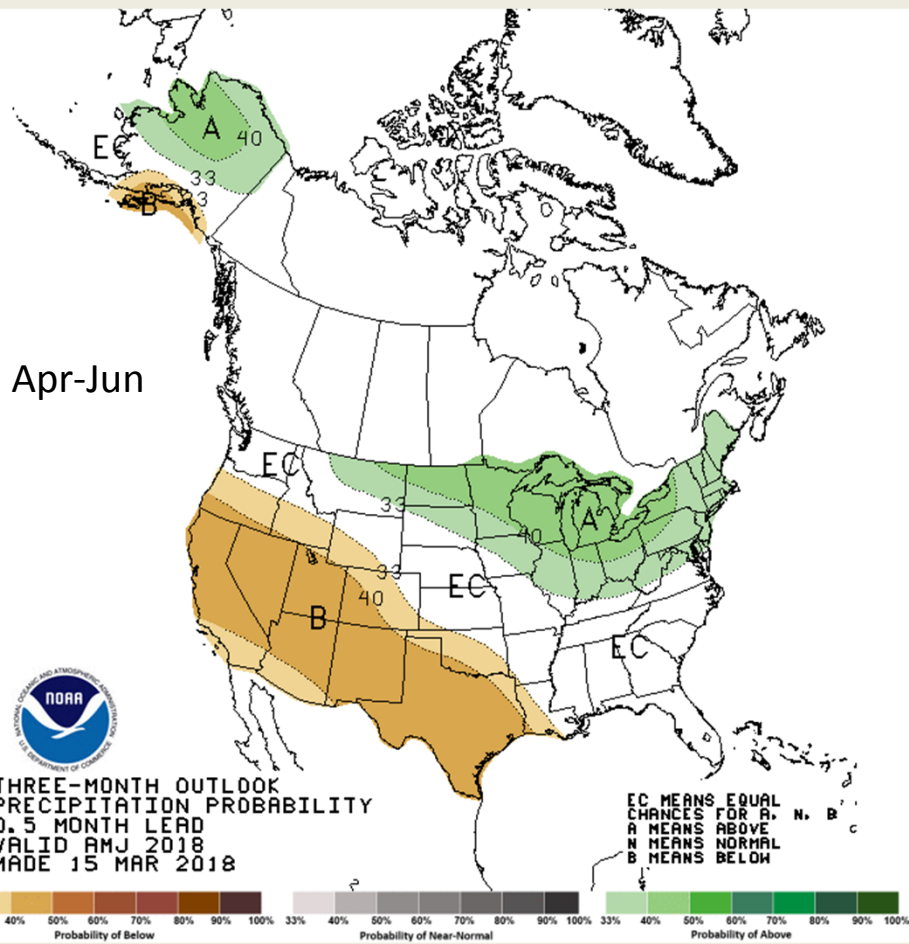


# U.S. Seasonal Temperature Forecasts



Source: NOAA/CPC

# U.S. Seasonal Precipitation Forecasts



Source: NOAA/CPC

# Call Agenda

---



- Project Recap & Updates (Polly Hicks)
- El Niño and Regional Climate brief (Dan McEvoy)
- **Guest Speaker: Debris-Flow Hazards Following Wildfire (Dennis M. Staley, USGS)**
- IOOS Nearshore Conditions brief (Julie Thomas, Marine Lebrech, Alex Harper)
- Environmental conditions and impacts reporting and discussion (Polly Hicks)
- Discussion

## Debris-Flow Hazards Following Wildfire



Dennis M. Staley, Jason W. Kean, and Francis K. Rengers

*U.S. Geological Survey Landslide Hazards Program, Golden, CO, USA*

# Fire-induced Changes That Contribute to Increased Hydrologic Hazard



**Combustion of Canopy**  
**+ Physical and Chemical Changes in Soils**  
**Enhanced runoff and Erosion**

## Fire-induced Changes That Contribute to Increased Hydrologic Hazard



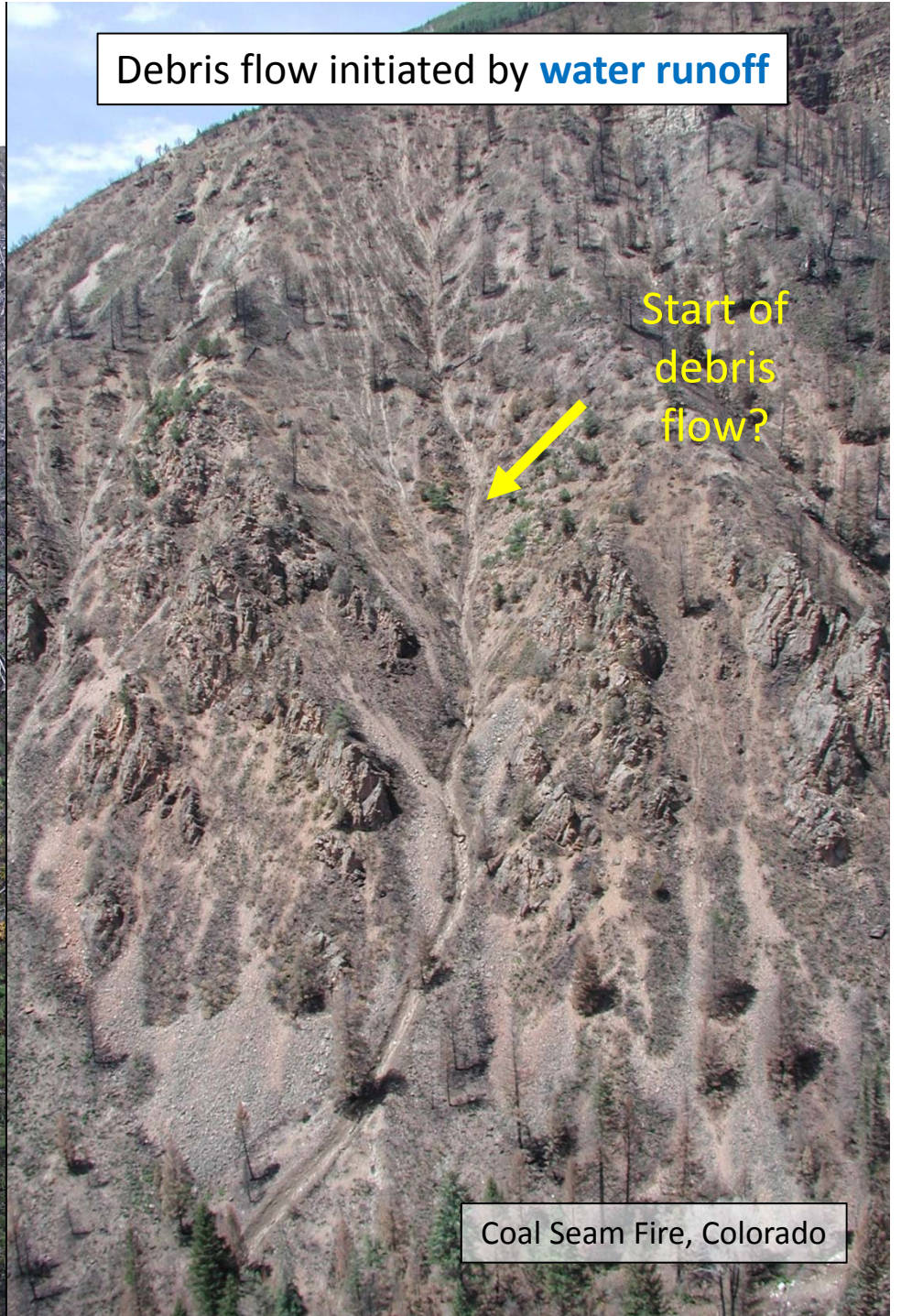
**Combustion of Canopy**  
**+ Physical and Chemical Changes in Soils**  
**Enhanced runoff and Erosion**

Debris flow initiated by a **landslide**



Elliot State Forest, Oregon

Debris flow initiated by **water runoff**



Coal Seam Fire, Colorado

**Debris Flow: Fish burn area [2016], Duarte, CA: January 20, 2017**





# Debris Flow: Fish burn area [2016], Duarte, CA, January 20, 2017



## Floods and Debris Flows Happen Quickly, and Do Not Require Lots of Rain



**Manitou Springs, Colorado**

**July 1, 2013**

**Storm Duration = ~15 minutes**

**Max 15 minute Intensity = ~50 mm/h**

**Flow Duration = < 10 minutes**

**Flooding:** Waldo Canyon burn area [2012], Colorado Springs, CO: July 1, 2013

MANITOU SPRINGS, CO / KUSA

**BREAKING**

VIDA URBONAS - @VIDAURBONAS

**DEADLY FLOODING IN MANITOU SPRINGS**



SUNNY START

CRASHES CLOSE I-70

POSSIBLE KIDNAPPING



# Intensity Matters!

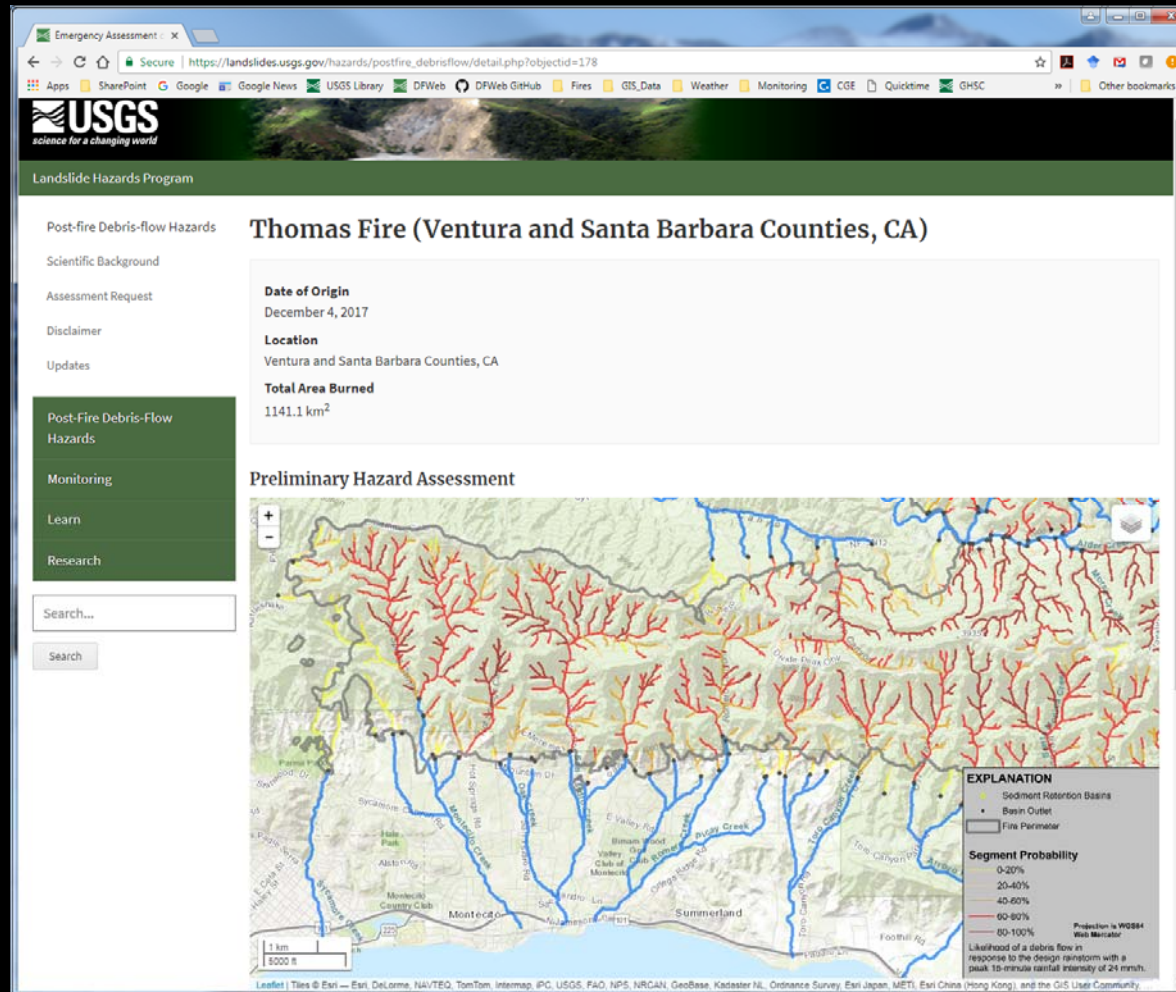


## Debris Flows Travel At High Velocity And Can Be Very Destructive



# Debris Flow Hazard Assessment

[https://landslides.usgs.gov/hazards/postfire\\_debrisflow/](https://landslides.usgs.gov/hazards/postfire_debrisflow/)



- Likelihood of debris flow
- Estimated magnitude of debris flow.
- Combined hazard.
- Estimated rainfall-intensity duration threshold.

## Take-Home Messages



- **Post-fire floods and debris flows do not require any antecedent moisture.**
- **Post-fire floods and debris flows can be triggered within minutes of intense rainfall.**
- **Hazards may persist 2 – 5+ years following wildfire.**
- **Avoidance is the best form of risk reduction.**
- **USGS provides debris-flow hazard assessments**

# Call Agenda

---



- Project Recap & Updates (Polly Hicks)
- El Niño and Regional Climate brief (Dan McEvoy)
- Guest Speaker: Debris-Flow Hazards Following Wildfire (Dennis M. Staley, USGS)
- **IOOS Nearshore Conditions brief (Julie Thomas, Marine Lebrech, Alex Harper)**
- Environmental conditions and impacts reporting and discussion (Polly Hicks)
- Discussion



# Coastal Data Information Program (CDIP)



Partners:

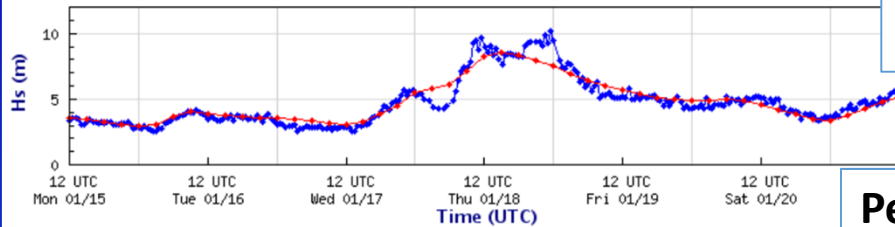


# Grays HARBOR, WA

Jan 2018

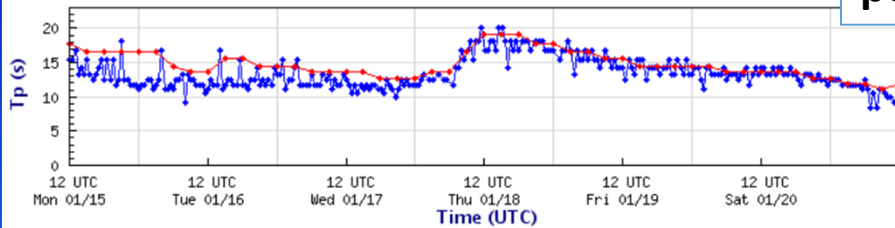
Observations: CDIP buoy 036  
Forecast: NOAA WW3 46211

Wave height - Station 036



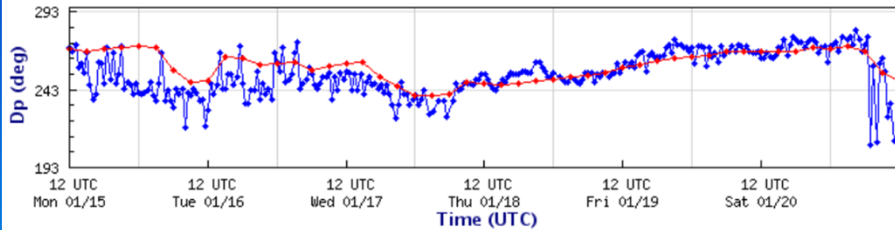
**Sig. wave height ~ 10 m**

Peak period - Station 036

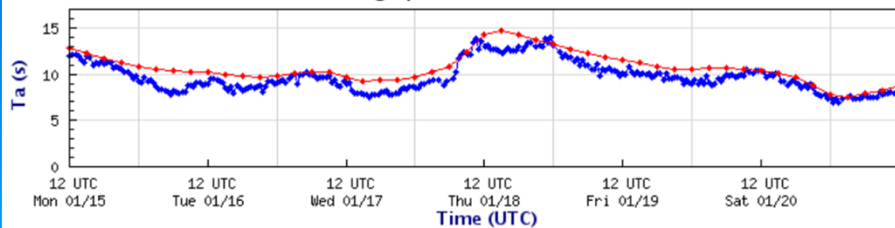


**Peak wave period > 18 sec**

Peak direction - Station 036



Average period - Station 036



Waves runup covered geotube sand cover during high tide



US Army Corps of Engineers

David Michalsen, Seattle District , "Barrier Island Restoration for Storm Damage Reduction: Willapa Bay, Washington", ICCE, 2010

# Westport, Grays Harbor, WA



January 18, 2018

Person



November 6, 2009, 23ft waves @18 sec  
(Photo: David Michalsen & Scott Brown, USACE Seattle)

Date (PST)	Hs (ft)	Tp (s)	Ta (s)	Dp (deg)	SST (F)	C
2006-02-04 05:01	39.37	15.38	13.15	233	50.7	
2006-02-04 06:31	35.63	18.18	12.87	237	50.7	
2006-02-04 06:01	33.43	16.67	12.64	236	50.7	
2018-01-18 15:33	33.33	16.67	13.92	251	49.3	
2006-12-13 18:24	33.04	18.18	13.27	268	50.2	
2006-02-04 04:01	32.71	13.33	11.84	219	50.7	
2018-01-18 14:33	32.51	16.67	13.86	255	49.3	
2006-12-13 16:54	32.35	16.67	13.35	261	50.2	
2006-12-13 16:24	32.15	16.67	12.66	264	50.2	
2003-10-12 04:26	31.99	16.67	12.76	265	55.6	
2007-12-03 10:59	31.92	15.38	11.37	213	49.8	
2006-12-13 18:54	31.86	18.18	12.79	271	50.2	
2018-01-18 03:33	31.63	20.00	13.54	253	49.3	
2007-12-03 08:59	31.50	16.67	11.46	214	49.5	
2007-12-03 11:29	31.43	15.38	11.51	209	49.8	
2006-12-13 15:54	31.30	16.67	12.70	261	50.4	
2006-12-13 19:54	31.10	18.18	13.25	265	50.2	
2018-01-18 16:03	31.07	16.67	13.10	254	49.3	
2007-12-03 12:29	31.07	16.67	11.72	216	50.0	
2018-01-18 02:33	31.00	18.18	13.90	250	49.5	
2015-12-10 14:24	30.84	18.18	12.72	247	52.2	
2018-01-18 13:33	30.64	18.18	13.18	261	49.3	
2000-01-16 13:37	30.64	14.29	11.05	213	47.5	
2018-01-18 12:03	30.61	16.67	13.41	254	49.3	
2003-10-12 00:56	30.61	15.38	12.52	268	56.7	

Max Significant Wave Heights  
1981 - present



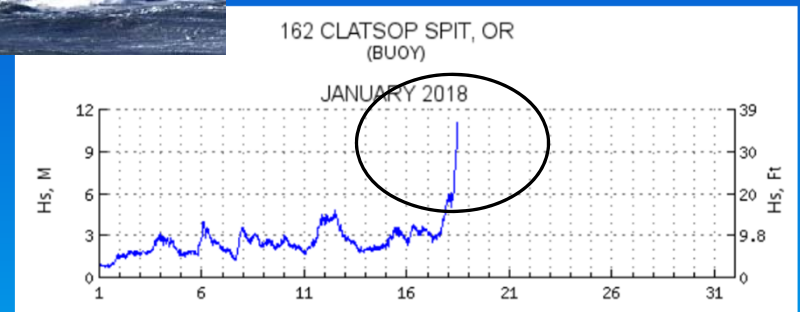
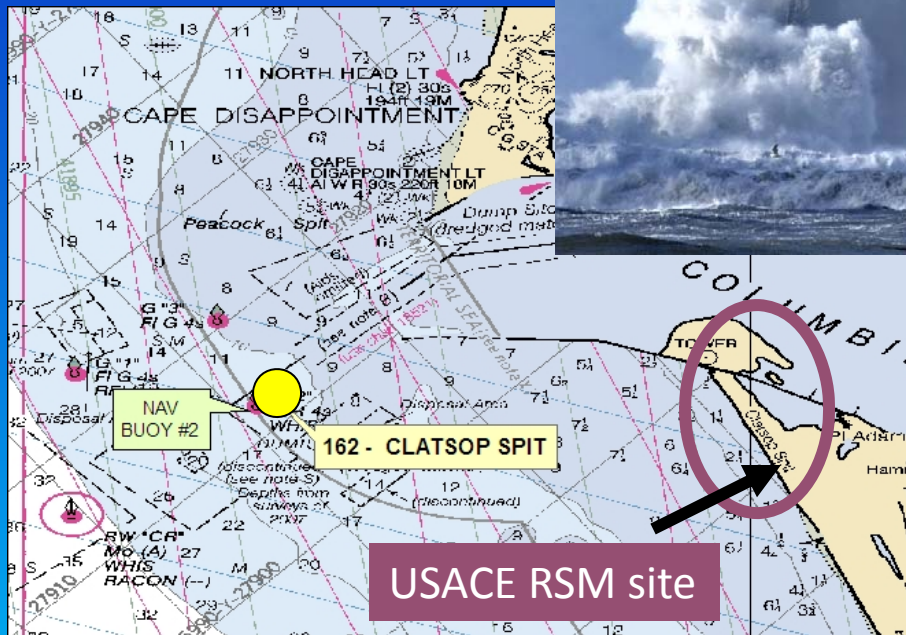
US Army Corps  
of Engineers

# Portland District - Mouth of the Columbia River

Regional Sediment Management (RSM) :  
“... it is really **GOOD** to have **CDIP**  
**wave-riders OPERATIONAL** on the **WEST Coast...**  
**these are huge assets to have while we are being**  
**subjected to El Nino and big wave events.”**  
**Rod Moritz USACE**



JANUARY 2018



Waves measured 11m significant height  
Water depth = 25m



US Army Corps  
of Engineers

# Portland District Dredging – Columbia River Navigation



*“CDIP’s timely and accurate wave data update every 30 minutes and are highly utilized by the maritime community, where they are critical to safe and efficient navigation by dredging project managers as well as by military, commercial, and recreational mariners.” Captain Dan Jordan, Columbia River Bar Pilots*



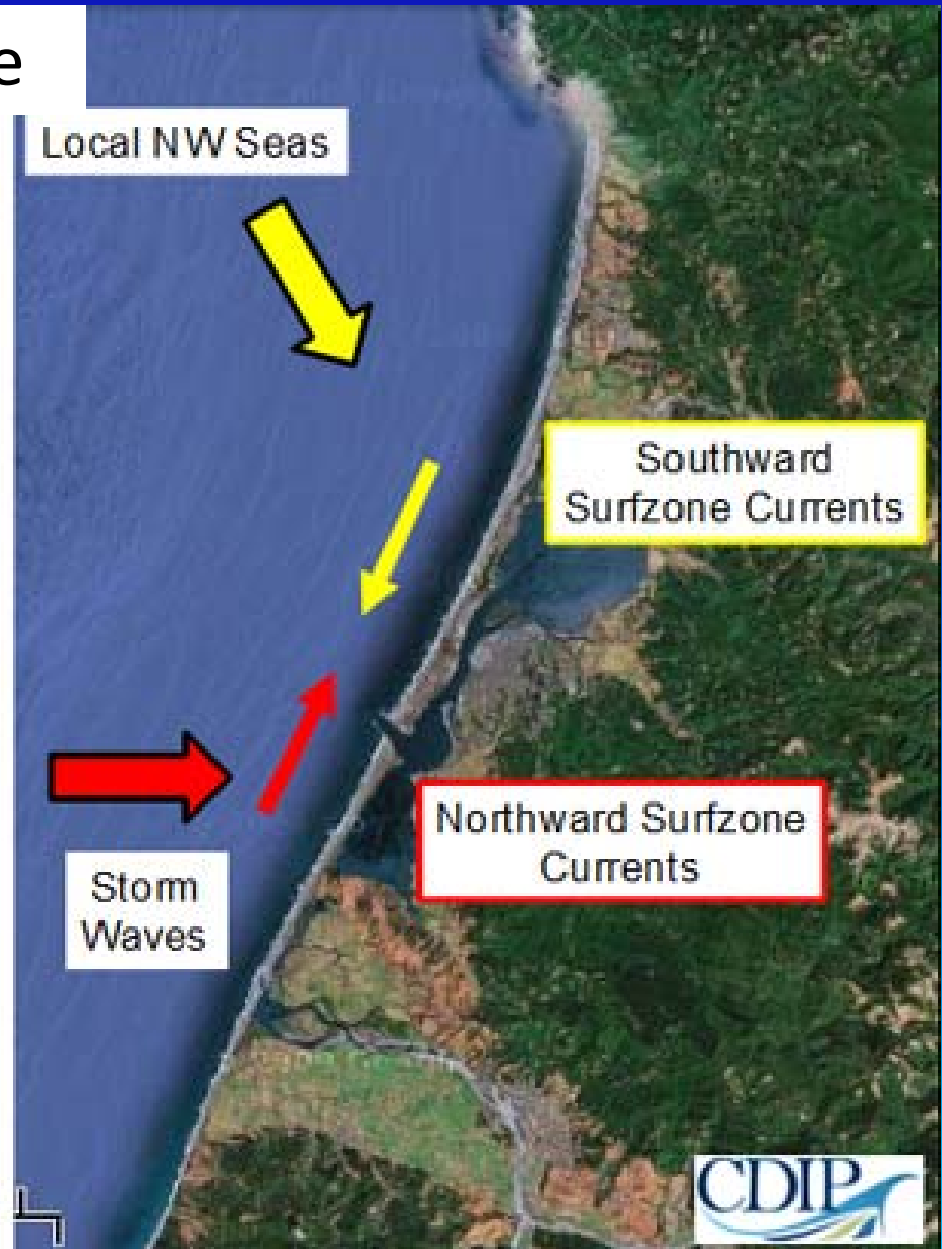
US Army Corps  
of Engineers®

# San Francisco Corps District

## Humboldt Channel Entrance

### Wave-driven Surfzone Currents & Sediment Transport

- Balance between year-round NW seas and W storm waves
- Summer months dominated by NW seas and southward transport
- Winter months dominated by W sea & swells and northward transport



# Humboldt North Spit

- Buoy data are reviewed prior to annual on-site jetty inspections
- Data are used in the North Jetty site design (when repairs are needed)

*Anne Sturm, James Zoulas, and John Dinger,  
South Pacific Division*



3-5 people die per year in nearshore boating accidents (Troy Nicolini – NWS, Eureka).



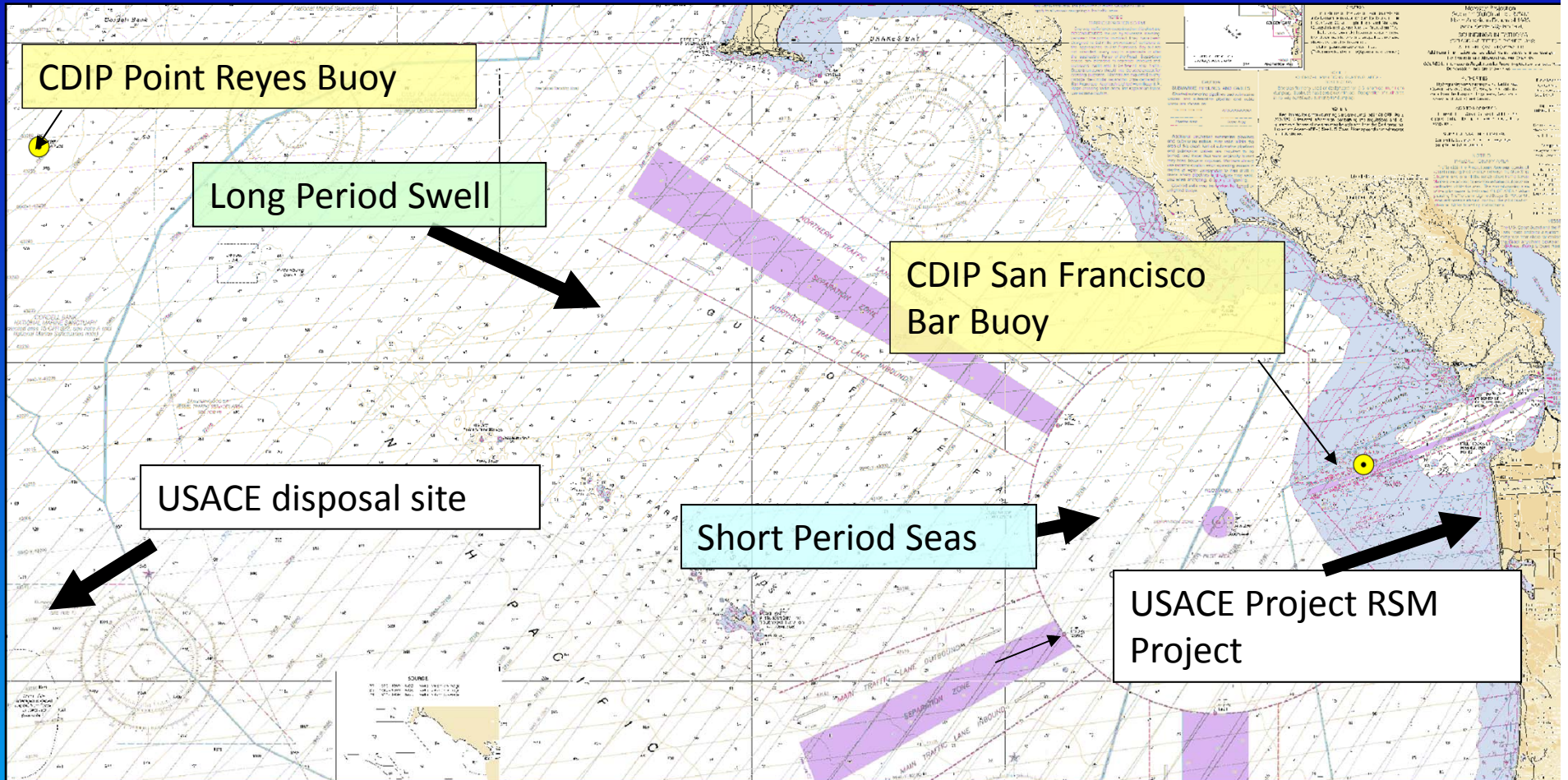
20ft Hs waves – Jan 26, 2017



US Army Corps  
of Engineers

<https://www.youtube.com/watch?v=46A7eYkCRI8>

# San Francisco District



US Army Corps of Engineers





# San Francisco District

1) Assess conditions for dredge material placement sites near the San Francisco Bar and Ocean Beach

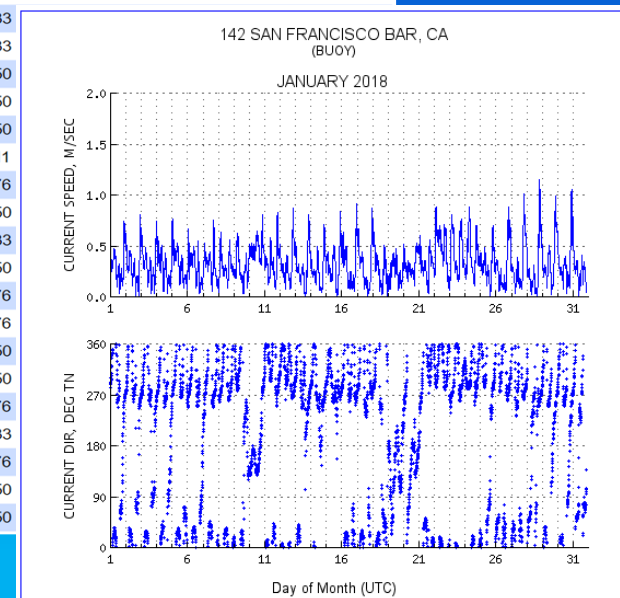
2) Assess real-time conditions for hopper dredge captains during annual O&M dredging activities.

*Anne Sturm, James Zoulas, and John Dingler, South Pacific Division*



Date (PST)	Hs (ft)	Tp (s)	Dp (deg)	Ta (s)	SST (F)	Current sp (kt)	Current dir (deg)
2018-01-31 10:30	6.59	12.50	281	9.46	53.4	0.54	71
2018-01-31 10:00	6.27	13.33	281	9.06	53.4	0.58	79
2018-01-31 09:30	6.92	13.33	279	9.97	53.4	0.60	73
2018-01-31 09:00	6.50	13.33	283	9.60	53.4	0.60	70
2018-01-31 08:30	5.68	13.33	278	9.34	53.2	0.52	90
2018-01-31 08:00	5.91	12.50	276	9.26	53.2	0.45	75
2018-01-31 07:30	6.07	13.33	280	9.23	53.2	0.25	54
2018-01-31 07:00	5.84	12.50	276	8.74	53.4	0.27	339
2018-01-31 06:30	6.20	11.76	278	8.84	53.2	0.58	304
2018-01-31 06:00	6.79	13.33					
2018-01-31 05:30	6.00	13.33					
2018-01-31 05:00	6.14	12.50					
2018-01-31 04:30	6.36	12.50					
2018-01-31 03:30	5.97	12.50					
2018-01-31 03:00	5.94	11.11					
2018-01-31 02:30	5.94	11.76					
2018-01-31 02:00	5.54	12.50					
2018-01-31 01:30	5.94	13.33					
2018-01-31 01:00	5.61	12.50					
2018-01-31 00:30	5.51	11.76					
2018-01-31 00:00	5.68	11.76					
2018-01-30 23:30	5.91	12.50					
2018-01-30 23:00	5.84	12.50					
2018-01-30 22:30	5.31	11.76					
2018-01-30 22:00	5.28	13.33					
2018-01-30 21:30	4.89	11.76					
2018-01-30 21:00	4.99	12.50					
2018-01-30 20:30	5.02	12.50					

Thanks to Michael Dillabough and Capt Kixon



# Contributions from NANOOS re PNW coastal conditions

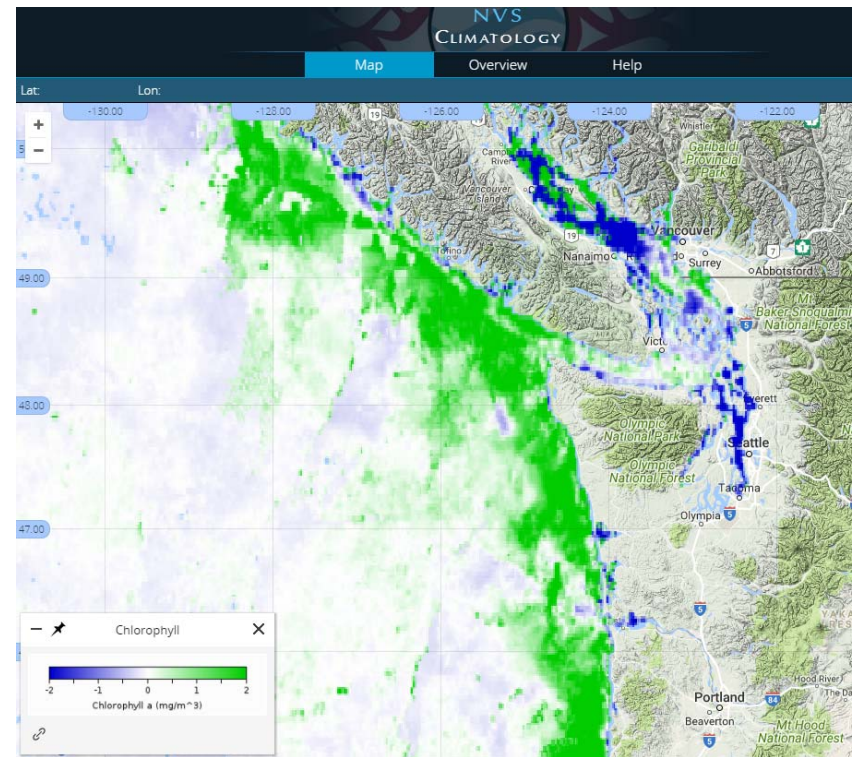
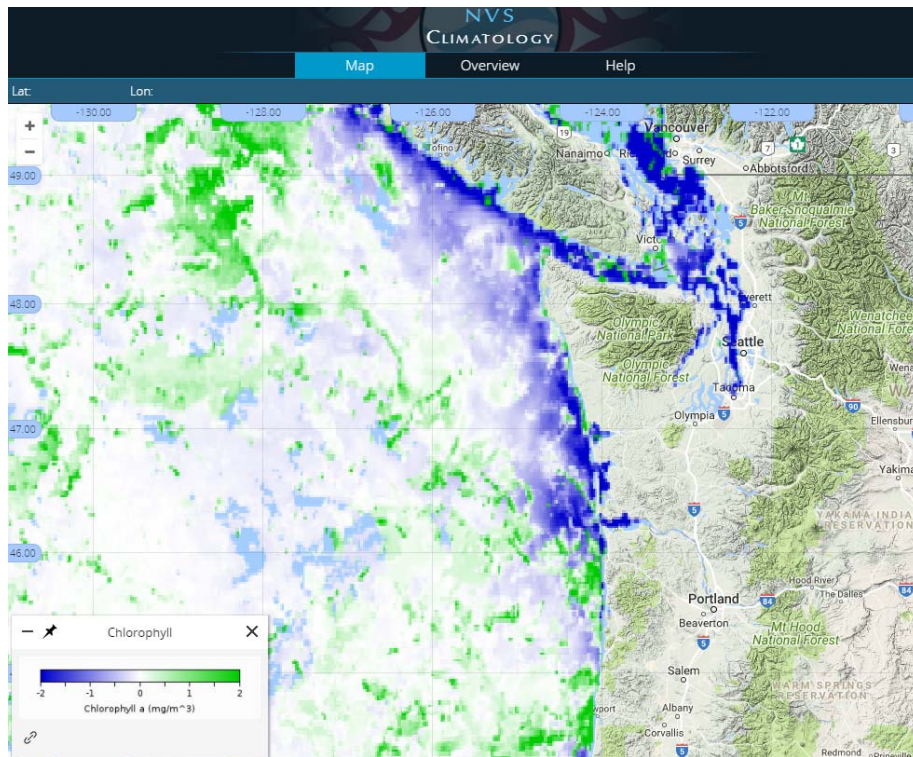




## Chlorophyll Anomaly

January 2018

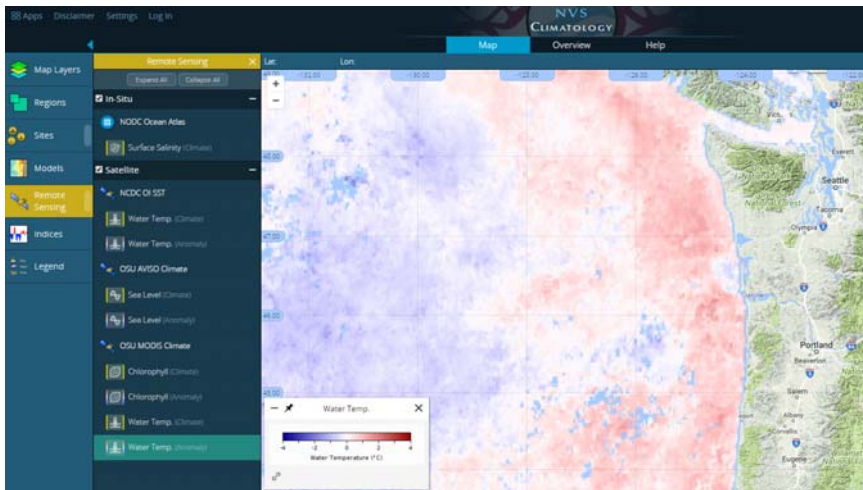
February 2018



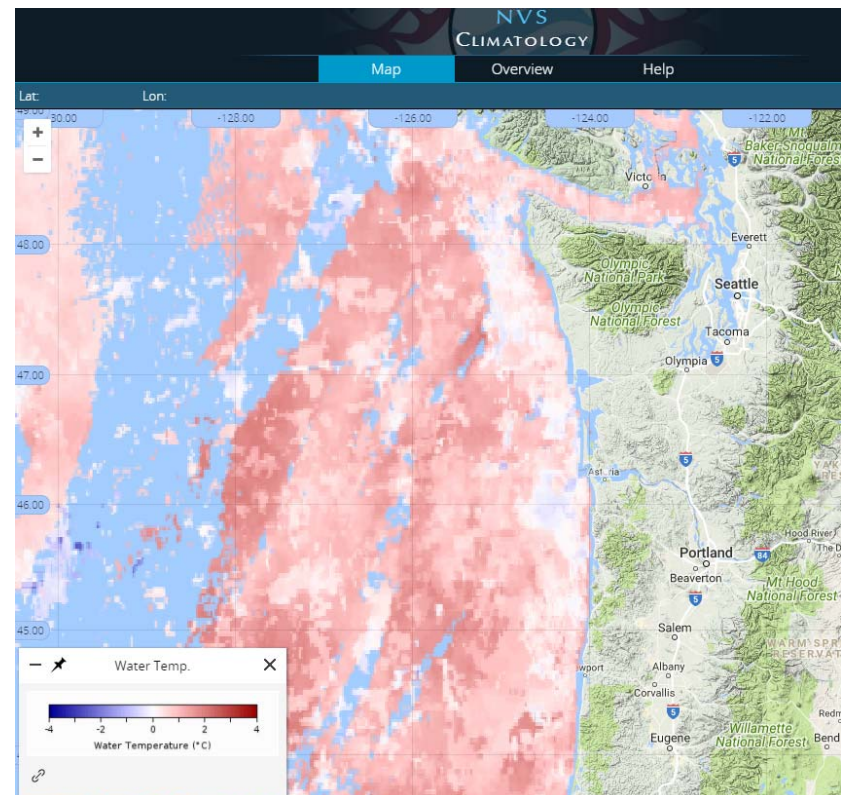


## Sea Surface Temperature Anomaly

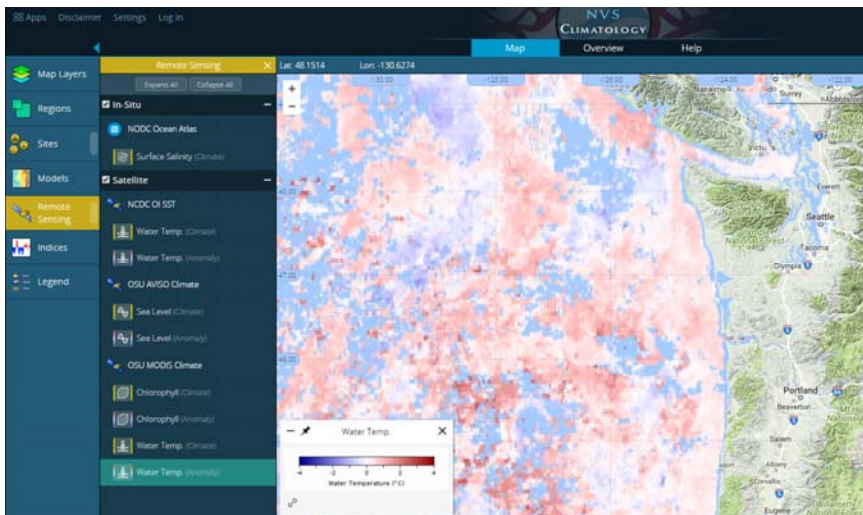
February 2017



February 2018

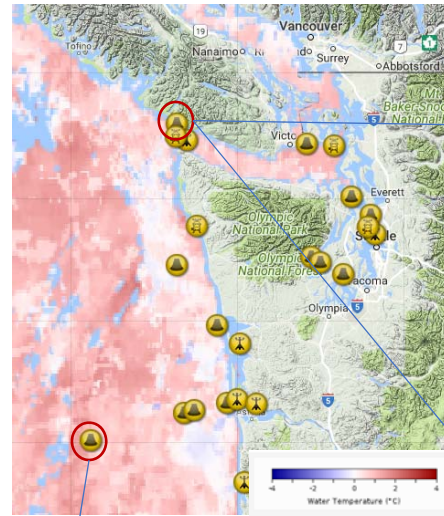


November 2017

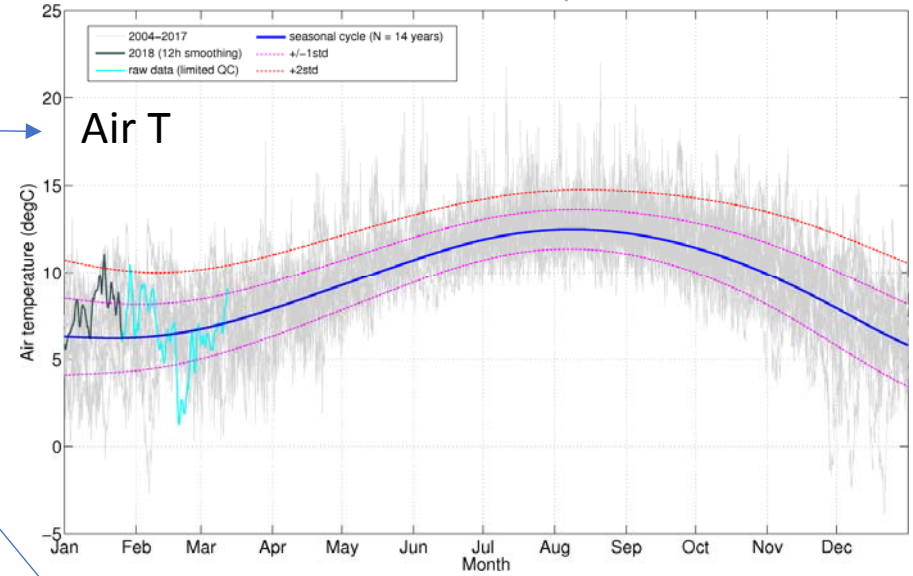




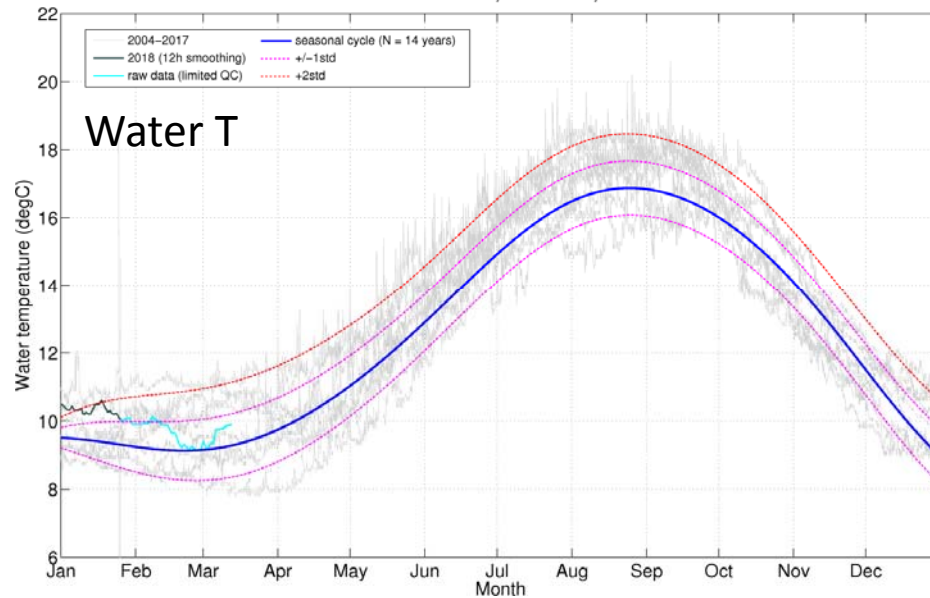
## Air & Water Temperature Anomalies



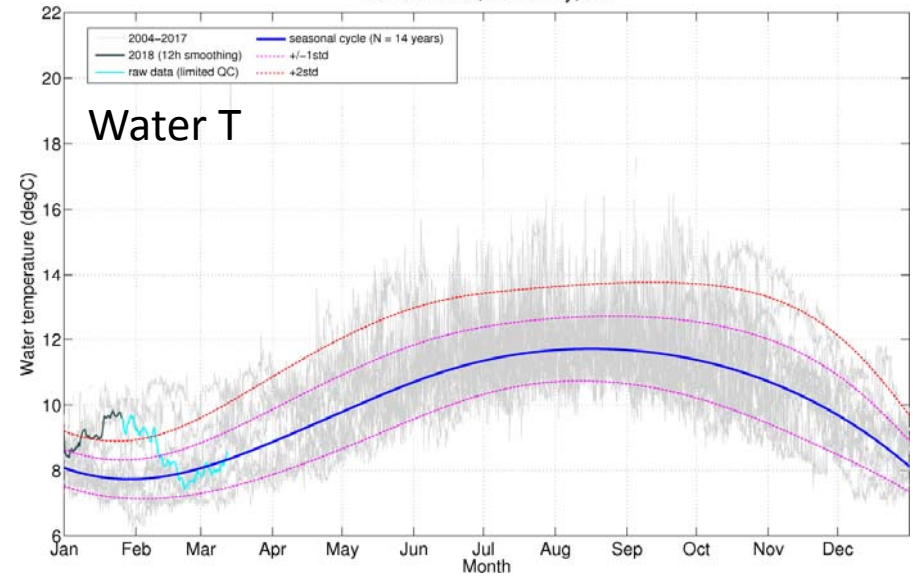
NDBC 46087, Neah Bay, Wa

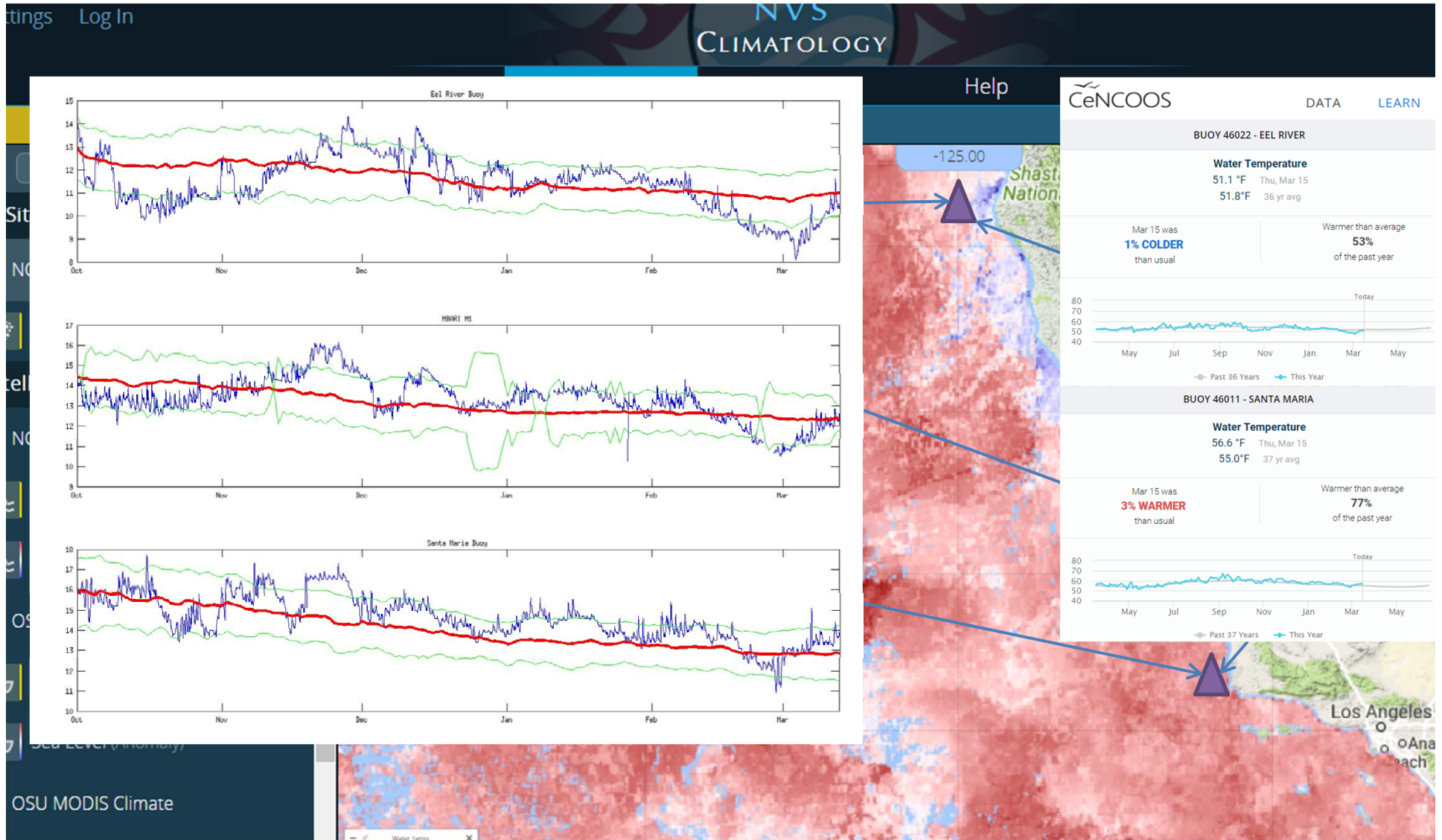


NDBC 46089, Tillamook, Or



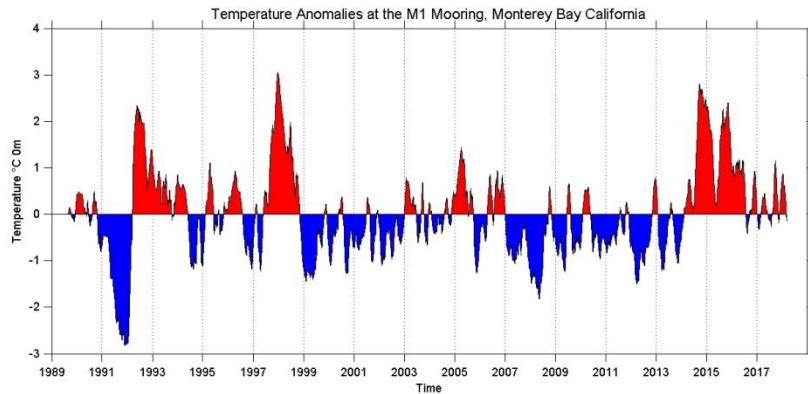
NDBC 46087, Neah Bay, Wa





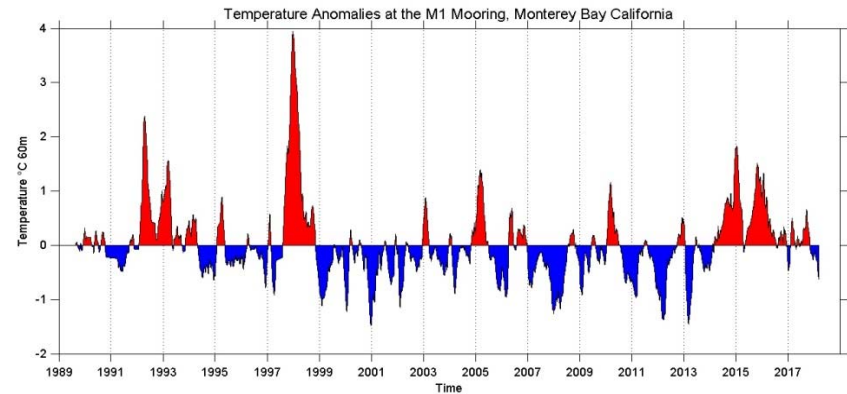
# Seasonal Cooling Trend in Monterey Bay

## M1 Buoy



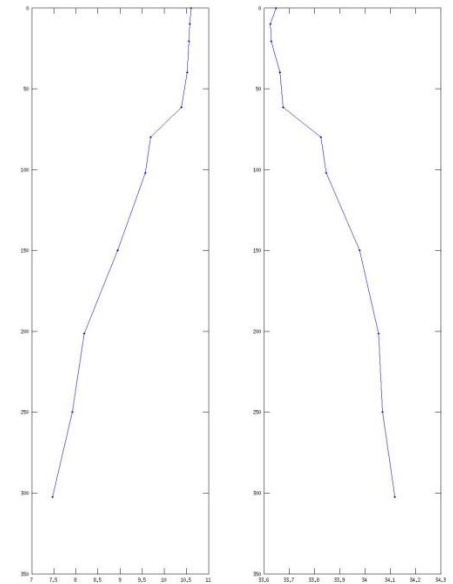
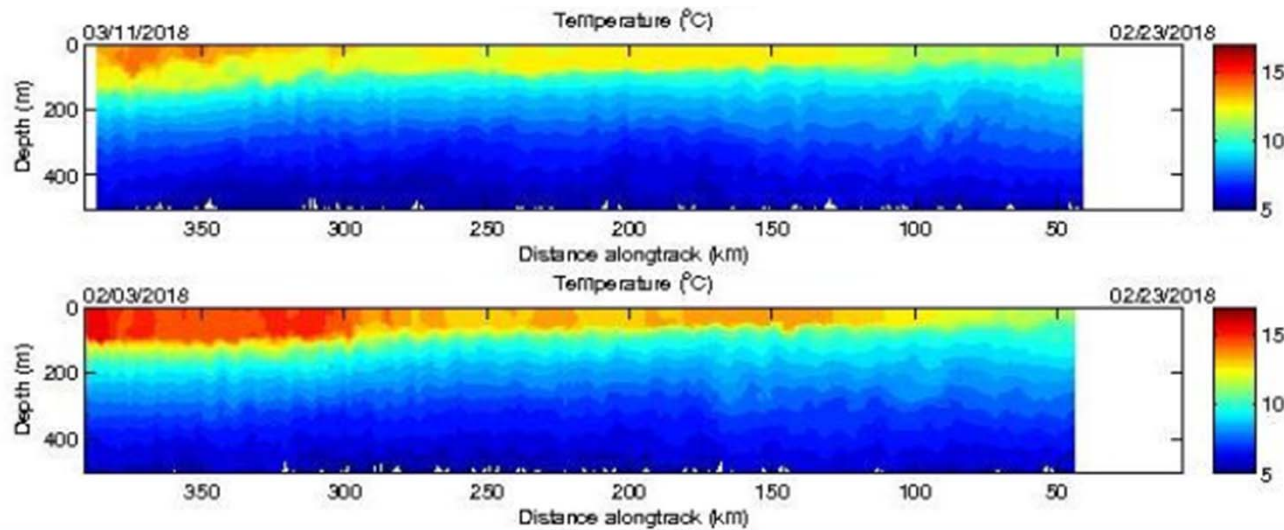
Note: 60 point moving average applied to daily averaged values.  
Monterey Bay Aquarium Research Institute

Updated: 16-Mar-2018

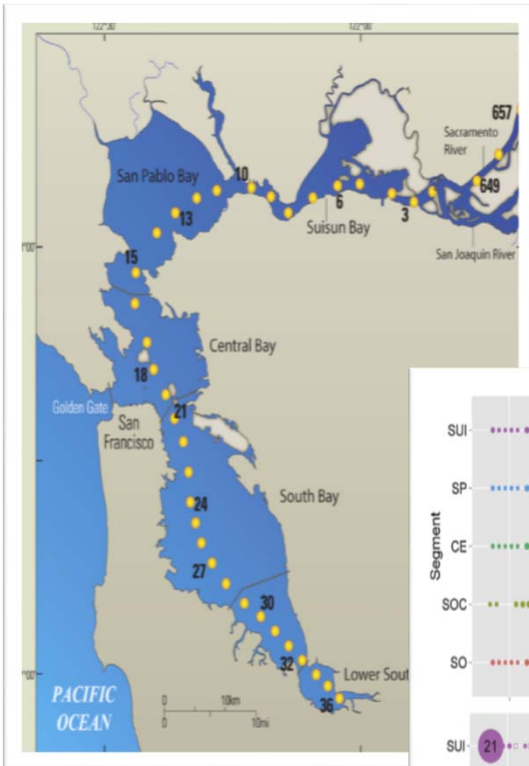


Note: 60 point moving average applied to daily averaged values.  
Monterey Bay Aquarium Research Institute

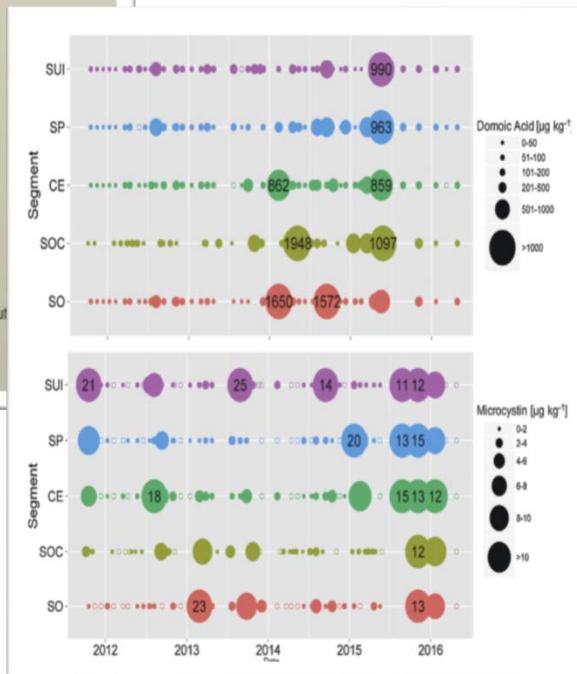
## Spray Glider



## New SF Bay HAB Study from UCSC



Simultaneous occurrence of three marine algal toxins and one freshwater algal toxin in San Francisco Bay



Peacock et al  
2018  
*Harmful Algae*

## Two new OA buoys deployed in SF Bay by EOS SFSU

Bay Ocean Buoy (BOB)  
Marine Acidification Research Inquiry (MARI)

Long-term water quality monitoring + carbon chemistry + atmospheric CO<sub>2</sub>



Photo Credit: Steve Babuljak



# Call Agenda

---



- Project Recap & Updates (Polly Hicks)
- El Niño and Regional Climate brief (Dan McEvoy)
- Guest Speaker: Debris-Flow Hazards Following Wildfire (Dennis M. Staley, USGS)
- IOOS Nearshore Conditions brief (Julie Thomas, Marine Lebrech, Alex Harper)
- **Environmental conditions and impacts reporting and discussion (Polly Hicks)**
- Discussion

# Regional Impacts Summary

---



## Reporting Status:

- 35 entries since January 20, 2018

## Environmental Conditions

- Drought
- Snowpack/snow drought
- Wildfires and smoke
- Mudslides
- Water temperatures
- Algal bloom
- Tsunami watch
- Changing ocean conditions
- Global temperature

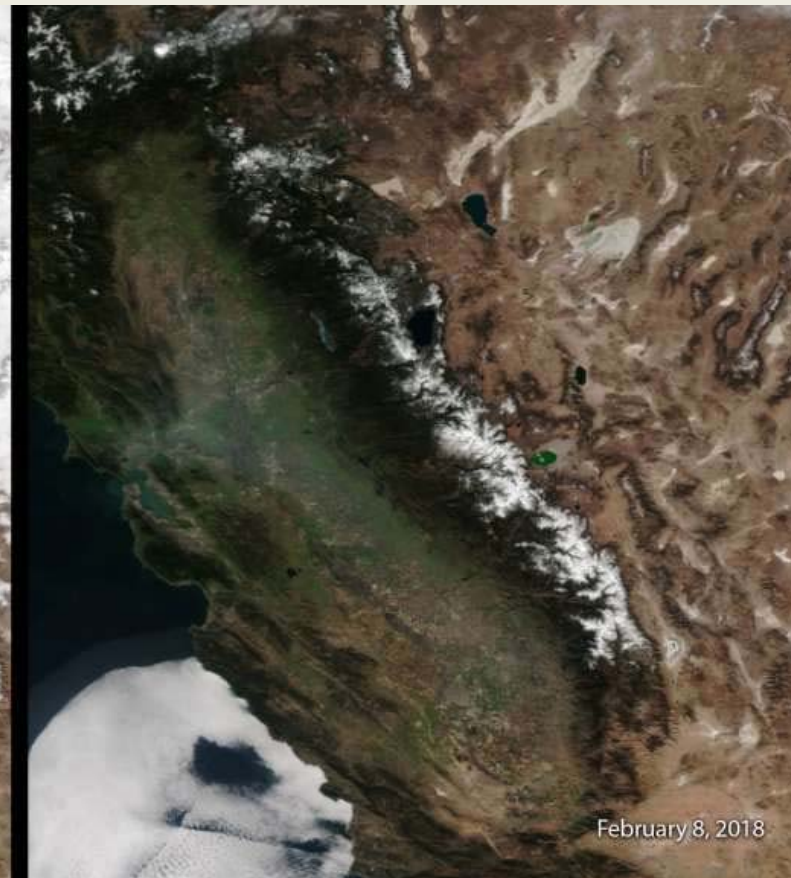
## Human & Environmental Impacts

- Economic impacts
  - Recreational & tourism
  - Agriculture
- Reservoir levels/water restrictions
- Evacuations
- Species impacts
  - Disease susceptibility
  - Average size of individuals
- Harvest restrictions
- Increased human health risks

# Impacts in Pictures



Low snowpack in much of the region is impacting recreational use and local economies. By early January, Colorado had lowest snow-pack in 30 years. By February the Sierra Nevada only had 23% of their average snowpack. The lack of snow caused many low-elevation downhill and cross country ski areas to close early or fail to open resulting in potential millions of dollars in economic losses.





# Impacts in Pictures

---

Drought and reduced snowpack is impacting reservoir levels and causing concerns for water users. Lake Powell is expected to get only 47% of its average inflow due to low snowpack.

OR Governor Brown declared a Drought Emergency for Klamath Co, which is at 45% snowpack. Officials predict \$557M in economic losses impacting 4,500 jobs in agriculture, natural resources and recreation.

Lack of snow may also impact water temperatures. For the Sacramento River, the BOR is delaying the allocation of water to some agriculture users incase releases are needed to keep temperatures low for endangered chinook salmon.



# Impacts in Pictures



Wind-driven fire in rural central California forced evacuations in February.

30,000 individuals were forced to evacuated due to a potential mudslide threat along the Santa Barbara Coast. The evacuations were in the same area that experienced severe mudslides in January.



Mike Eliason/Santa Barbara County Fire/Handout via REUTERS



Matt Udkow/Santa Barbara County Fire Department/Associated Press

# Impacts in Pictures

---



The northern Pacific sardine population (from Mexico to British Columbia) has plummeted 97 percent since 2006. An assessment by NOAA Fisheries and the Pacific Fishery Management Council projects that only 52,065 metric tons of sardines will be along the West Coast on July 1; below the 150,000 metric-ton threshold required for commercial fishing. It is anticipated that the fishery will be closed for a fourth year in a row. The source of the declines is related to both natural fluctuations as well as changing ocean conditions.



Photo: CHUCK KIRMAN, AP

# Impacts in Pictures

---



WA Governor Inslee announced an initiative that directs state agencies to take immediate and long-term steps to protect the Southern Resident Killer Whales. The endangered orcas are at a 30-year low with only 76 individuals down from 98 in 1995.



# Call Agenda

---



- Project Recap & Updates (Polly Hicks)
- El Niño and Regional Climate brief (Dan McEvoy)
- Guest Speaker: Debris-Flow Hazards Following Wildfire (Dennis M. Staley, USGS)
- IOOS Nearshore Conditions brief (Marine Lebrec, Julie Thomas, Alex Harper)
- Environmental conditions and impacts reporting and discussion (Polly Hicks)
- **Discussion (all)**
  - Additional impacts to report?
  - Observations on recent environmental anomalies?

**Next NOAA West Watch: May 22<sup>nd</sup>, 1-2pm PDT/ 2-3pm PDT**