



NOAA West Watch

*Reporting Regional Environmental
Conditions & Impacts in the West*

March 21, 2017

Call Agenda



- **Project Recap & Updates (Ruth Howell)**
- El Niño and Regional Climate brief (Dan McEvoy)
- Guest Speakers: Recent Observations of Zooplankton Community from northern California Current (Bill Peterson, Roxanne Robertson)
- IOOS Nearshore Conditions brief (Clarissa Anderson, Aric Bickel, Jan Newton)
- Environmental conditions and impacts reporting and discussion (Ruth Howell)
- 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: August 22, 1-2PM PDT/ 2-3PM MDT

Call Agenda



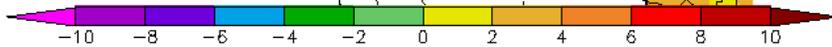
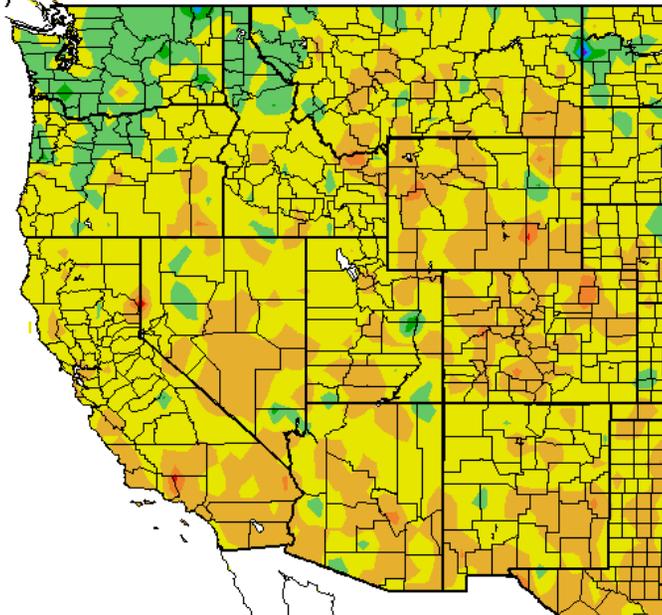
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Climate Brief – Temperature



Temperature Anomaly Last 90 Days 03/06/2017 – 06/03/2017

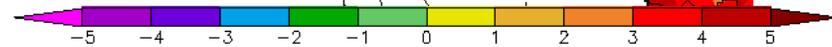
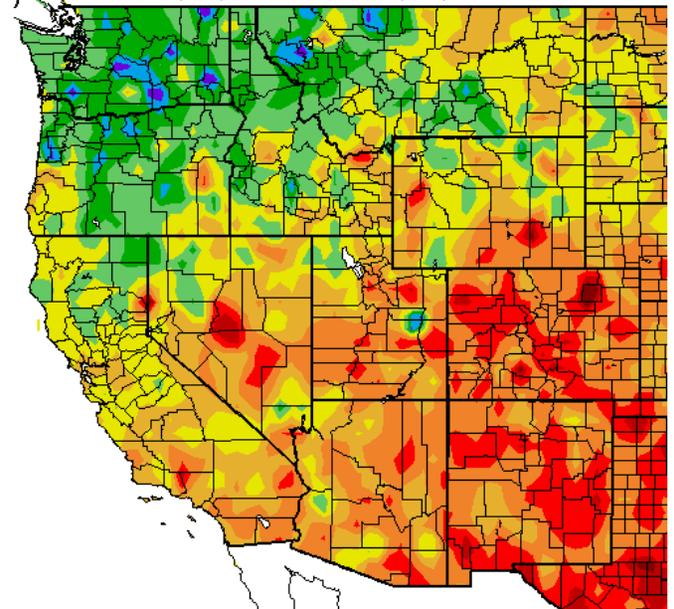
Ave. Temperature dep from Ave (deg F)
3/6/2017 – 6/3/2017



Generated 6/04/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

Temperature Anomaly WY 10/01/2016 – 06/03/2017

Ave. Temperature dep from Ave (deg F)
10/1/2016 – 6/3/2017



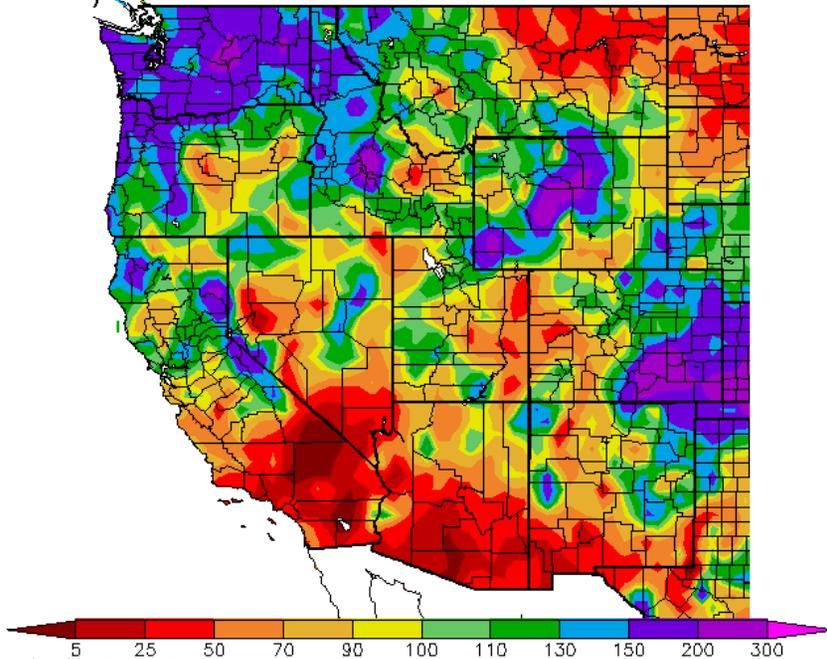
Generated 6/04/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

Precipitation



Precipitation % of Normal Last 90 Days 03/06/2017 – 06/03/2017

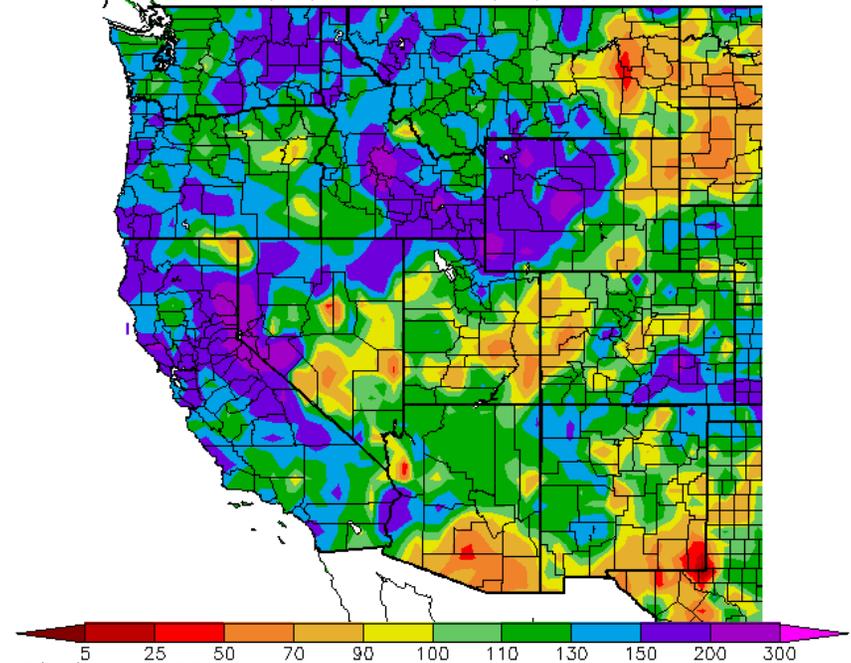
Percent of Average Precipitation (%)
3/6/2017 – 6/3/2017



Generated 6/04/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

Precipitation % of Normal WY 10/01/2016 – 06/03/2017

Percent of Average Precipitation (%)
10/1/2016 – 6/3/2017

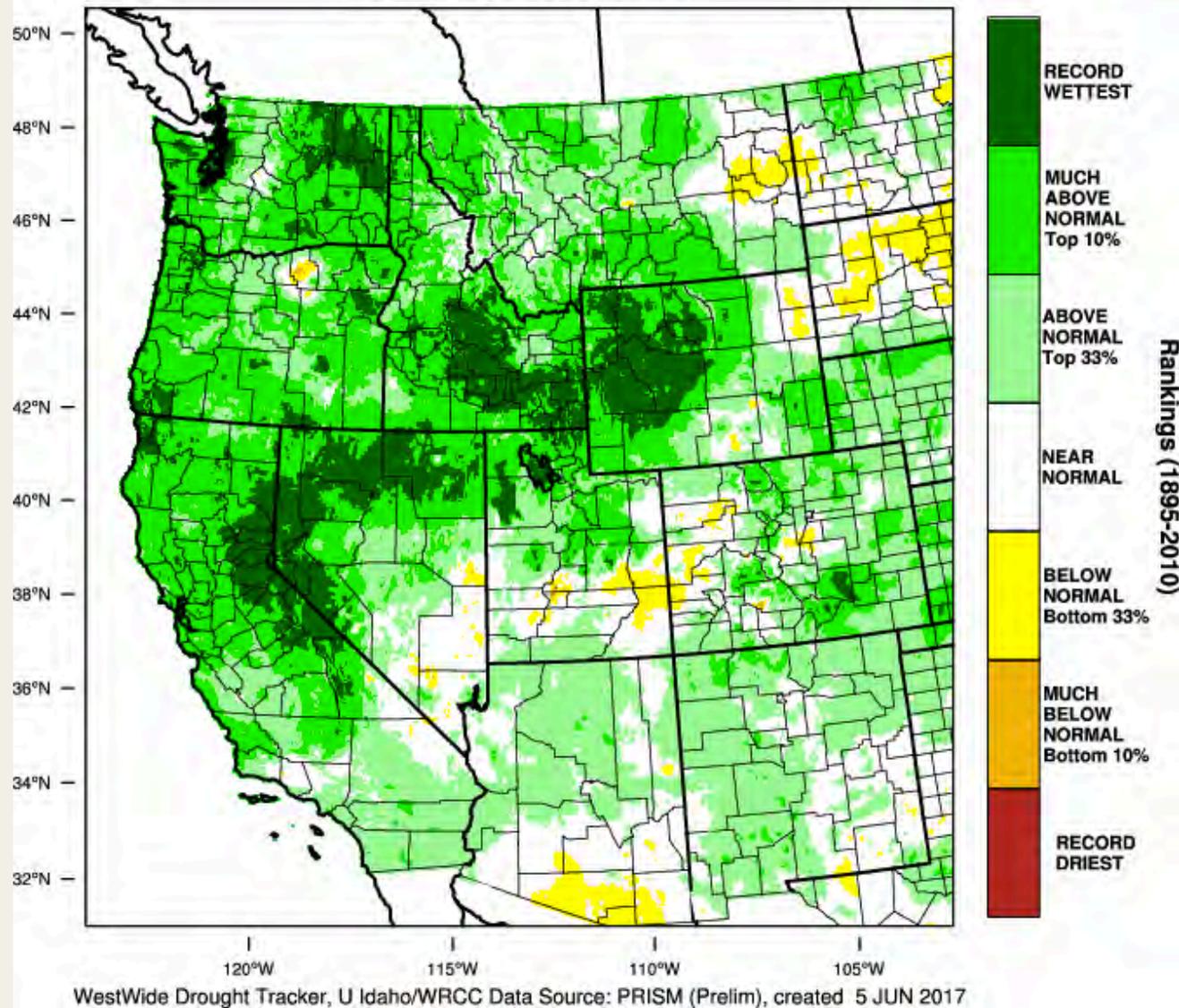


Generated 6/04/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

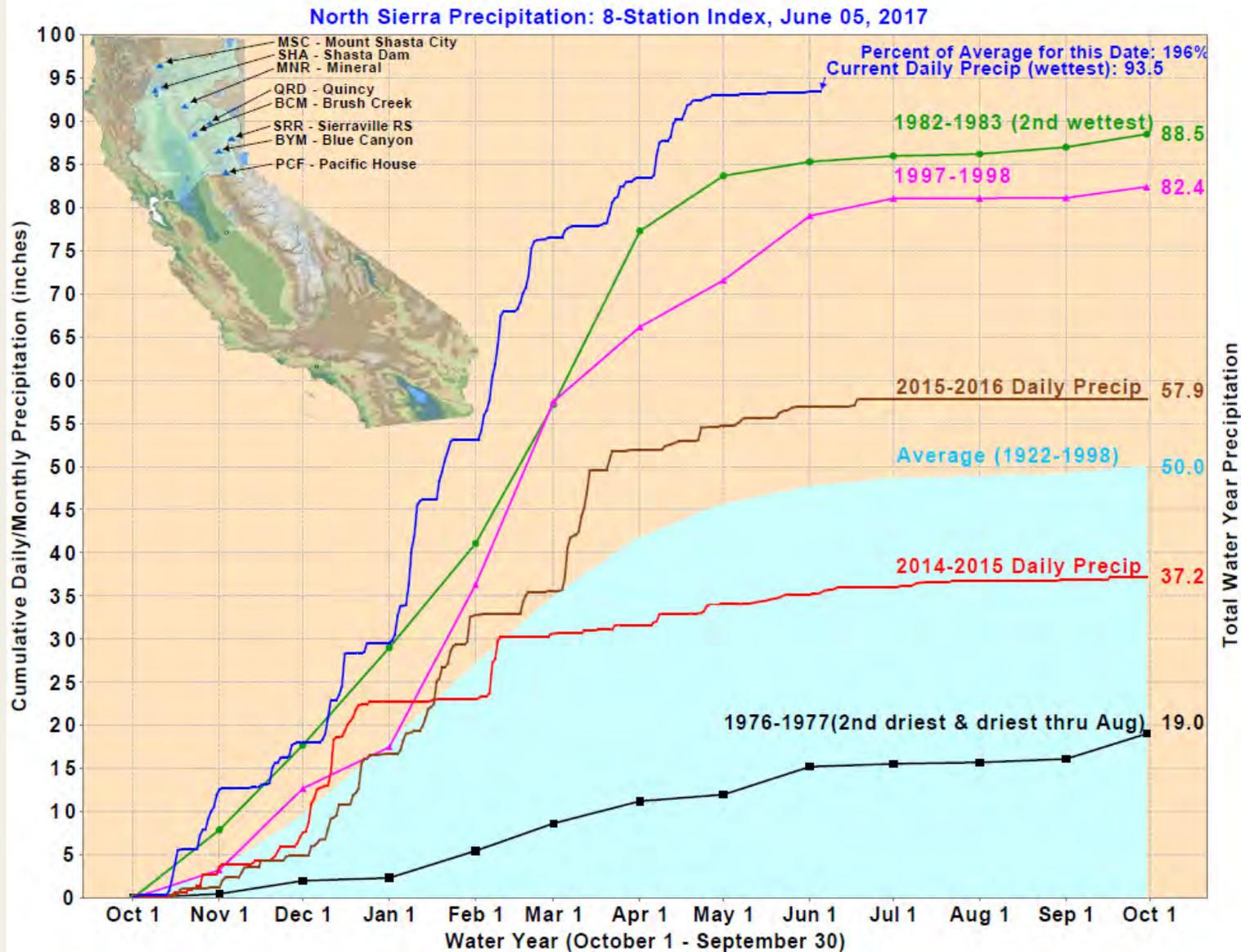
Precipitation



Western United States - Precipitation
October-May 2017 Percentile

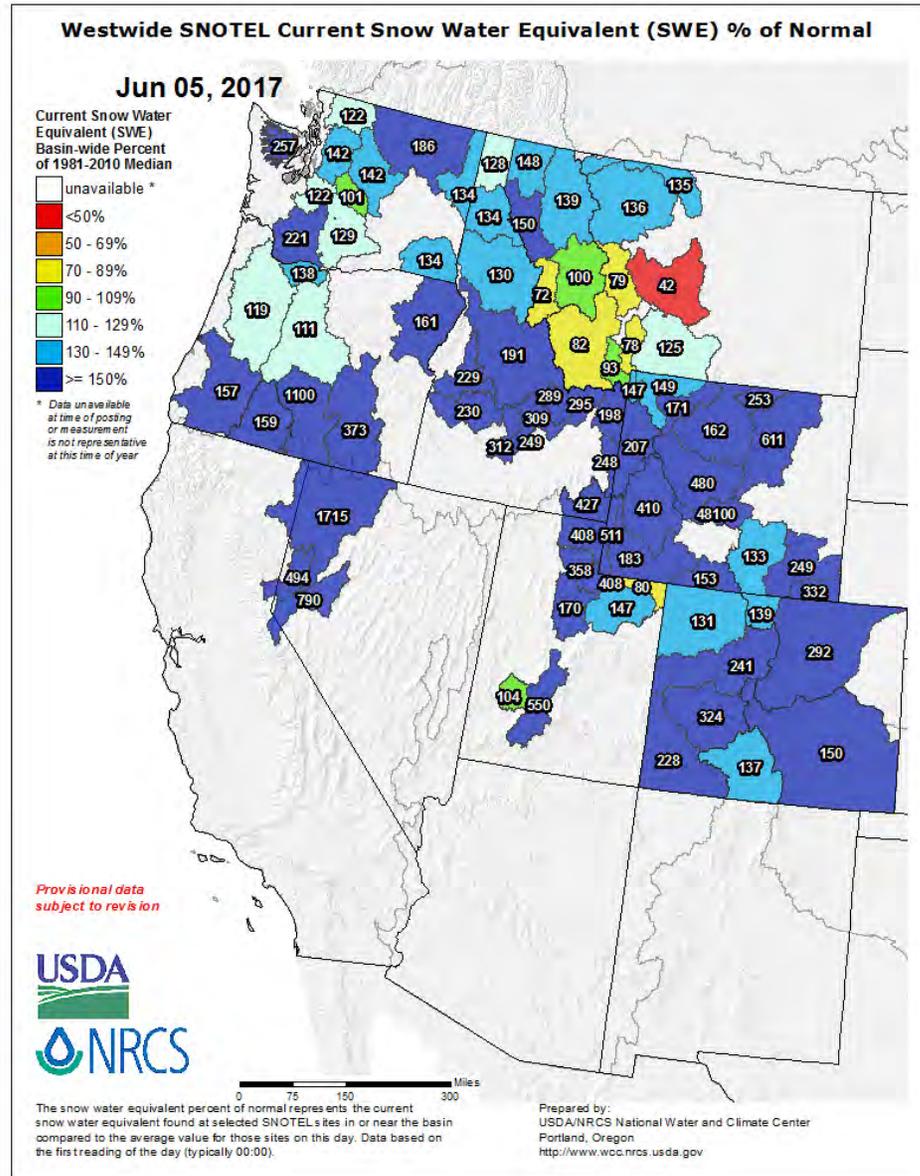


Precipitation



Source: CDEC/CA DWR

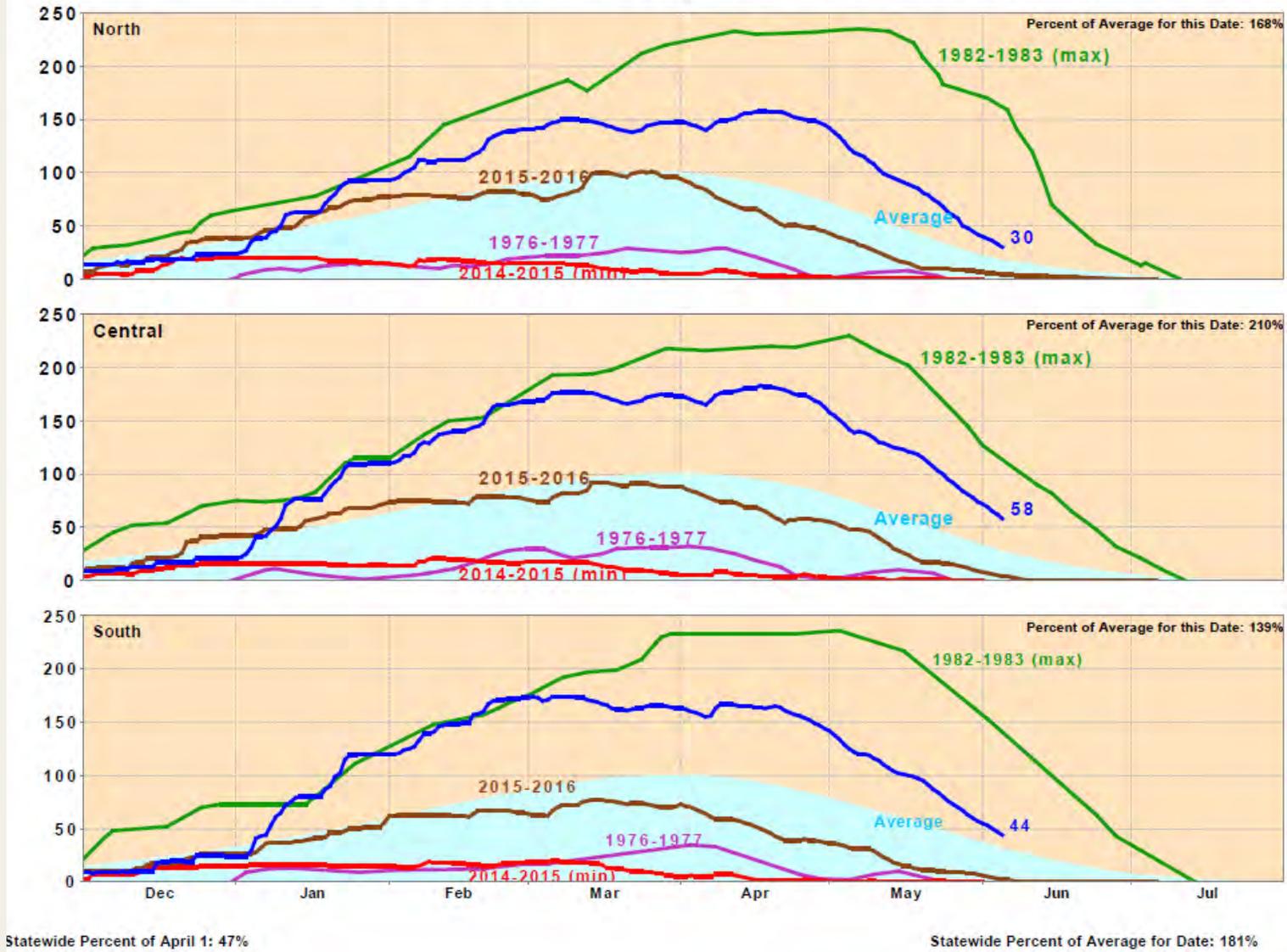
Snow Water Equivalent



Snow Water Equivalent



California Snow Water Content, June 5, 2017, Percent of April 1 Average

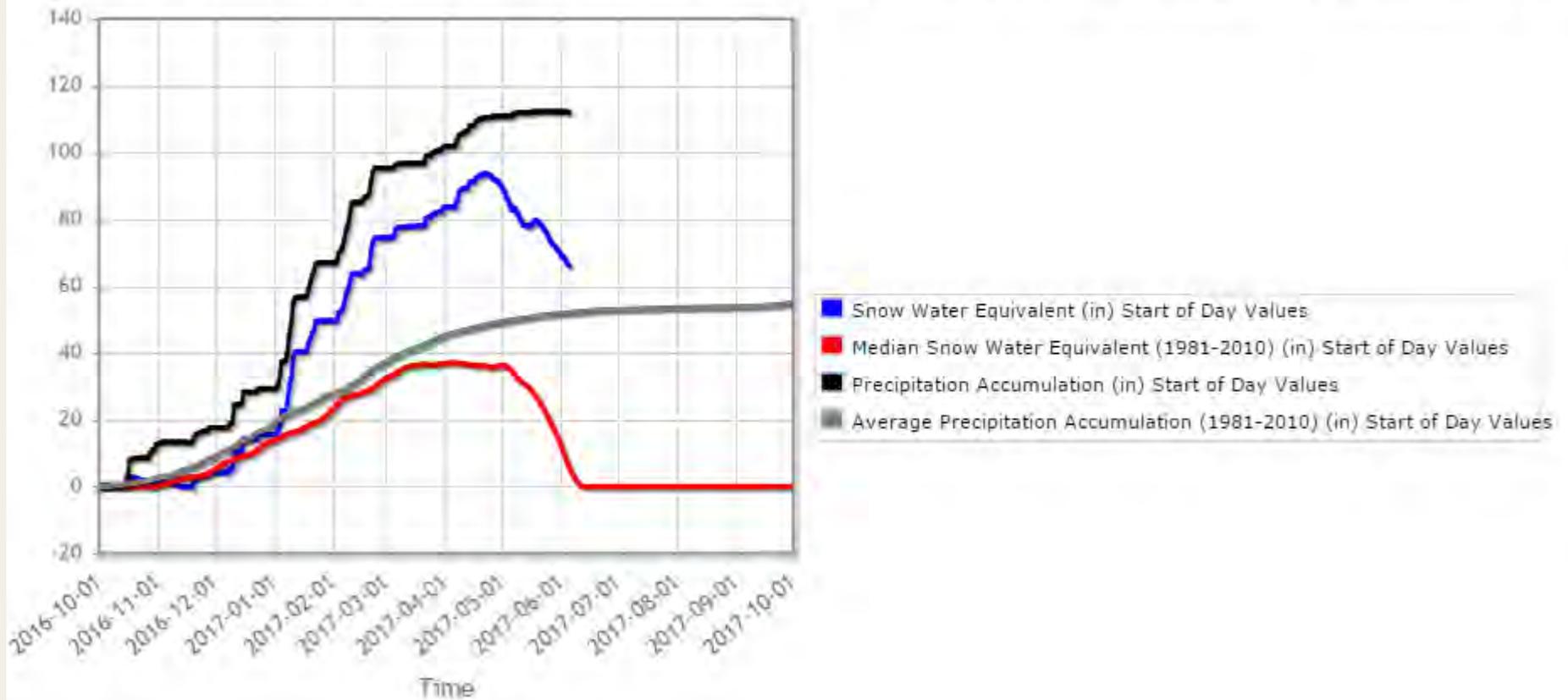


Snow Water Equivalent



- Mount Rose, NV SNOTEL
- Record April 1 SWE
- Period of record: 1979-2017

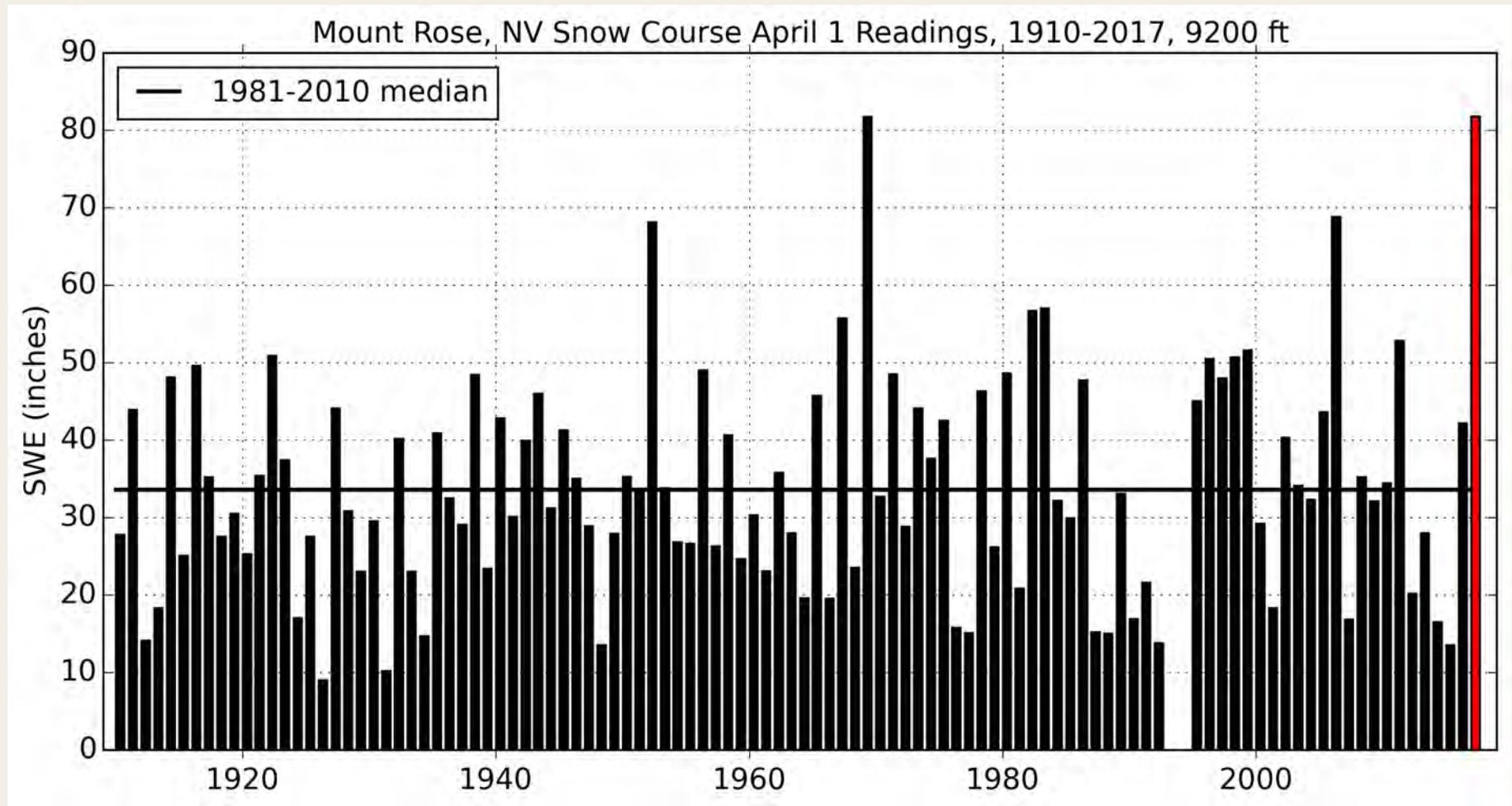
Mt Rose Ski Area (652) Nevada SNOTEL Site - 8801 ft Reporting Frequency: Daily; Date Range: 2016-10-01 to 2017-09-3



Snow Water Equivalent



- New record, 81.8 inches SWE
- Old record, 81.7 inches SWE, 1969



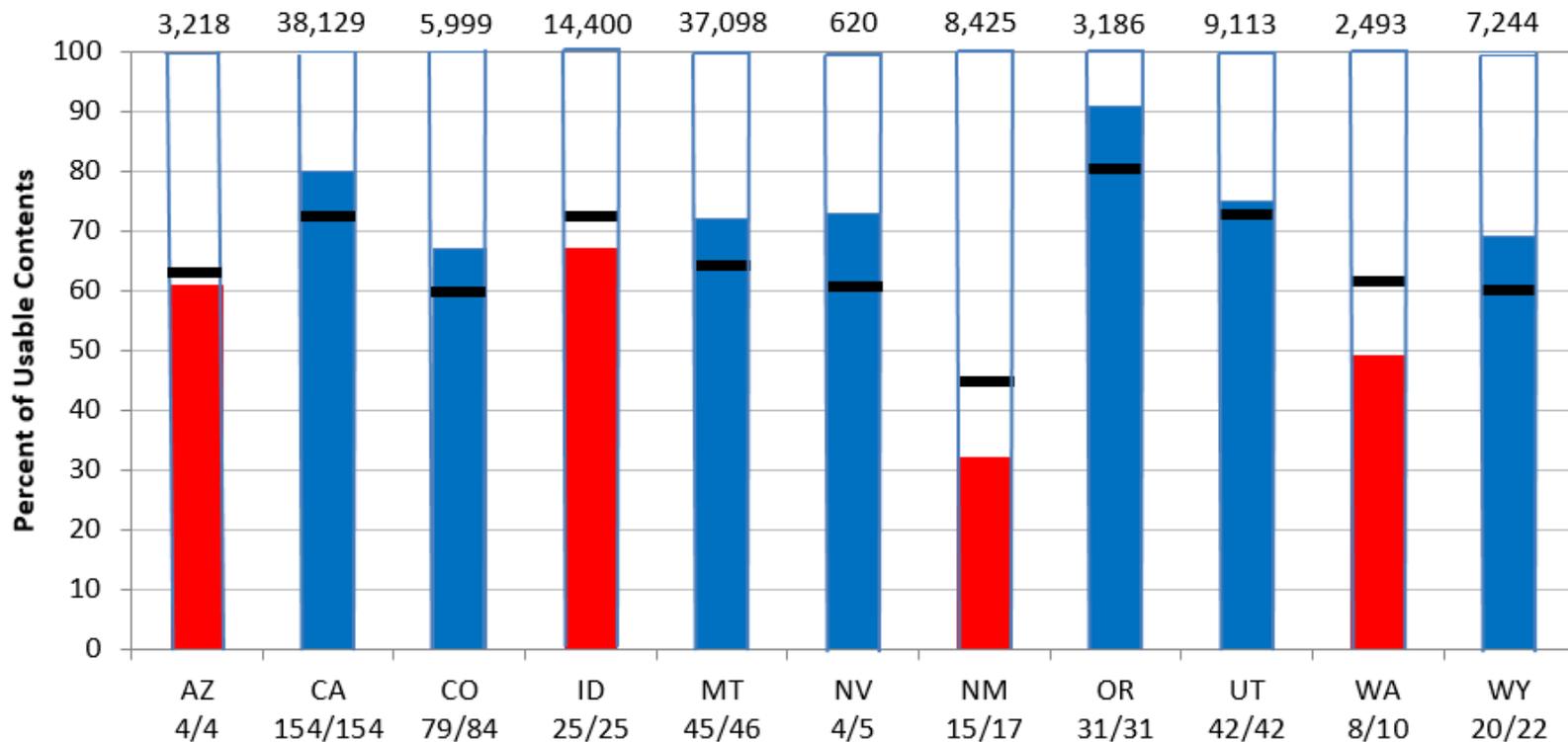
Reservoir Storage



Reservoir Storage as of May 1, 2017

■ Below Average ■ At or Above Average ■ Average

Capacity of Reservoirs Reported (1000 Acre-Feet)



Prepared by: USDA Natural Resources Conservation Service
National Water and Climate Center, Portland, OR
www.wcc.nrcs.usda.gov

State and Number of Reservoirs Reported

ENSO Status



- ENSO Alert System Status: Not Active
- ENSO-neutral conditions are present
- Equatorial sea surface temperatures (SSTs) are near-to-above average across most of the Pacific Ocean.
- ENSO-neutral and El Niño are nearly equally favored during the Northern Hemisphere summer and fall 2017.*

Credit: CPC

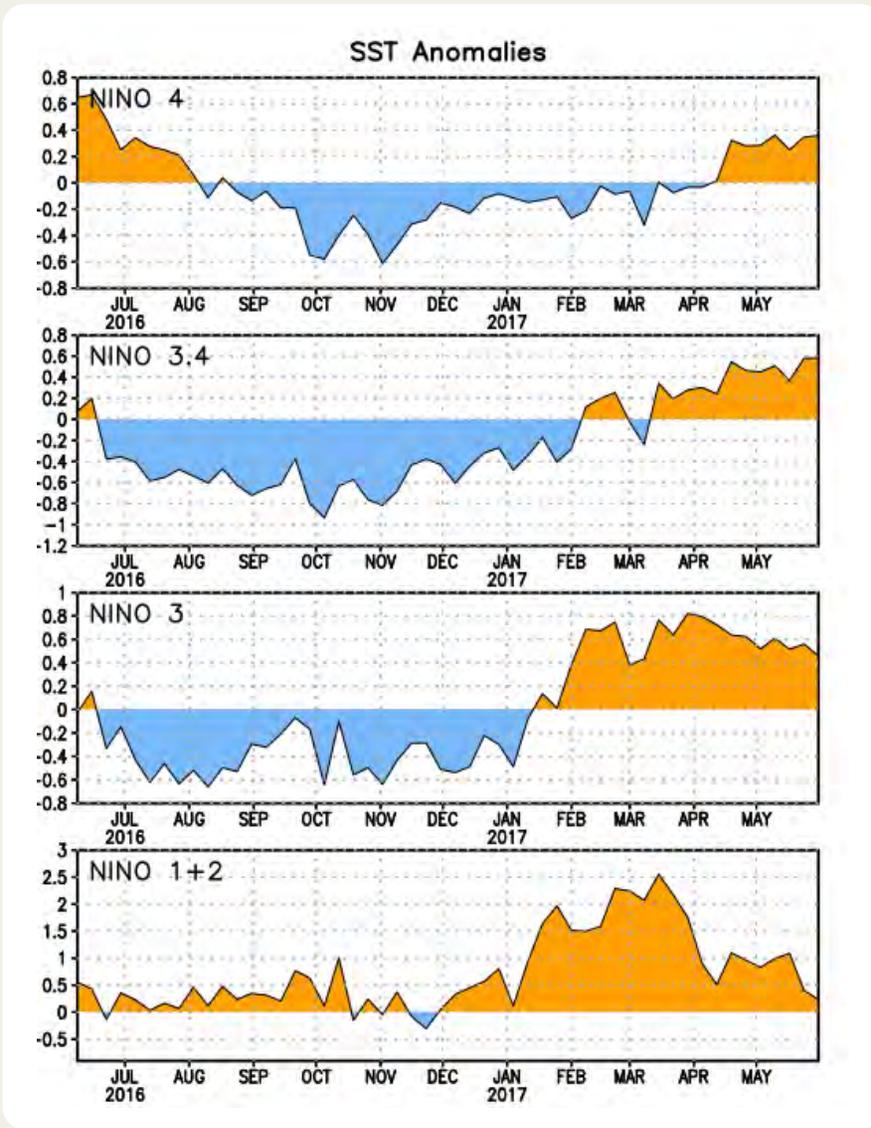
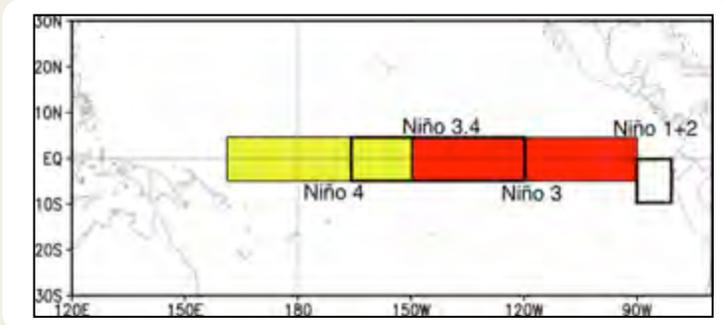
* Note: These statements are updated once a month (2nd Thursday) in association with the ENSO Diagnostics Discussion, which can be found here: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/.

Niño Region SST Departures (°C) Recent Evolution

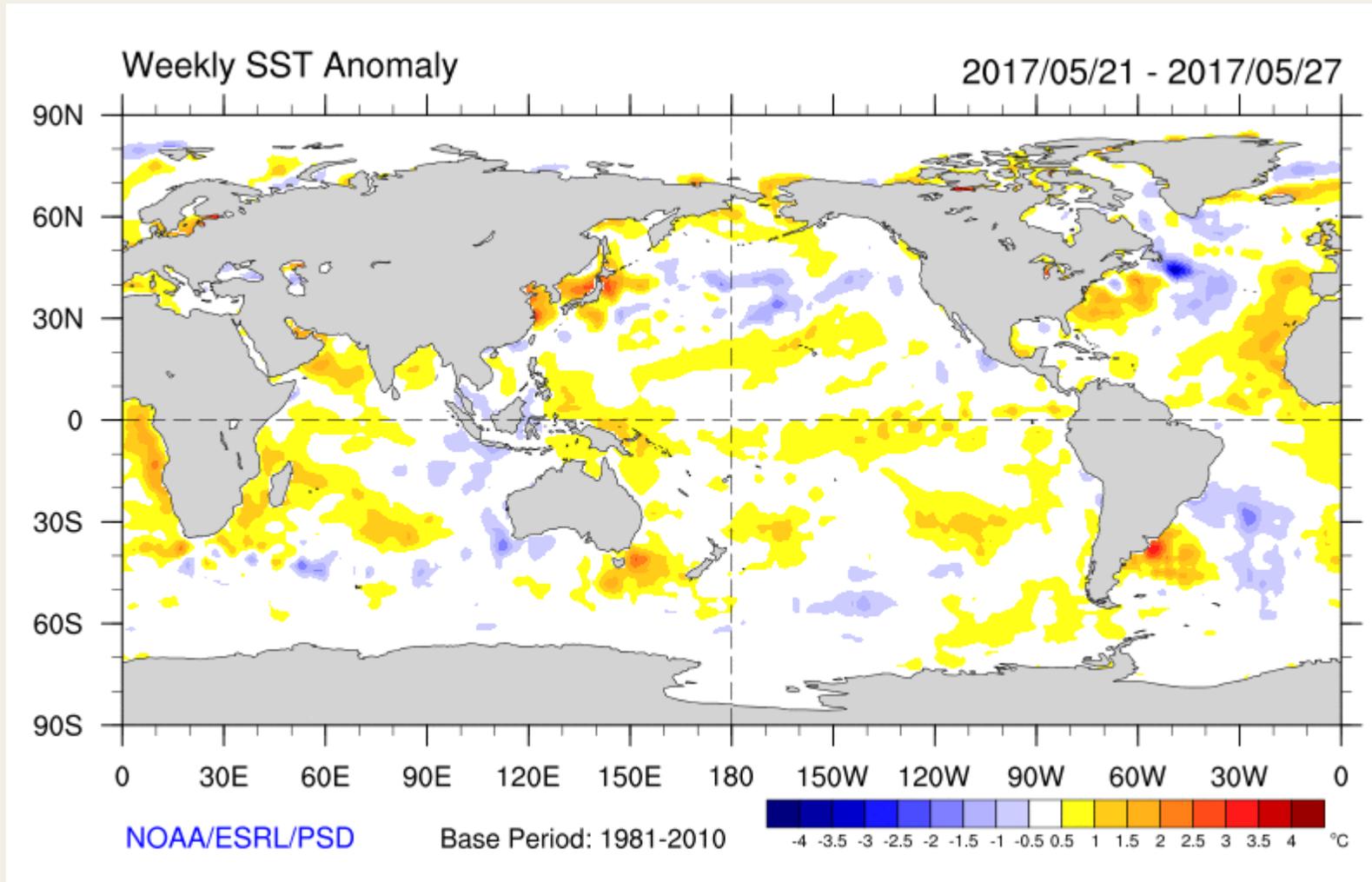


The latest weekly SST departures are:

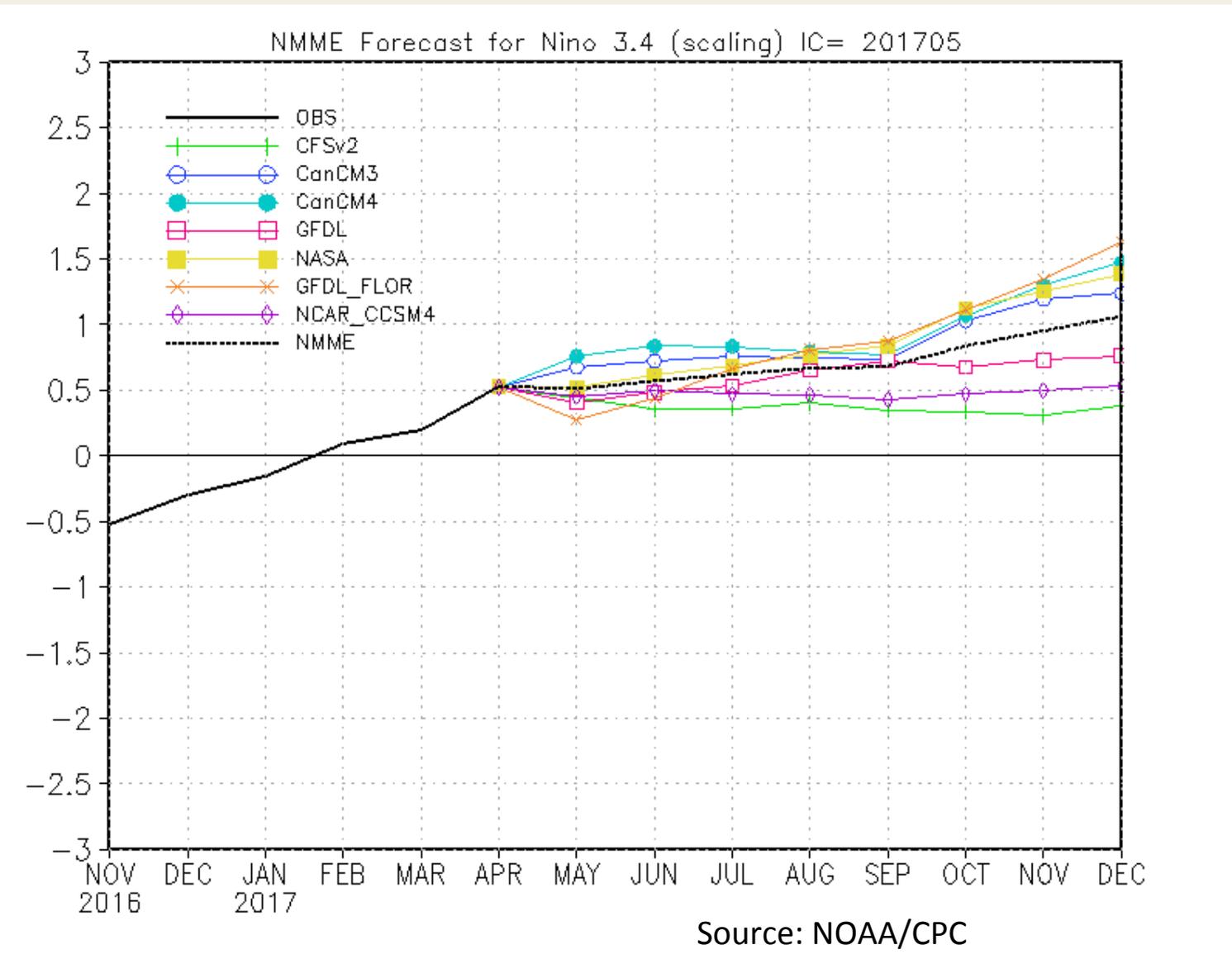
- Niño 4 0.4°C
- Niño 3.4 0.6°C
- Niño 3 0.5°C
- Niño 1+2 0.2°C



Current Sea Surface Temperatures



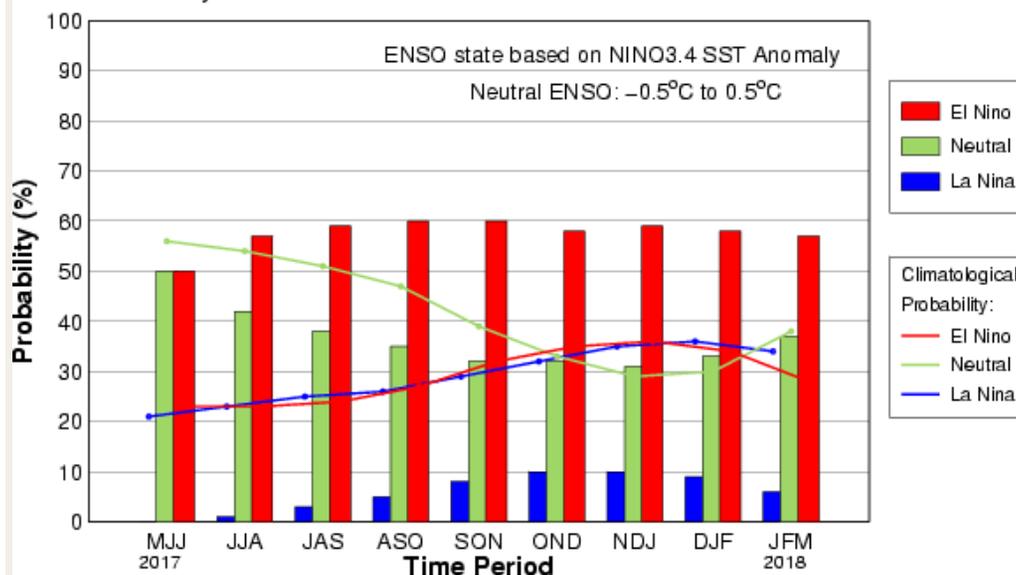
ENSO Forecasts





ENSO Forecasts

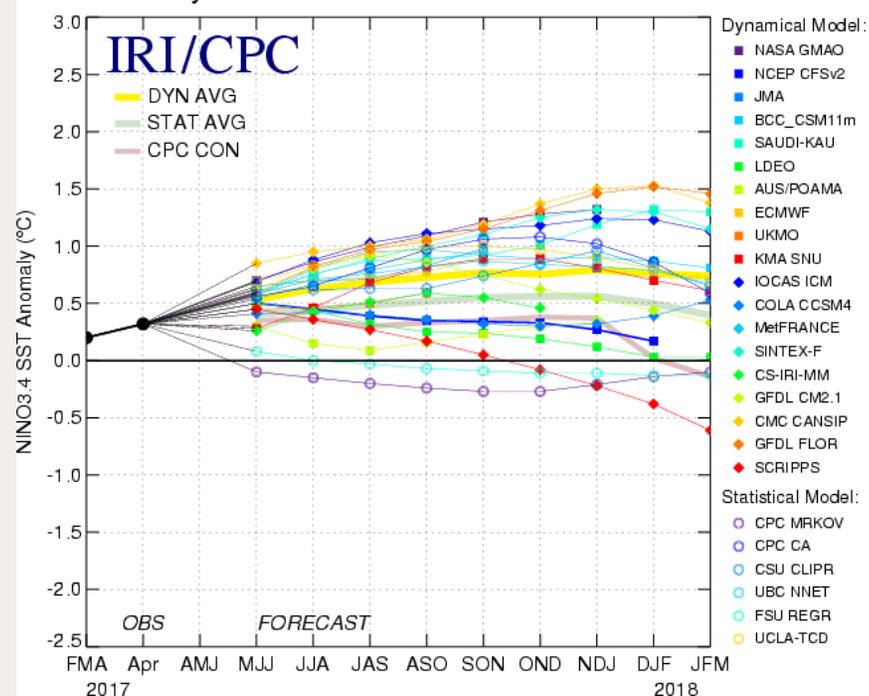
Mid-May IRI/CPC Model-Based Probabilistic ENSO Forecast



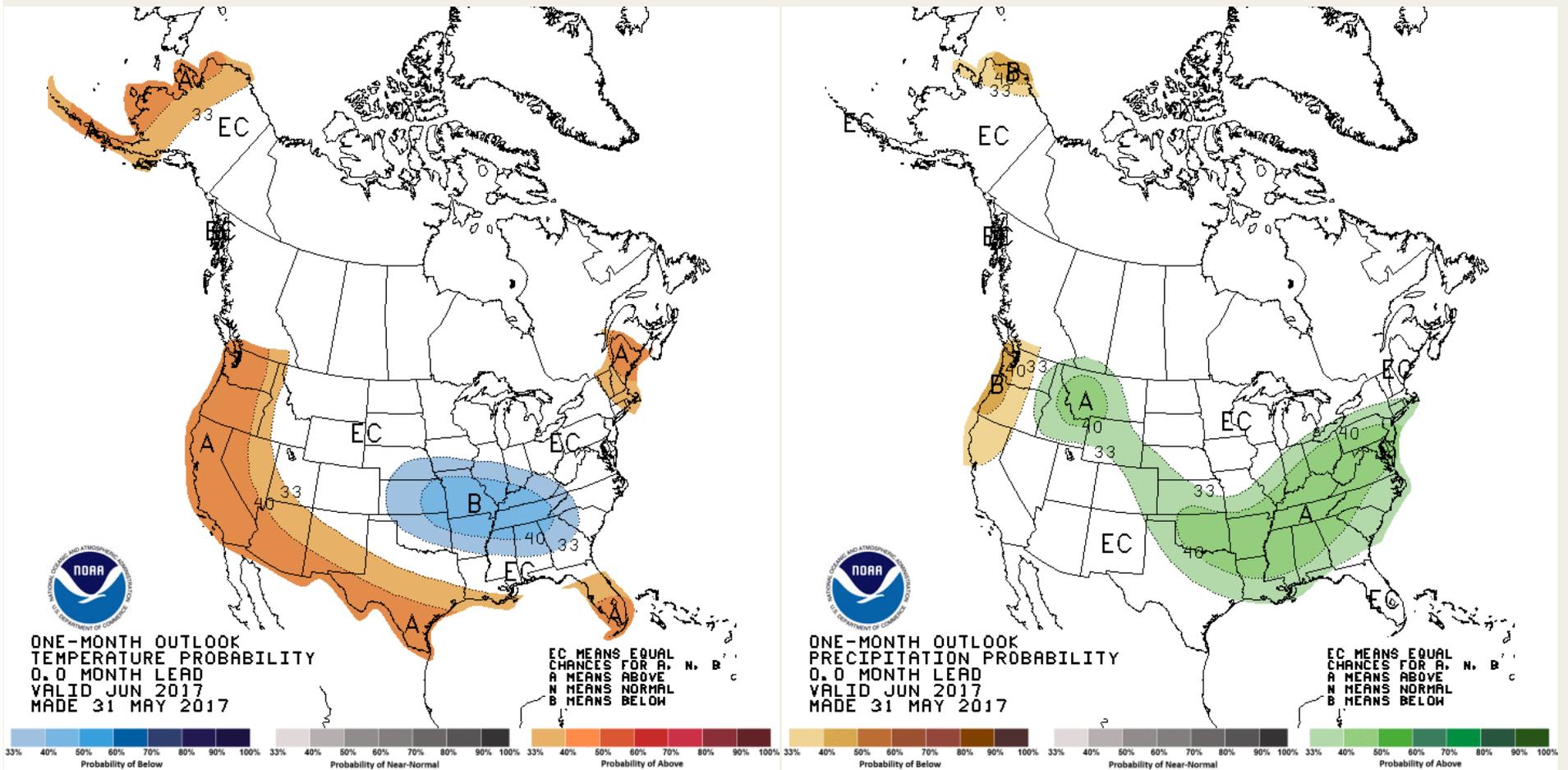
CPC/IRI El Niño forecast:

NMME models + other dynamical models + statistical models

Mid-May 2017 Plume of Model ENSO Predictions

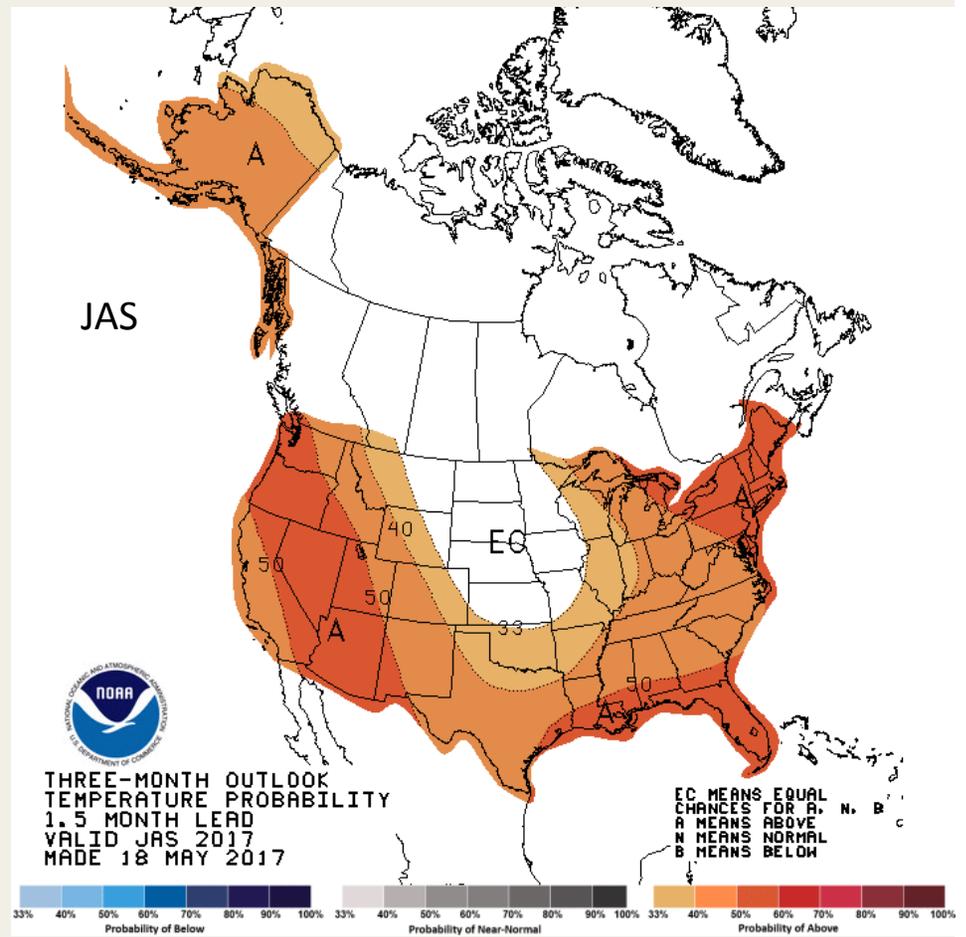
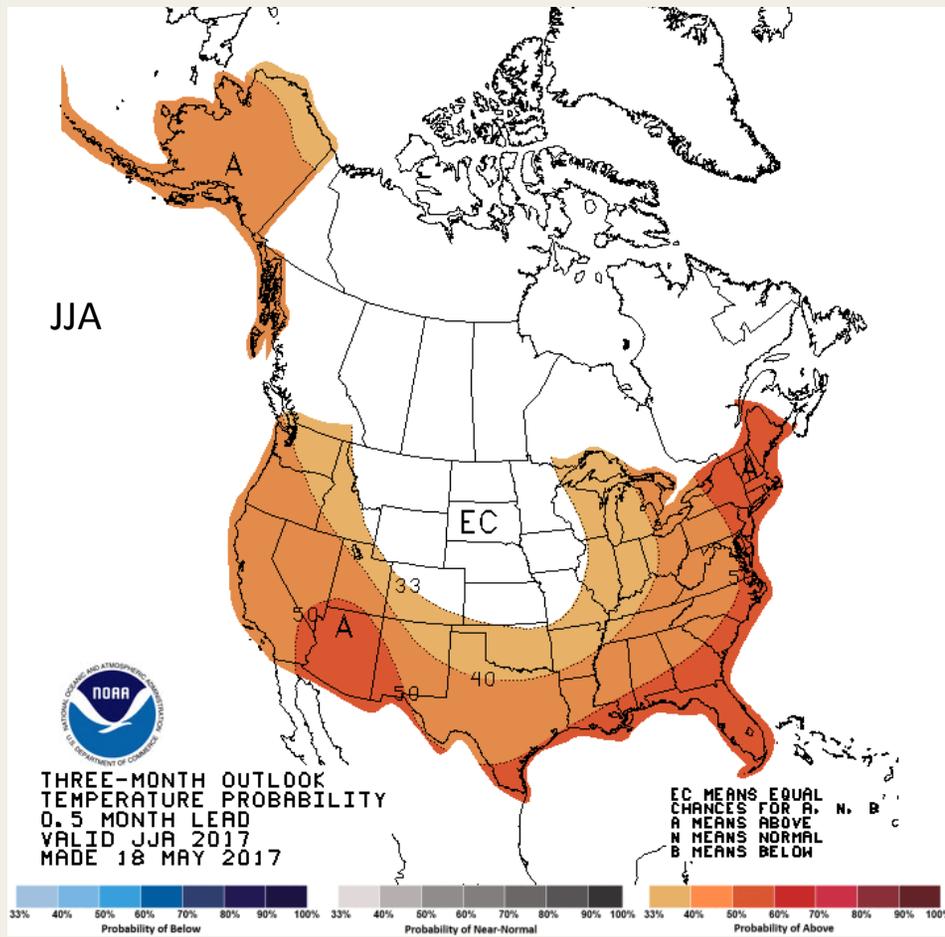


June U.S. Forecasts



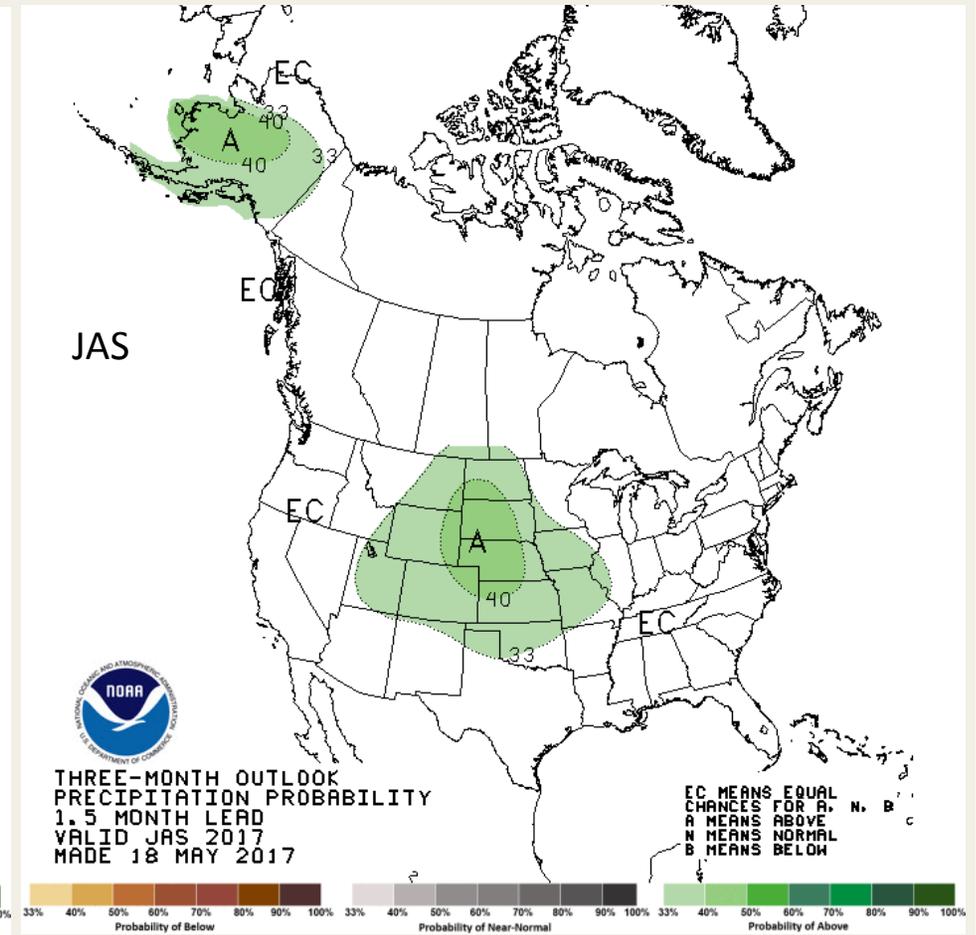
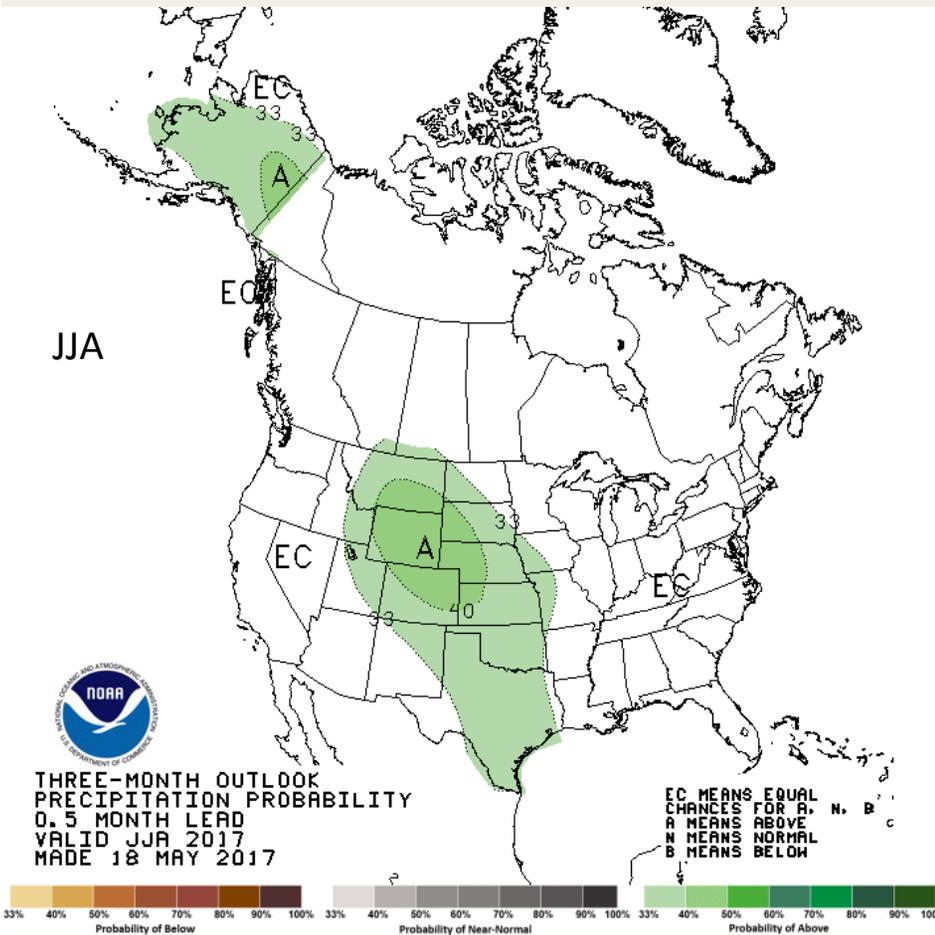
Source: NOAA/CPC

U.S. Temperature Forecasts



Source: NOAA/CPC

U.S. Precipitation Forecasts



Source: NOAA/CPC

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Patterns and recent observations in coastal zooplankton communities of the northern California Current

Roxanne R. Robertson¹, Eric P. Bjorkstedt², Bill Peterson³

¹CIMEC, Humboldt State University

²Southwest Fisheries Science Center, Humboldt State University

³Northwest Fisheries Science Center, Newport



NCC Ocean Observing Lines

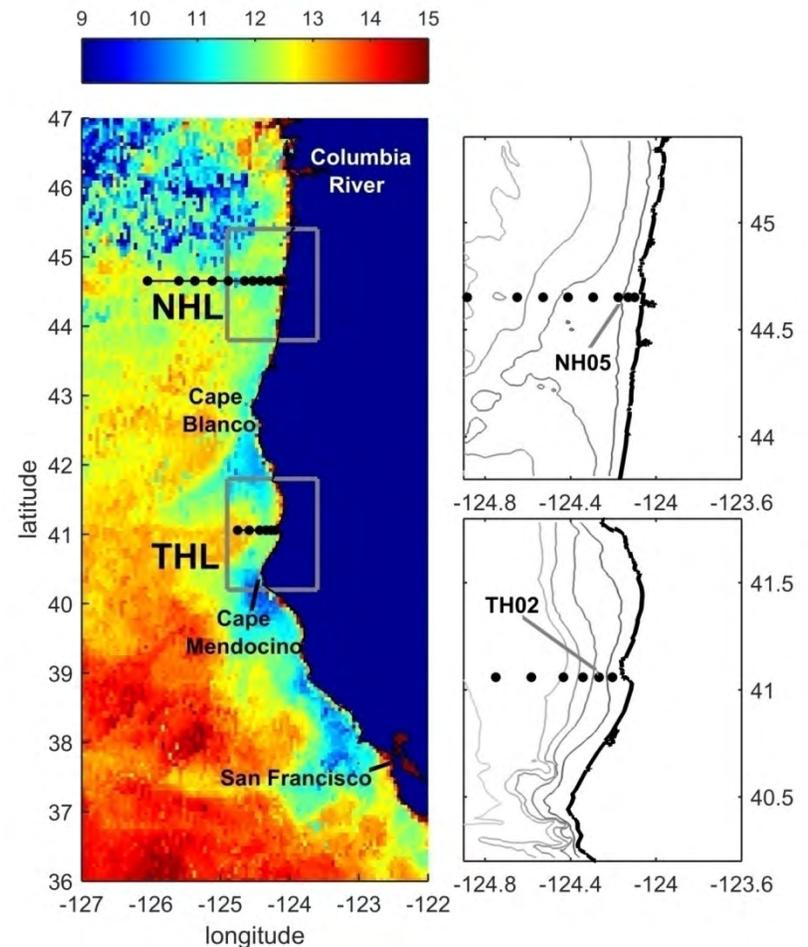
Newport Hydrographic Line (NHL)

1996 – present;
Biweekly
wide, retentive shelf
linear coastline
strongly seasonal upwelling

Trinidad Head Line (THL)

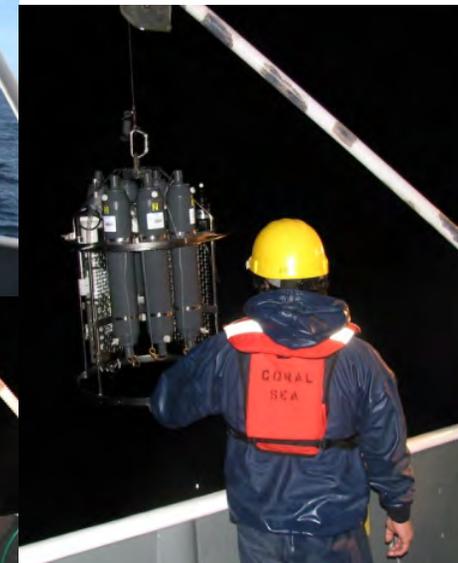
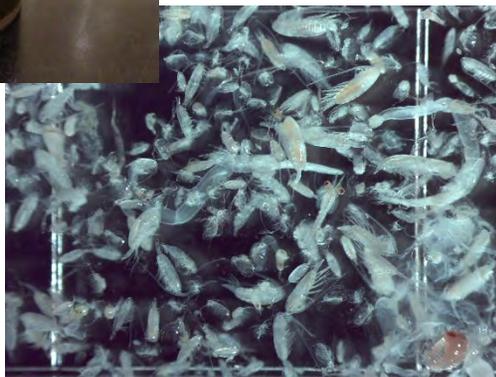
2008*-present;
monthly (sometimes biweekly)
narrow shelf
lies between major headlands of
Cape Blanco and Cape Mendocino

*Initiated in late 2006; infrequent
sampling prior to late 2007



Core sampling: zooplankton & hydrography

- Ring net (copepods)
- Bongo net (krill)
- CTD



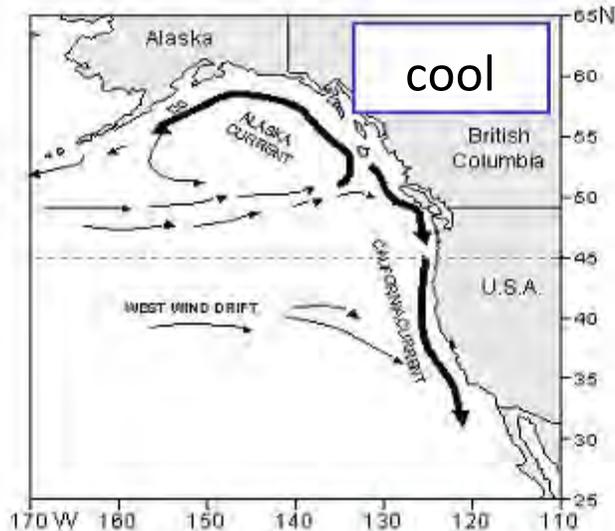
Why plankton?

Copepods & krill are key path for energy transfer in marine ecosystems.

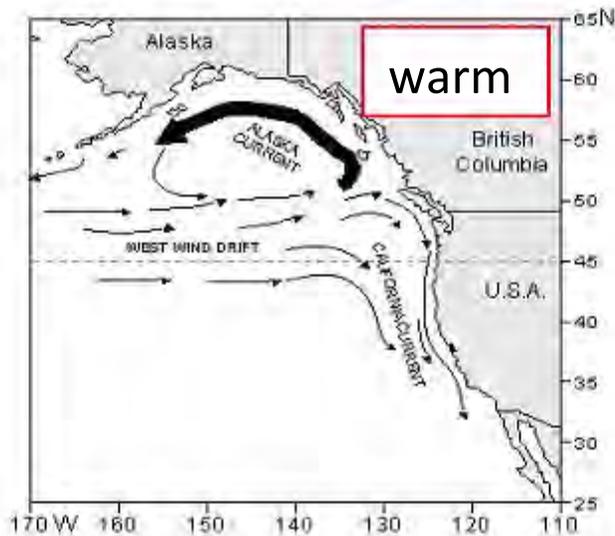
Copepods & krill exhibit:

- Strong warm-v-cold and onshore-v-offshore affinities
- Substantial differences in energy content (lipids)
- Contrast between
 - depauperate, **lipid-rich** cold-water communities
 - diverse, **lipid-poor** warm-water communities





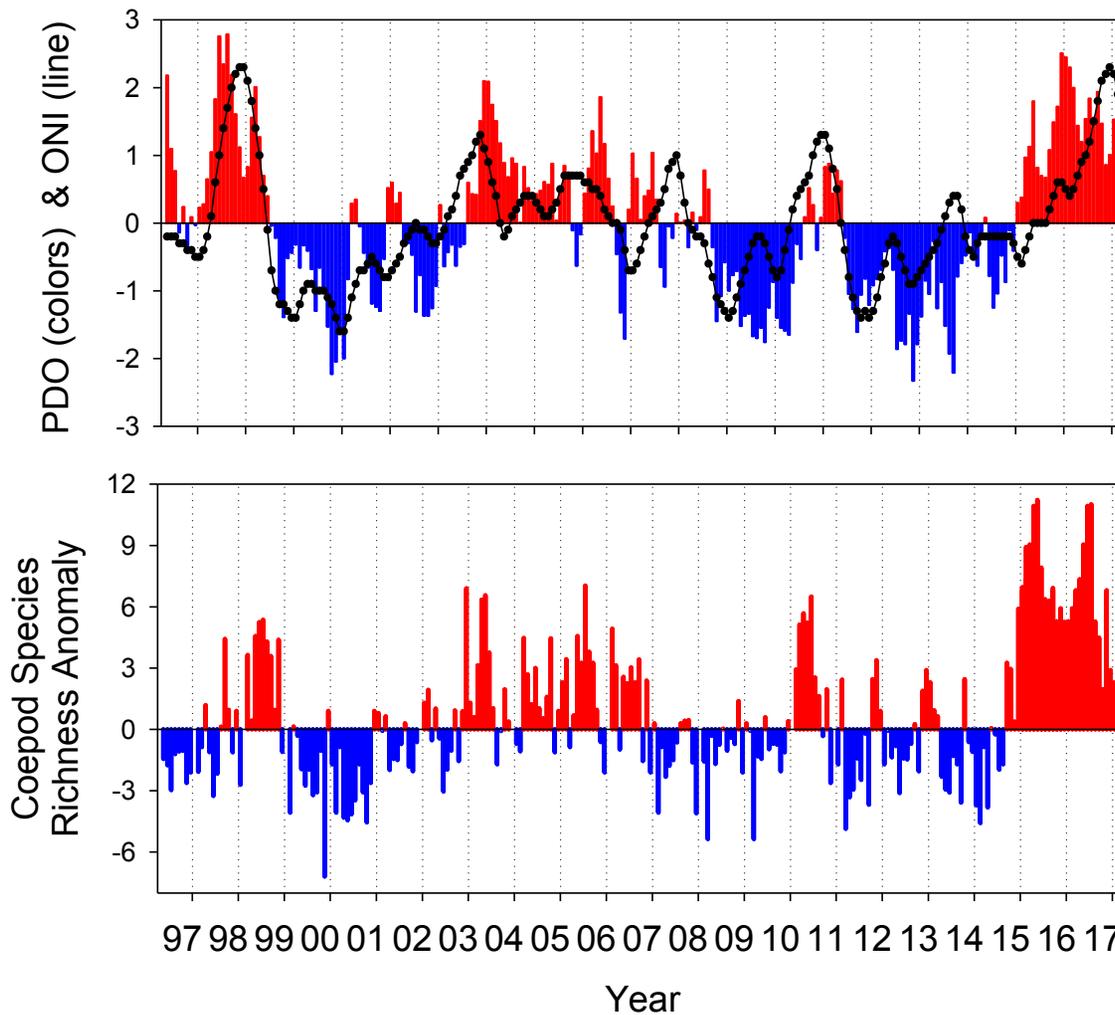
1. “Cool Phase of the California Current”. Strong subarctic coastal currents bring cold water and **large boreal copepod** species to the ecosystem.



2. “Warm Phase”. The West Wind Drift along with seasonal reversals in coastal currents and a weak California Current bring sub-tropical water and **small subtropical copepod** species to the northern California Current

3. Thus the size of copepods varies with the ocean currents.

Which copepods are present off Oregon? Ask the PDO and the ONI...

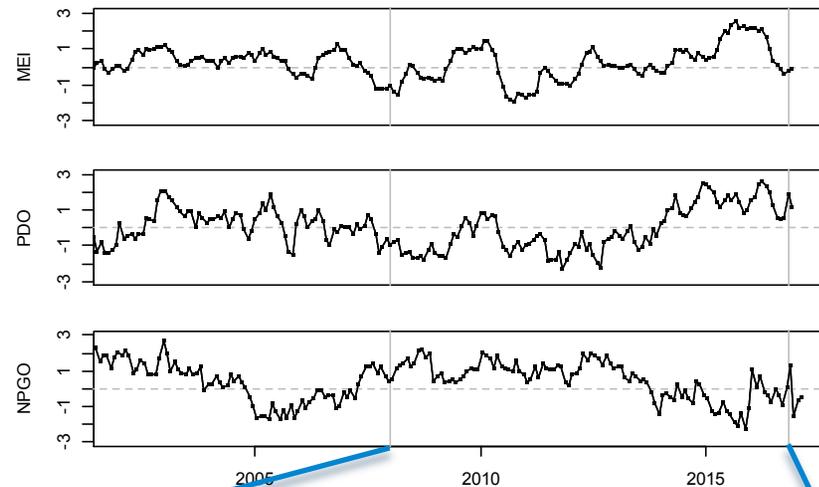


Persistently warm
PDO for 2+ years

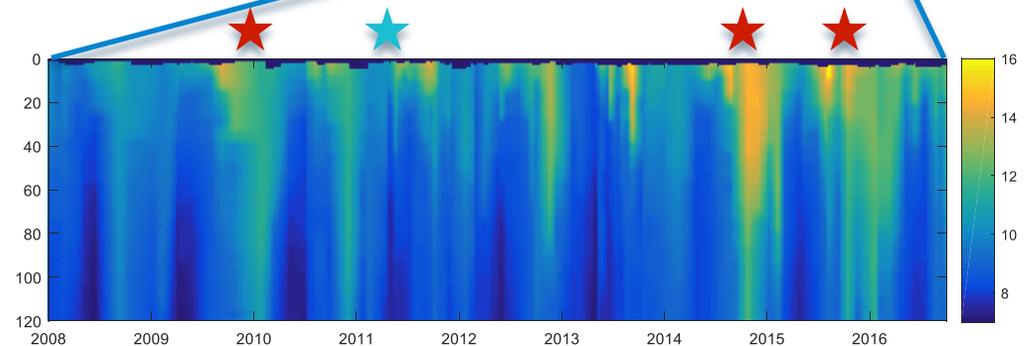
Incredibly high
number of copepod
species...many 'new'
warm water species

Climate indices – local conditions

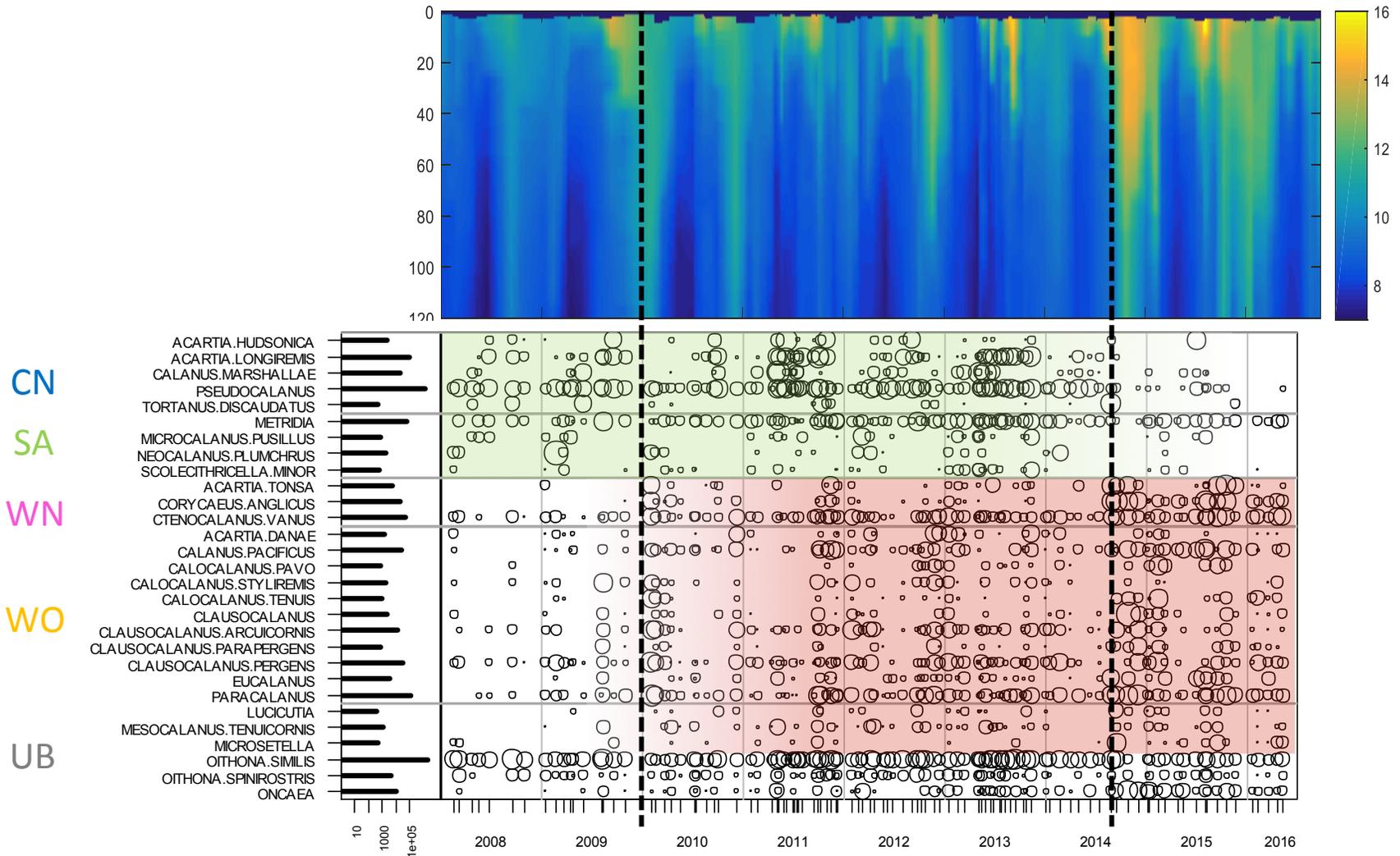
- 2009-10 El Niño
- 2011 La Niña
- 2014 Warm Blob
- 2015-16 El Niño



Water column temperature
at station TH03 (~140 m)

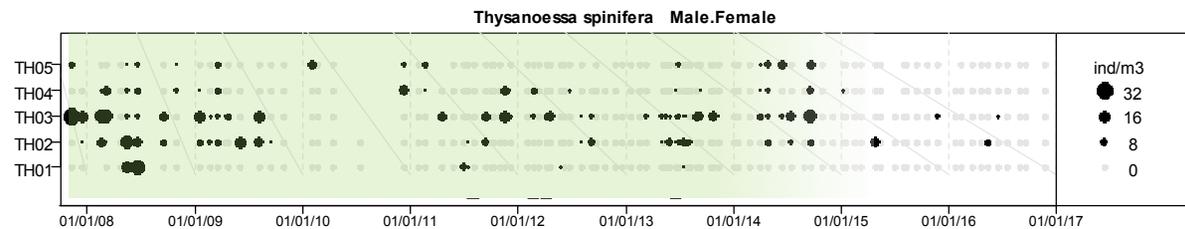


Copepods off northern California

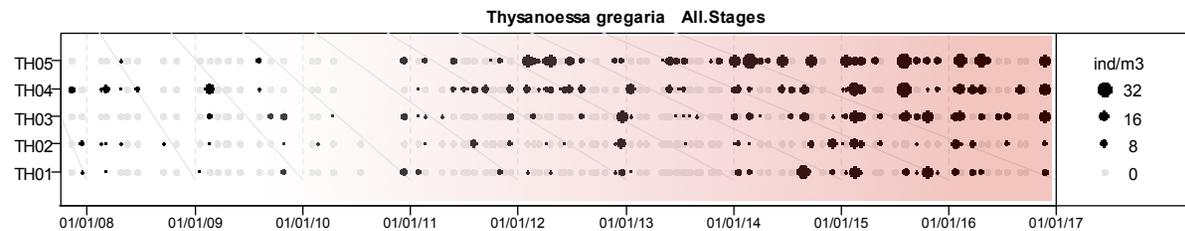


Similar shift in krill community...

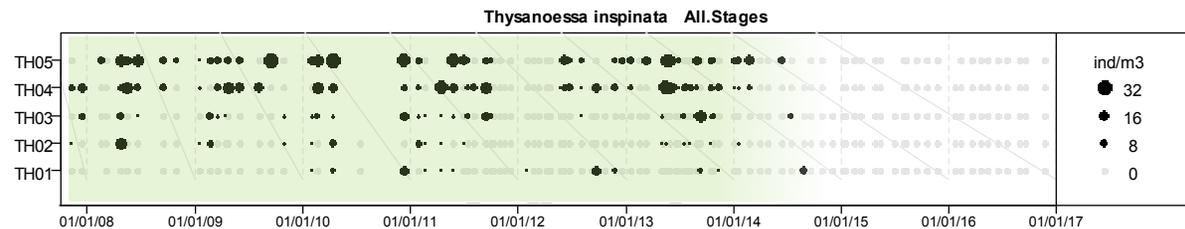
Thysanoessa spinifera



Thysanoessa gregaria



Thysanoessa inspinata

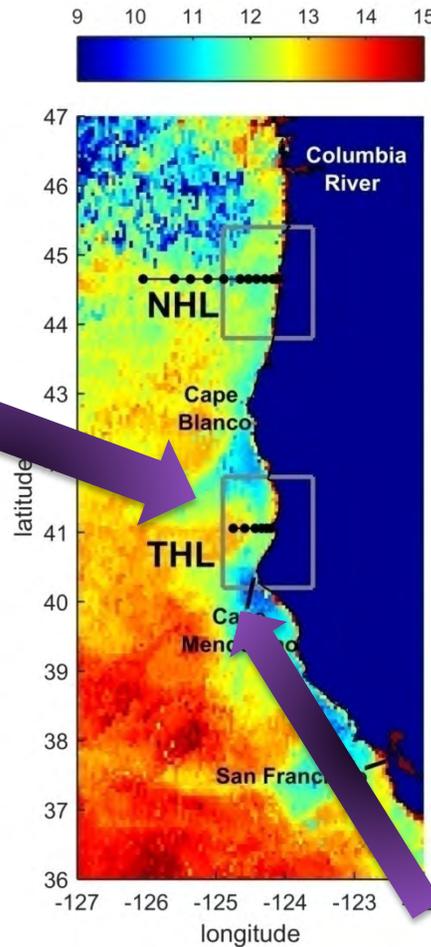


... including unusual krill visitors!



Photo credit: R. Robertson

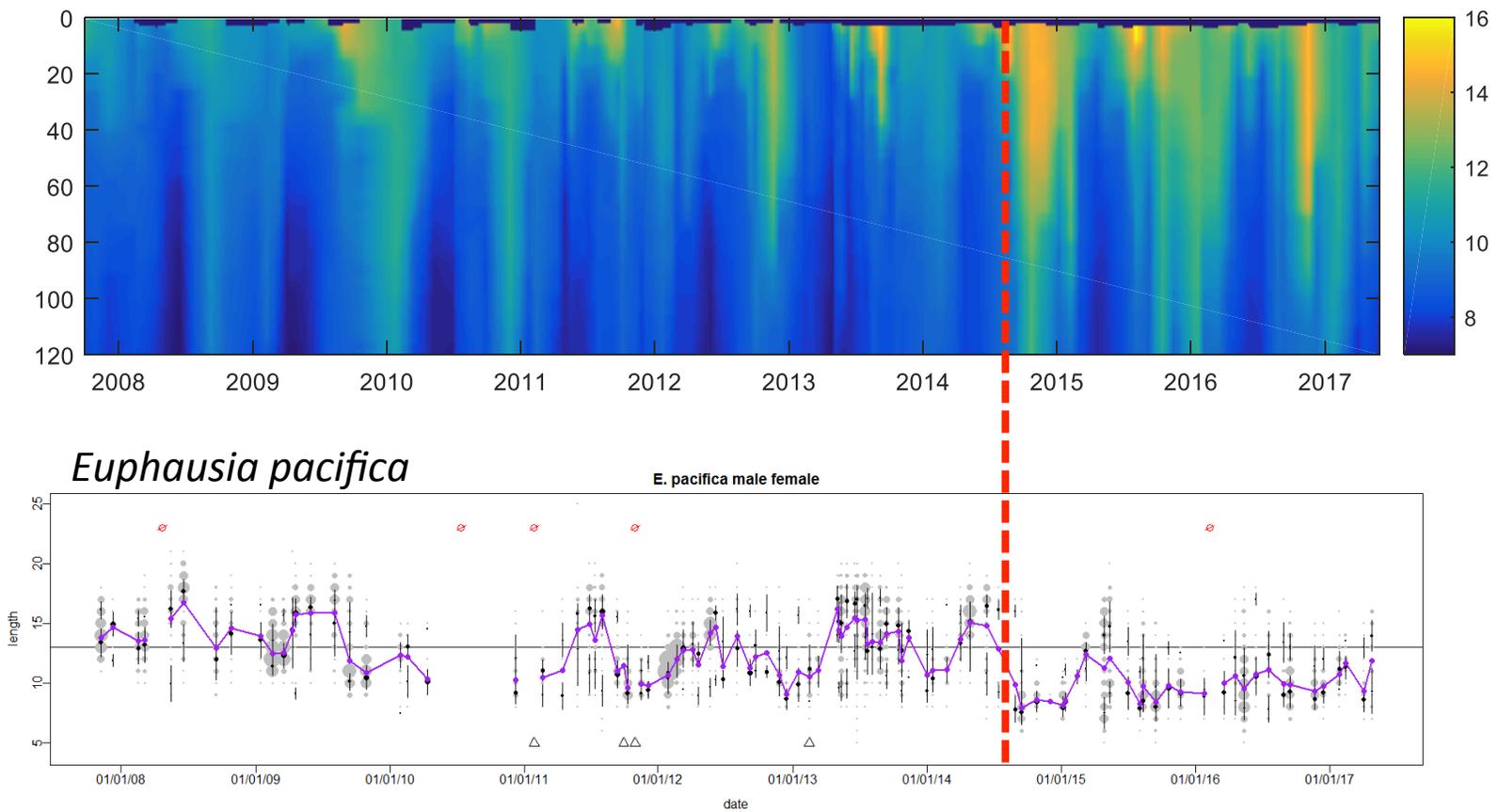
From offshore:
Euphausia recurva
(winters 2014-15,
2015-16 2016-2017)



From the south:
Nyctiphanes simplex
(2015-16 El Niño,
Winter 2017)

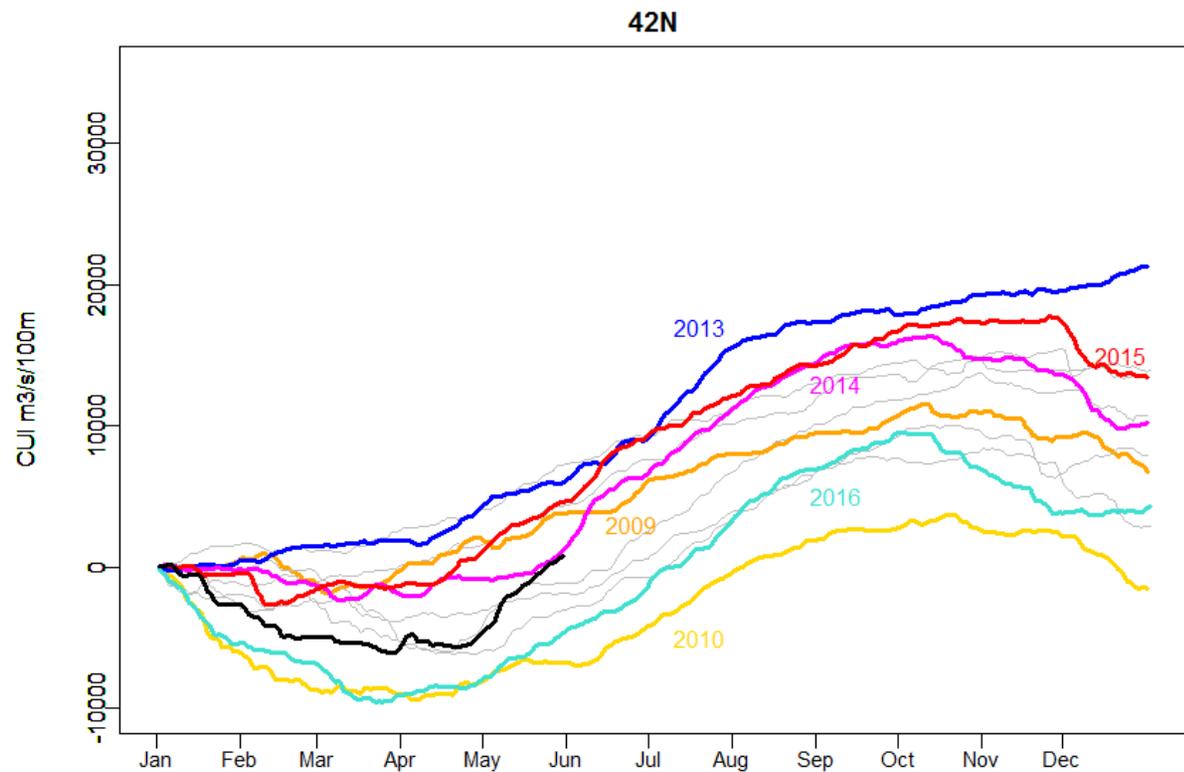


Shift in size structure of krill



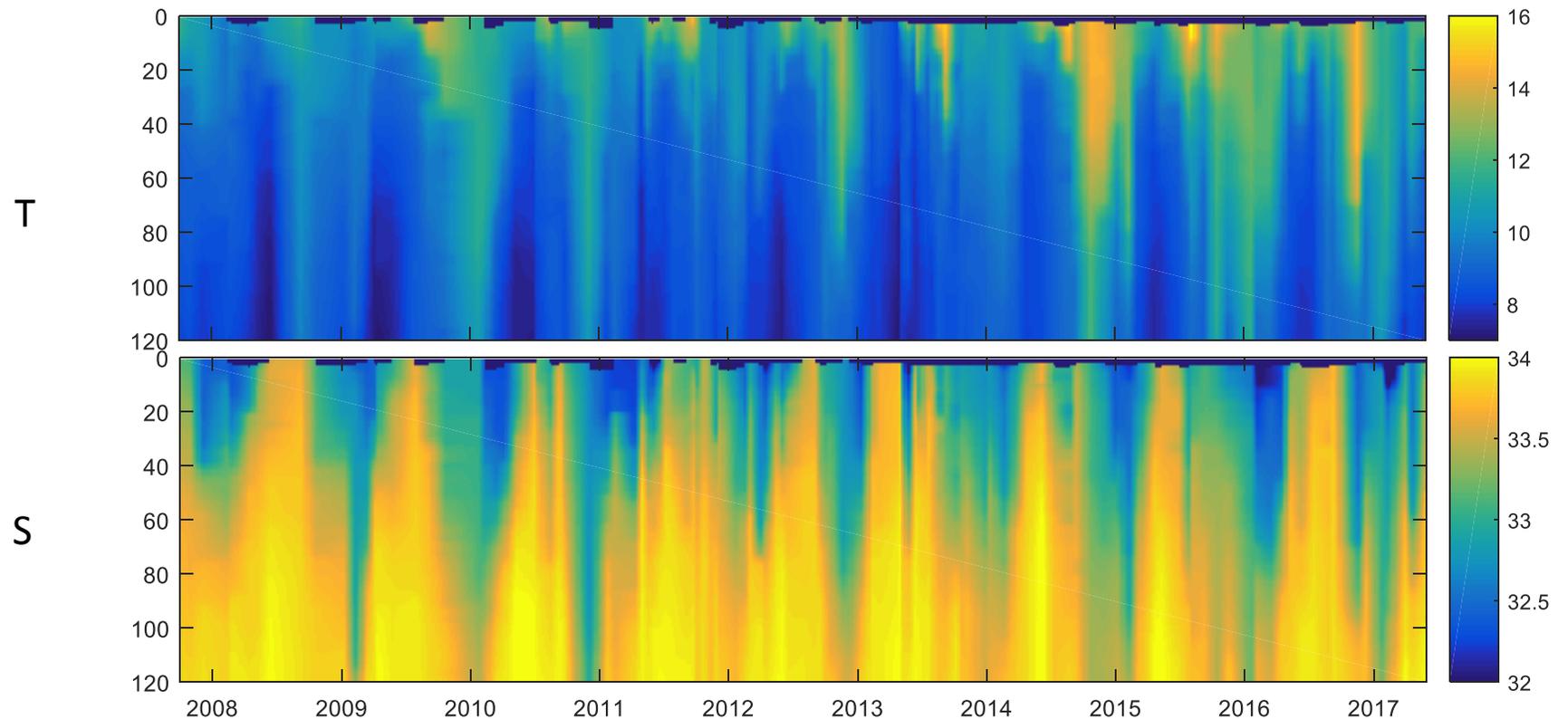
Recent conditions

- Sustained upwelling has only recently started (early May)



Recent conditions

- Cool, but not cold, upwelled water on shelf
- Freshwater signature of strong river discharge

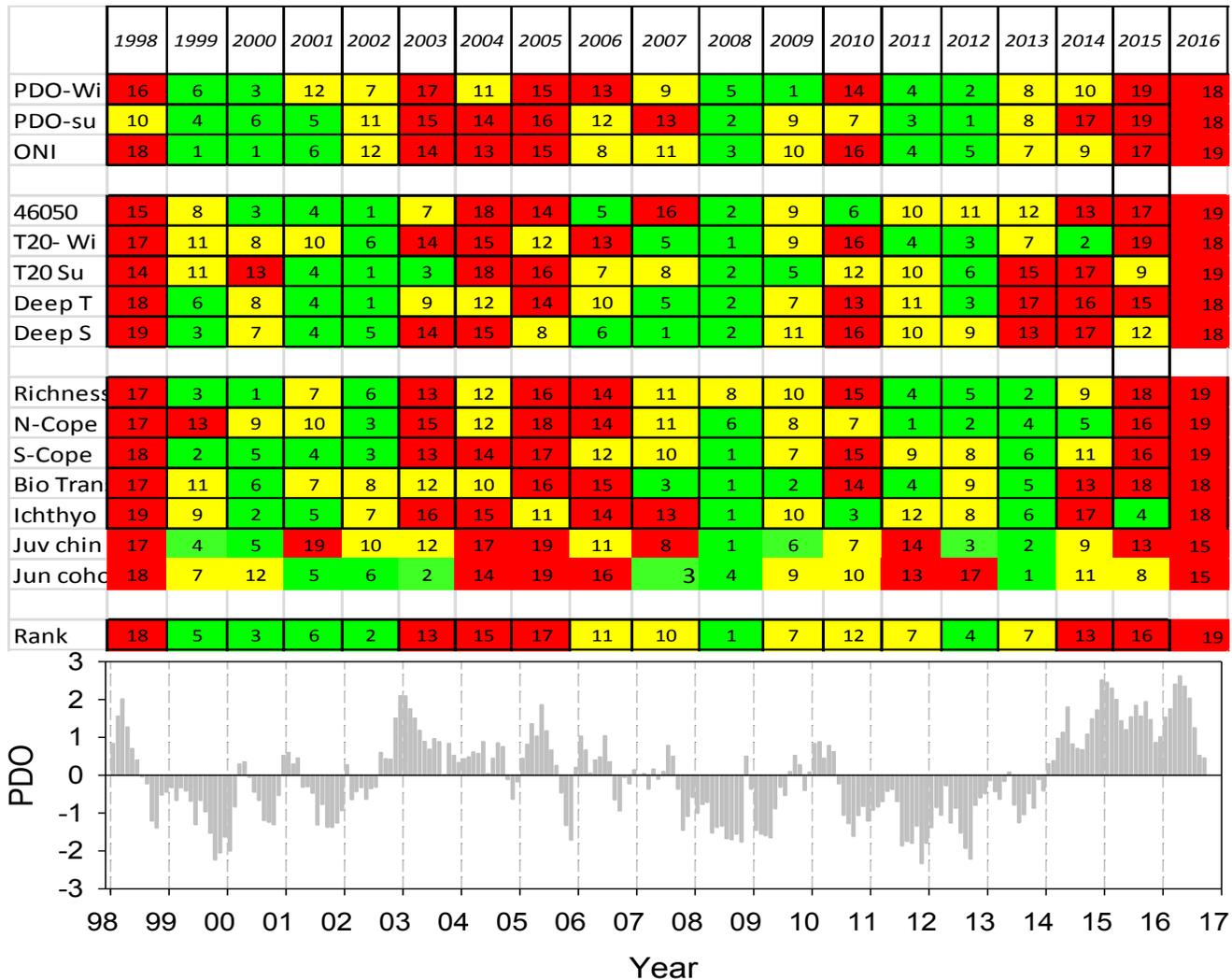




Recent plankton observations

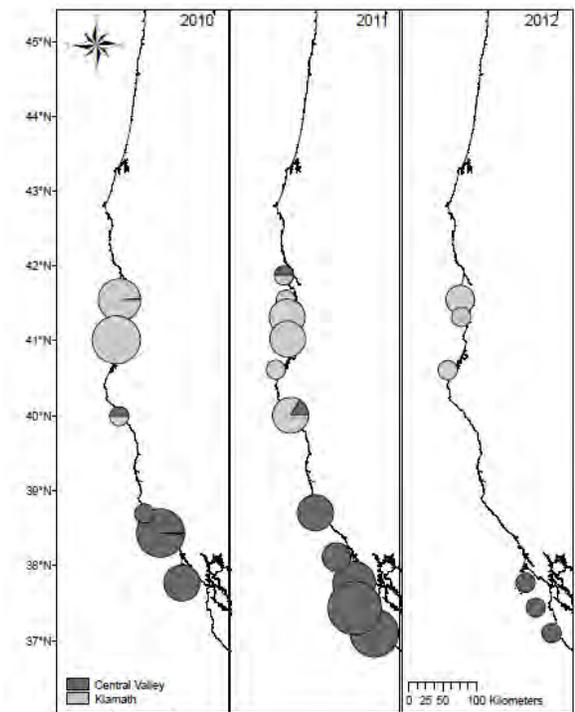
- Warm-water copepods persisting off Oregon (as appears also to be the case off northern California) – can take a while to recover from major warming event.
- Lots of adult krill from Bodega to Newport...large and fat off Bodega and Trinidad. Lots of pyrosomes from Trinidad north, yet conspicuously absent at Bodega. Strong freshwater signal nearshore with thick phytoplankton blooms and cool upwelled water on the shelf.
- Decent numbers of juvenile rockfish, but lots of pyrosomes observed off central/northern California during juvenile rockfish/midwater trawl survey.

Ecosystem implications: Salmon “Stoplight Chart”



THL Copepods: Klamath Salmon?

- Juvenile Klamath River Fall-Run Chinook hang out between Cape Blanco and Cape Mendocino
- Time series is short, but recent shift to warm-water copepods corresponds with recent poor returns to Klamath.



Hassrick et al. (2016)



So, what will 2017 look like?

- Late transition to upwelling coming out of strong storm season
 - Little evidence of favorable “pre-conditioning” in winter
- Mixed signals from plankton
 - Krill still small as of April, though larger, fatty krill were observed in May ... yet, not super-abundant
 - Persistence of warm-water copepods
 - Persistence of pyrosomes
 - Persistence/recurrence of *Pseudo-nitzschia* blooms



Thanks & Questions

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2017 – Ongoing Harmful Algal Bloom in Southern California

Sea Lions Suffering From Domoic Acid Poisoning, Laguna Beach Rescue Says

"In large concentrations, (the algae) produces neurotoxins that can destroy the brain," Pacific Marine Mammal Center said.

By Ashley Ludwig (Patch Staff) - April 11, 2017 12:23 pm ET

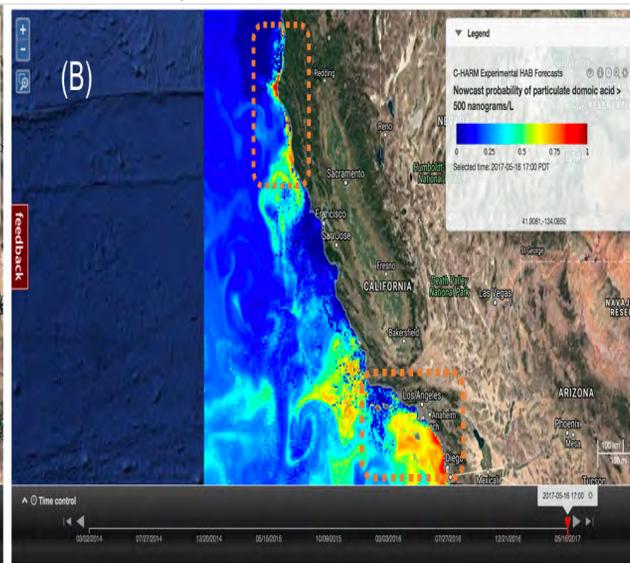
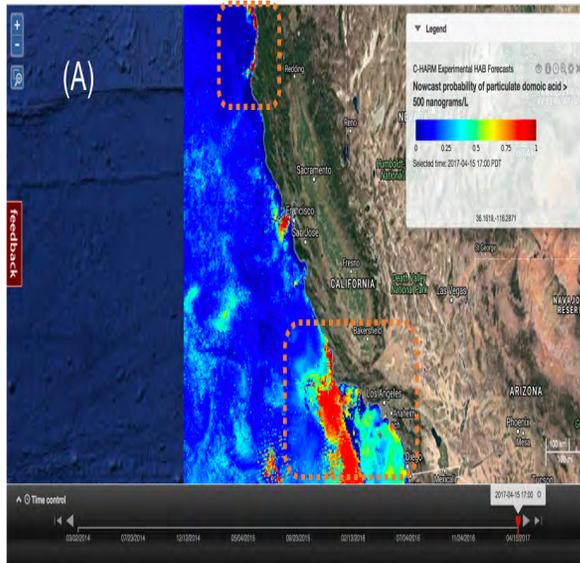
Like 161 Share



Broad Impacts: Animal Strandings/Death [Sea Lions, Elephant Fur Seals, Seabirds (Common Murres, Grebes, CA Brown Pelicans)]
Shellfish Advisories in Santa Barbara/Ventura Counties



Pseudo-nitzschia produces the neurotoxin domoic acid (DA)



~April 1 = Onset of DA Event

- Large Upwelling Event
- Animals start stranding

May 17 = HAB moves South & North

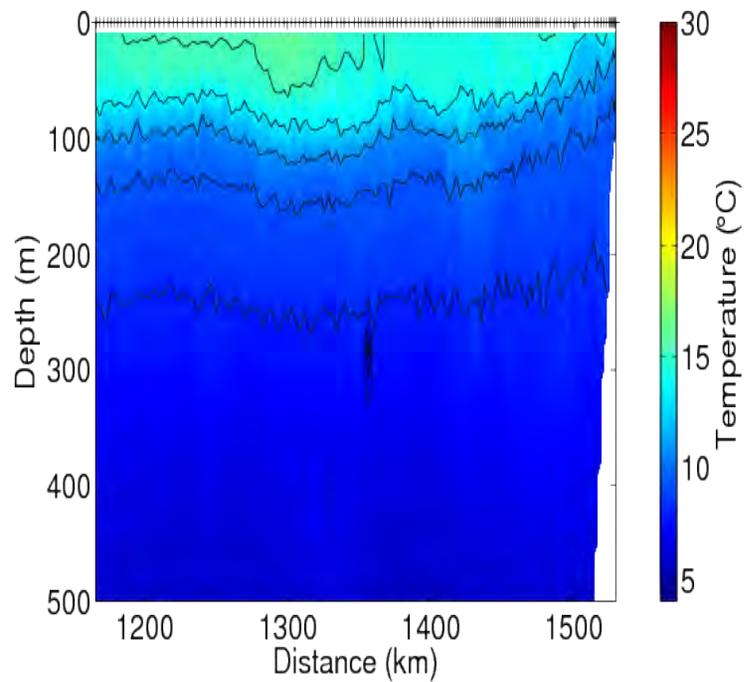
- More Impacts felt near San Diego
- HAB persists in Santa Barbara Channel
- Rock Crab fishery closed in Nor Cal

SCCOOS Glider Transects

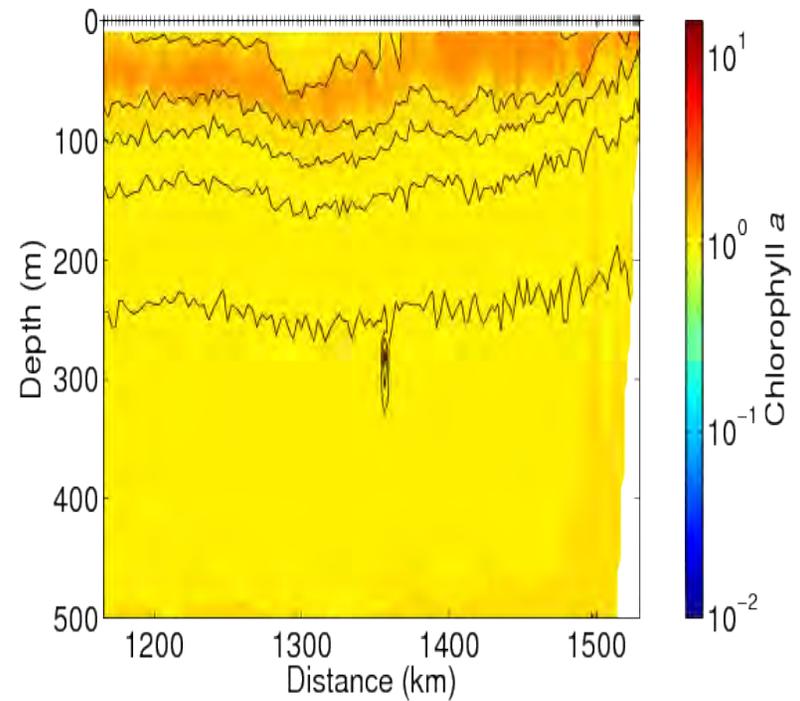
Line 80.0

Pt Conception

TEMPERATURE
April 6 -22, 2017



CHLOROPHYLL
April 6 -22, 2017



Event Response Sampling

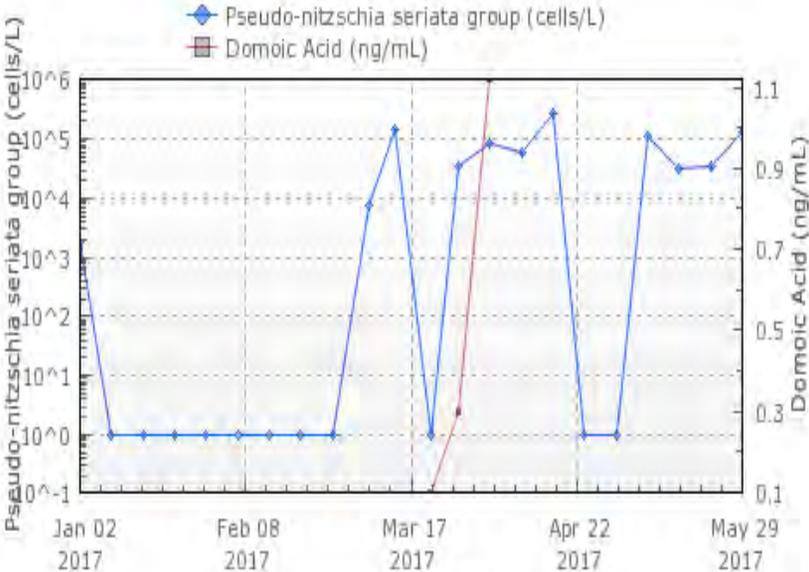
(conducted by Caron Lab, USC); MDR = Marina Del Ray (City of Los Angeles)

| | | Domoic Acid |
|-------------------------------|---------|-------------|
| Location | Date | ng/mL |
| Alta Sea | 4/10/17 | 0.48 |
| Alta Sea | 4/3/17 | BD |
| South LA Harbor (Los Angeles) | 4/13/17 | 6.06 |
| East LA Harbor (Los Angeles) | 4/13/17 | 7.65 |
| NW of MDR (Los Angeles) | 4/13/17 | 2.26 |
| W of MDR (Los Angeles) | 4/13/17 | 2.56 |
| S of MDR (Los Angeles) | 4/13/17 | 4.11 |
| SW of MDR (Los Angeles) | 4/13/17 | 1.97 |

****Threshold for "calling" a DA event = 0.5 ng/mL**

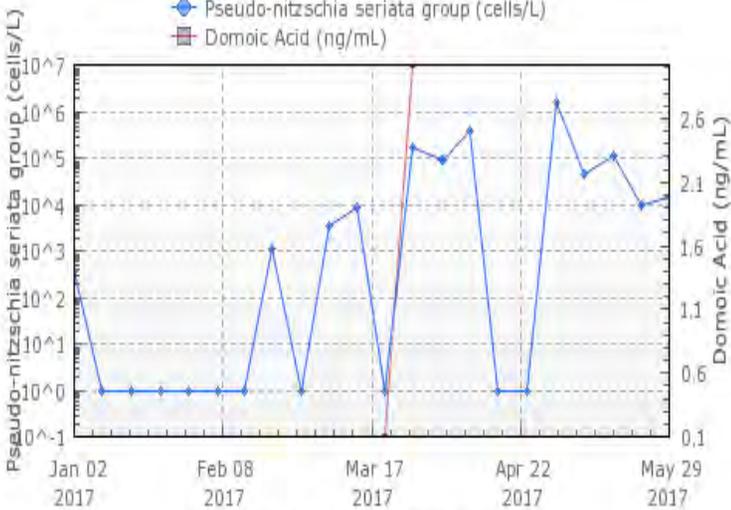
SCCOOS HAMBAP Monitoring

Selected data at Stearns Wharf



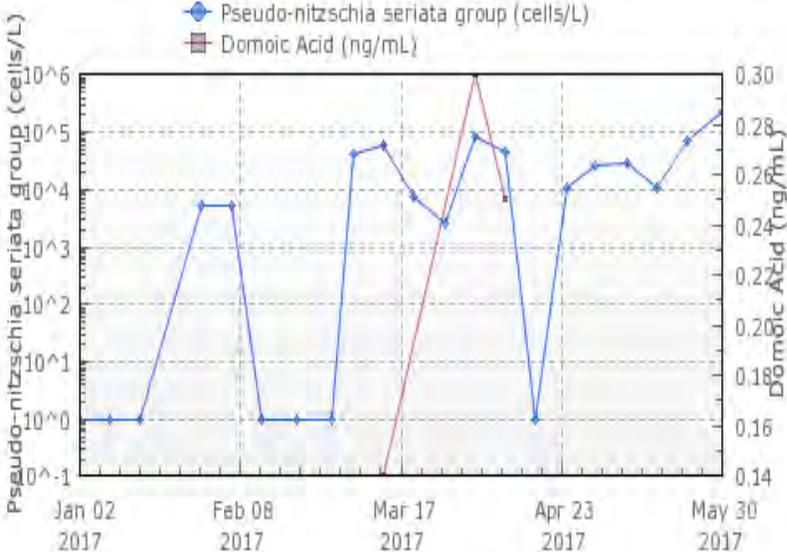
generated 2017-06-01 - www.sccoos.org

Selected data at Santa Monica Pier



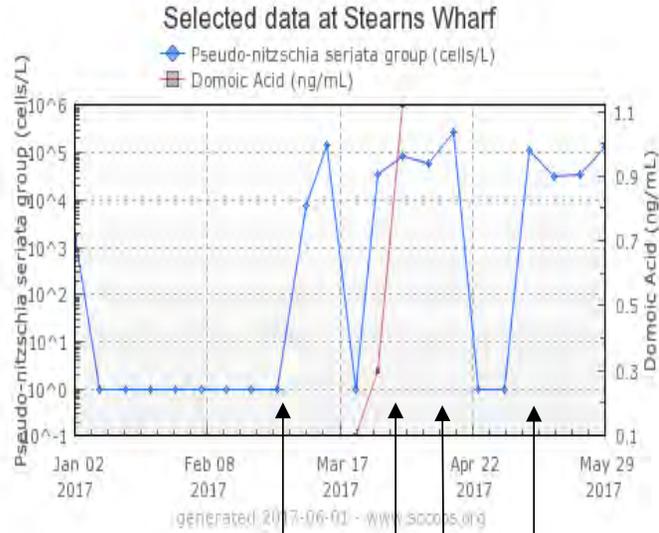
generated 2017-06-01 - www.sccoos.org

Selected data at Newport Pier



Note : domoic acid records not fully uploaded to system yet

SCCOOS Automated Shore Stations

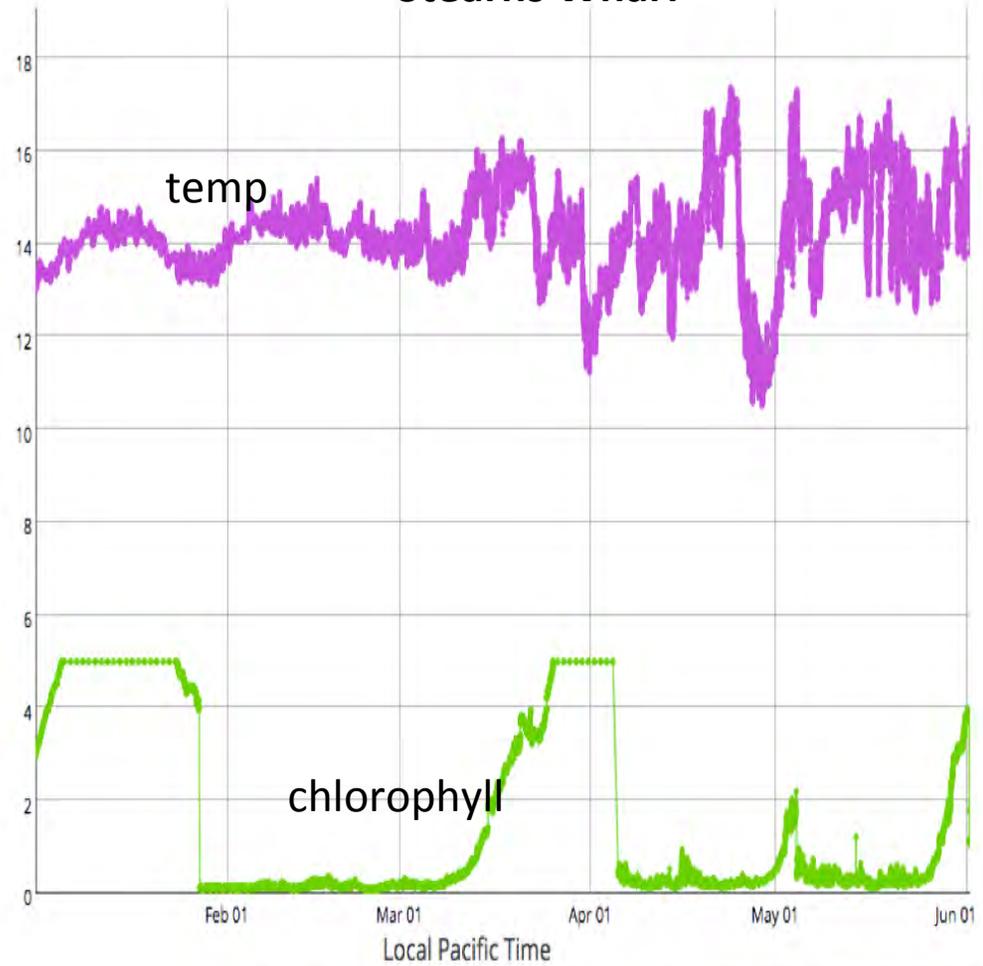


Storm
 m
 Late
 Feb/
 early
 Mar

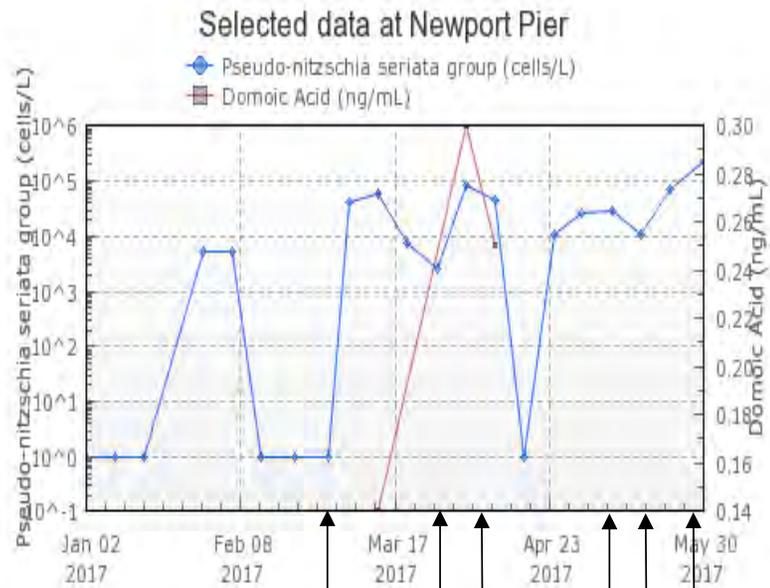
Storm
 Mar 26-28
 +
 Upwelling

Storm
 Warming
 May 7
 +
 following
 an
 Upwelling
 pulse

Stearns Wharf



SCCOOS Automated Shore Stations

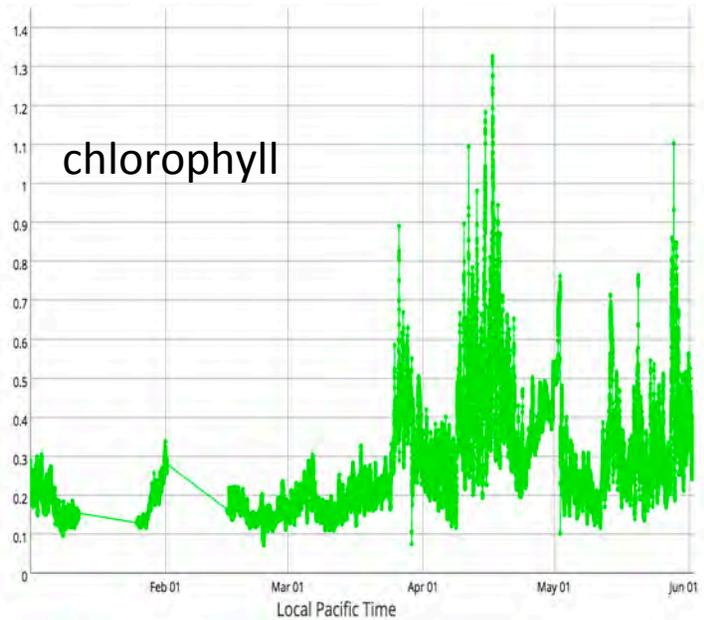
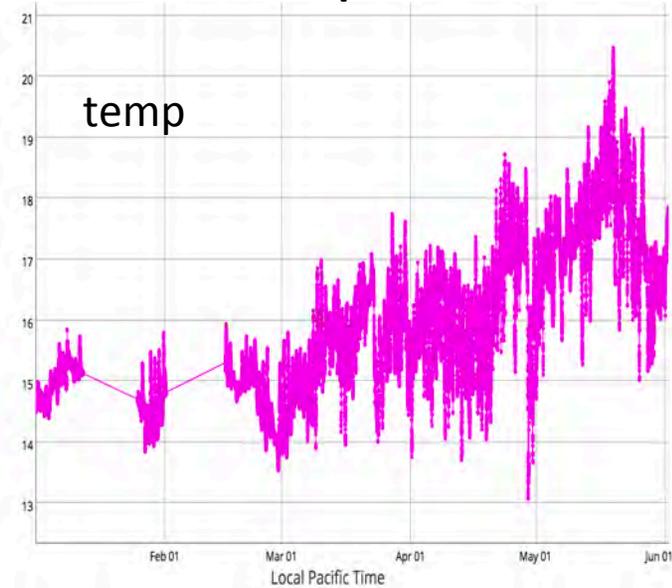


Storm + Warming
 Late Feb/early Mar +
 Upwelling

Storm + Warming
 Mar 26-28 +
 Upwelling

Storm + Warming
 May 7 +
 following an Upwelling pulse

Newport Pier



**Santa Monica Shore Station was decommissioned

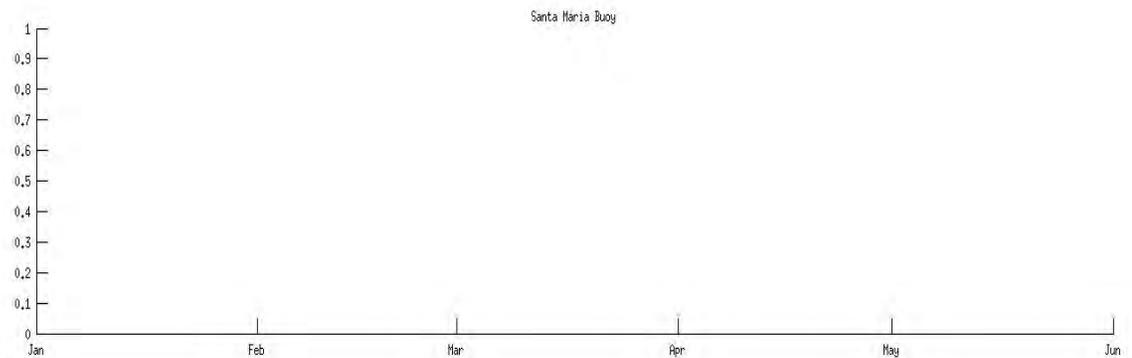
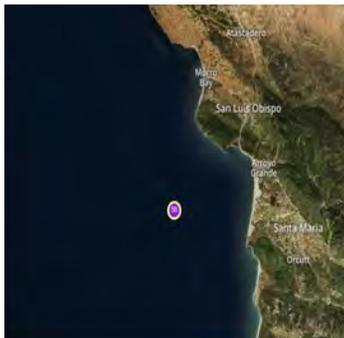
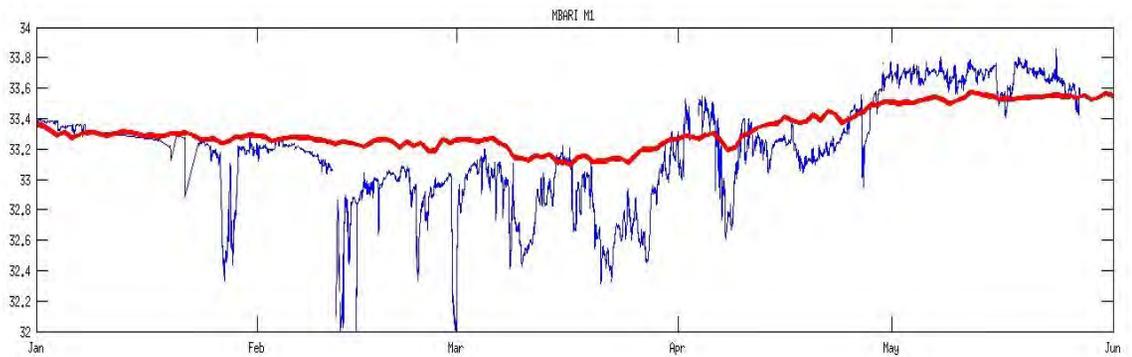
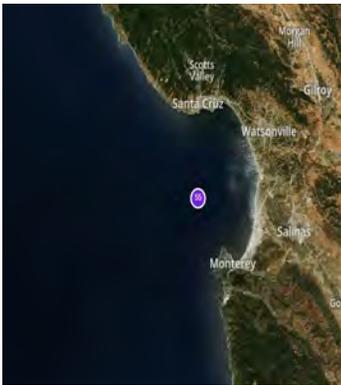
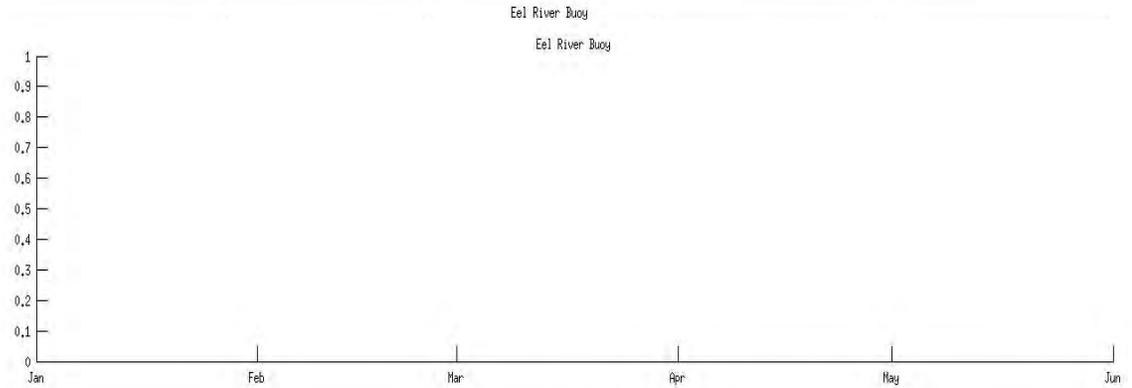
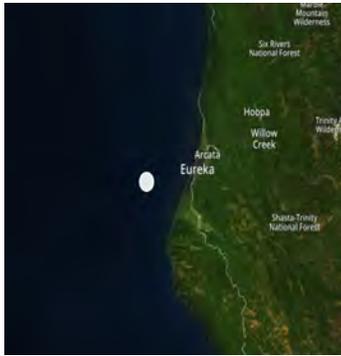
Central and Northern California Ocean Observing System (CeNCOOS)



cencoos.org

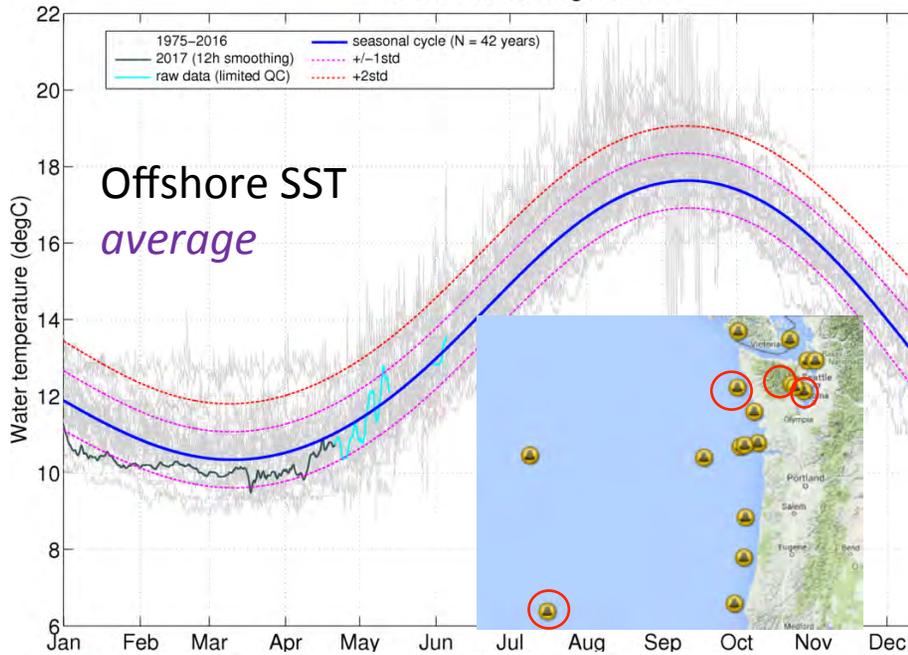
data.cencoos.org

Surface Temperature

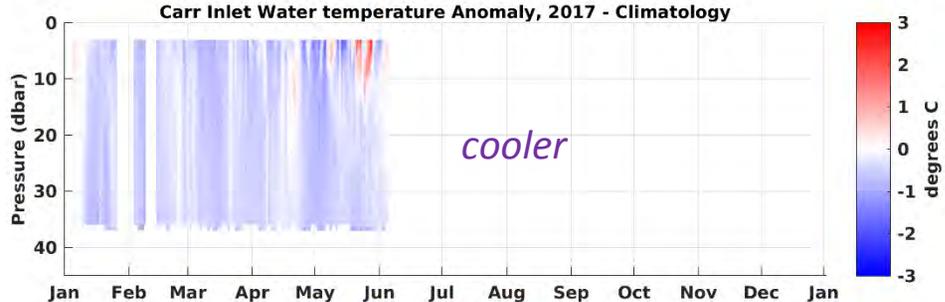
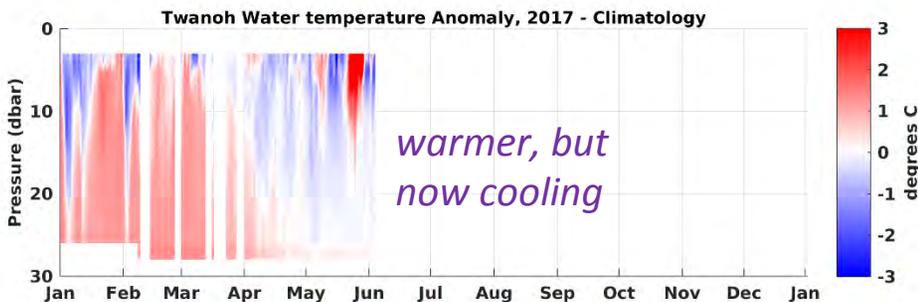
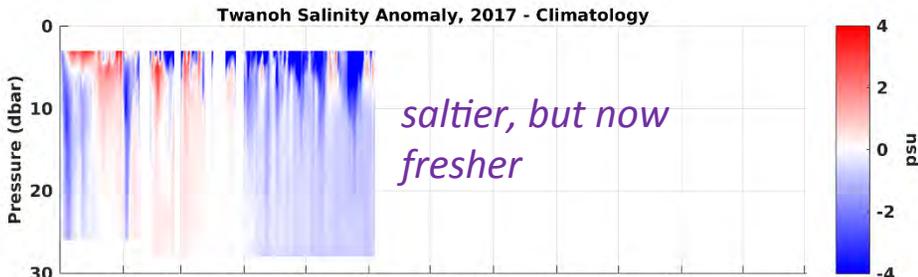
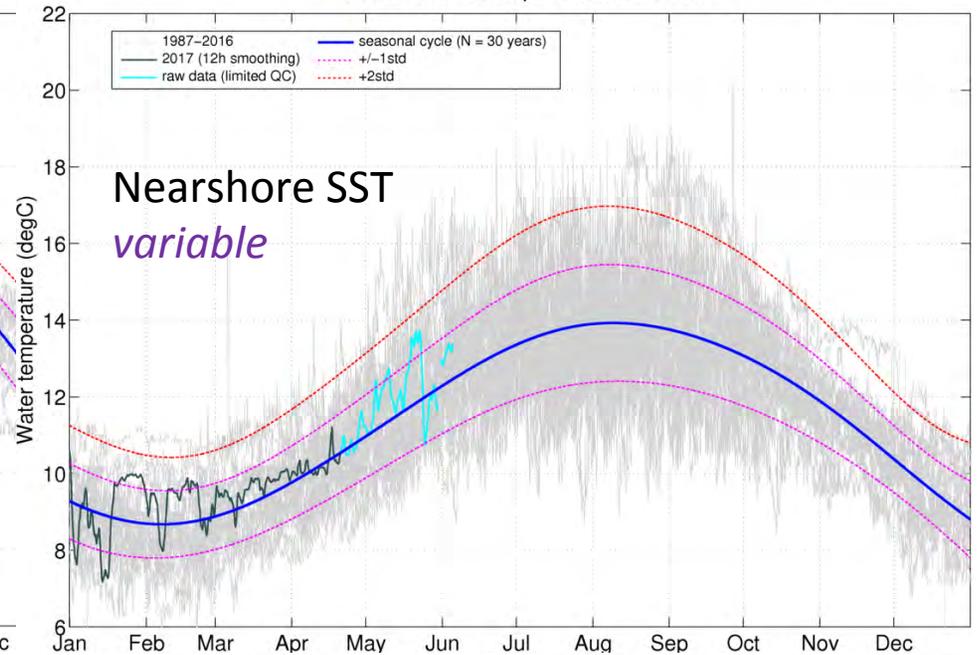


NANOOS: www.nanoos.org Climatology app

NDBC 46002, Oregon, Or



NDBC 46041, Cape Elizabeth, Wa



Call Agenda



- Project Recap & Updates (Ruth Howell)
- El Niño and Regional Climate brief (Dan McEvoy)
- Guest Speakers: Recent Observations of Zooplankton Community from northern California Current (Bill Peterson, Roxanne Robertson)
- IOOS Nearshore Conditions brief (Clarissa Anderson, Aric Bickel, Jan Newton)
- **Environmental conditions and impacts reporting and discussion (Ruth Howell)**
- Discussion

Regional Impacts Summary



Reporting Status:

- 42 entries since March 22, 2017

Environmental Conditions

- Floods
- Powerful Storms
- Drought Alleviation
- Landslides
- Fire
- Invasive Species

Human & Environmental Impacts

- Property damage/Loss of property
- Impacts to recreational access
- School & business closures
- Evacuations
- Increased human health risks
- Fisheries Closures

Impacts in Pictures



A massive landslide buried a quarter mile stretch of Highway 1 in Big Sur CA. More than 1 million tons of rock and dirt tumbled down a saturated slope in an area called Mud Creek. This years storms have cause over \$1 billion in highway damage.



Impacts in Pictures



The Boise River, Payette River, and Big Wood River in Idaho continue to see flooding events due to recent warm weather and snowmelt. The Big Wood River crested at 7.82' on May 6th, making it the 3rd highest crest in 101 years.



Impacts in Pictures



A late season storm brought very strong winds to parts of Oregon and Washington. 40-60 mph winds in Portland, 35-50 mph winds in Seattle, 50-60 mph winds in NW WA, and 90-100 mph at the crest of the Olympic and Cascade mountain ranges. Several hundred thousand people lost power. 1 person lost his life in Oregon.



Impacts in Pictures



After upwards of 10" of rain in Southern California this winter, a wildflower super bloom occurred in the southern Central Valley on the Carrizo Plain. The bloom was so large it could be seen from space.



Impacts in Pictures



An Historic May winter storm caused big problems in the Rockies, where roads were closed, strong winds damaged trees and thousands lost power.



Impacts in Pictures



A powerful windstorm blew through Las Vegas leaving 40,000 people without power. This was the strongest windstorm in the last 5 years. Winds caused semi trucks to roll over, ripped off roofs, and knocked over power poles along the strip. Winds were recorded at 82 mph at Red Rock conservation area, 70 mph in north Vegas, and 60 mph at McCarran International where many flights were delayed.



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- **Discussion (all)**
 - Additional impacts to report?
 - Observations on recent environmental anomalies?

Next NOAA West Watch: August 22, 1-2pm PDT/ 2-3pm PDT