



# NOAA West Watch

## *Reporting Regional Environmental Conditions & Impacts in the West*

July 21, 2020



# Call Agenda

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- **Project Recap & Updates (Dan McEvoy)**
- Regional Climate and ENSO brief (Dan McEvoy)
- Guest speaker: Dr. Drew Lucas: *Technology Demonstration to Observe Bloom Triggers: A SCCOOS Pilot Project*
- IOOS Nearshore Conditions brief (Jan Newton, Henry Ruhl, Megan Hepner-Medina)
- Discussion - Environmental conditions and impacts reporting (All)
  - Additional impacts to share?

# Project Recap and Updates

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- NOAA West Watch webinars are run by the Western Regional Climate Center, in partnership with the NOAA Western Regional Collaboration Team (NOAA West) with standing contributions from the three Integrated Ocean Observing System Regional Associations.
- Project Goals:
  - Serve as forum for bringing together NOAA staff and partners from across the agency and region to share information about regional scale environmental observations and impacts on human systems.
  - Help facilitate interdisciplinary connections and the exchange of information among agency staff and partners on regional climatic and oceanic conditions, particularly departures from normal.

These webinars are not formal public releases of data.

# Project Recap and Updates

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- The Western Regional Climate Center has agreed to provide funding to support continued quarterly webinars in 2020 and will be reassessed again at the end of the year.
- Request: If you find these webinars helpful, or if you have ideas of in-region entities that may be open to taking on this webinar please let me know: (mcevoyd@dri.edu).

# Call Agenda

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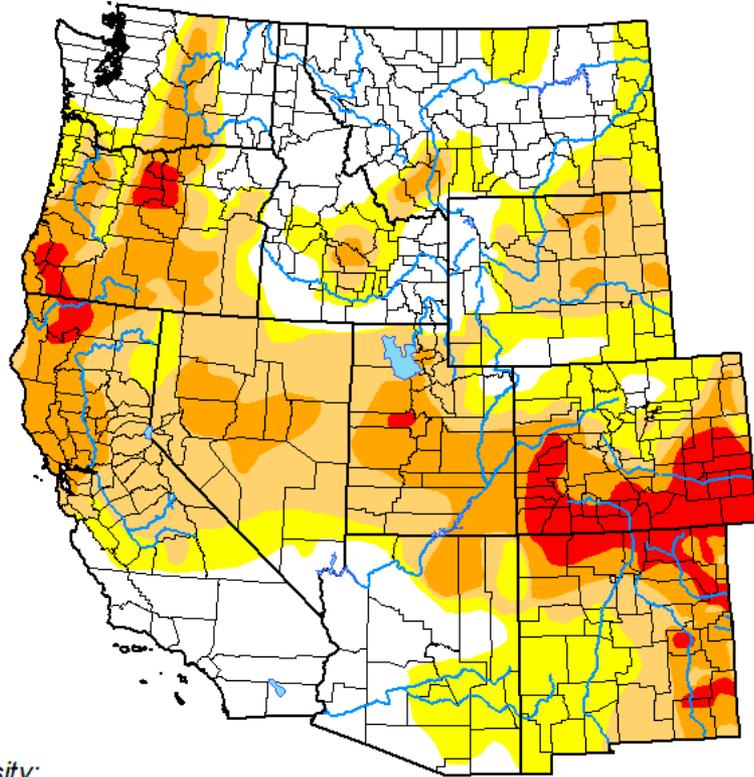


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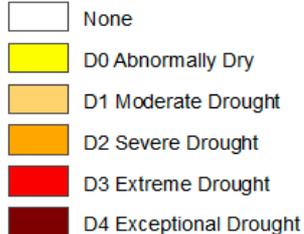
# Widespread Western US Drought



US Drought Monitor  
July 14, 2020

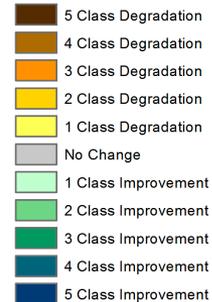
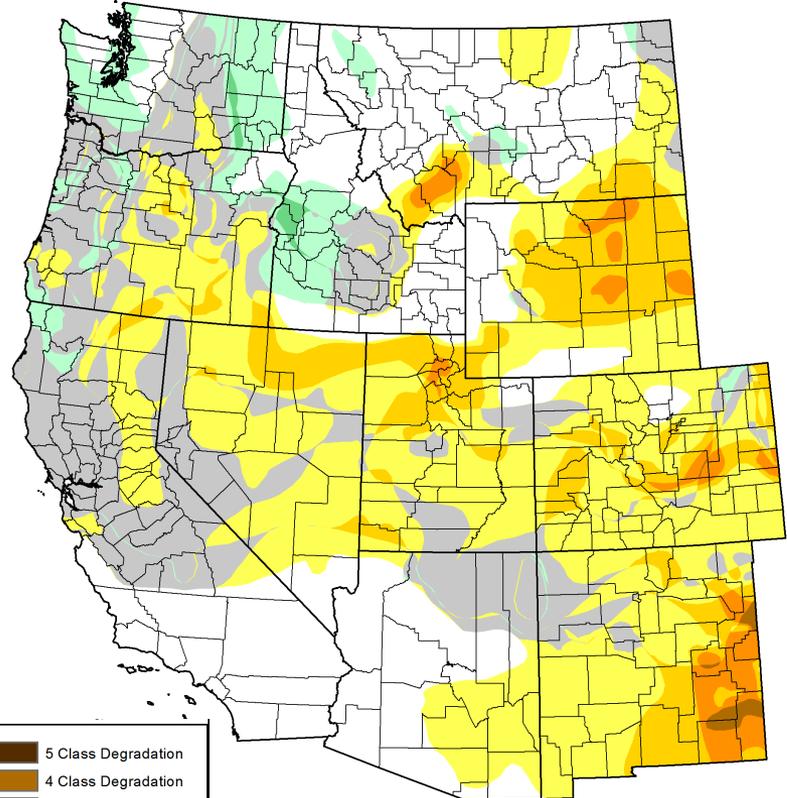


**Intensity:**



- 48% in drought (D1-D3)
- 6% in extreme drought (D3)

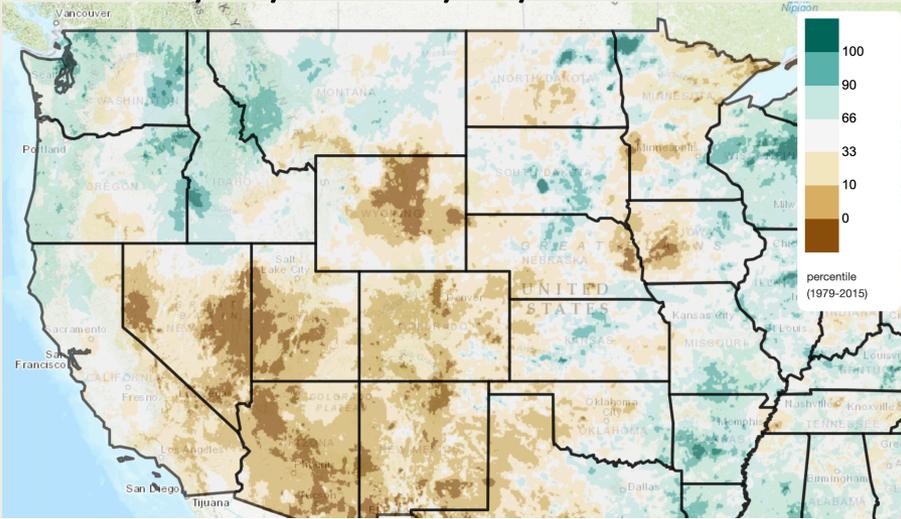
US Drought Monitor 3 Month Change  
July 14, 2020



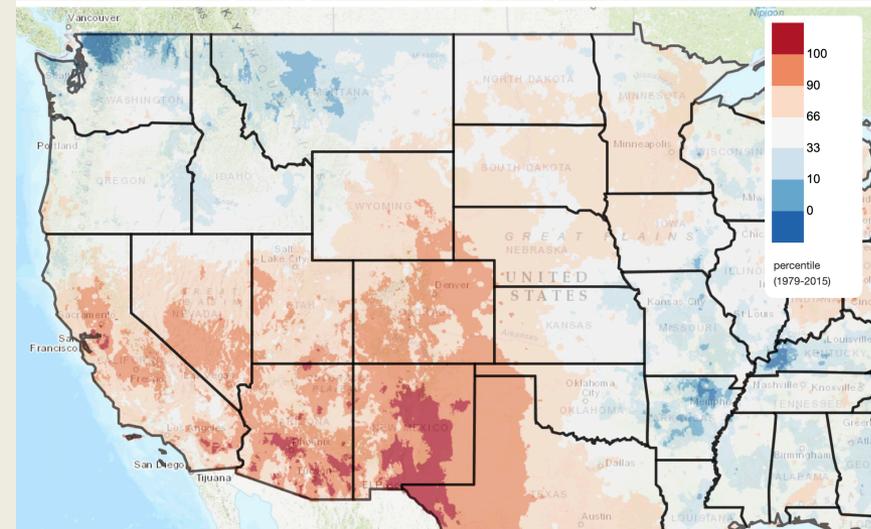
# Climate Anomalies – Past 3 Months



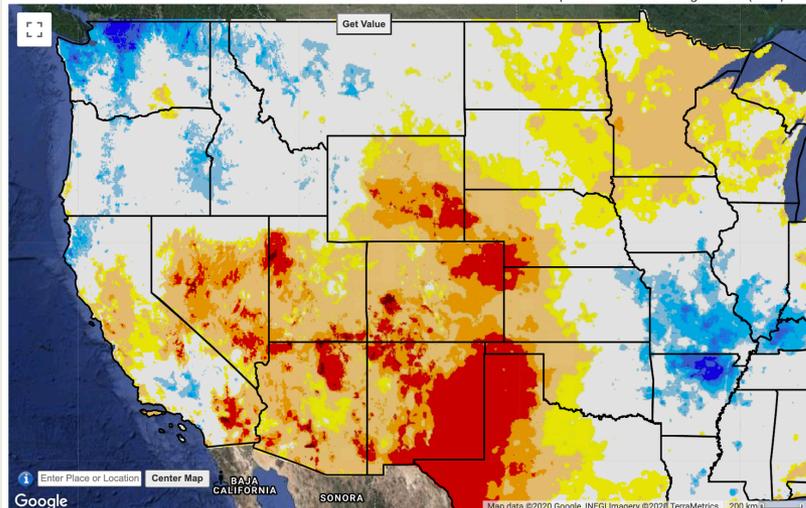
## Total Precipitation Percentile 4/20/2020-7/18/2020



## Mean Temperature Percentile 4/20/2020-7/18/2020



## 3-Month Evaporative Demand Drought Index (EDDI) (gridMET) 2020-04-16 to 2020-07-17, standardized from 1979 - 2020



<https://climatetoolbox.org/tool/Climate-Mapper>  
<https://app.climateengine.org/climateEngine>

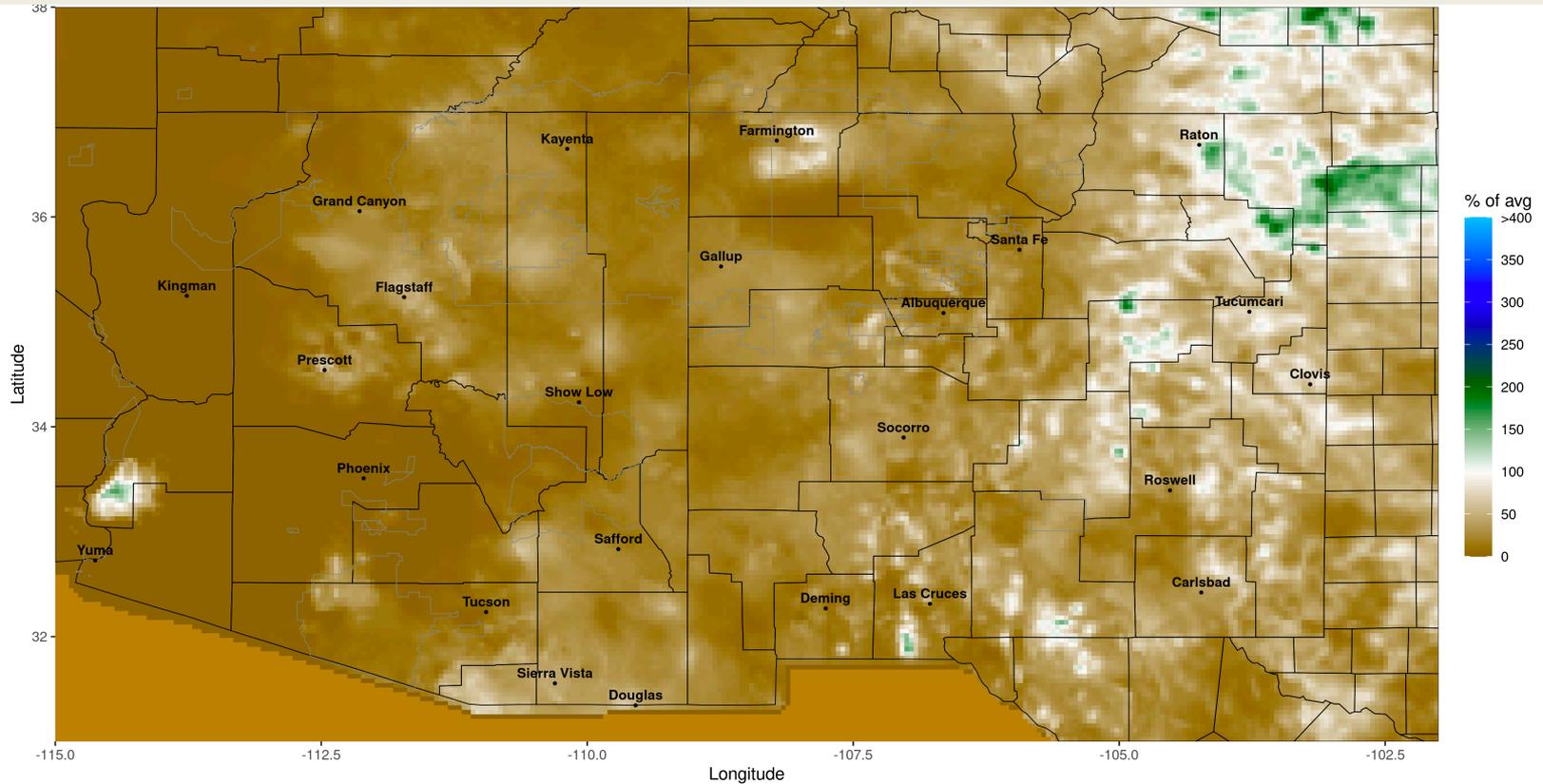
Evaporative Demand  
Drought Index (EDDI)

4/16/2020 to 7/17/2020

# Southwest Monsoon Update

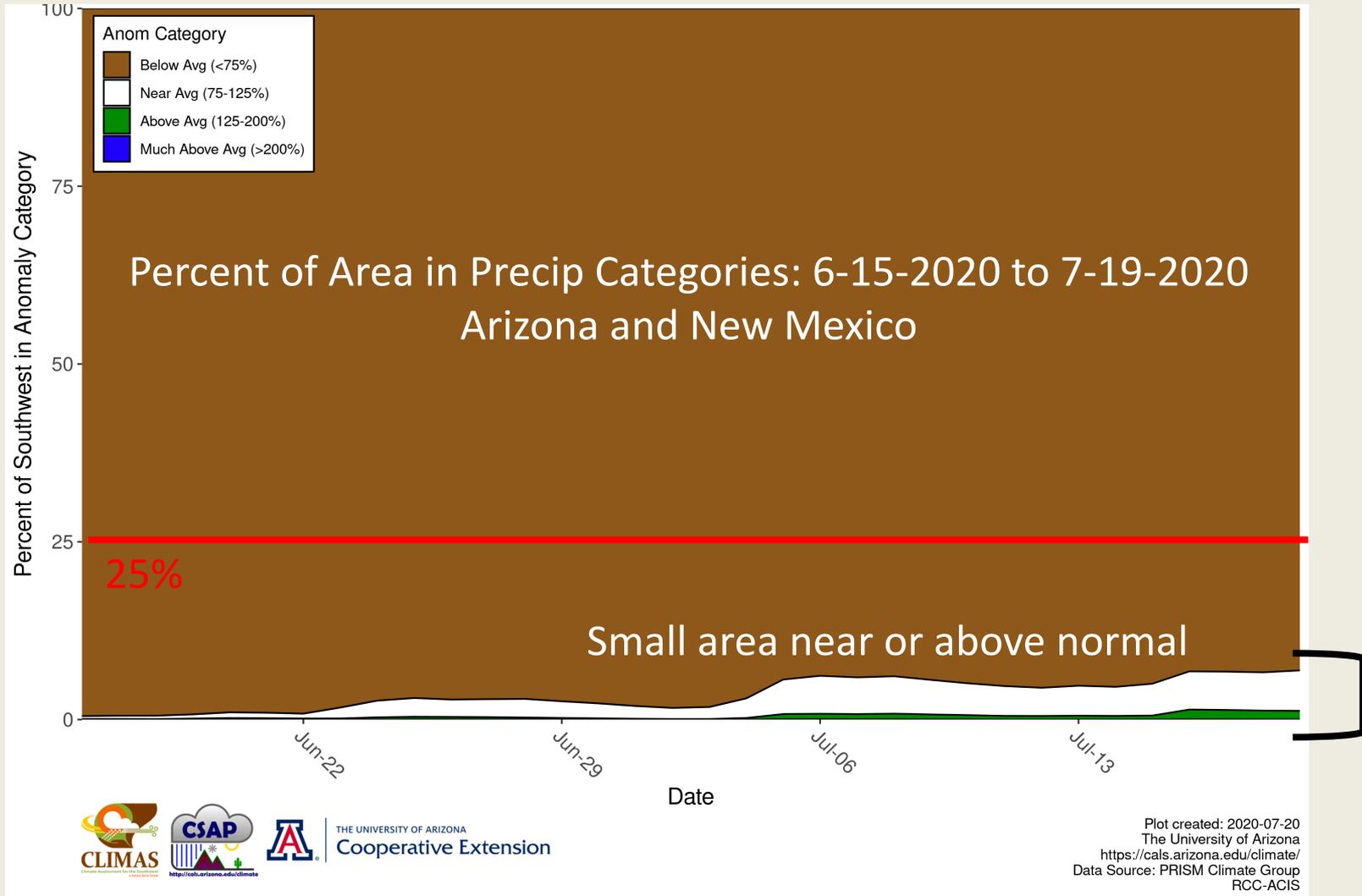


## Percent of Average Precipitation: 6-15-2020 to 7-19-2020 Arizona and New Mexico



Plot created: 2020-07-20  
The University of Arizona  
<https://cals.arizona.edu/climate/>  
Data Source: PRISM Climate Group  
RCC-ACIS

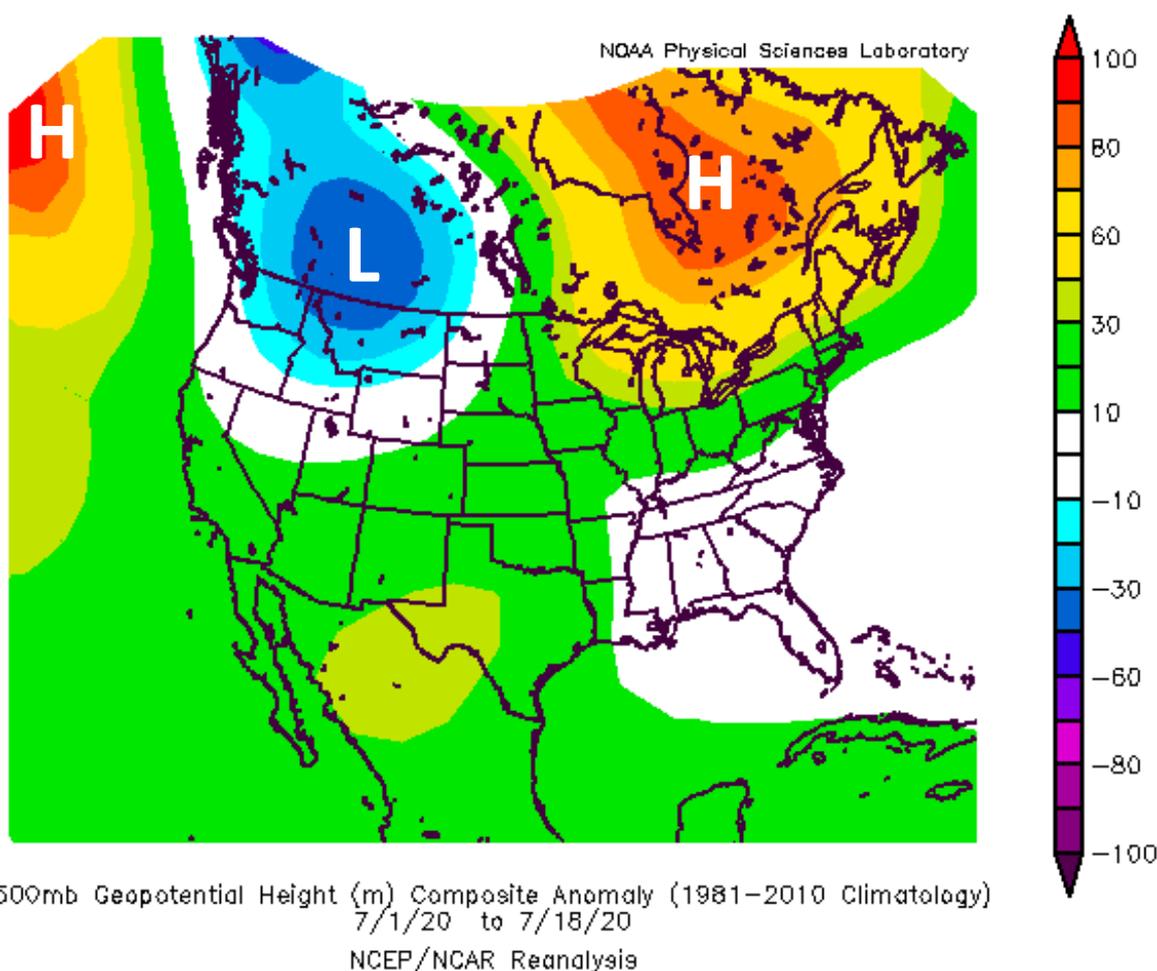
# Southwest Monsoon Update



# Southwest Monsoon Update



## 500 mb Geopotential Height Anomalies 7-1-2020 to 7-18-2020

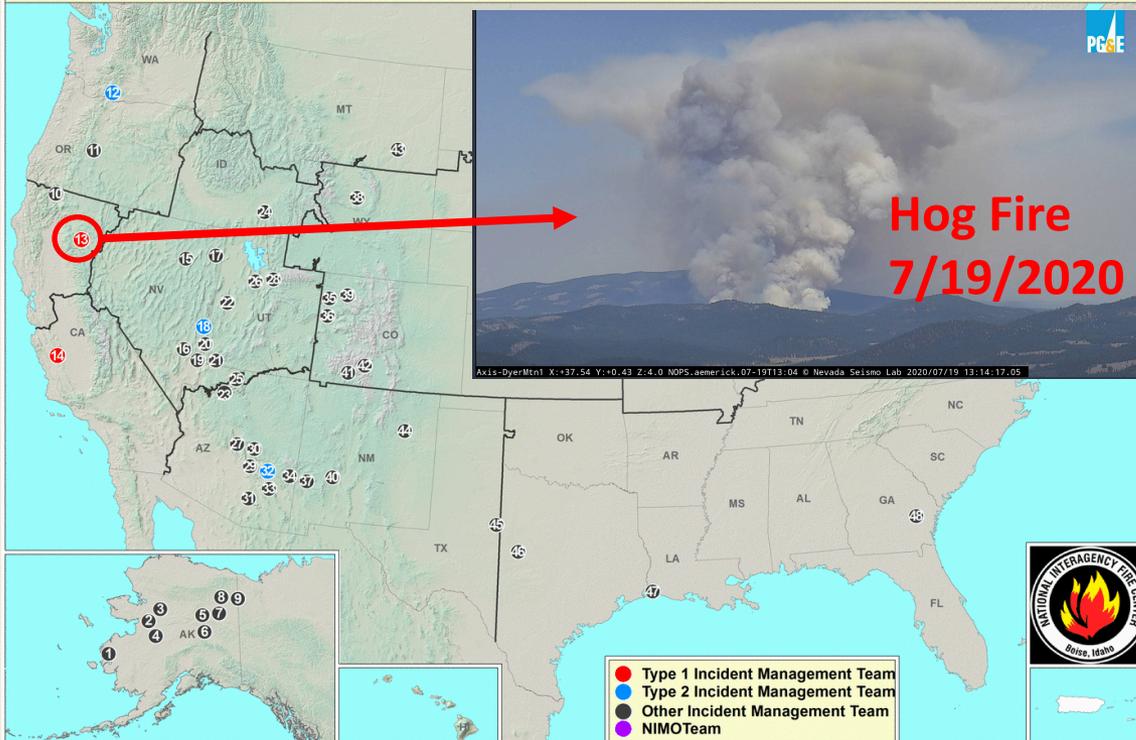


- Mid-atmosphere pressure and circulation patterns
- Persistent low pressure in PNW and southwest Canada
- Four Corners High unable to establish

# Wildfire Season Update



## Current Large Incidents July 20, 2020



1 IWAKTOK HILL	13 HOG	25 MANGUM	37 CUB
2 WAPOO CREEK	14 MINERAL	26 POLE CANYON	38 NEIBER
3 BILLY HAWK CREEK	15 CEDAR	27 PINE	39 STREETER
4 WAPOO CREEK 2	16 STEWART CANYON	28 BIG HOLLOW	40 VICS PEAK
5 OLD LOST	17 SHAFTER	29 YANKEE JOE	41 SAND CREEK
6 CLEAR CREEK	18 BIG SUMMIT	30 POLLES	42 171
7 TIVEHVUN LAKE	19 TURKEY FARM ROAD	31 BIGHORN	43 RED BUTTE
8 SHEENJEK RIVER	20 VEYO WEST	32 BLUE RIVER 2	44 TREMENTINA CANYON
9 COLEEN	21 COTTONWOOD TRAIL	33 JACKSON	45 GAME RANCH
10 BADGER	22 HOWELL PEAK	34 BRINGHAM	46 GATE 5
11 ROSLAND ROAD 0429 NE	23 THUMB	35 GRASSY	47 COCHON
12 BERTSCHI ROAD	24 CHINESE PEAK	36 FAWN CREEK	48 8 MILE STILL ROAD # 2

US Wildfire stats  
January 1 – July 20:

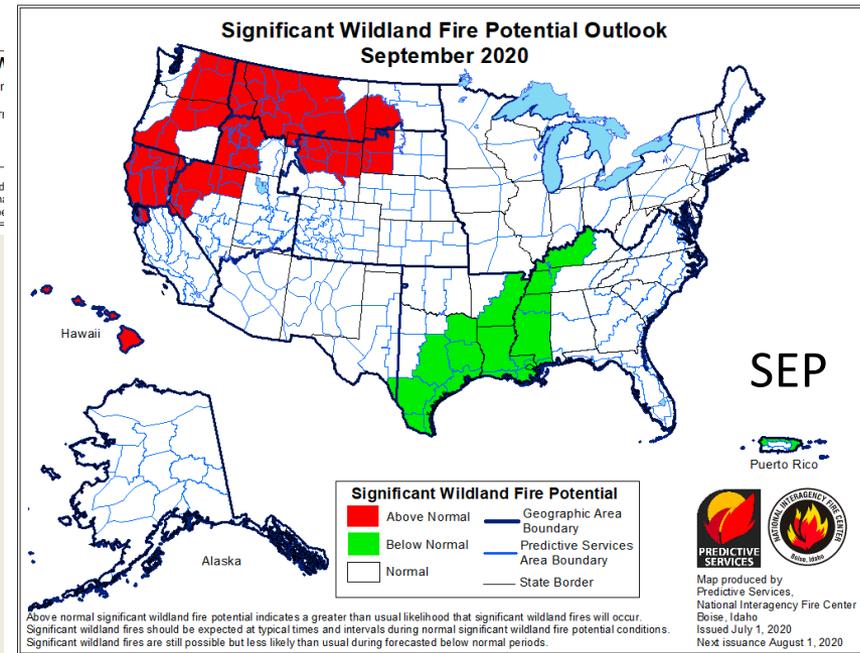
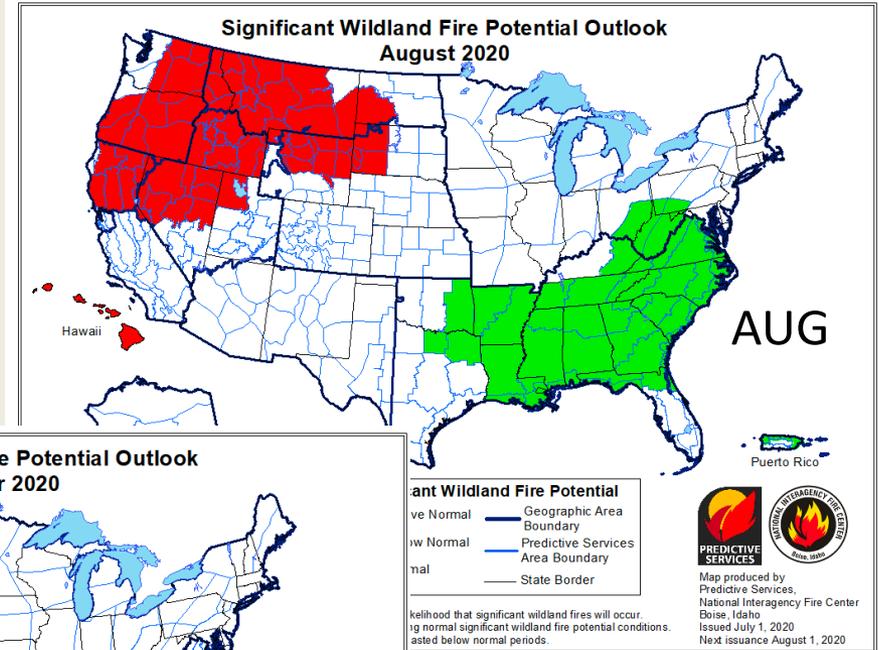
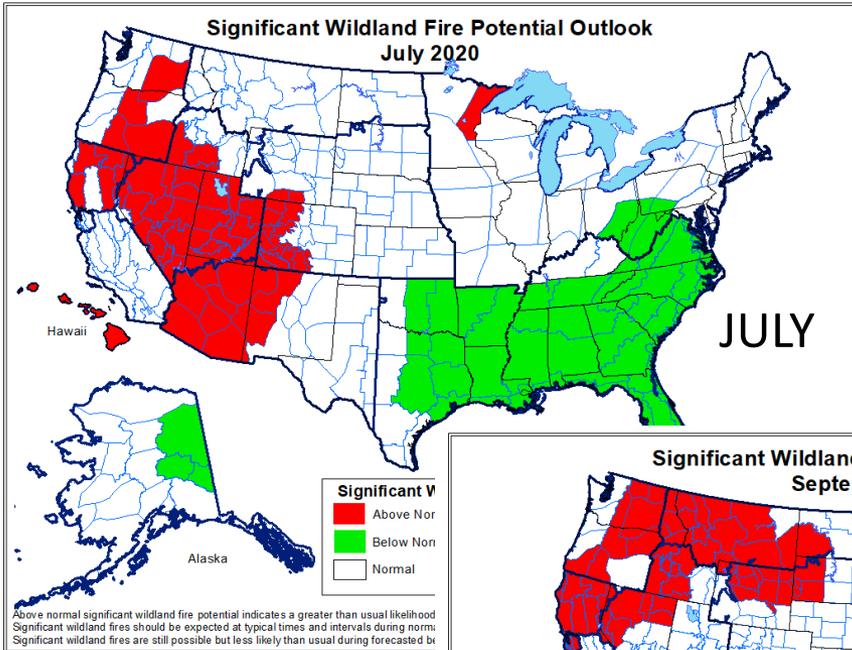
Fires:

- 2020: 28,423
- 2010-2019 average: 31,584

Acres burned:

- 2020: 1,778,583
- 2010-2019 average: 3,261,145

# Significant Wildland Fire Potential Outlook





## ENSO Alert System Status: **La Niña Watch**

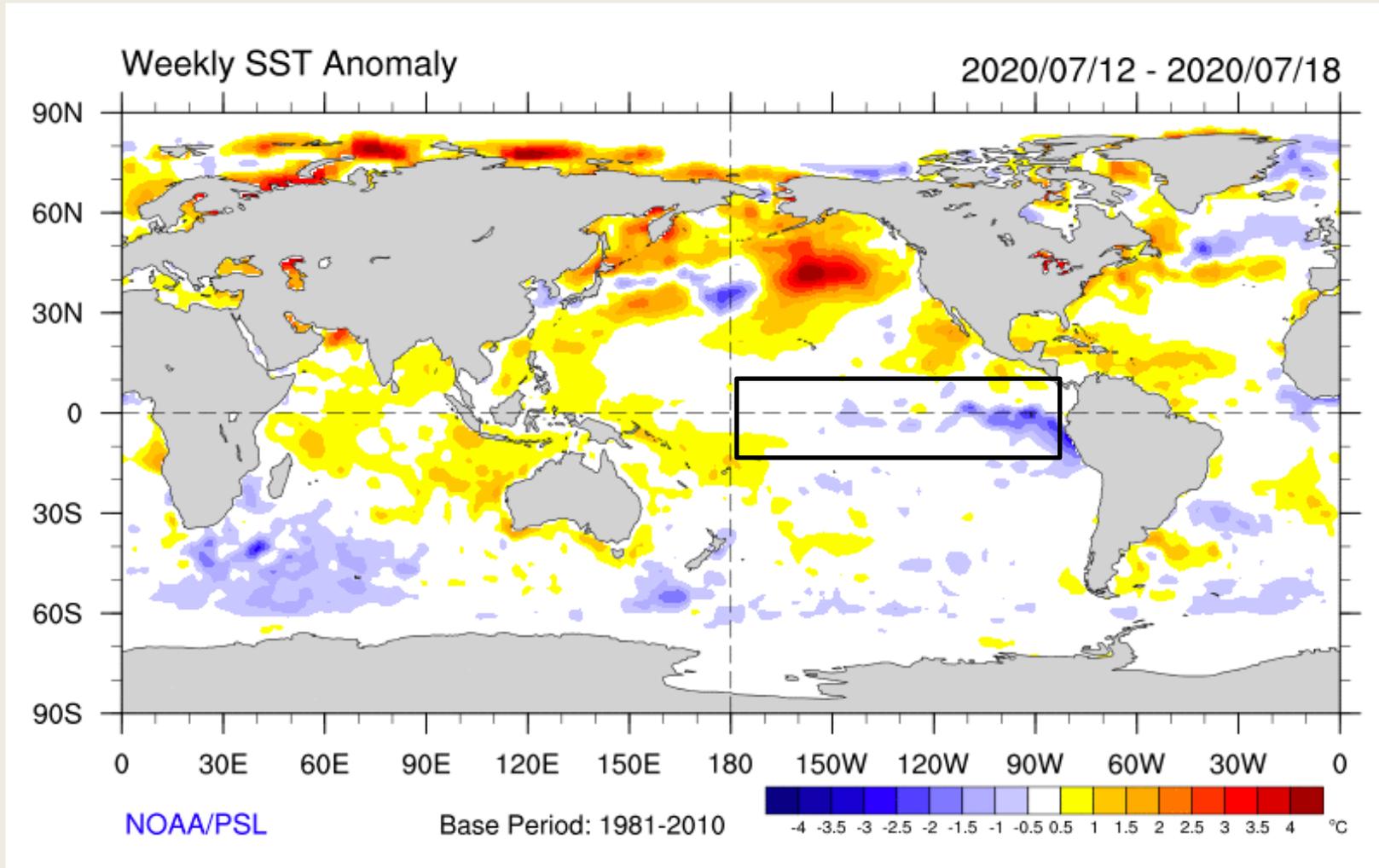
- ENSO-neutral conditions are present.\*
- Equatorial sea surface temperatures (SSTs) are near-to-below average across the east-central and eastern Pacific Ocean.
- The tropical atmospheric circulation is consistent with ENSO-neutral.
- ENSO-neutral is favored to continue through the summer, with a 50-55% chance of La Niña development during Northern Hemisphere fall 2020 and continuing through winter 2020-21 (~50% chance).\*

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/).

# Sea Surface Temperatures

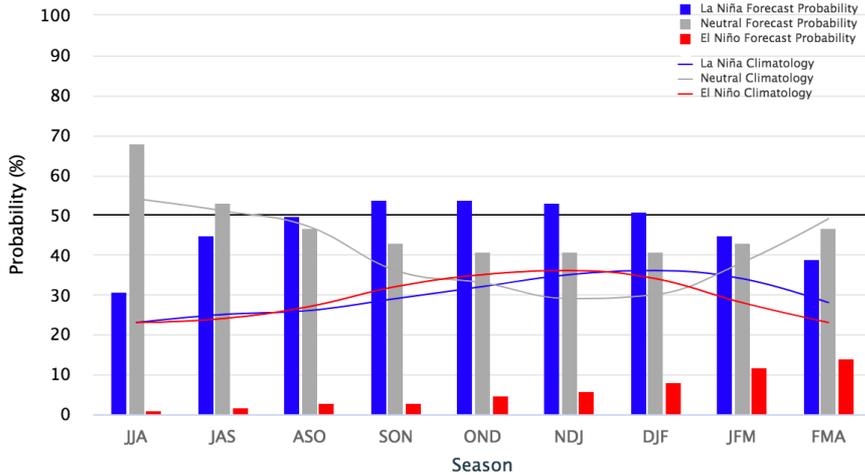


# ENSO Forecasts



Early-July 2020 CPC/IRI Official Probabilistic ENSO Forecasts

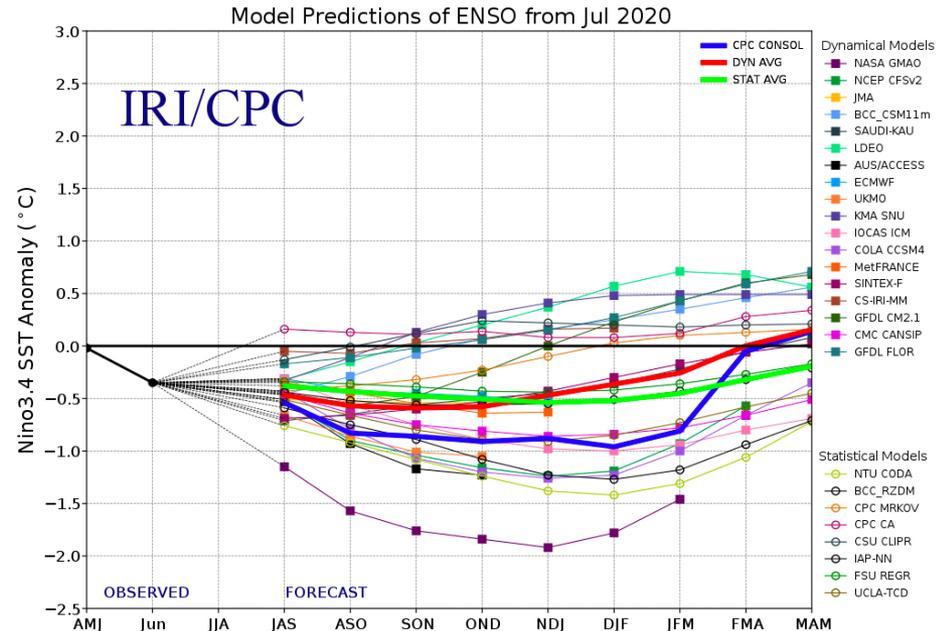
ENSO state based on NINO3.4 SST Anomaly  
Neutral ENSO: -0.5 °C to 0.5 °C



From CPC: ENSO-neutral is favored to continue through the summer, with a 50-55% chance of La Niña development during Northern Hemisphere fall 2020 and continuing through winter 2020-21 (~50% chance)

CPC/IRI El Niño forecast:

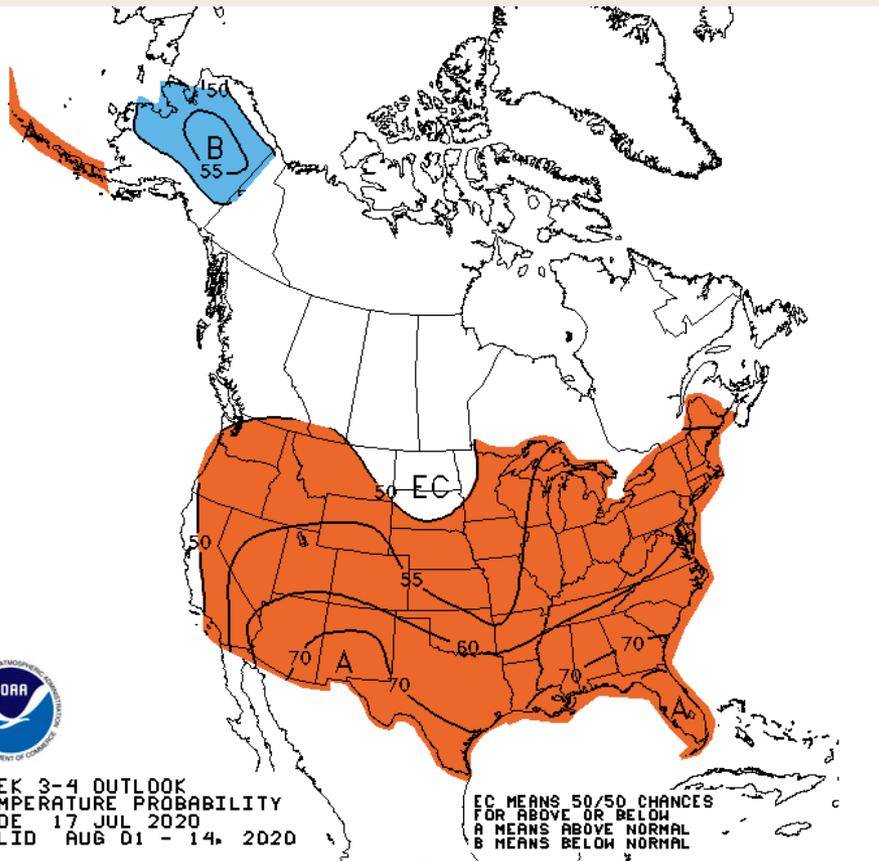
NMME models + other dynamical models + statistical models



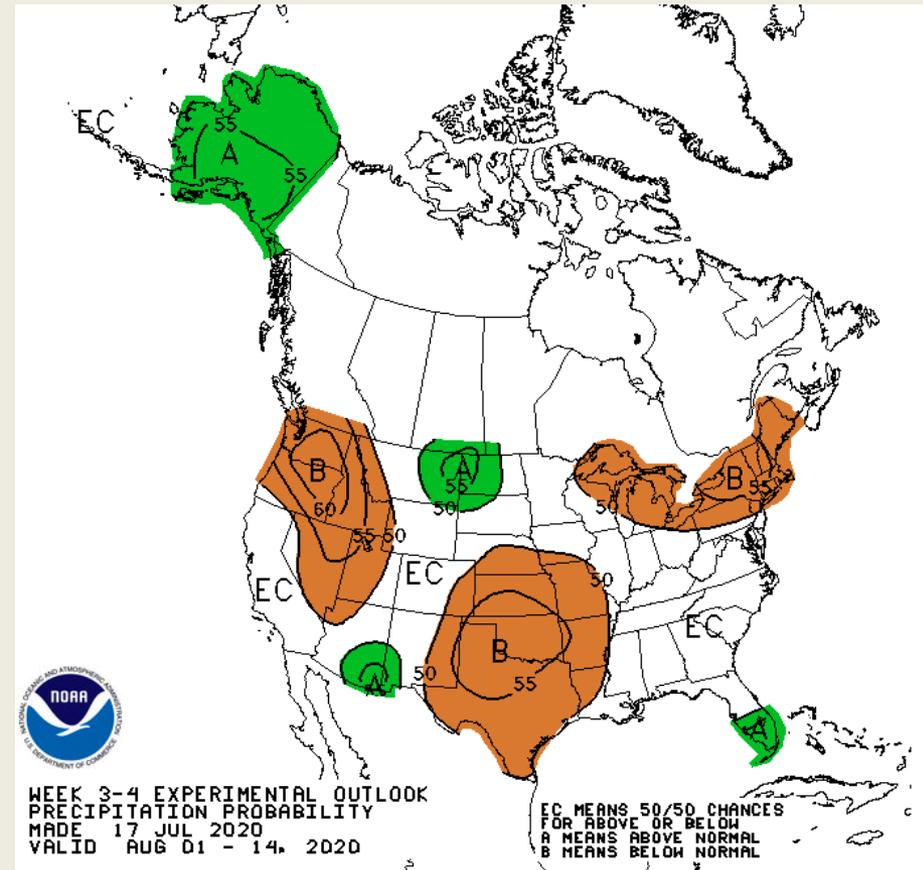
# August 1<sup>st</sup>-14<sup>th</sup> 2020 U.S. Outlook



## Temperature Probability



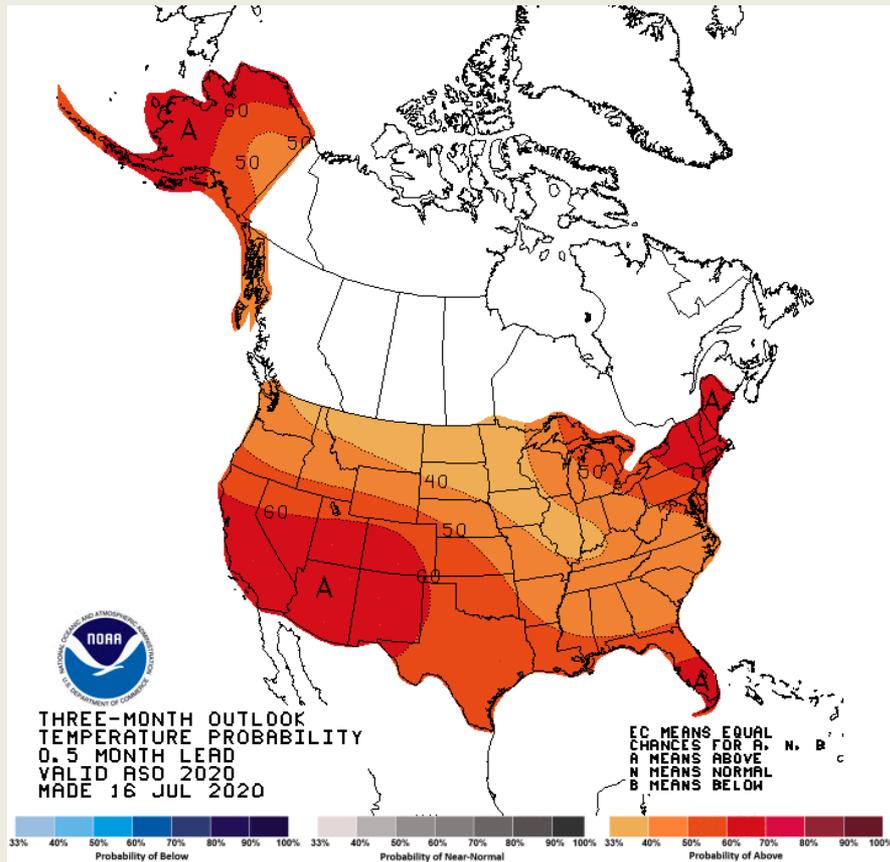
## Precipitation Probability



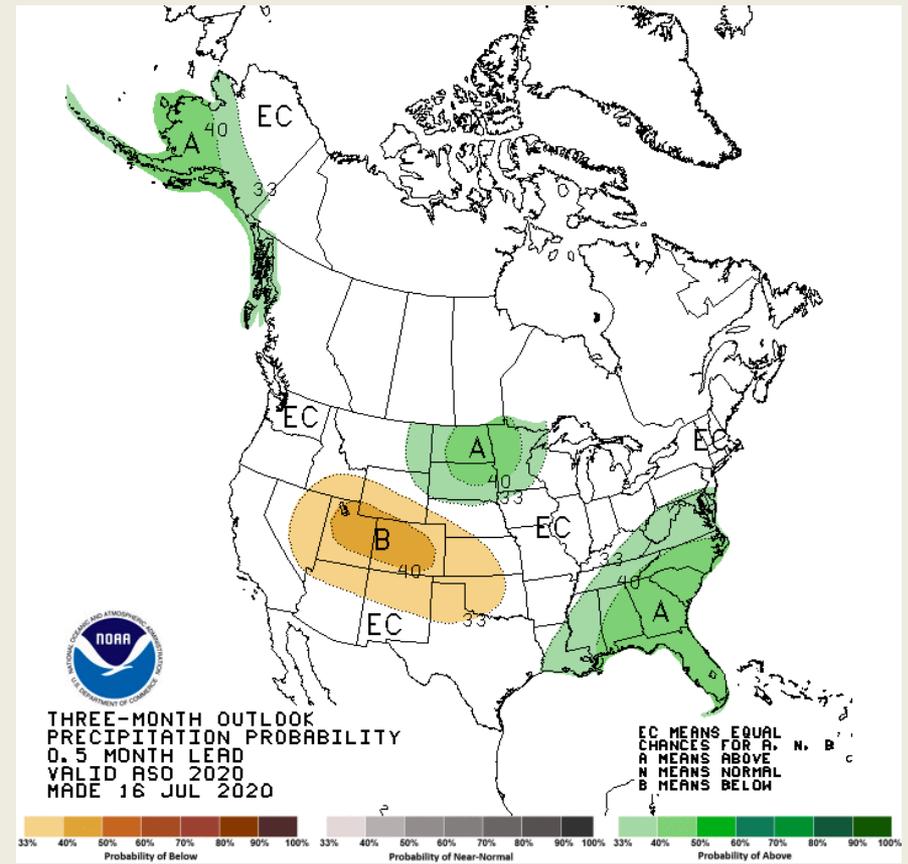
# August-October 2020 Outlook



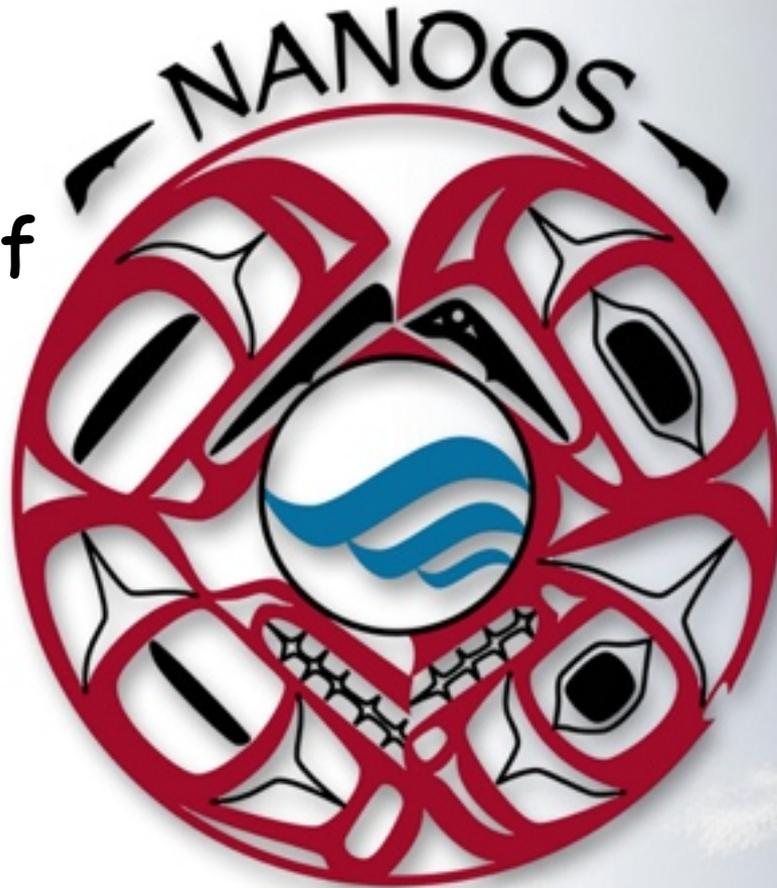
## Temperature Probability



## Precipitation Probability

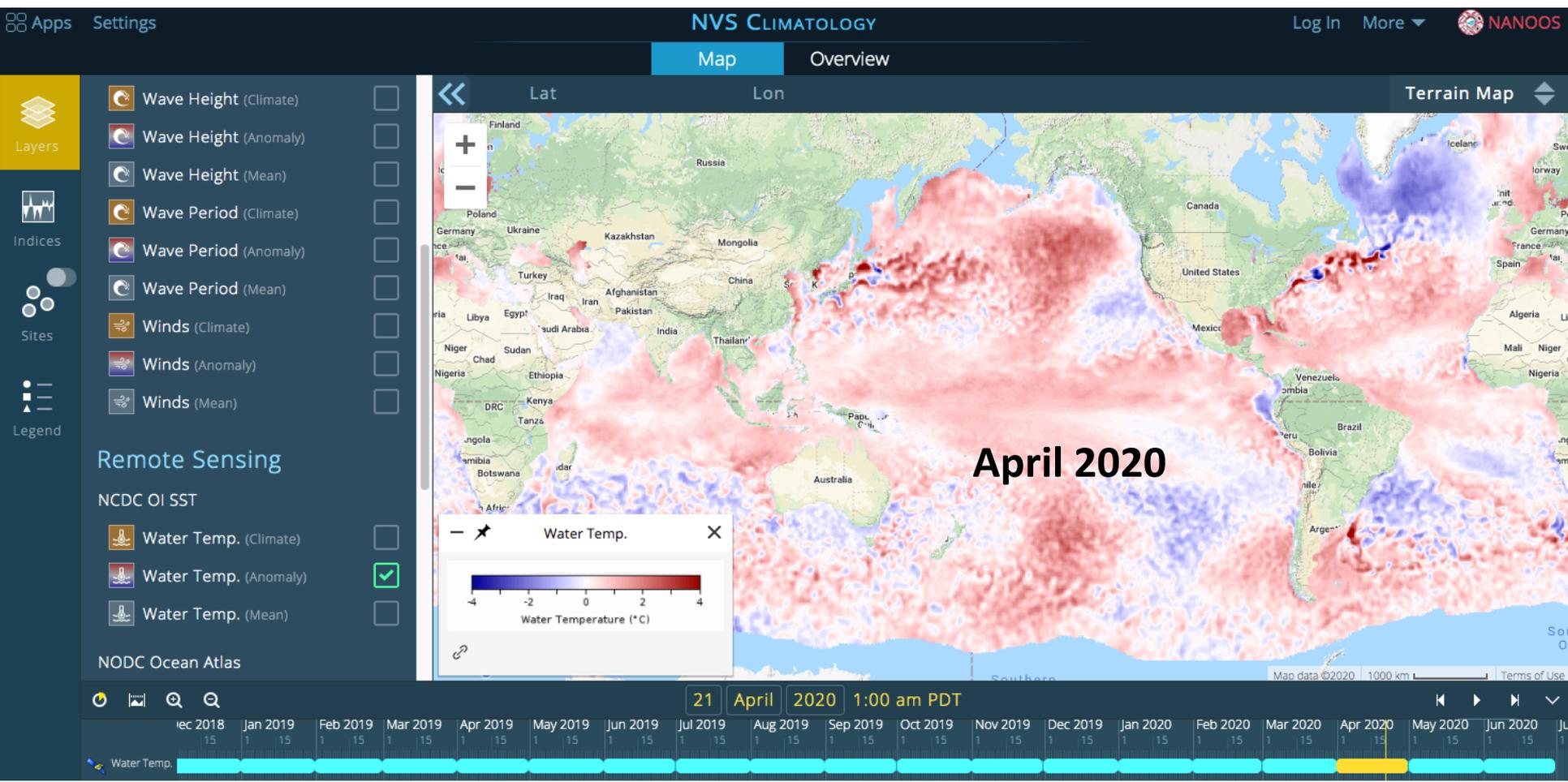


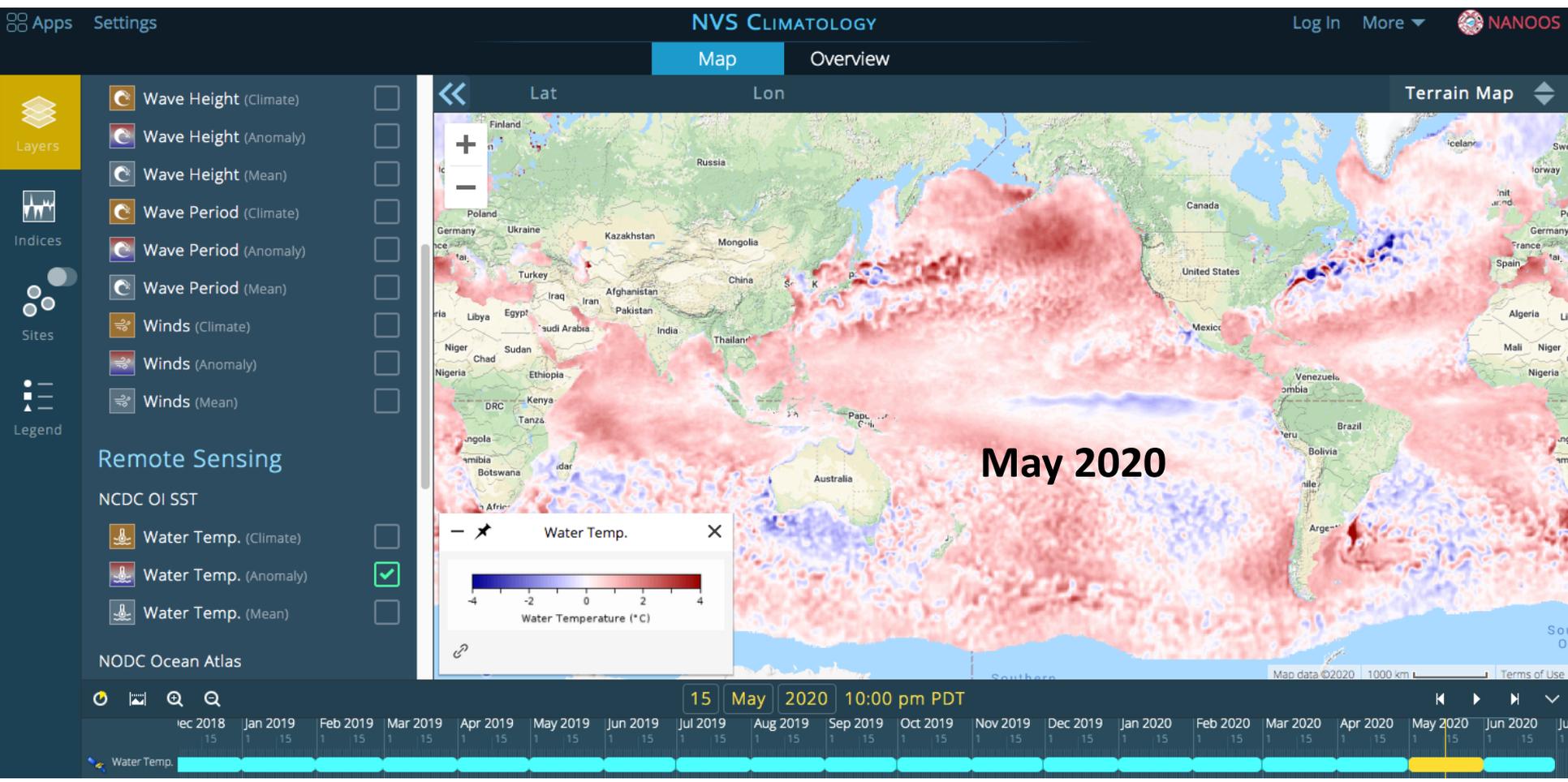
# Northwest Association of Networked Ocean Observing Systems

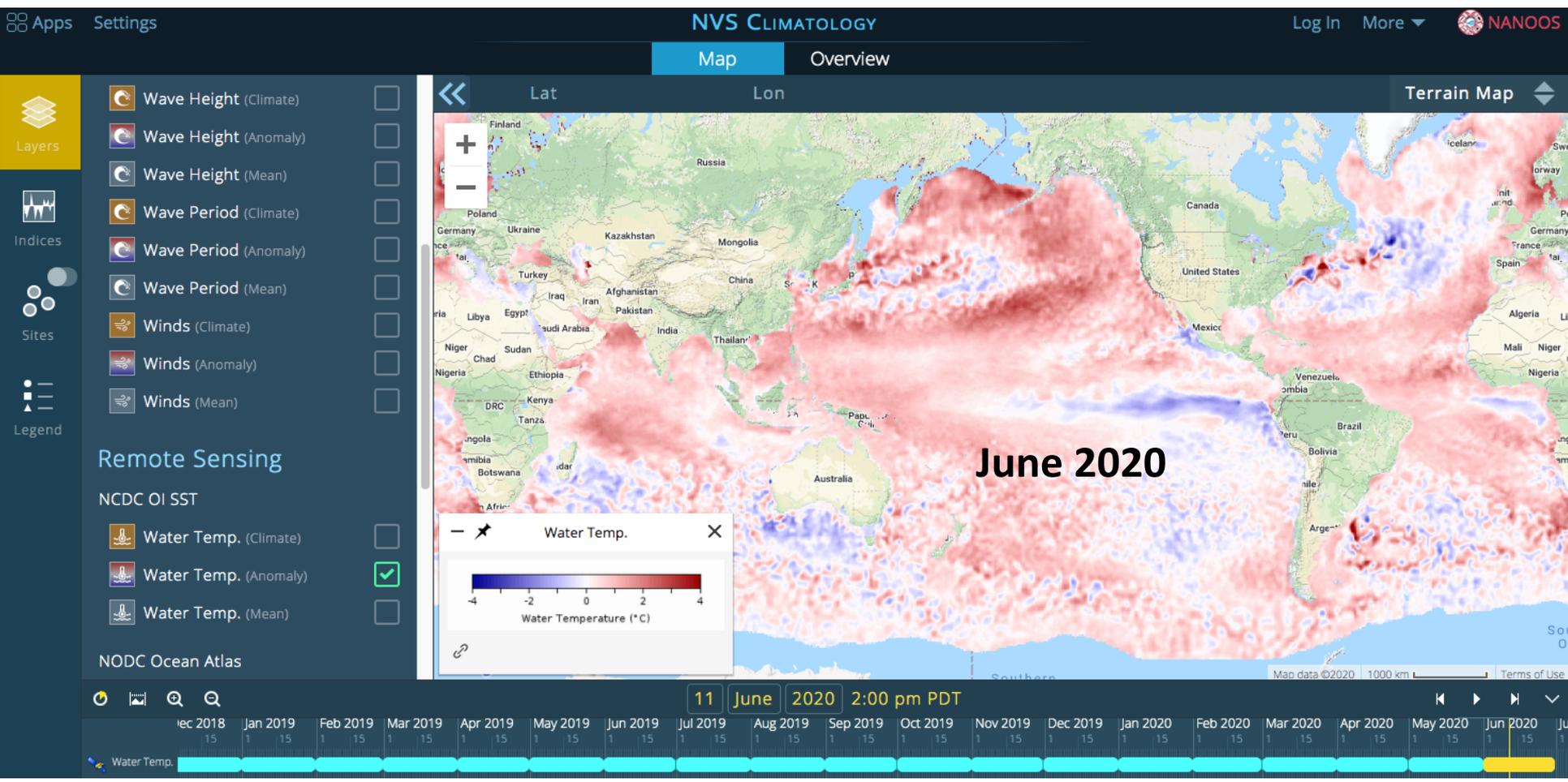


NOAA West Watch Update 21 July 2020:  
Washington / Oregon Observations

*Jan Newton, NANOOS Executive Director*

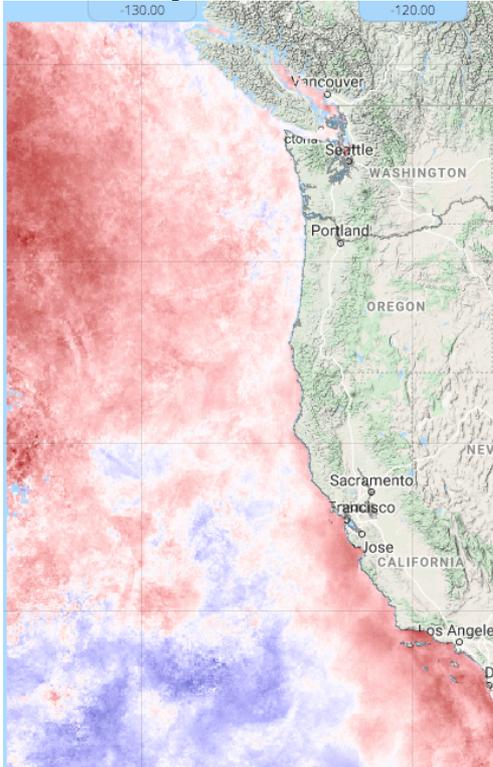




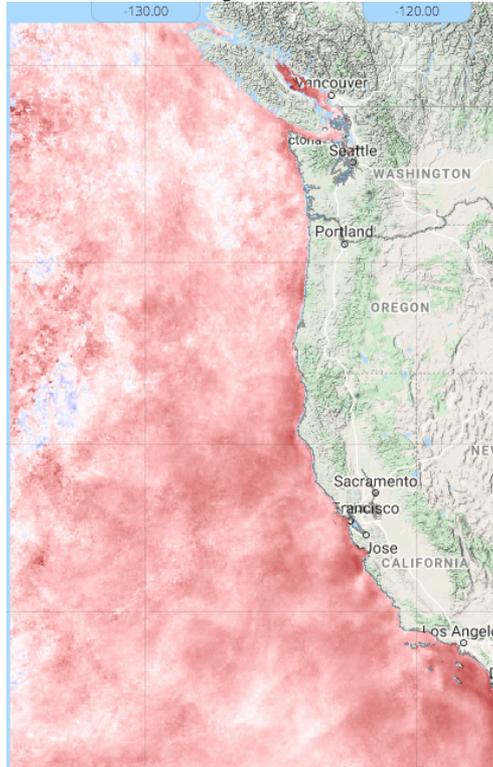


# Sea Surface Temperature Anomaly OSU Modis

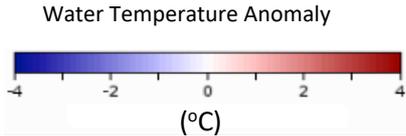
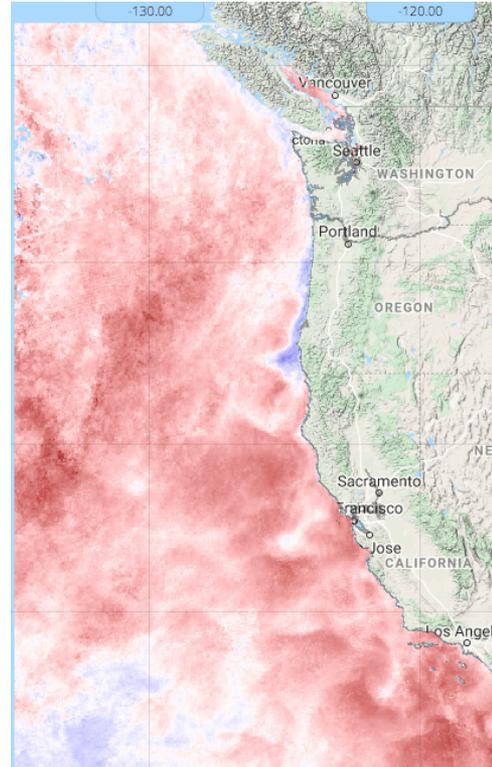
**April 2020**



**May 2020**

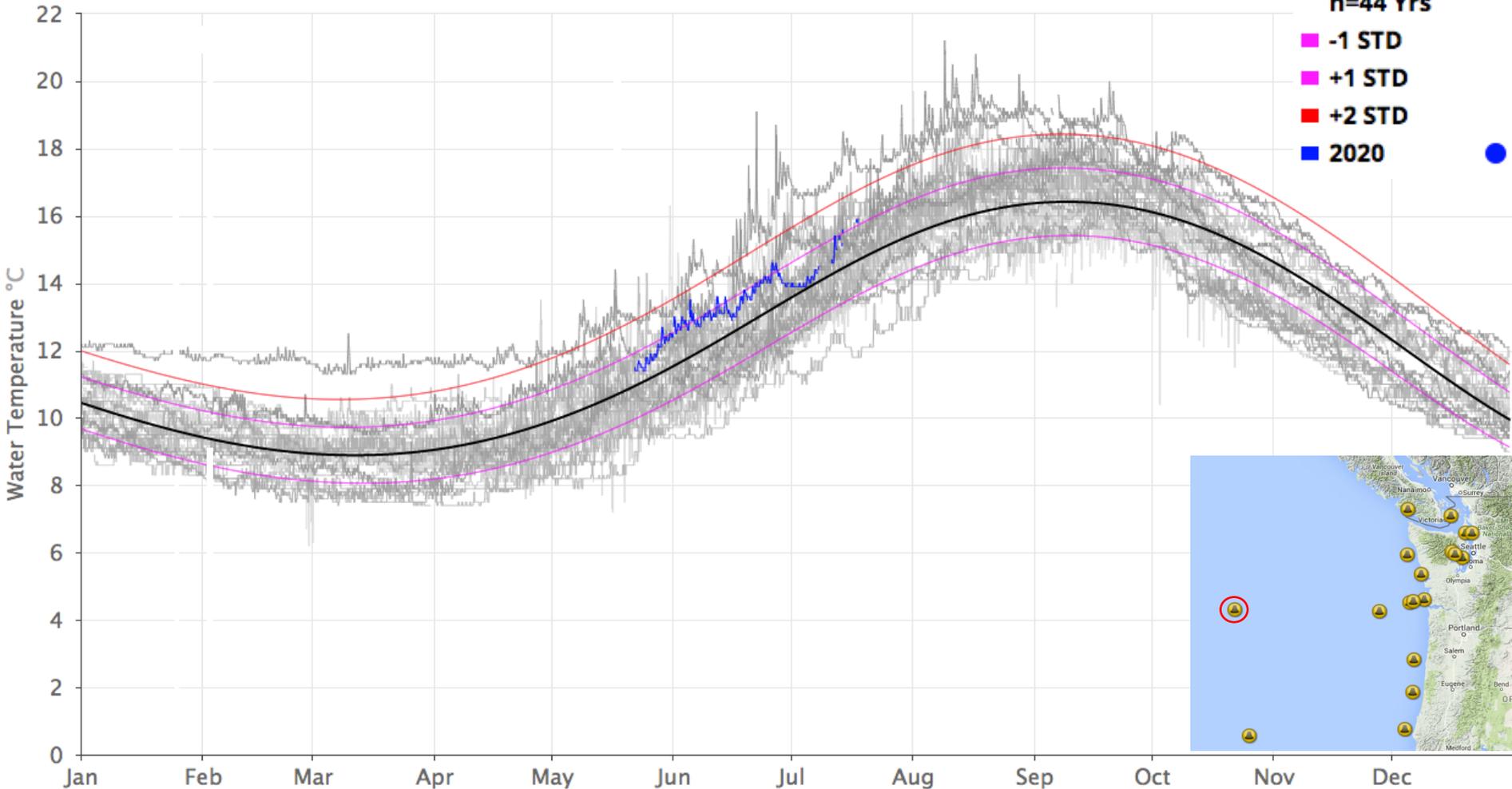


**June 2020**



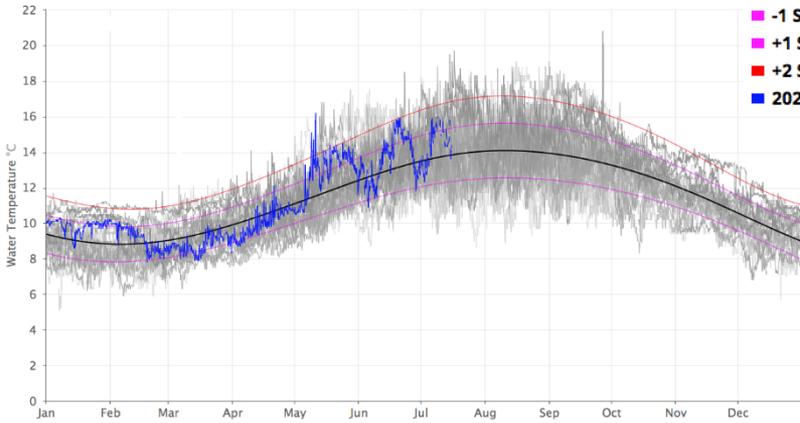
NDBC Washington

- Seasonal Cycle n=44 Yrs
- -1 STD
- +1 STD
- +2 STD
- 2020



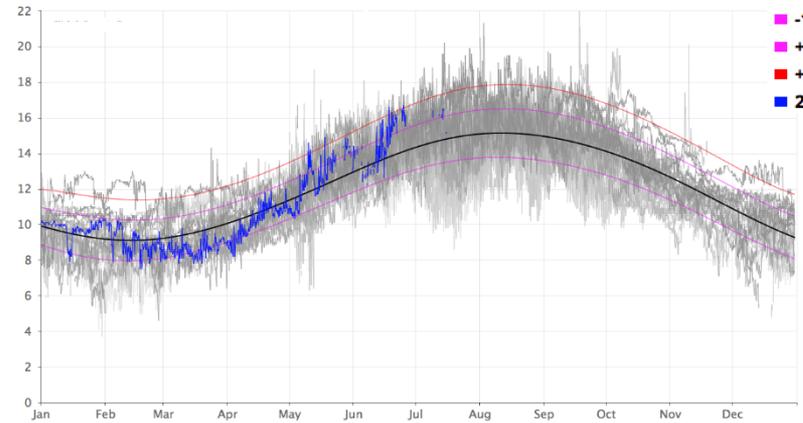
## NDBC Cape Elizabeth ●

■ Seasonal Cycle  
n=33 Yrs  
■ -1 STD  
■ +1 STD  
■ +2 STD  
■ 2020



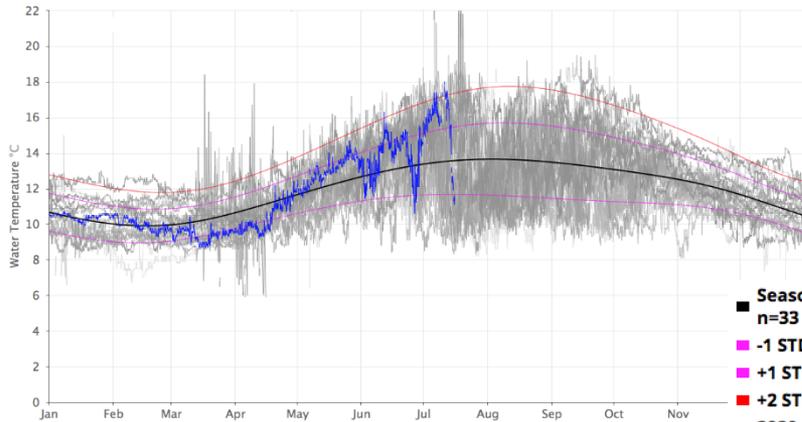
## NDBC Columbia River Bar ●

■ Seasonal Cycle  
n=36 Yrs  
■ -1 STD  
■ +1 STD  
■ +2 STD  
■ 2020



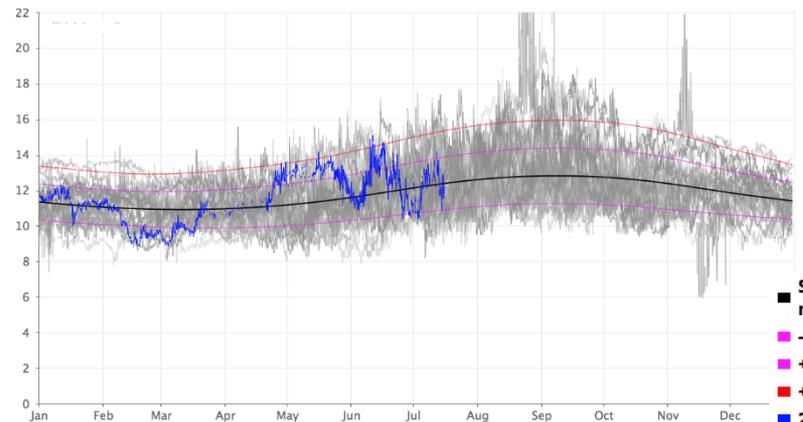
## NDBC Stonewall Bank ●

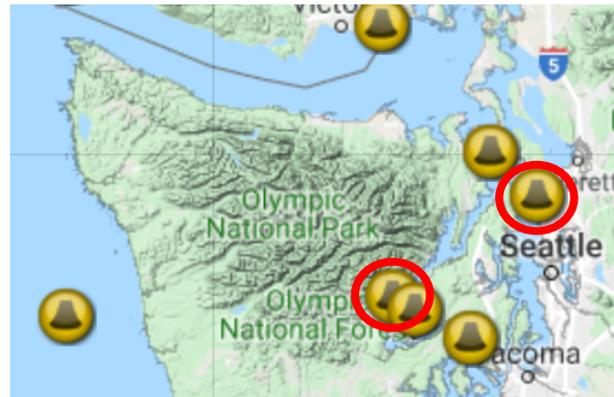
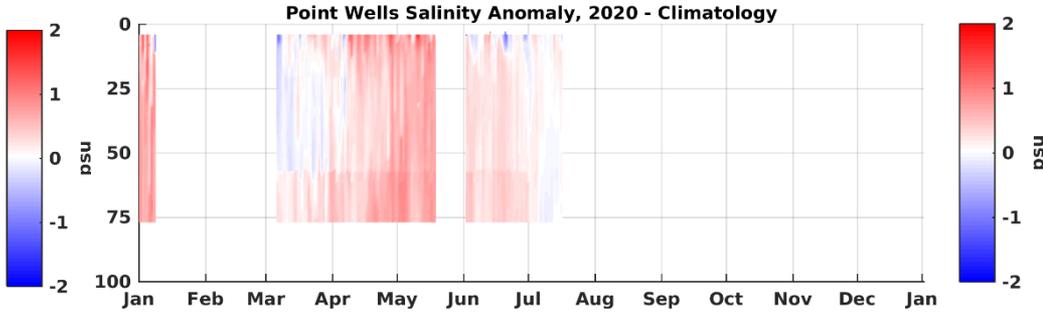
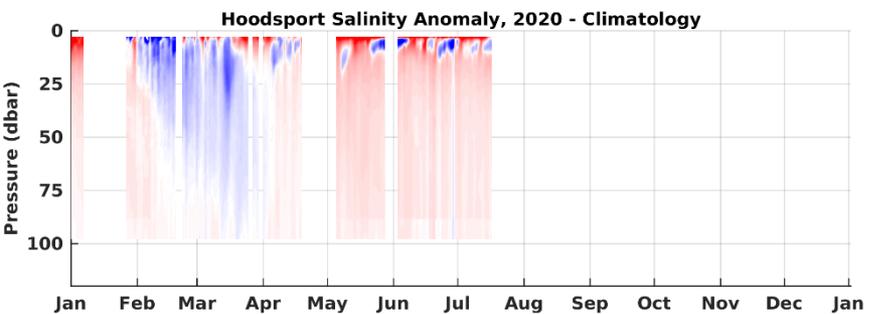
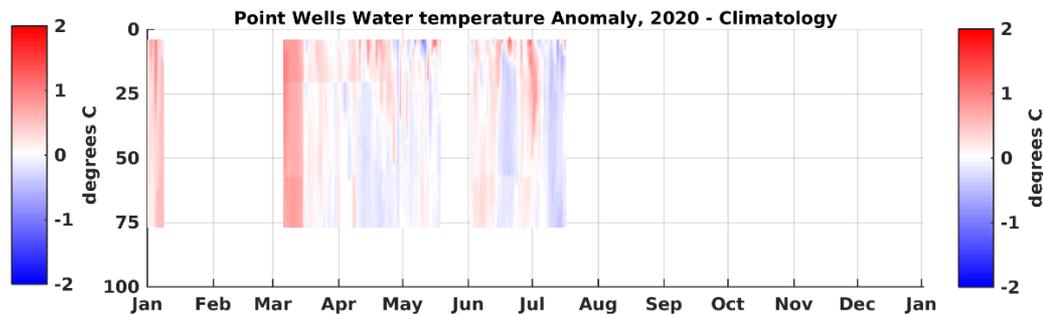
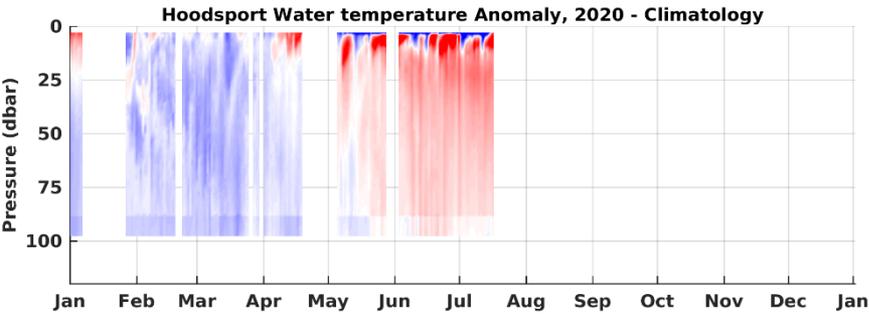
■ Seasonal Cycle  
n=33 Yrs  
■ -1 STD  
■ +1 STD  
■ +2 STD  
■ 2020

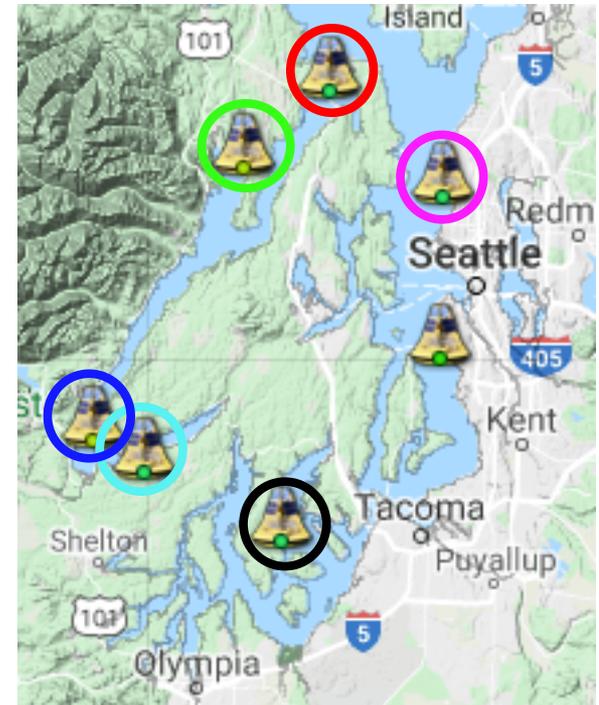
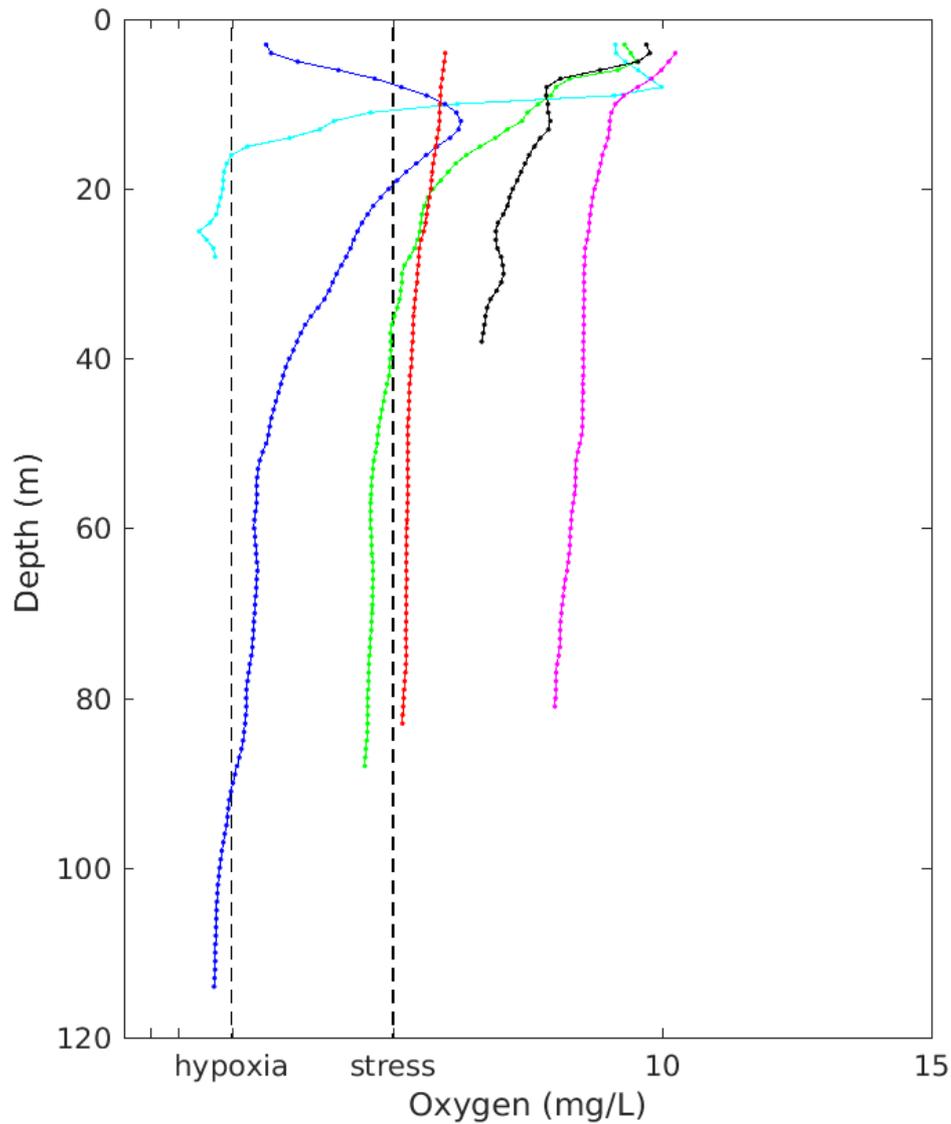


## NDBC Eel River ●

■ Seasonal Cycle  
n=38 Yrs  
■ -1 STD  
■ +1 STD  
■ +2 STD  
■ 2020



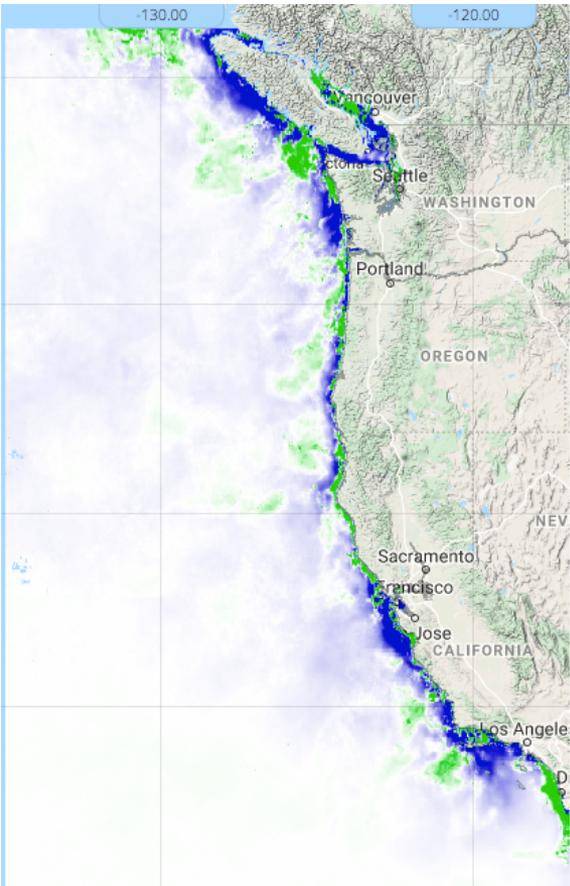




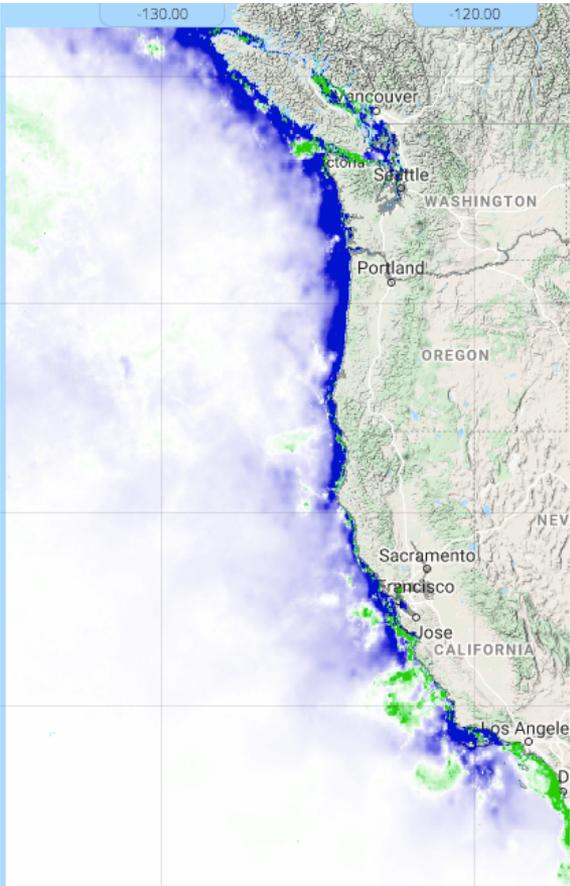
- hypoxia (2 mg/L)
- biological stress (5 mg/L)
- Twanoh (South Hood Canal), 10-Jul-2020 12:21:59
- Hoodsport (South Hood Canal), 10-Jul-2020 12:20:04
- Dabob Bay (North Hood Canal), 10-Jul-2020 06:21:16
- Hansville (near Admiralty Inlet), 10-Jul-2020 12:23:32
- Carr Inlet (South Sound), 10-Jul-2020 12:16:47
- Point Wells (Main Basin), 10-Jul-2020 12:15:26

# Chlorophyll Anomaly OSU Modis

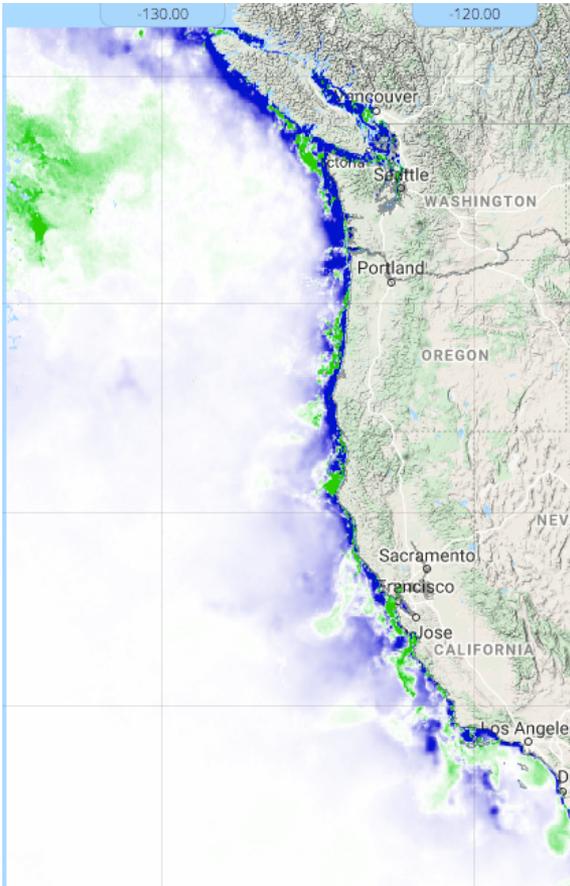
## April 2020



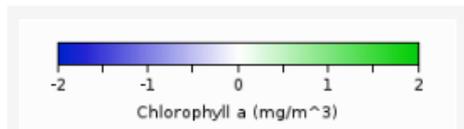
## May 2020



## June 2020

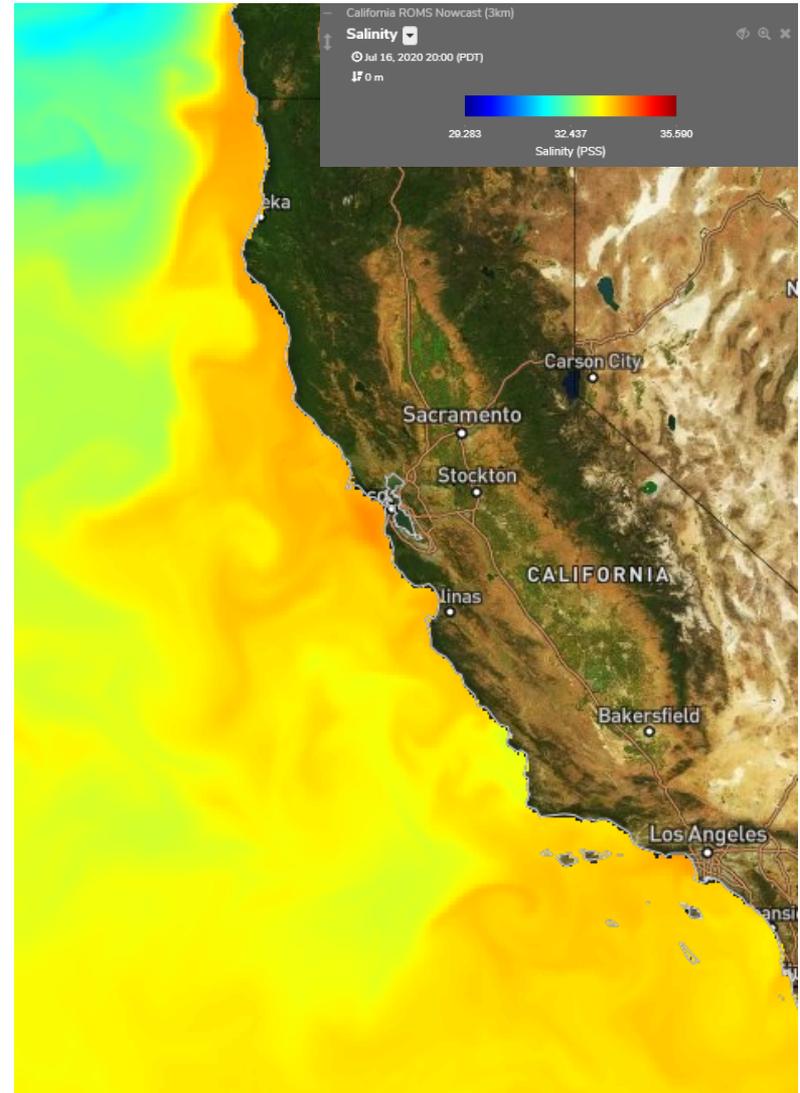
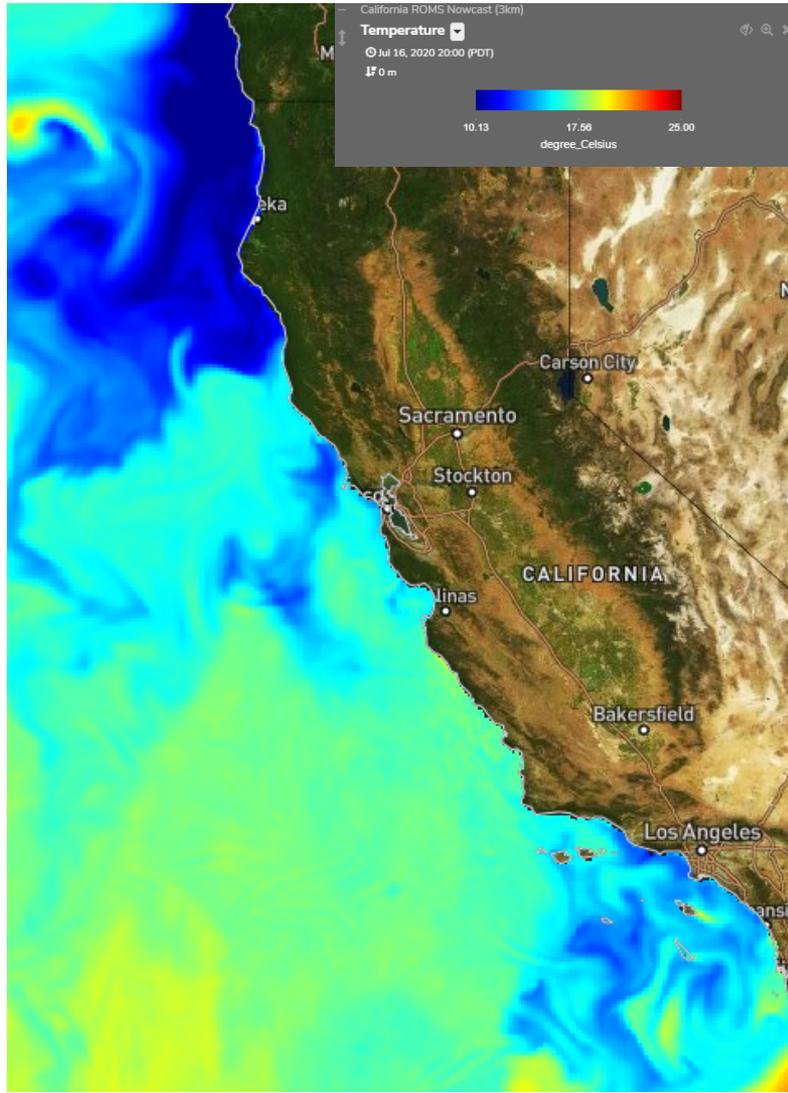


Chlorophyll



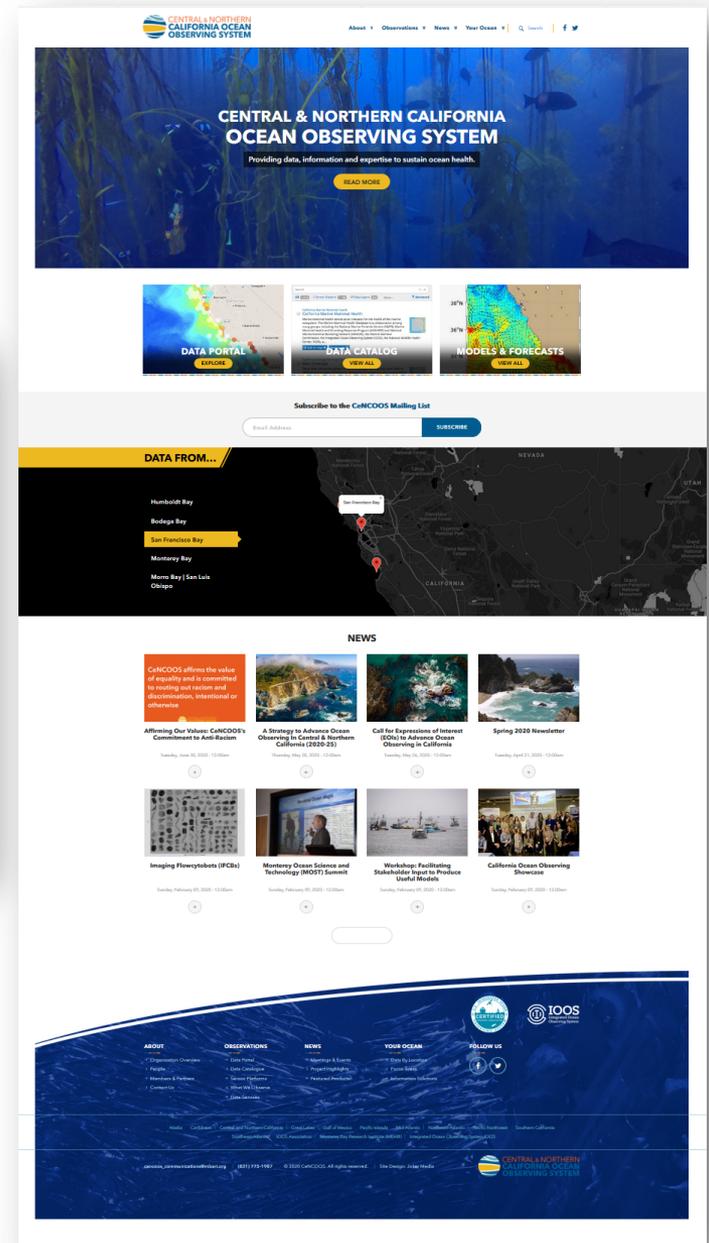
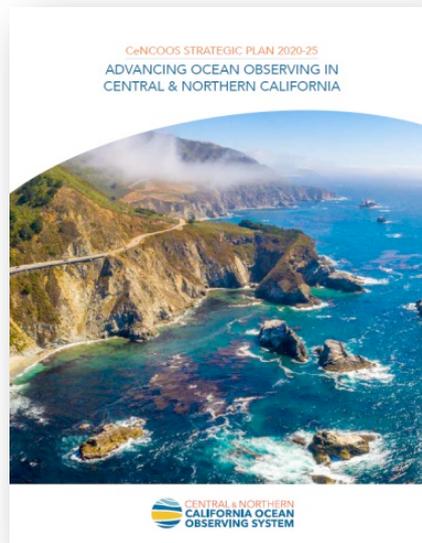
# NOAA West Watch Update

July 2020



# Operations under COVID-19

- Most Datastreams either uninterrupted or have restarted after spring hiatus
- Ongoing servicing issues at small number of stations and the Trinidad Head glider line
- Working with delivery partners to understand impacts and improve resilience
- *Draft* CeNCOOS Strategic Plan 2020-25
- New website: [www.cencoos.org](http://www.cencoos.org)

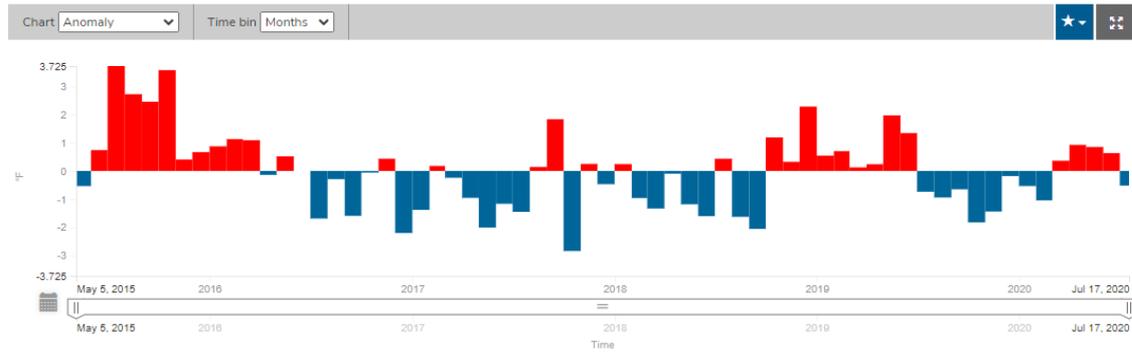


# Temp Anomaly: Moorings

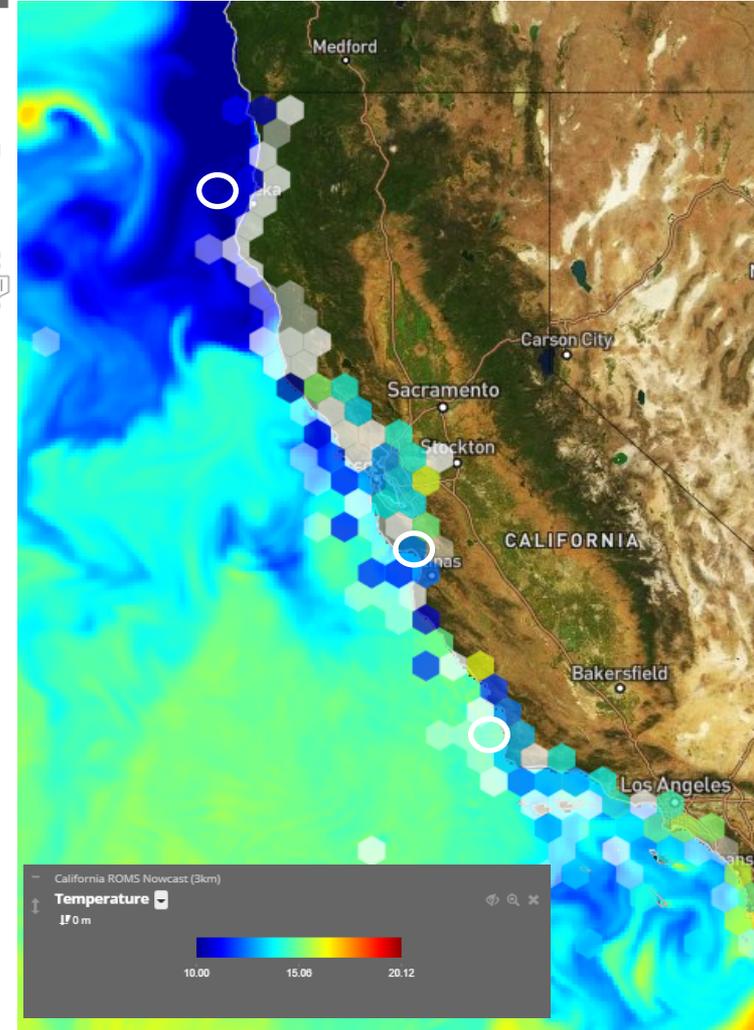
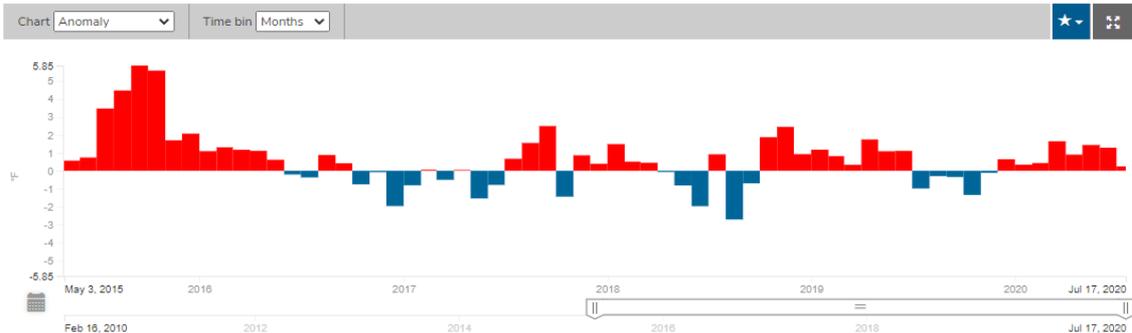
46022 - EEL RIVER - 17NM WSW of Eureka, CA



M1 MBARI

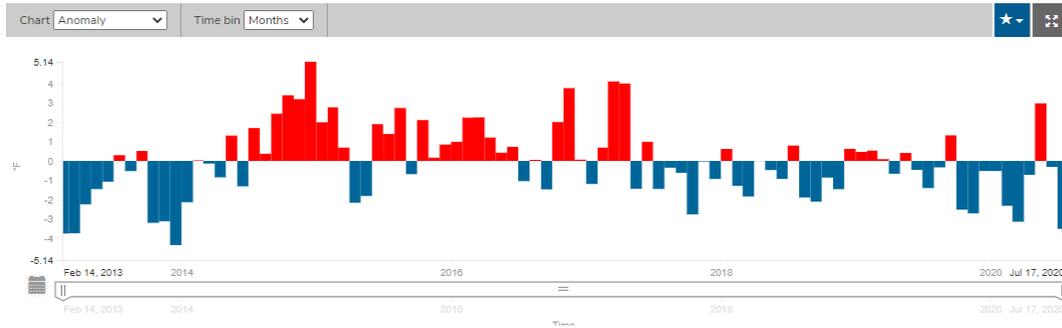


Santa Maria - 21 NM NW of Point Arguello, CA (46011)

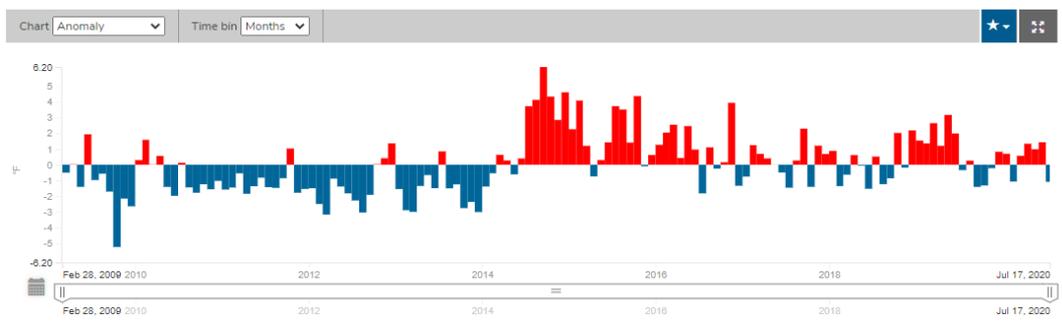


# Temp Anomaly: Shore Stations

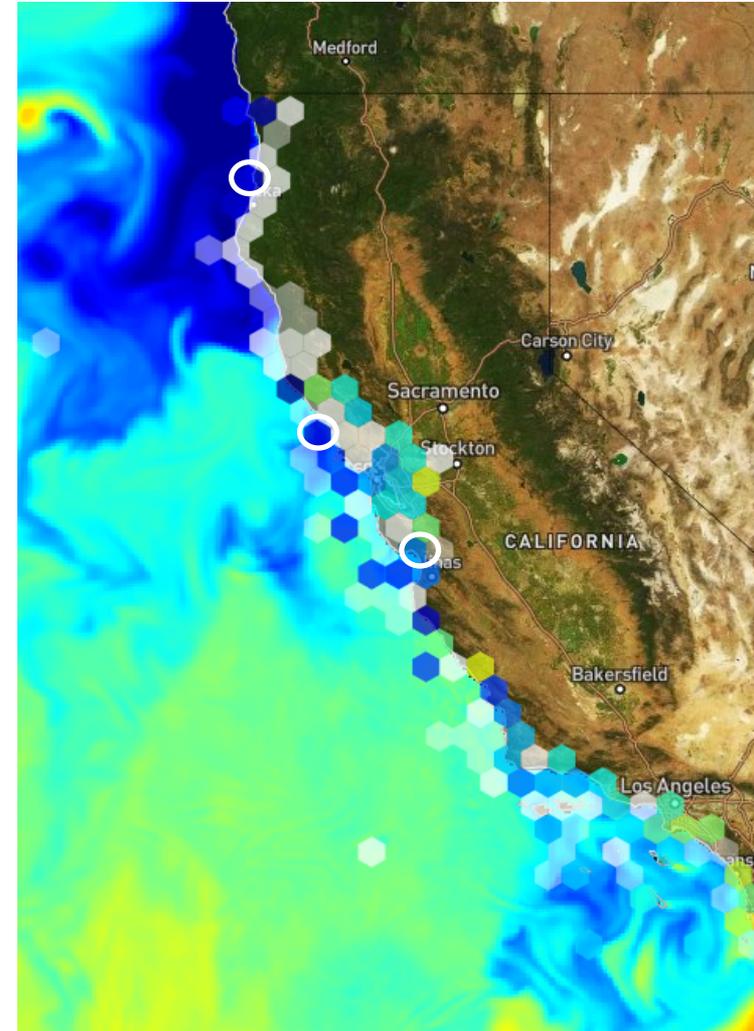
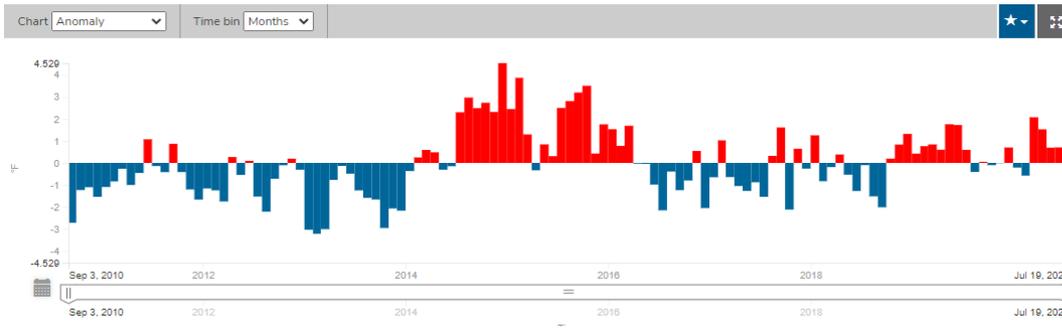
## HSU Trinidad Station



## Bodega Bay (BML\_WTS)



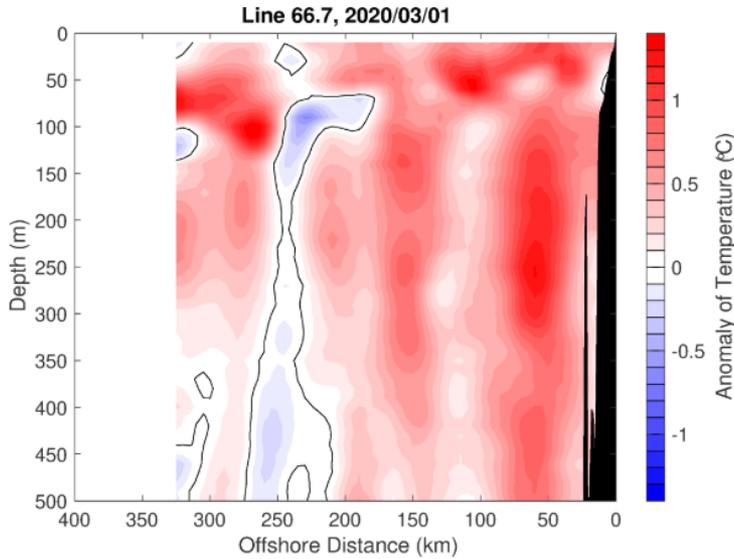
## Moss Landing Marine Laboratories Seawater Intake



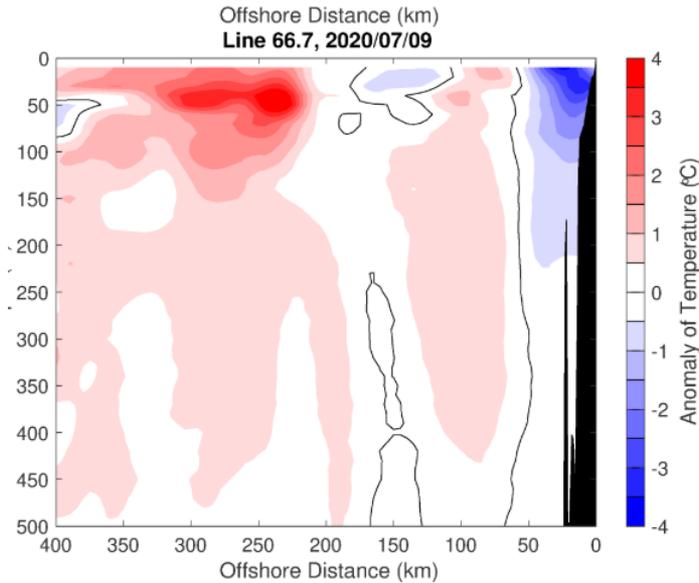
# Temp Anomaly - Monterey Bay Region

## M1 mooring

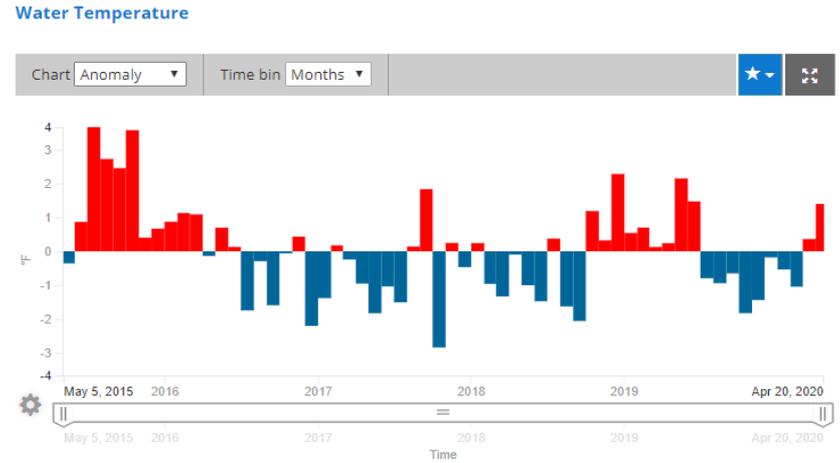
May 2020



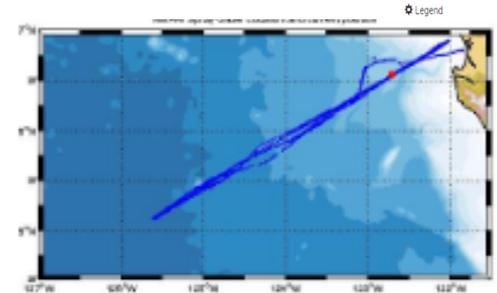
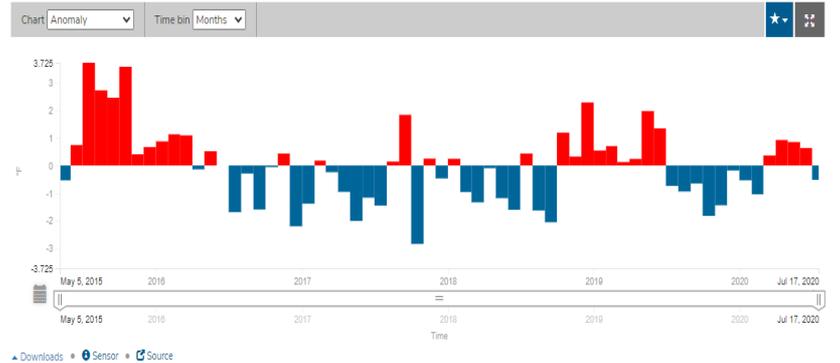
July 2020

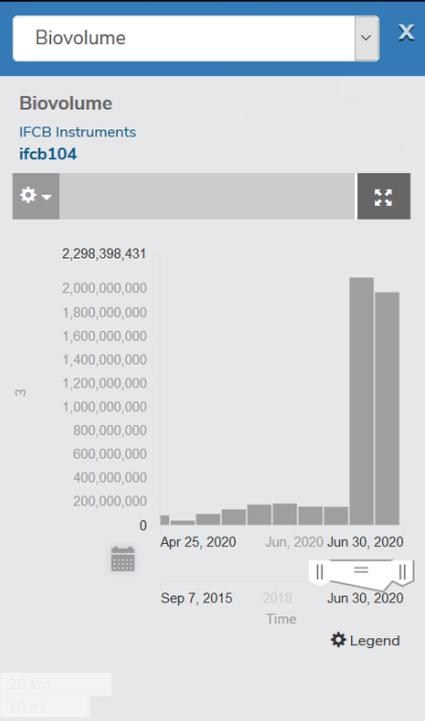
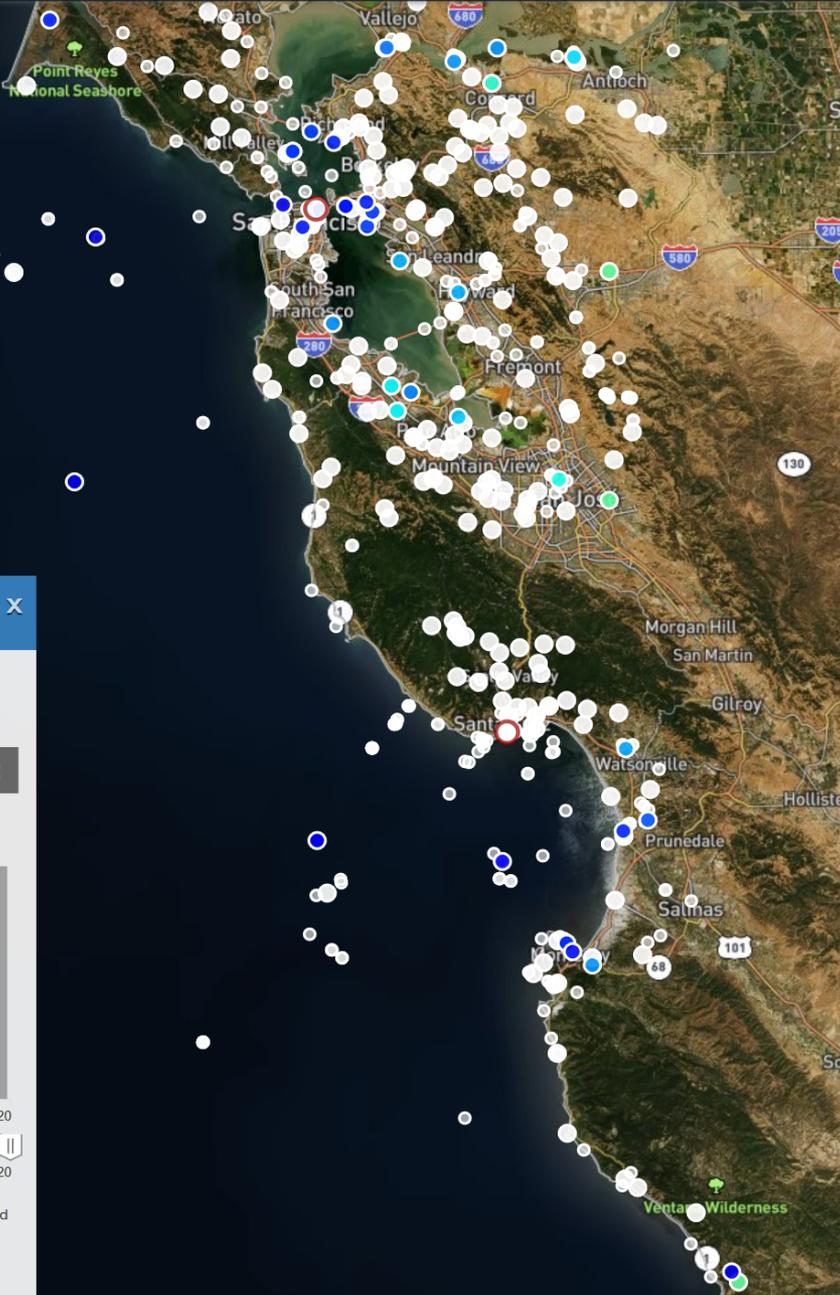


May 2020



July 2020





Data

Time

Depth

**Legend** Find Data

Minimize all Hide all

**IFCB**

IFCB Instruments

Total points: 2 On screen: 2

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**CeNCOOS Historical Sensors**

CeNCOOS Historical Sensors

-3.213 to 3.213 m

52 80 109

Air Temperature (°F)

Variable types

All

Show all

Sources

All

Platform

All

Search available sensor stations

+ Advanced

Total points: 1244 On screen: 505

### Imaging Flow Cytobot (IFCB)





# CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

**Thank you**

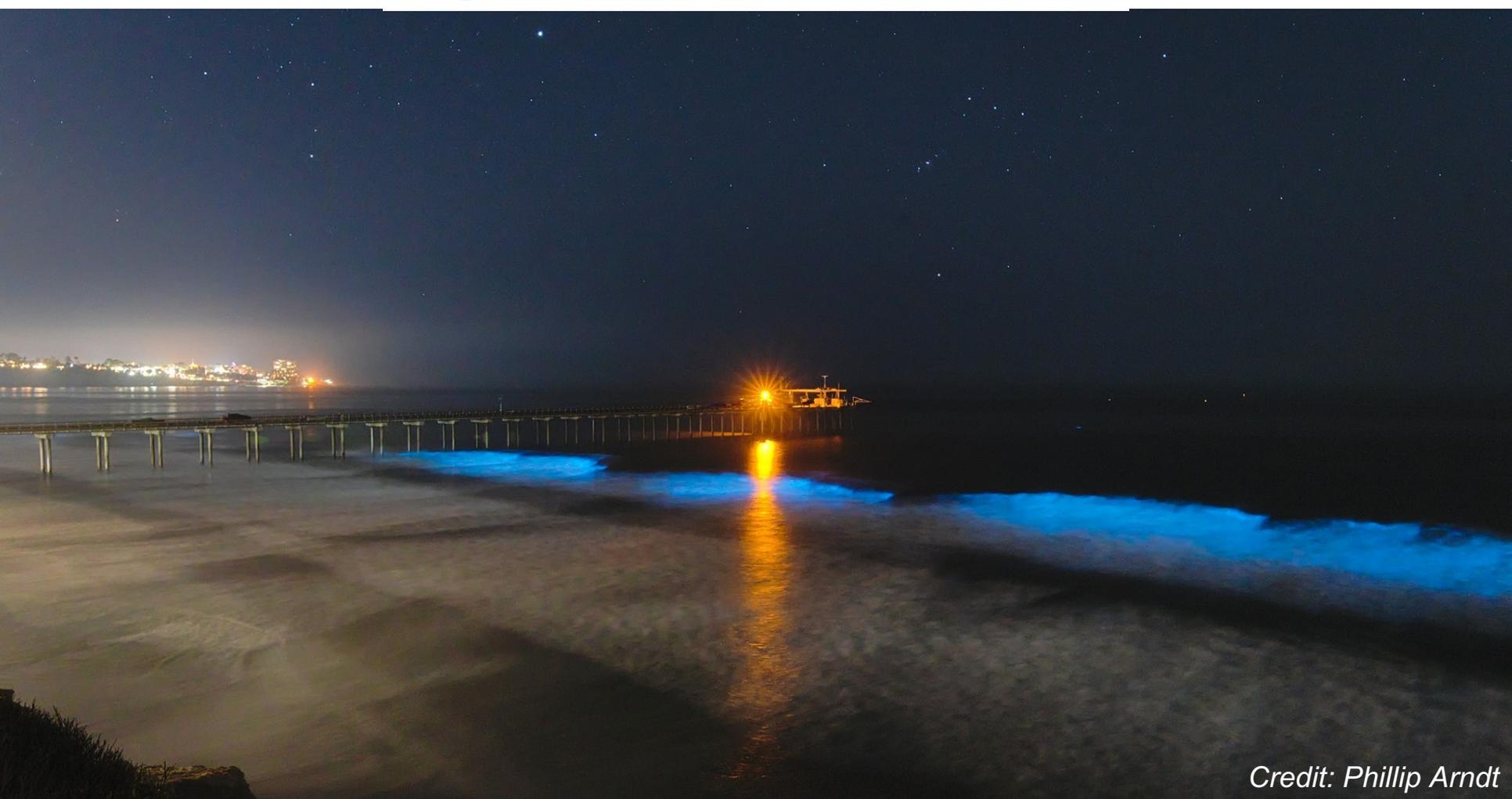
[hruhl@mbari.org](mailto:hruhl@mbari.org)

**NOAA West Watch Update**

July 2020



SOUTHERN CALIFORNIA  
**COASTAL OCEAN**  
**OBSERVING SYSTEM**



*Credit: Phillip Arndt*

## **NOAA West Watch Update: Southern California**

Clarissa Anderson and Megan Medina

21-July 2020

# Red Tide Bulletin: Spring 2020



## Red Tide Bulletin: Spring 2020

Author: Clarissa Anderson, SCCOOS and Megan Hepner-Medina, SCCOOS.

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Updated: May 12<sup>th</sup>, 2020.

*More data may be added to the bulletin as it becomes available.*

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Figure 1-5. (Left to Right) Photos of Bioluminescence captured at Scripps Pier on April 24<sup>th</sup>, 2020 by Phillip Arndt, UCSD/SIO; Blacks Beach by Austin Blair; Newport Beach on April 24<sup>th</sup>, 2020 by Zac Mullings and; La Jolla Shores, April 24<sup>th</sup>, 2020 by Michael Latz, UCSD/SIO.

## Summary:

In late March, a robotic microscope deployed on a mooring that sits on the continental shelf offshore of Del Mar captured images of the early stages of a spring phytoplankton bloom. It was a fairly typical mixture of microalgae for this time of year when upwelling of deeper

## Collaborators:

Carlsbad Aquafarm: Thomas Grimm

CISESE: Ernesto Garcia Mendoza

City of Carlsbad: Bailey Chapman, Hallie Thompson, Tim Murphy,

City of Los Angeles: Mas Dojiri, Curtis Cash, Gregory Deets

City of Oceanside: Justin Gamble

City of San Diego: Adrian Feit, Ryan Kempster

Desert Research Institute: Daniel McEvoy

NOAA: Toby Garfield, Kerri Danil, Joshua Lonhair, Dale Robinson, Richard Stumpf, Alexander Tardy, Michelle Tomlinson, Nick Wegner

SCCWRP: Jayme Smith

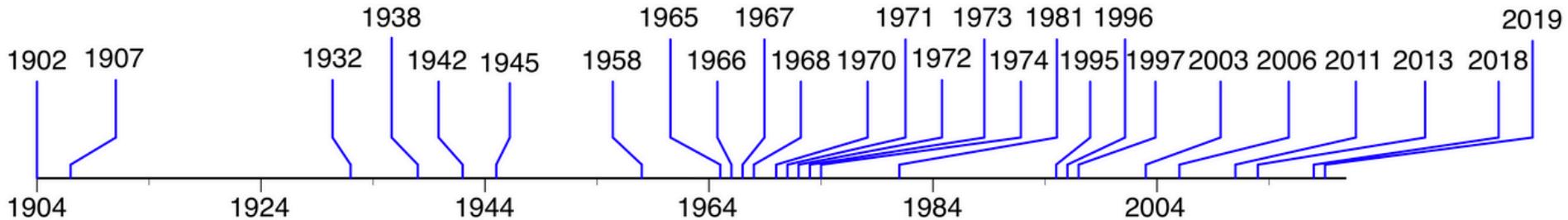
SIO/UCSD: Clarissa Anderson, Lanna Cheng, Samantha Clements, Andrew Barton, James Behrens, Melissa Carter, Jimmy Fumo, Megan Hepner-Medina, Jules Jaffe, Mati Kahru, Adi Khen, Michael Latz, Andrea Meinrat, Eric Orenstein, Daniel Rudnick, Kristi Seech, Uwe Send, Jennifer Smith, Todd Martz, Ross Timmerman, and Amanda Timmerman.

WHOI: Heidi Sosik

Public: Susan Emrich, Gary Cotter

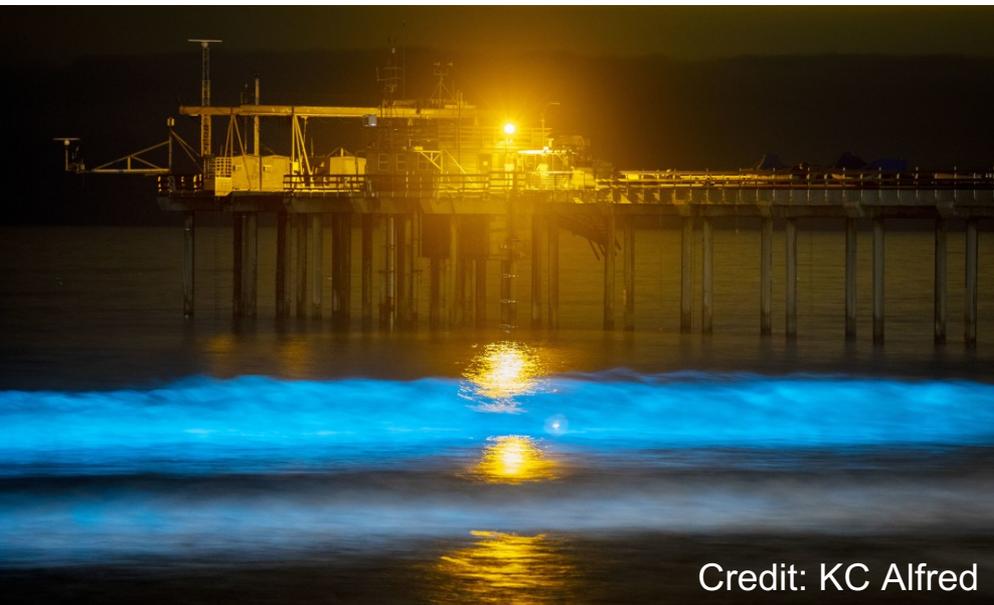
[sccoos.org/california-hab-bulletin/red-tide/](https://sccoos.org/california-hab-bulletin/red-tide/)

# History of Dinoflagellate Blooms

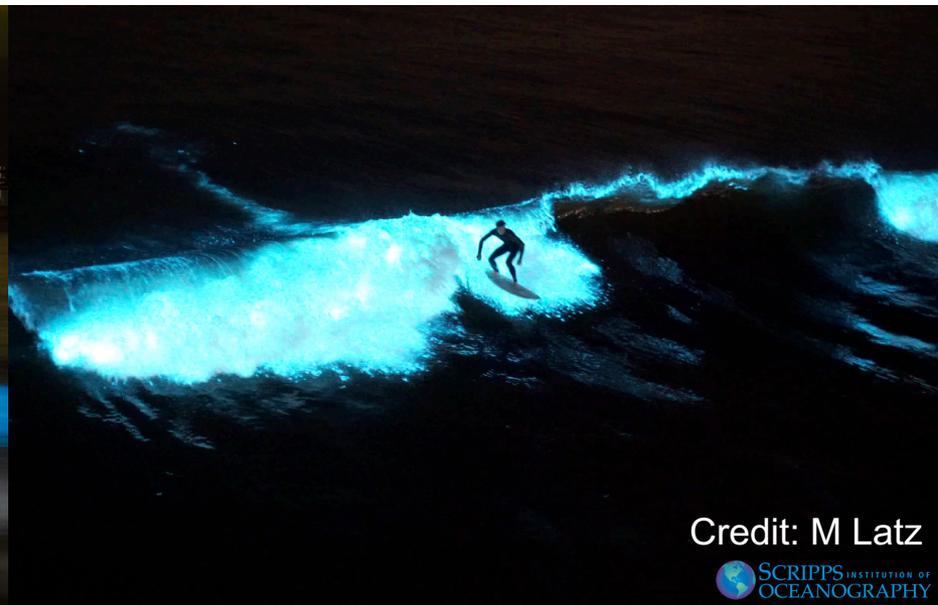


Prof. Michael Latz, SIO

2020 Bloom was 20x larger than the largest bloom on record at SIO



Credit: KC Alfred



Credit: M Latz

# History of Dinoflagellate Blooms

## Scripps Pier Chlorophyll 1983-2020

5 year mean 2008-2013 = 3.09  $\mu\text{g/l}$

Median = 1.58  $\mu\text{g/l}$

Blooms:

2020 – 1,319.20  $\mu\text{g/l}$

1995 – 218.95

2005 – 201.55

1997 – 136.93

2003 – 64.27

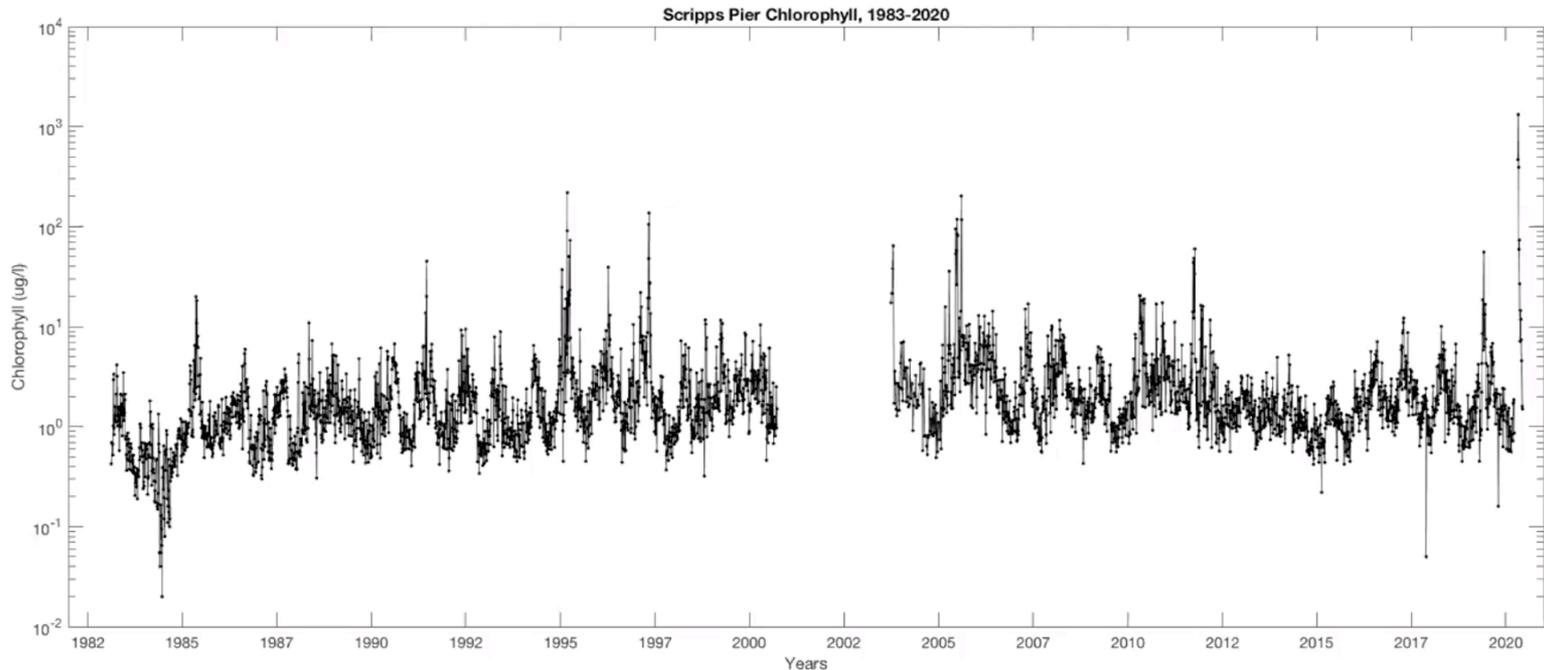
2011 – 59.91

2019 – 55.69

1991 – 45.13

1996 – 39.30

2010 – 20.48

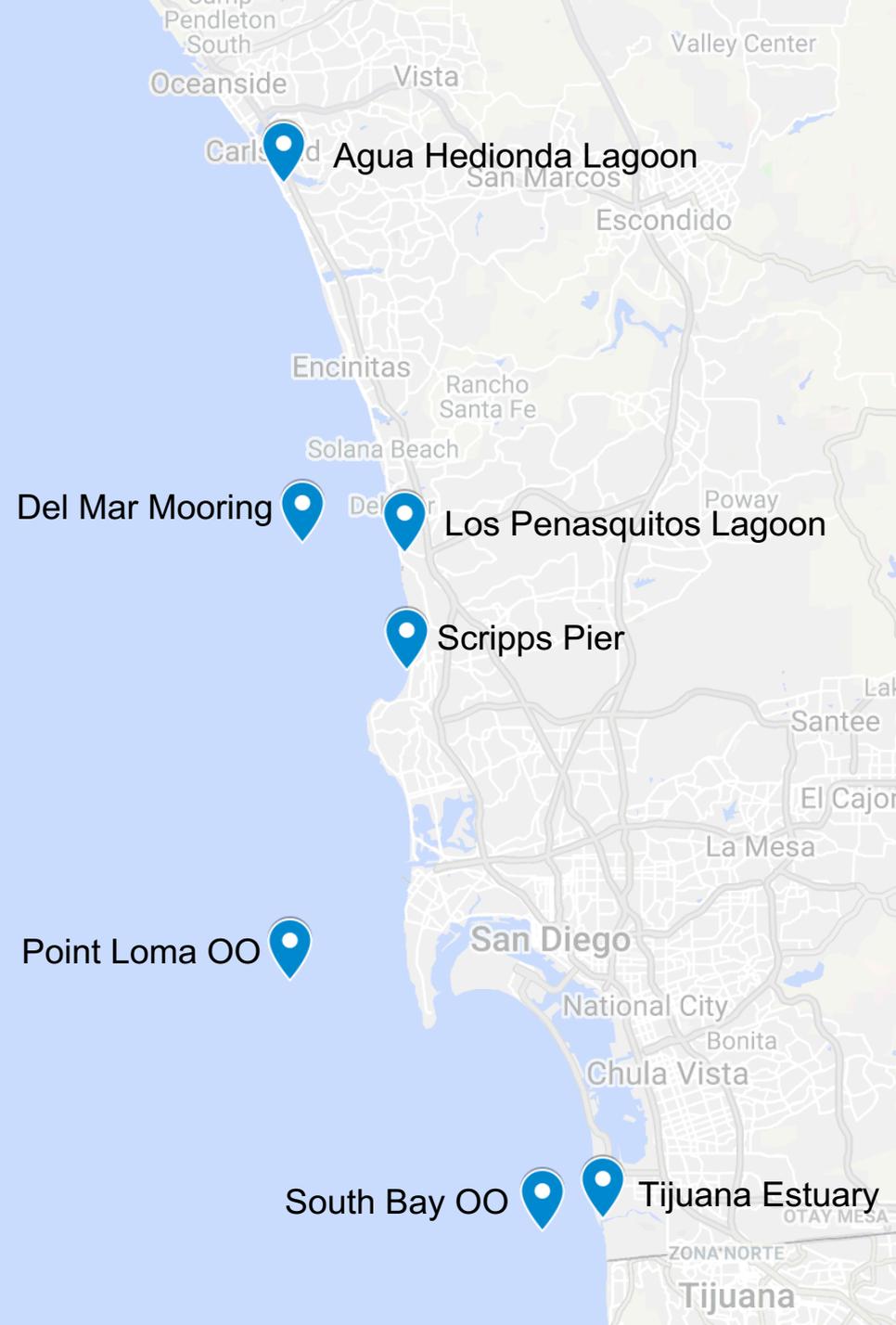


McGowan Chlorophyll Timeseries

2020 Bloom was 20x larger than the largest bloom on record at SIO

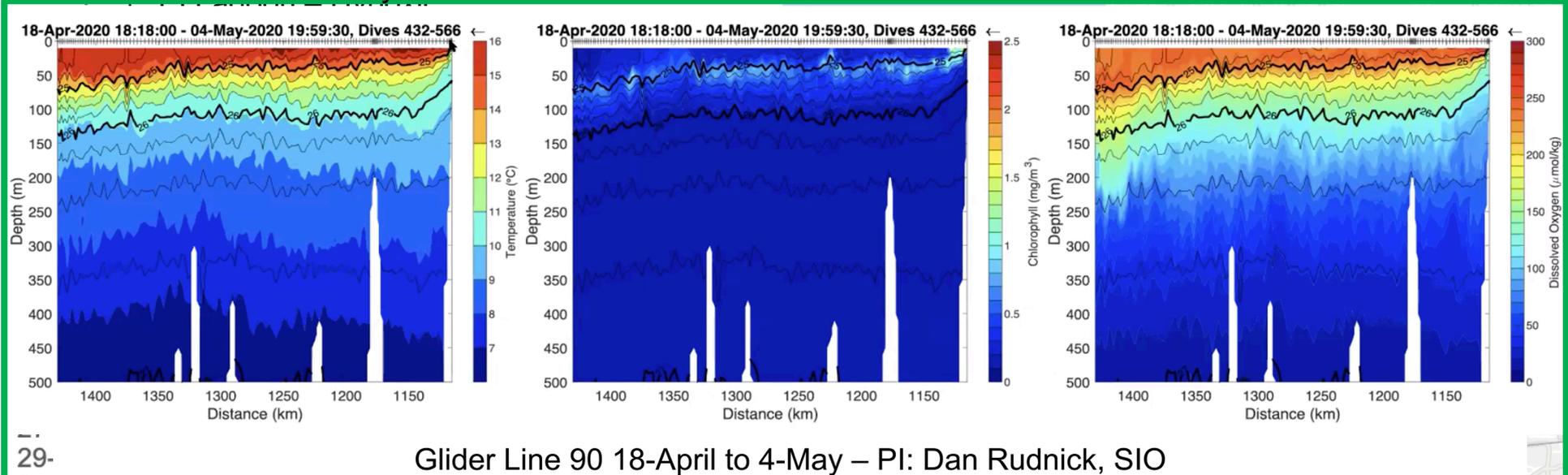
# Bloom Timeline

1-Apr	
3-Apr	
5-Apr	
7-Apr	
9-Apr	Rain Event
11-Apr	Upwelling at coast, Rising Temp, High
13-Apr	Chlorophyll, Low oxygen
15-Apr	
17-Apr	Line 90 – strong thermocline & oxycline
19-Apr	
21-Apr	
23-Apr	
25-Apr	Del Mar Mooring – L. Poly 1000 cells/mL
27-Apr	SIO Pier – L Poly 9M cells/L
29-Apr	TJ Lagoon – Hypoxic
1-May	Los Pen. - Hypoxic
3-May	
5-May	SIO Pier – Low DO, low pH
7-May	
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- 21-Apr
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- 25-Apr SIQ Pier – L. Poly 9M cells/L
- 27-Apr



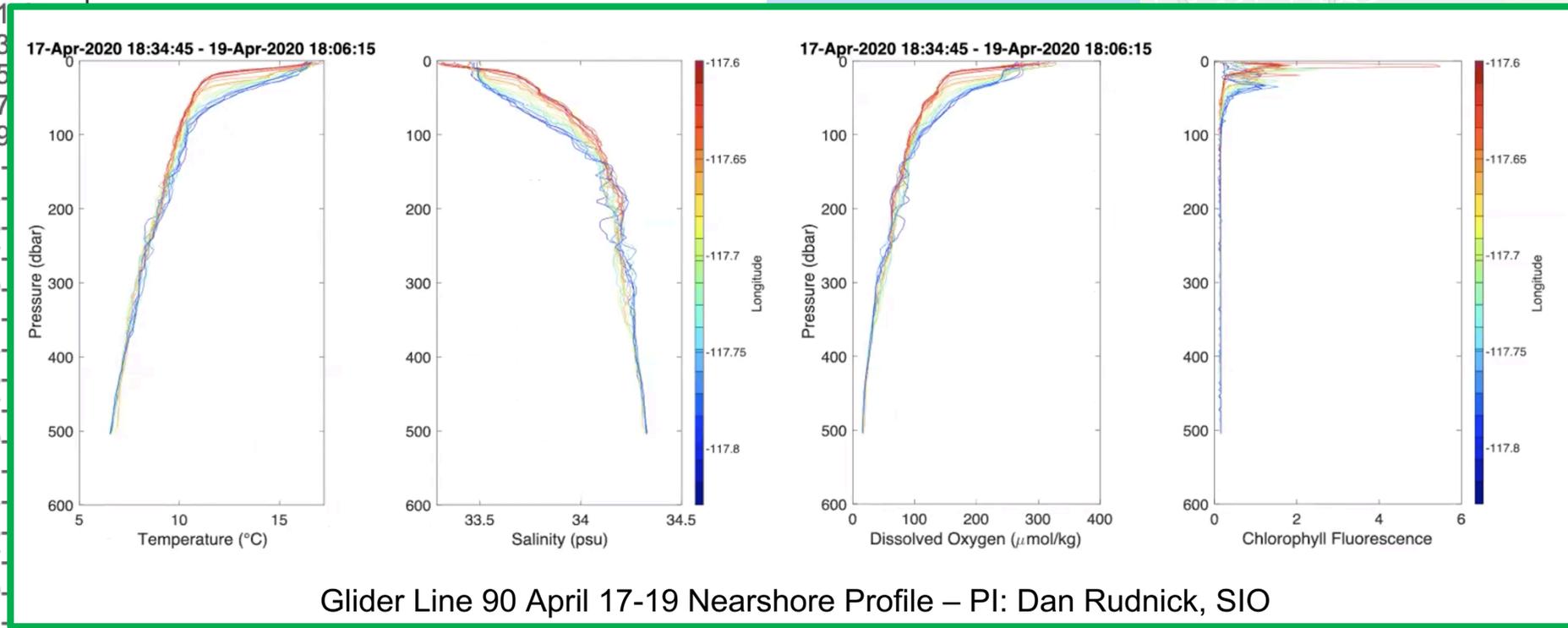
Glider Line 90 18-April to 4-May – PI: Dan Rudnick, SIO

29-  
31-May

Ijuana

# Timeline

- 1-Apr
- 3-Apr
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- 11-Apr Upwelling at coast, Rising Temperatures,
- 13-Apr High Chlorophyll, Low oxygen
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- 1-
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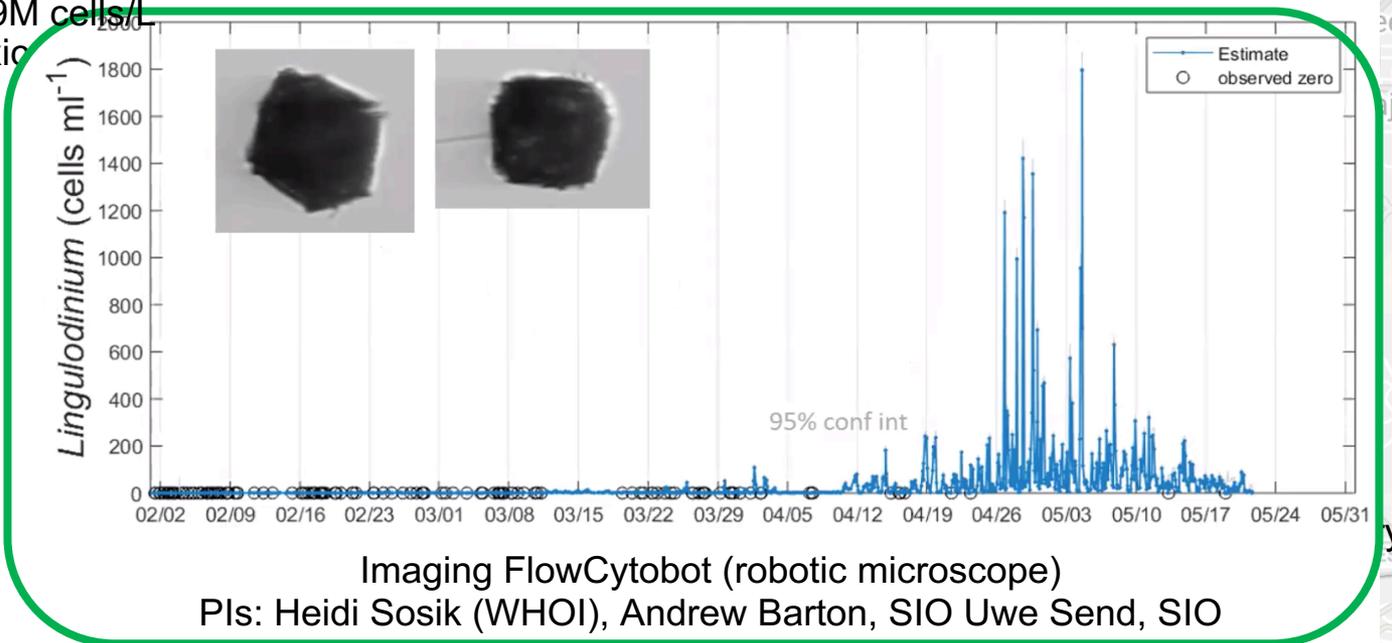


Glider Line 90 April 17-19 Nearshore Profile – PI: Dan Rudnick, SIO

# Timeline



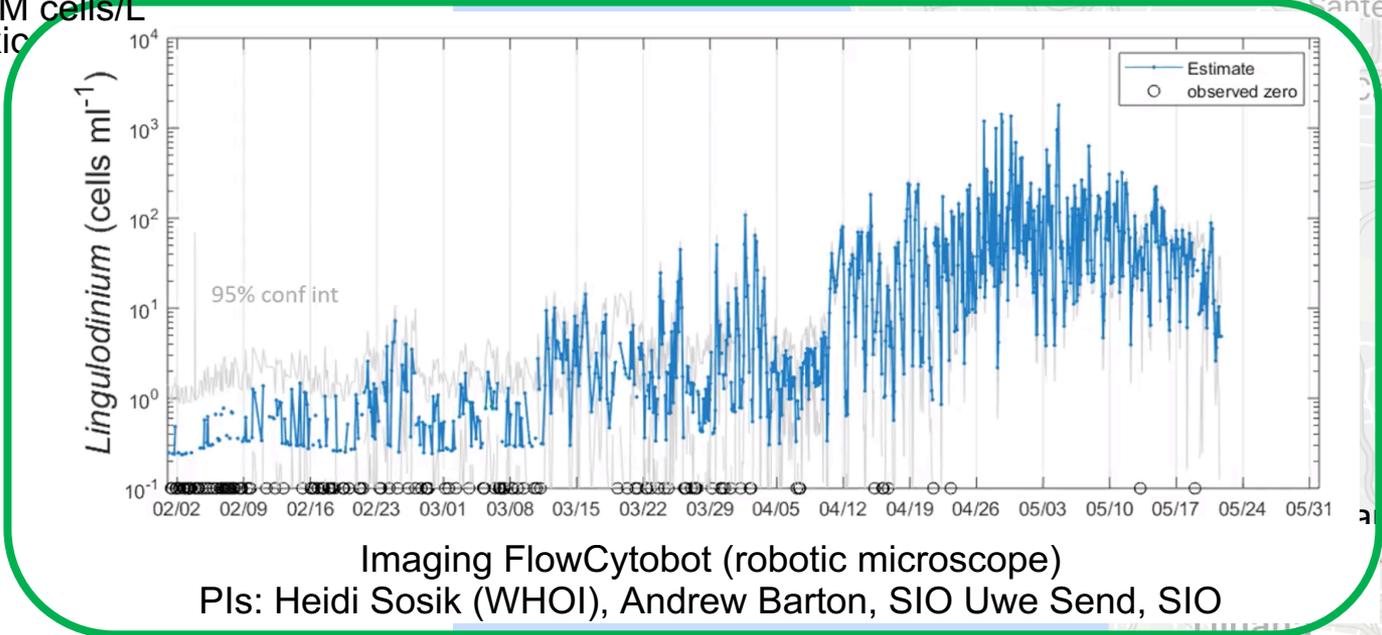
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- 29-Apr TJ Lagoon – Hypoxic
- 1-May Los Pen. - Hypoxic
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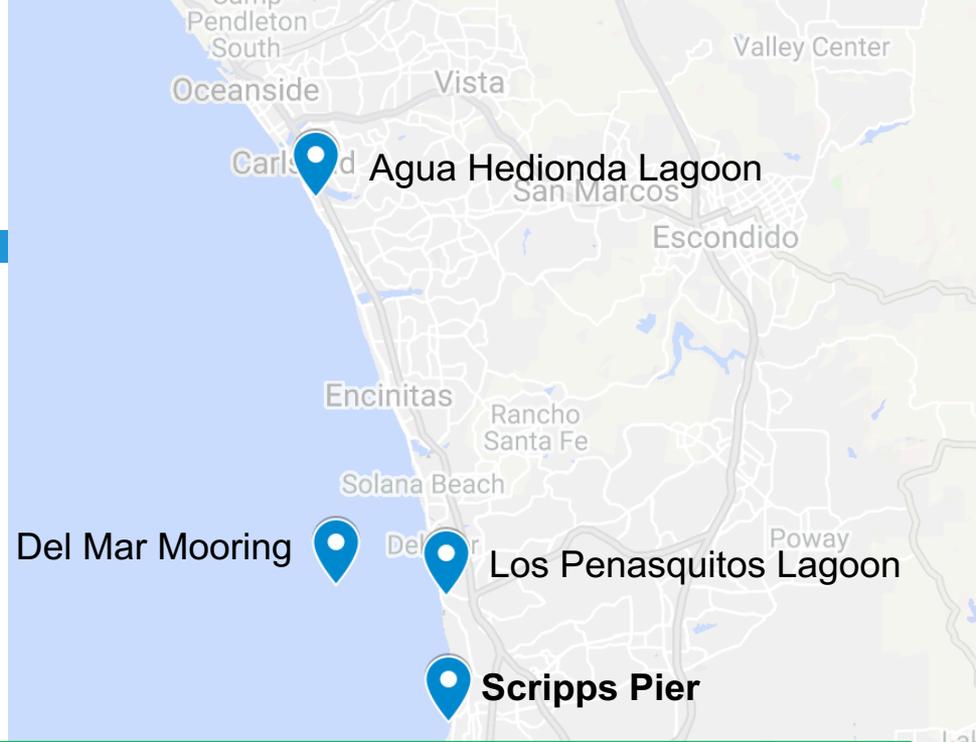


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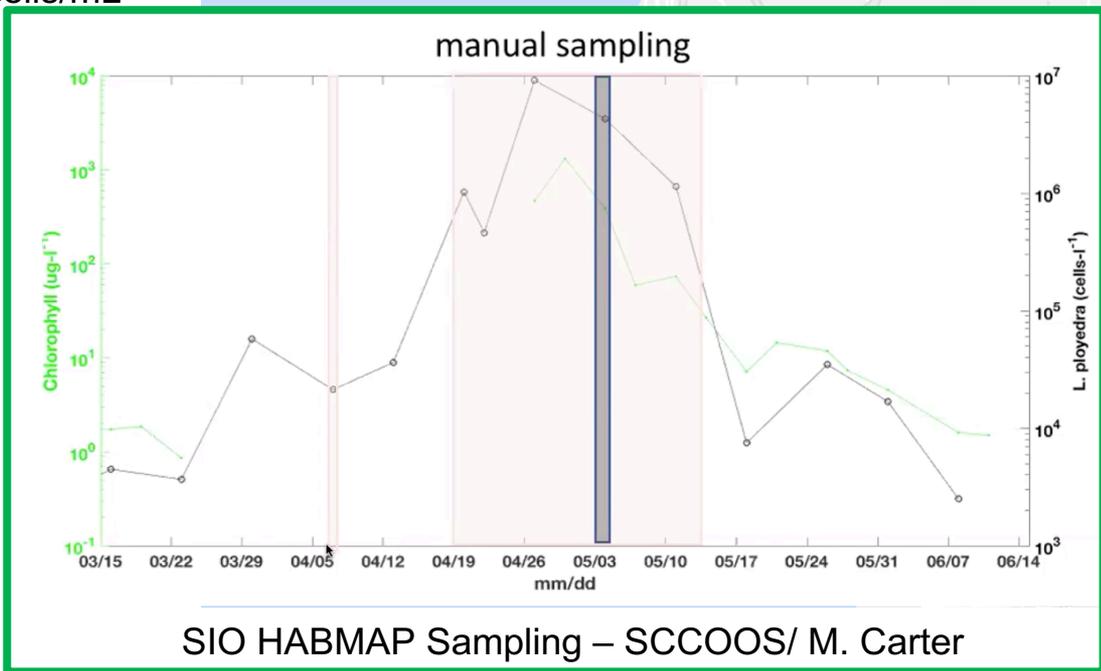


Imaging FlowCytobot (robotic microscope)  
 Pls: Heidi Sosik (WHOI), Andrew Barton, SIO Uwe Send, SIO

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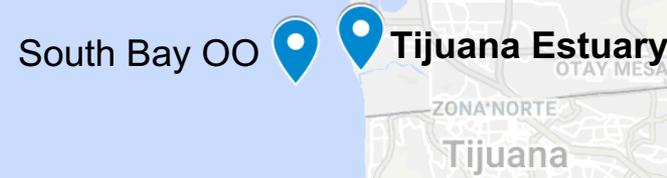
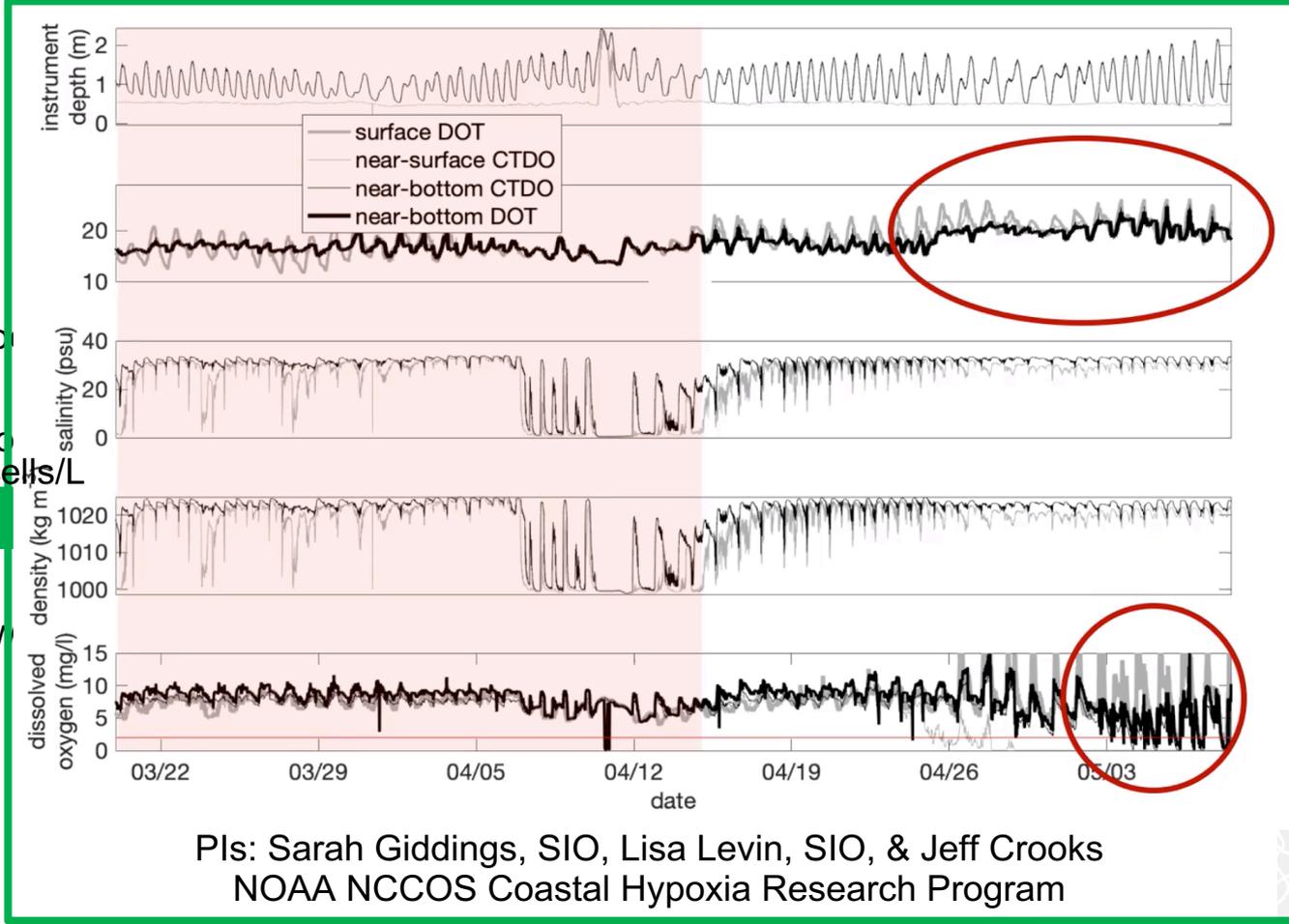


SIO HABMAP Sampling – SCCOOS/ M. Carter

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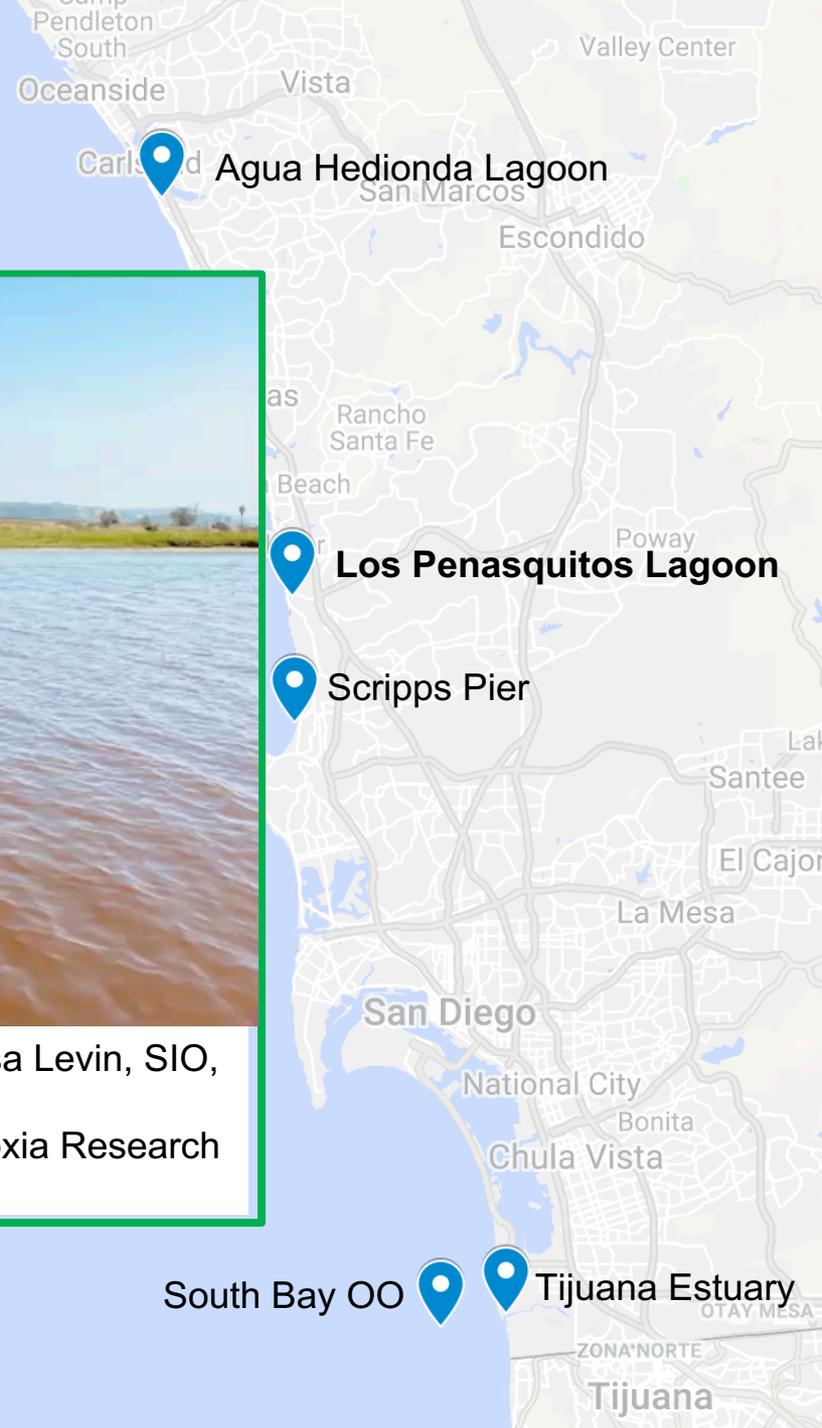


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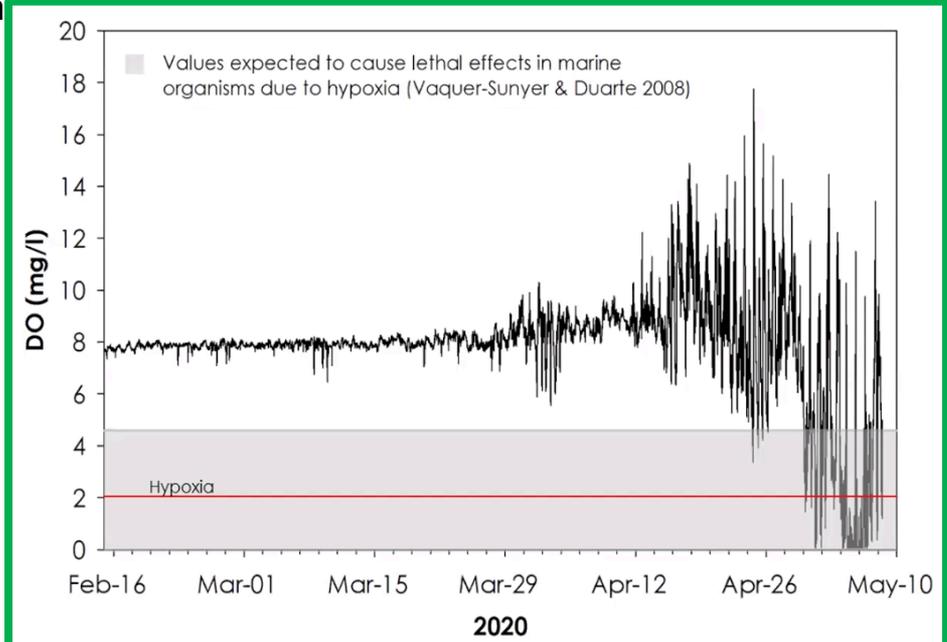
PIs: Sarah Giddings, SIO, Lisa Levin, SIO,  
 & Jeff Crooks  
 NOAA NCCOS Coastal Hypoxia Research  
 Program



# Timeline



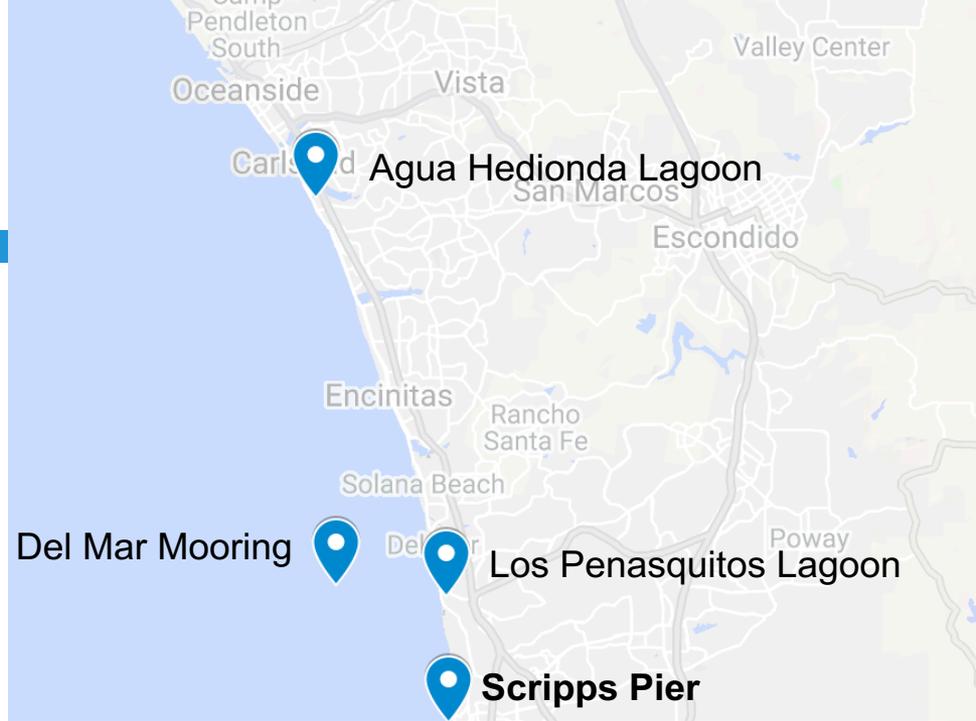
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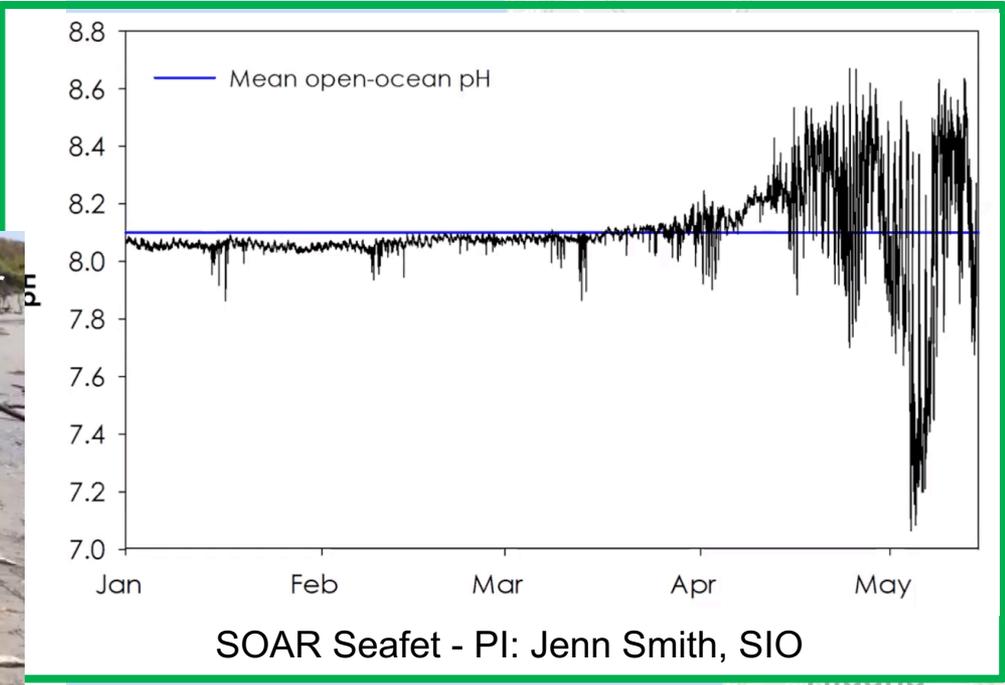
SOAR miniDOT Oxygen Logger - PI: Jenn Smith, SIO

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*Video: Gary Cotter*



SOAR Seafet - PI: Jenn Smith, SIO

# What's Next?

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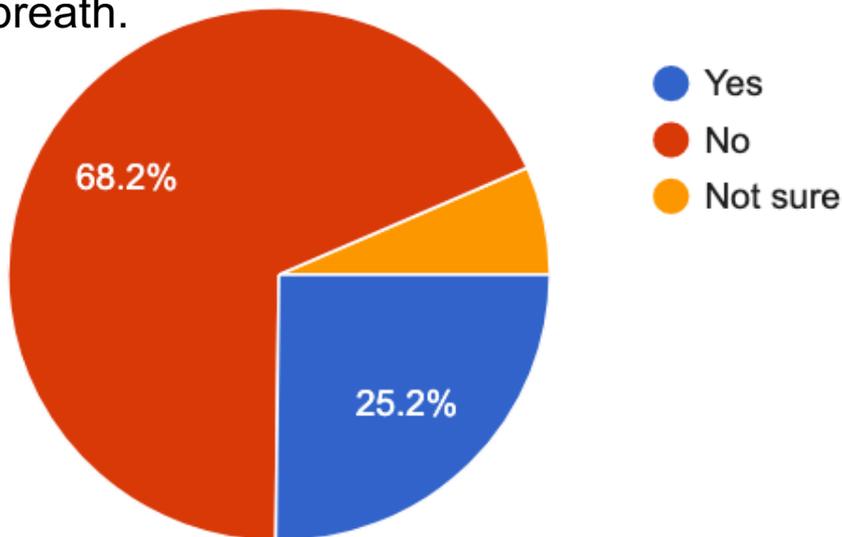
- Emergency event response funding from NOAA NCCOS
- Forensic toxin analysis and genomic studies (Eva Ternon, Bill & Lena Gerwick, Melissa Carter, Andy Allen, C. Anderson)
  - Were toxins present in water samples and/or animal tissue? Were bacterial toxins present?
  - What ultimately caused animal death: low oxygen or high toxin levels or both?
- Chemical analysis of air samples to document potential for exposure to phytoplankton toxins or bloom bi-products through aerosols (Kim Prather, Eva Ternon, Lena Gerwick)
- Conducting surveys with Surfrider to quantify extent of respiratory distress and allergic response in surfer community (Mandy Sackett, Katie Day, Megan Hepner-Medina, Clarissa Anderson)
- Special issue with publications about the bloom (over 30 SIO and UC-wide researchers involved)

# Respiratory Questionnaire

869 Responses Total

- English – 827
- Spanish – 42

Q5: Did you experience any respiratory symptoms after being exposed to the red tide event in Southern California that occurred between March 30, 2020 and May 30, 2020? Respiratory symptoms may include wheezing, coughing, chest tightness, and shortness of breath.



**Did you experience  
respiratory symptoms  
during the recent  
Red Tide event in  
Southern California?**

[Click here to complete  
a short survey.](#)

Photo: Stan Moniz



- 
- **Next webinar: Tuesday, October 20<sup>th</sup> 2020**

**THANK YOU!**