



NOAA West Watch: Reporting Regional Environmental Conditions & Impacts in the West

October 26, 2021



Call Agenda

- Project Background (Dan McEvoy)
- Regional Climate and ENSO brief (Dan McEvoy)
- IOOS Nearshore Conditions brief (Jan Newton, Henry Ruhl, Clarissa Anderson)
- Discussion - Environmental conditions and impacts reporting (All)
 - Additional impacts to share?

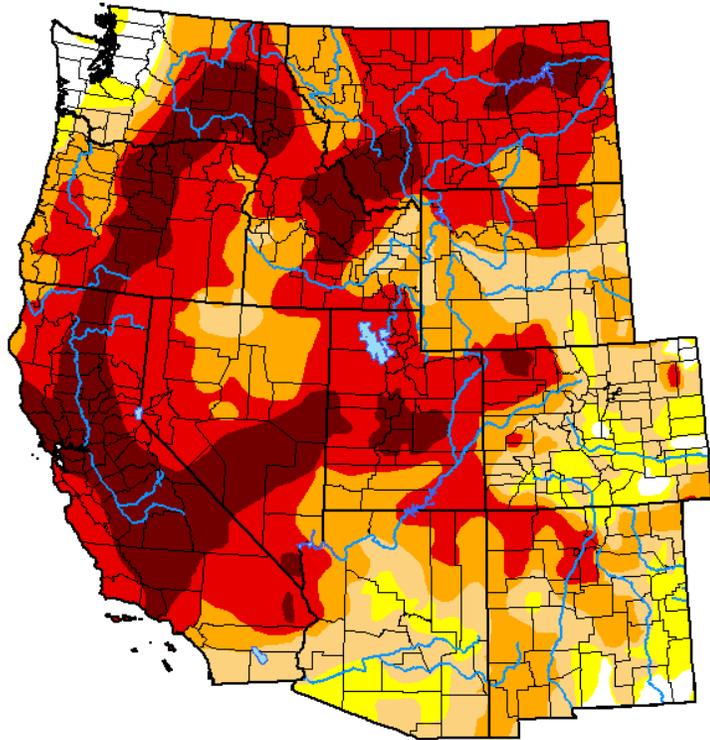
Project Background

- Run by the Western Regional Climate Center, in partnership with the NOAA Western Regional Collaboration Team (NOAA West)
- 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.

Drought expands in some areas; reductions in other areas

U.S. Drought Monitor Western U.S.



October 19, 2021
(Released Thursday, Oct. 21, 2021)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	2.44	97.56	90.09	74.61	51.40	16.94
Last Week <small>10-12-2021</small>	2.57	97.43	90.09	75.39	51.53	17.77
3 Months Ago <small>07-20-2021</small>	5.70	94.30	89.86	79.09	59.51	24.87
Start of Calendar Year <small>12-29-2020</small>	11.57	88.43	78.63	65.18	46.49	22.16
Start of Water Year <small>09-28-2021</small>	2.21	97.79	89.60	75.38	52.46	18.40
One Year Ago <small>10-20-2020</small>	6.93	93.07	78.03	58.06	40.89	6.10

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

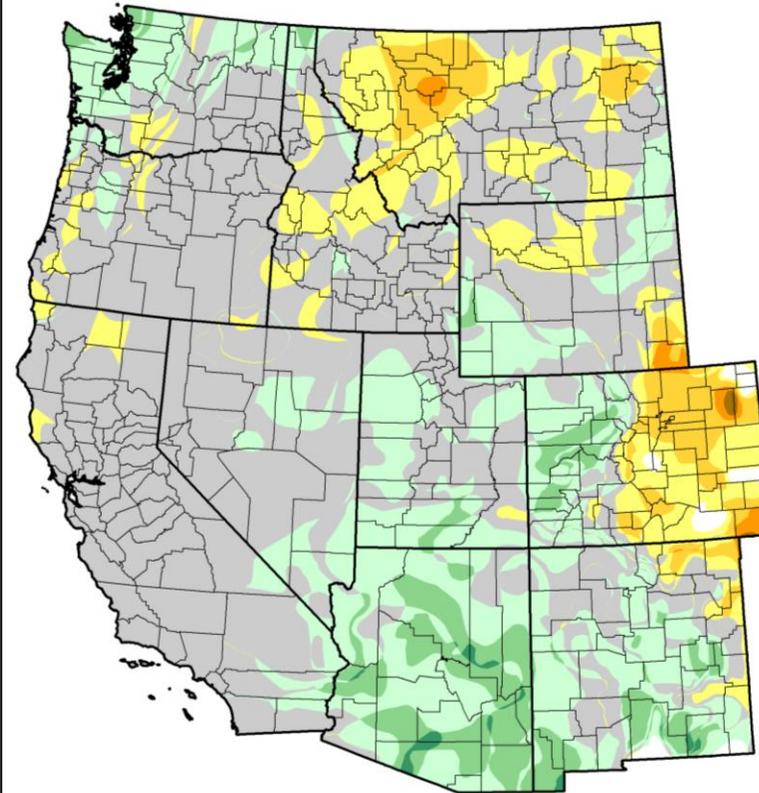
Author:

Brad Pugh
CPC/NOAA



droughtmonitor.unl.edu

U.S. Drought Monitor Class Change - Western U.S. 12 Week



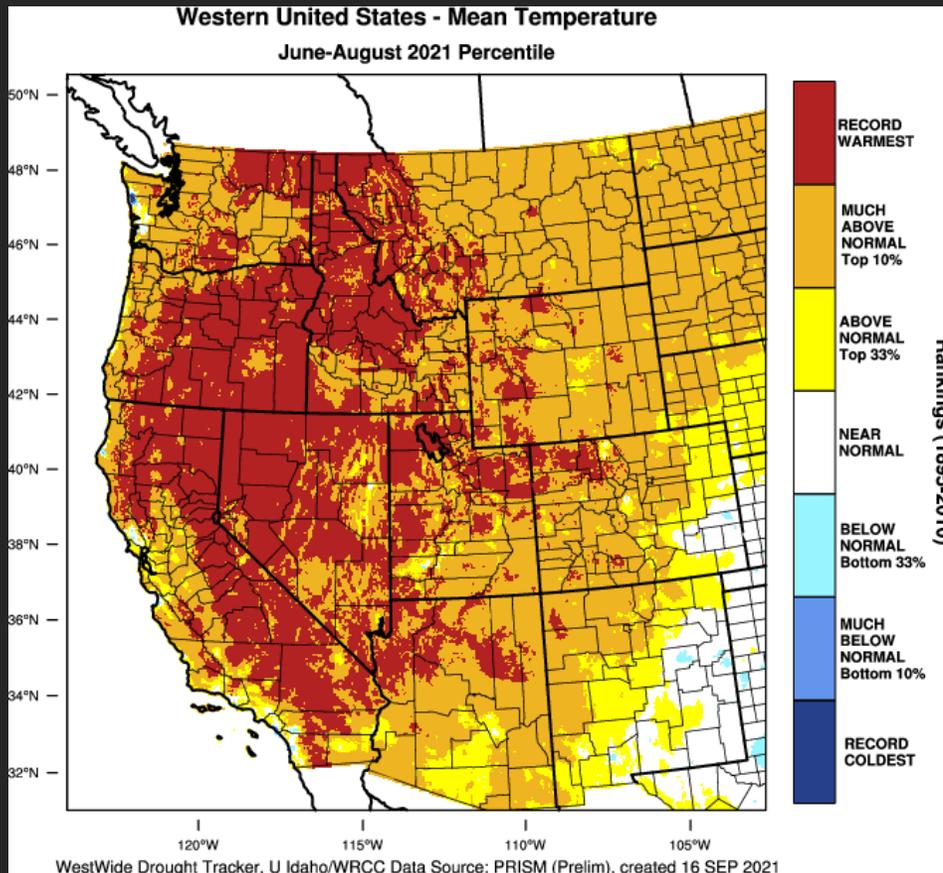
- 5 Class Degradation
- 4 Class Degradation
- 3 Class Degradation
- 2 Class Degradation
- 1 Class Degradation
- No Change
- 1 Class Improvement
- 2 Class Improvement
- 3 Class Improvement
- 4 Class Improvement
- 5 Class Improvement

droughtmonitor.unl.edu

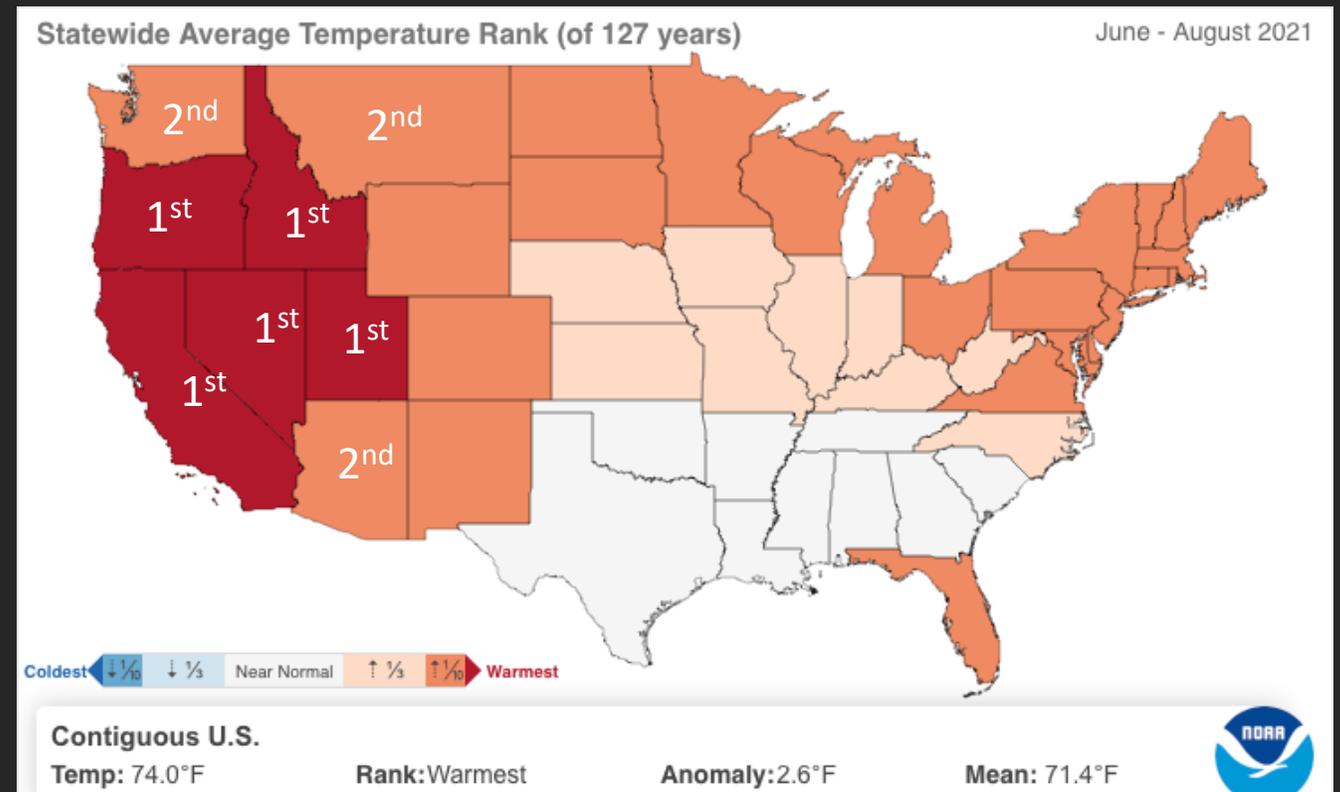
Change from July 27 to October 19, 2021

Scorcher of a Summer

Summer Temperature Percentiles: Gridded Data

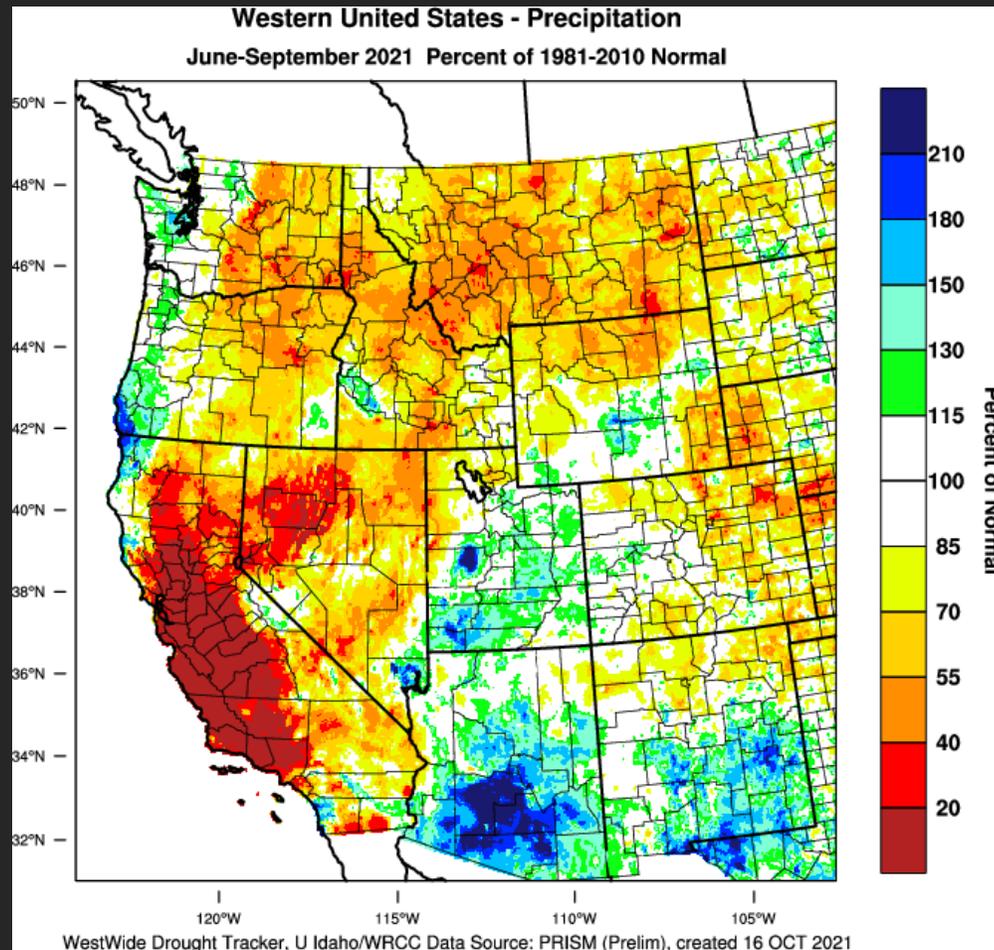


Summer Temperature Statewide Rankings

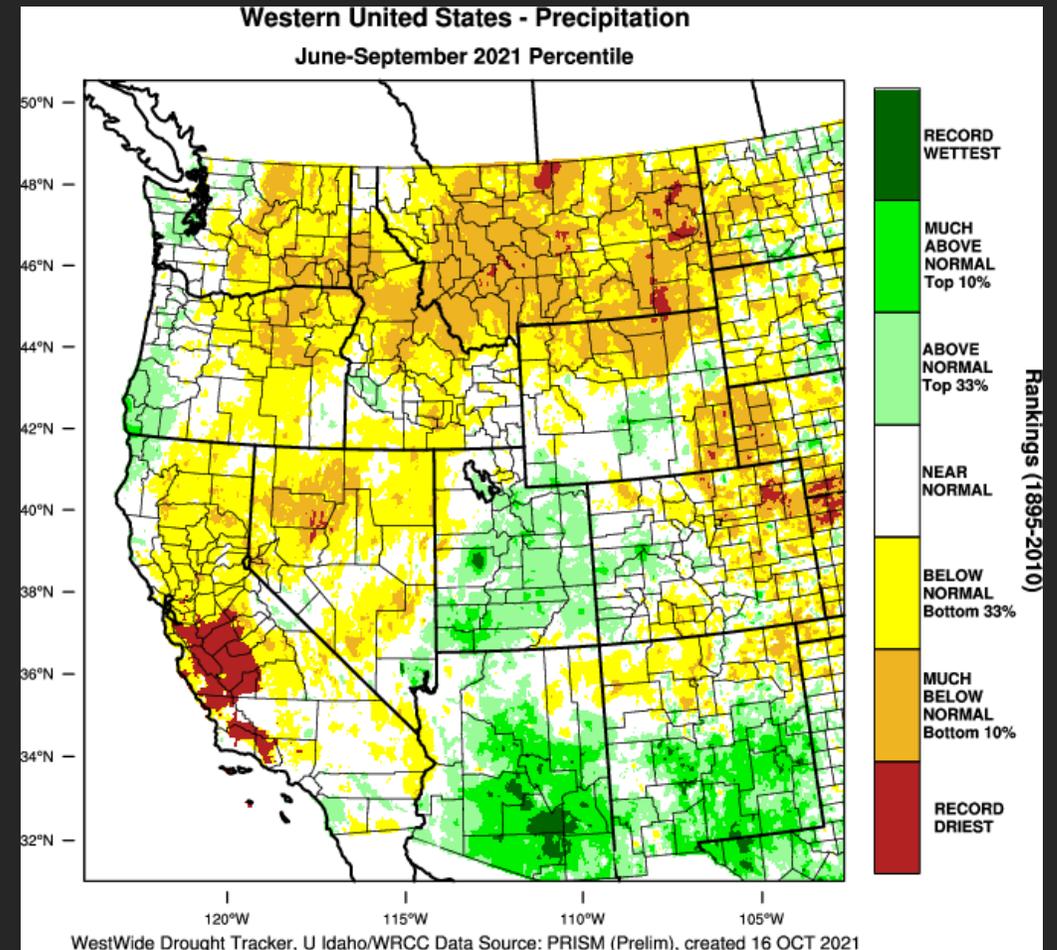


Localized Record Monsoon Rains

June-September % of normal Precipitation



June-September Precipitation Percentile



Vegetation response to Monsoon

MODIS NDVI Percentiles:
August 13-October 11, 2021

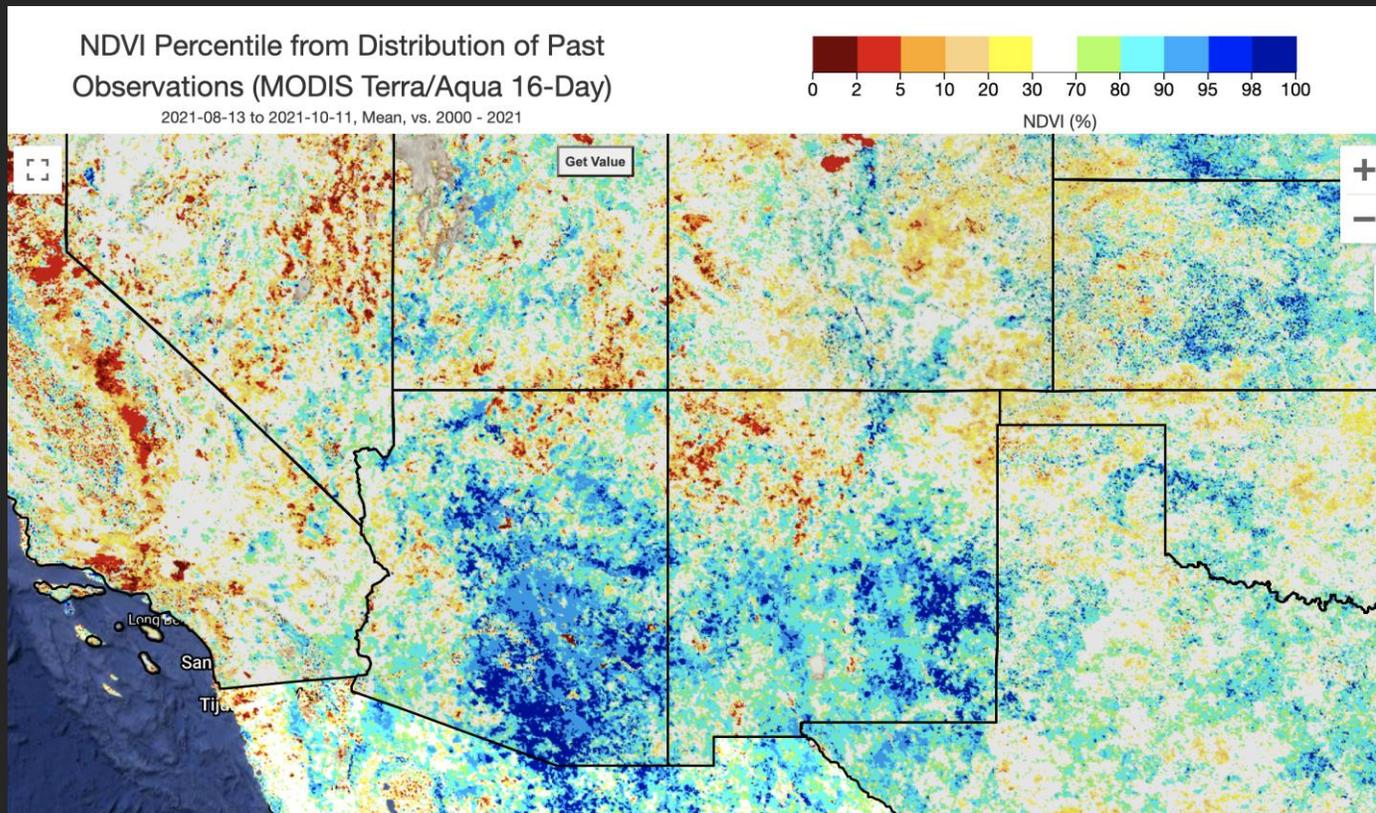


Photo: KGUN9/Joseph CYR

NDVI: Normalized Difference Vegetation Index

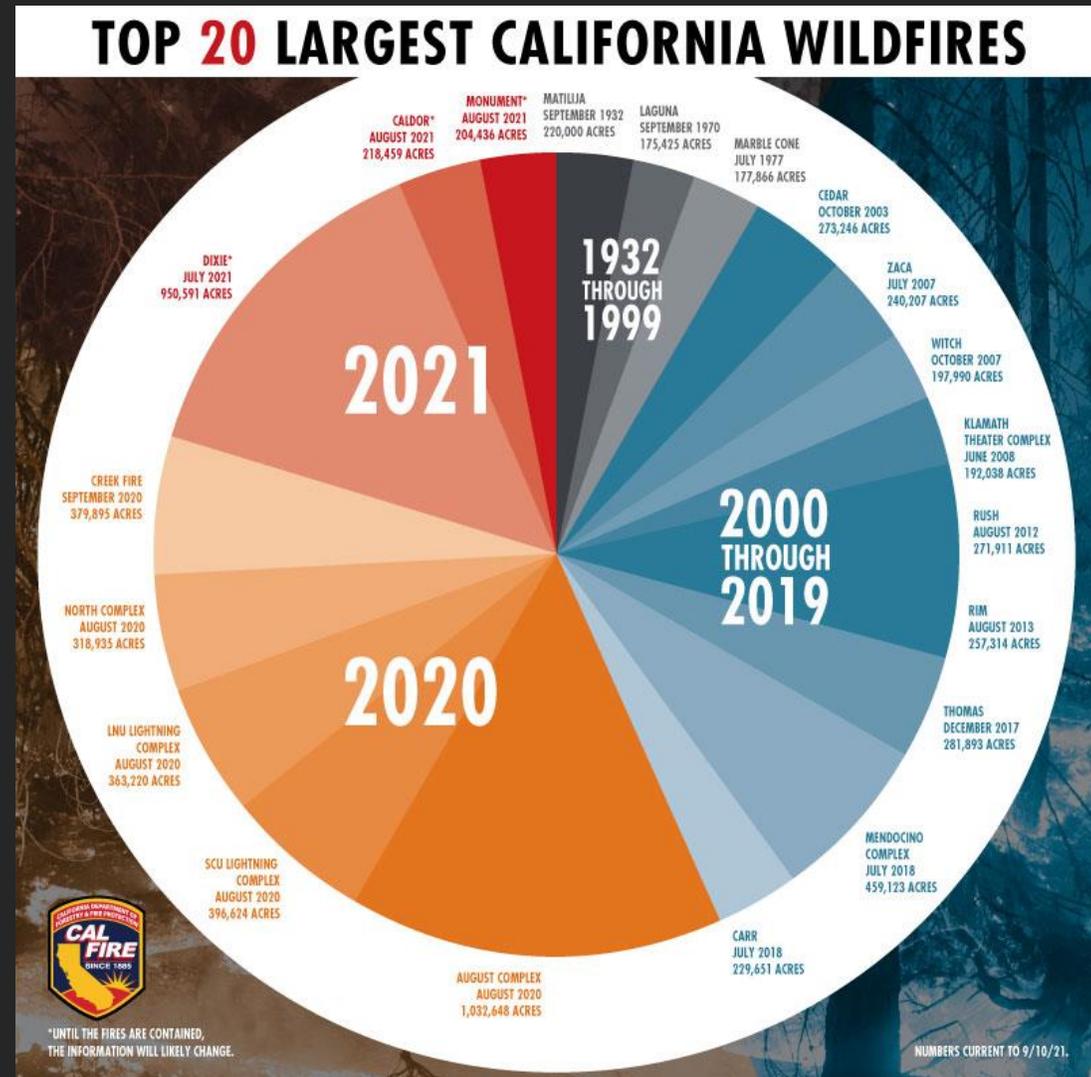
<https://app.climateengine.org/climateEngine>

2021 Fire Season Update

Year-to-date stats:

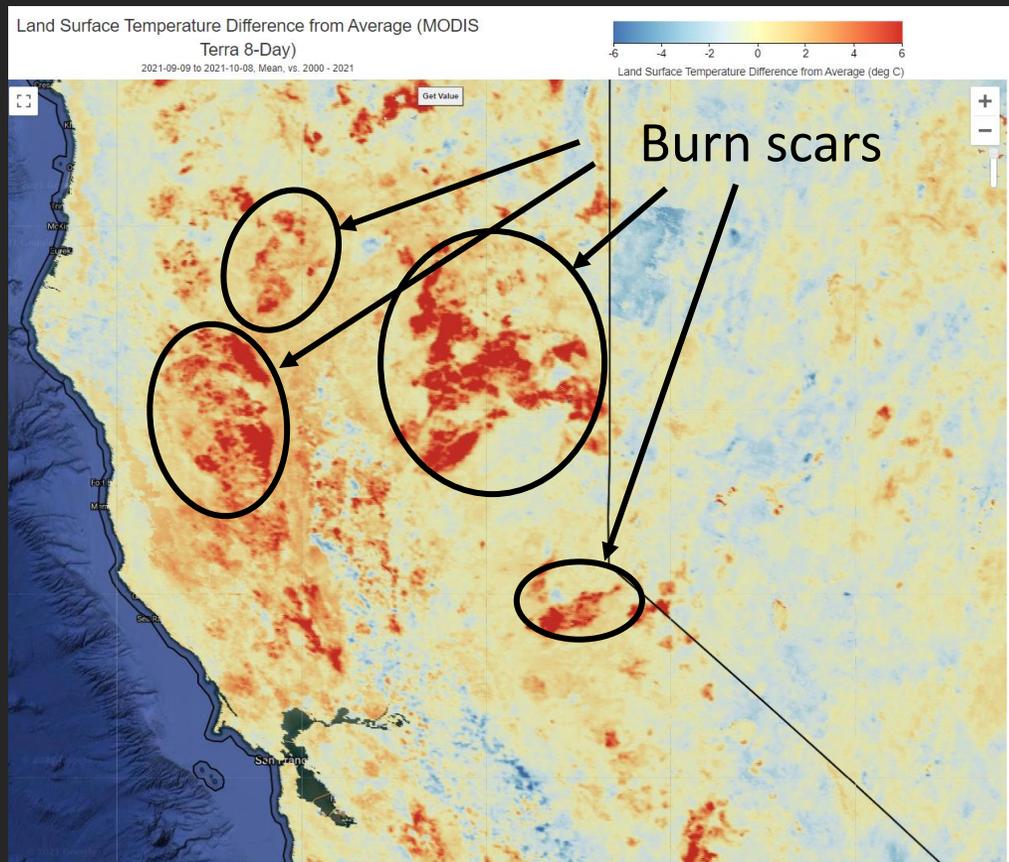
- 2021 # Fires: 47,884
- 2011-2020 average: 49,188
- 2021 acres: 6,515,883
- 2011-2020 average: 6,884,437
- Fire stats from the National Interagency Fire Center

Nationally, # of fires and acres burned below average. Another big year for California despite national numbers.



Big Year (again) for Northern California Fires

MODIS Land Surface Temperature Anomaly:
September 9-October 8, 2021



Flash Flood Watch

Recent Burn Scars

Timing
5 am October 24 through 5 am October 25, 2021

Impacts
Debris flows possible consisting of rock, mud, vegetation and loose materials

Locations Include

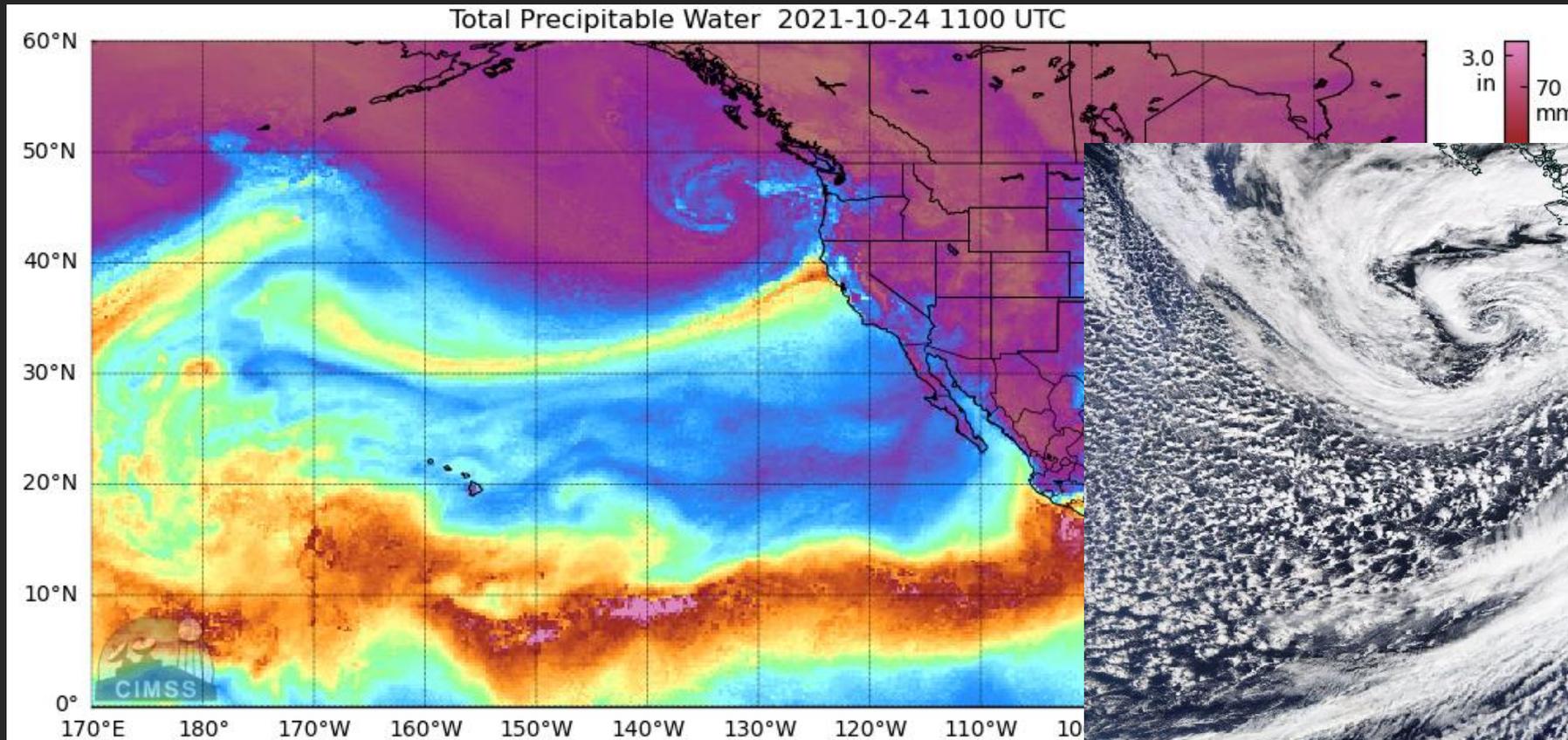
- Delta/Hirz, Salt, Carr, Zogg, McFarland, August, LNU, Dixie, Camp, North, River, and Caldor Fire burn scars

Be prepared to evacuate if told by local officials or if you feel threatened

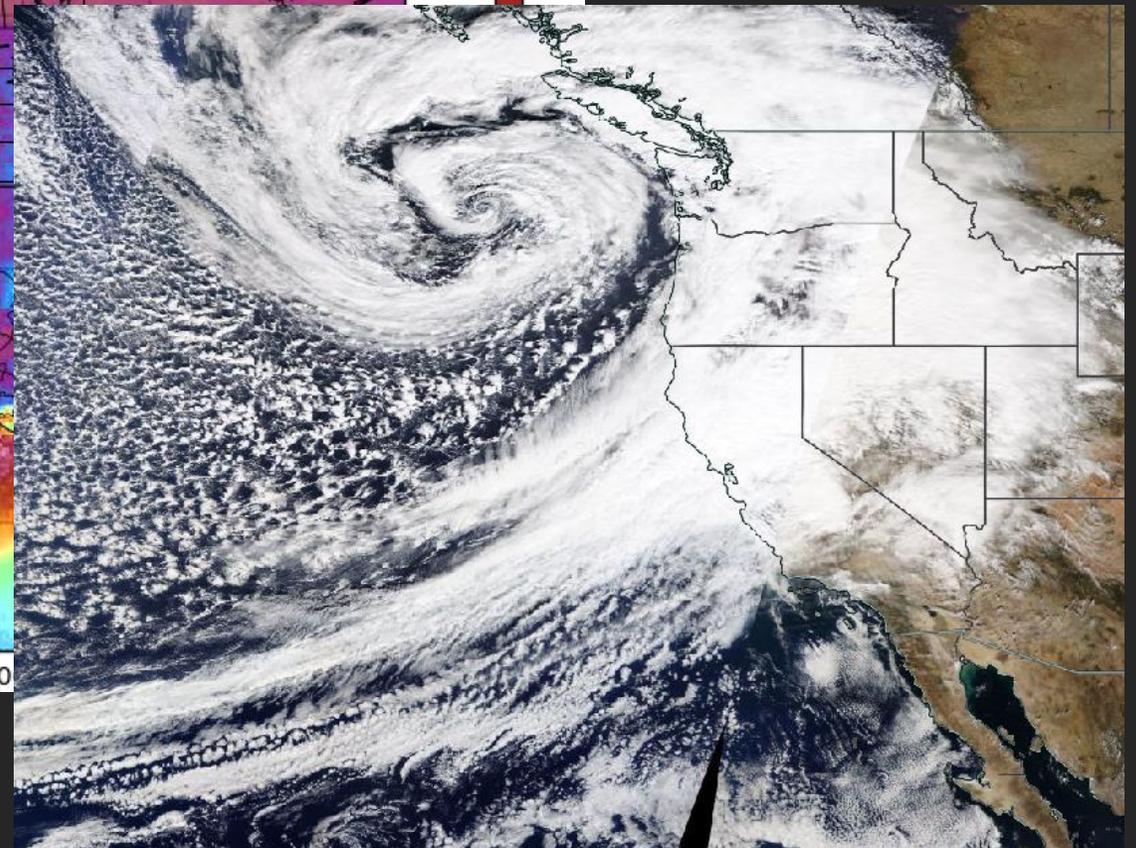
NWS Sacramento
Issued 10/22/2021

The graphic features a map of Northern California with several areas highlighted in green, representing burn scars. These areas are circled in black. The map includes major cities and geographical features. The text on the left provides details about the flash flood watch, including timing, potential impacts, and specific locations affected. A red box highlights the evacuation warning.

Fire Season Ending Atmospheric River?



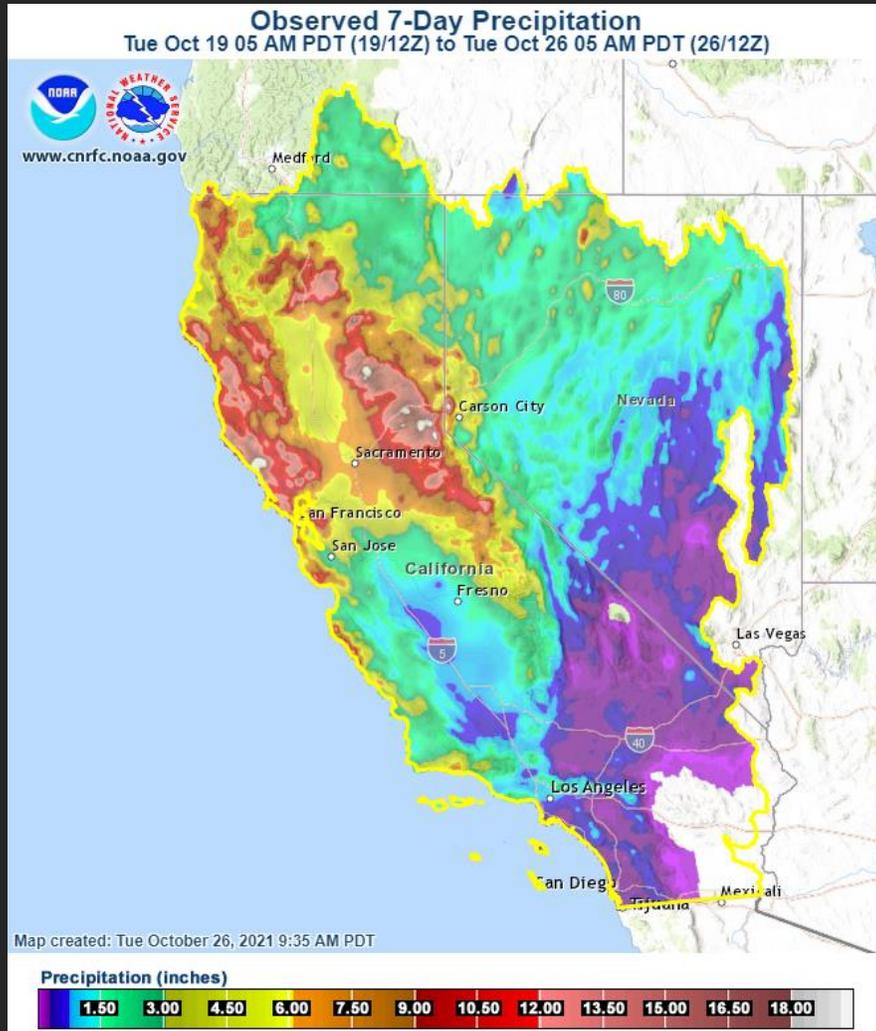
MODIS True Color
October 24, 2021



<http://tropic.ssec.wisc.edu/>

<https://worldview.earthdata.nasa.gov/>

Extreme California/Nevada Rainfall



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

**All Time Record
24 hr Rain Totals Set**

Issued: October 25 2021

Downtown Sacramento 5.44"
Previous record (1880) 5.28"

Sacramento Executive Airport 5.41"
Previous record (1962) 3.77"

Blue Canyon 10.40"
Previous record (1964) 9.33"

Period: 1:00 AM PDT 10/24 - 1:00 AM PDT 10/25

NWS Sacramento

<https://twitter.com/NWSSacramento/status/1452576872378761216>

**Maximum 1-Day Total Precipitation
for SAN FRANCISCO DOWNTOWN, CA**

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date
1	5.54	1994-11-05
2	4.67	1881-01-29
3	4.28	1866-12-19
4	4.02	2021-10-24
5	3.98	1874-11-23
-	3.98	1864-11-26
7	3.90	1982-01-04
8	3.62	1866-12-20
9	3.61	1995-12-11
10	3.50	1862-01-09

Period of record: 1849-10-01 to 2021-10-24

<https://xmacis.rcc-acis.org/>

- Wettest day in Sacramento, records begin in 1877
- 4th wettest day in San Francisco, records begin in 1849

Extreme California/Nevada




One Year vs One Day

WATER YEAR: OCTOBER 1, 2020 TO SEPTEMBER 30, 2021
 OCTOBER DAY: 24 HR PERIOD ENDING 1:00 AM PDT 10/25/2021

	OCTOBER 24-25 24 HRS 2021		WATER YEAR 2020-2021 TOTALS
Sacramento:	5.44"	= 69.1% of	7.87"
Sac Exec:	5.41"	= 81.9% of	6.61"
Sacramento Int'l Ap:	4.13"	= 61.8% of	6.68"
Blue Canyon:	10.40"	= 31.6% of	32.92"
Redding Ap:	2.99"	= 20.1% of	14.24"
Oroville:	4.57"	= 51.9% of	8.8"

NWS SACRAMENTO

<https://twitter.com/NWSSacramento/status/1452631334623473666>




RENO AIRPORT RAINFALL STATISTICS OCTOBER 24-25

2-Day Rainfall: 2.92"

*Highest ever for October
(old record 1.65")

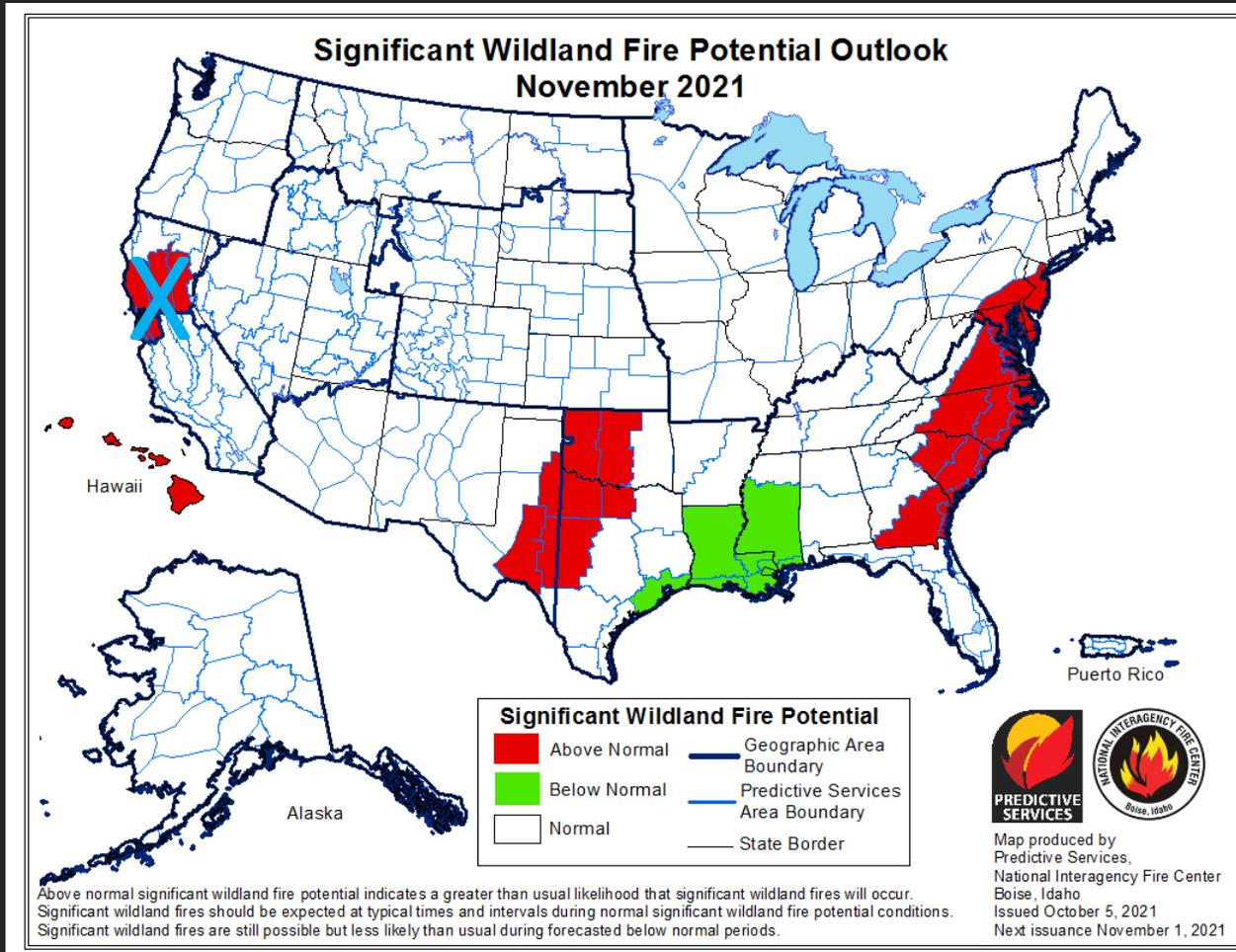
3rd highest since 1893
(highest 3.26")

2 Days vs 1 Year

Total Rainfall Water Year
2020-2021 (Oct-Sep): 3.01"
Oct 24-25th, 2021: 2.92"

<https://twitter.com/NWSReno/status/1452822586627289089>

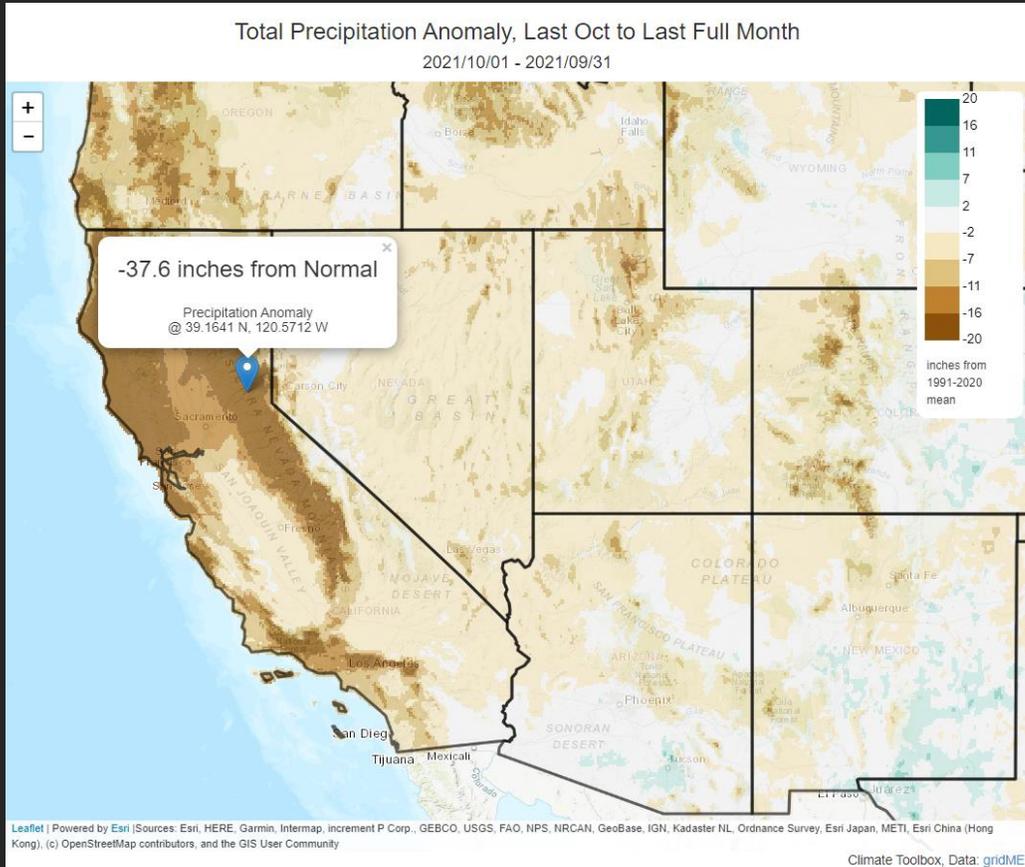
Fire Season Ending Atmospheric River?



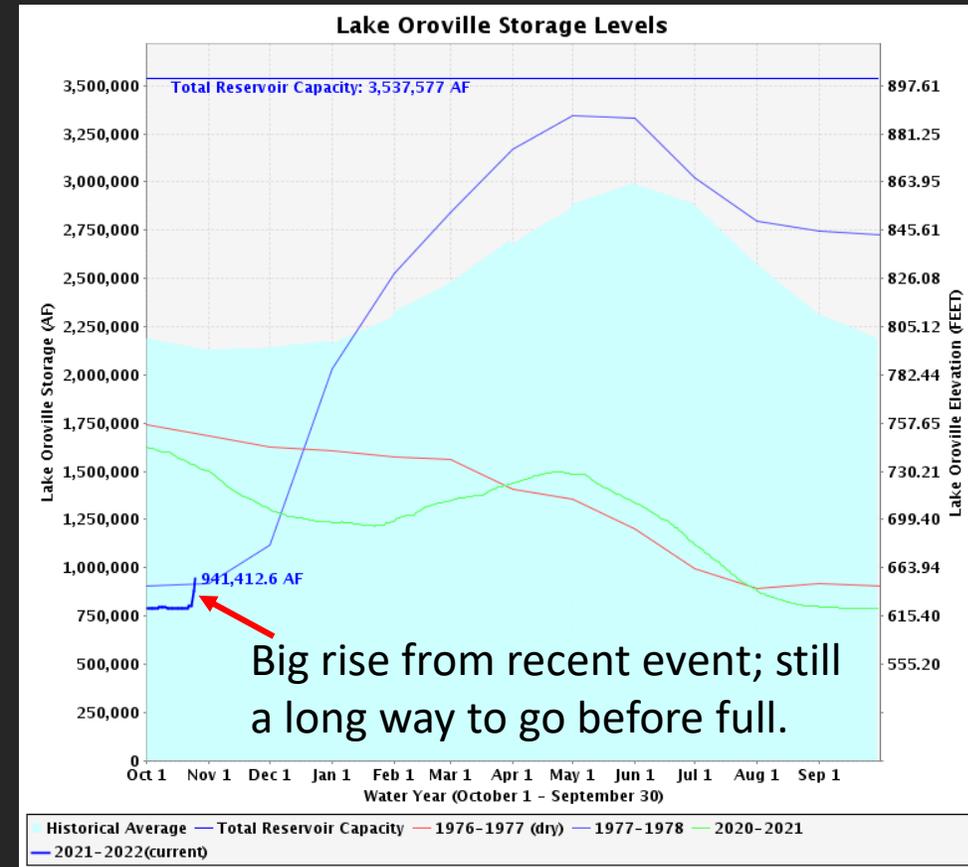
- Outlook issued October: Above normal significant wildland fire potential in November for much of Northern California
- This will likely be removed from the outlook issued on November 1
- Near-term fire danger is now minimal in northern CA
- *Things can dry out again if we go weeks or longer without significant precipitation again.*

Drought buster? Not quite.

Water Year 2021 Precipitation Anomaly (Inches)

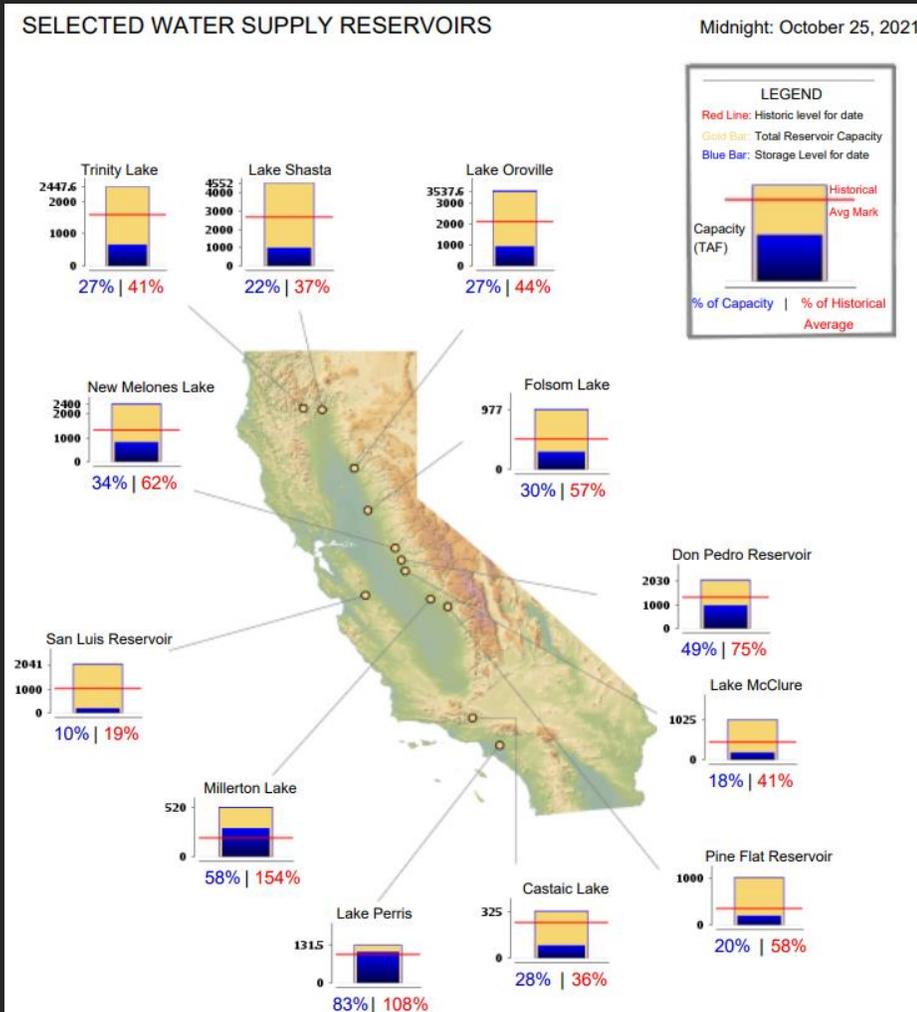


<https://climatetoolbox.org/tool/climate-mapper>



- Lake Oroville elevation 10/21: 629 feet
- Lake Oroville elevation 10/25: 655 feet

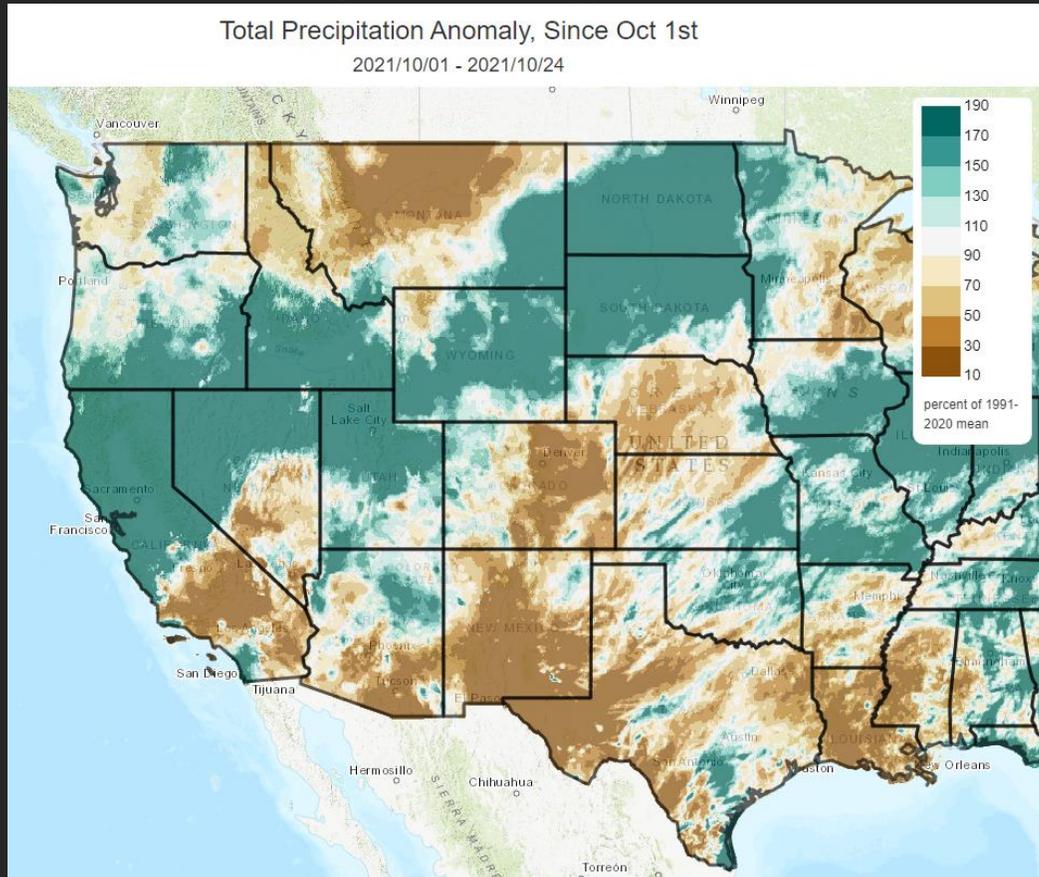
Drought buster? Not quite.



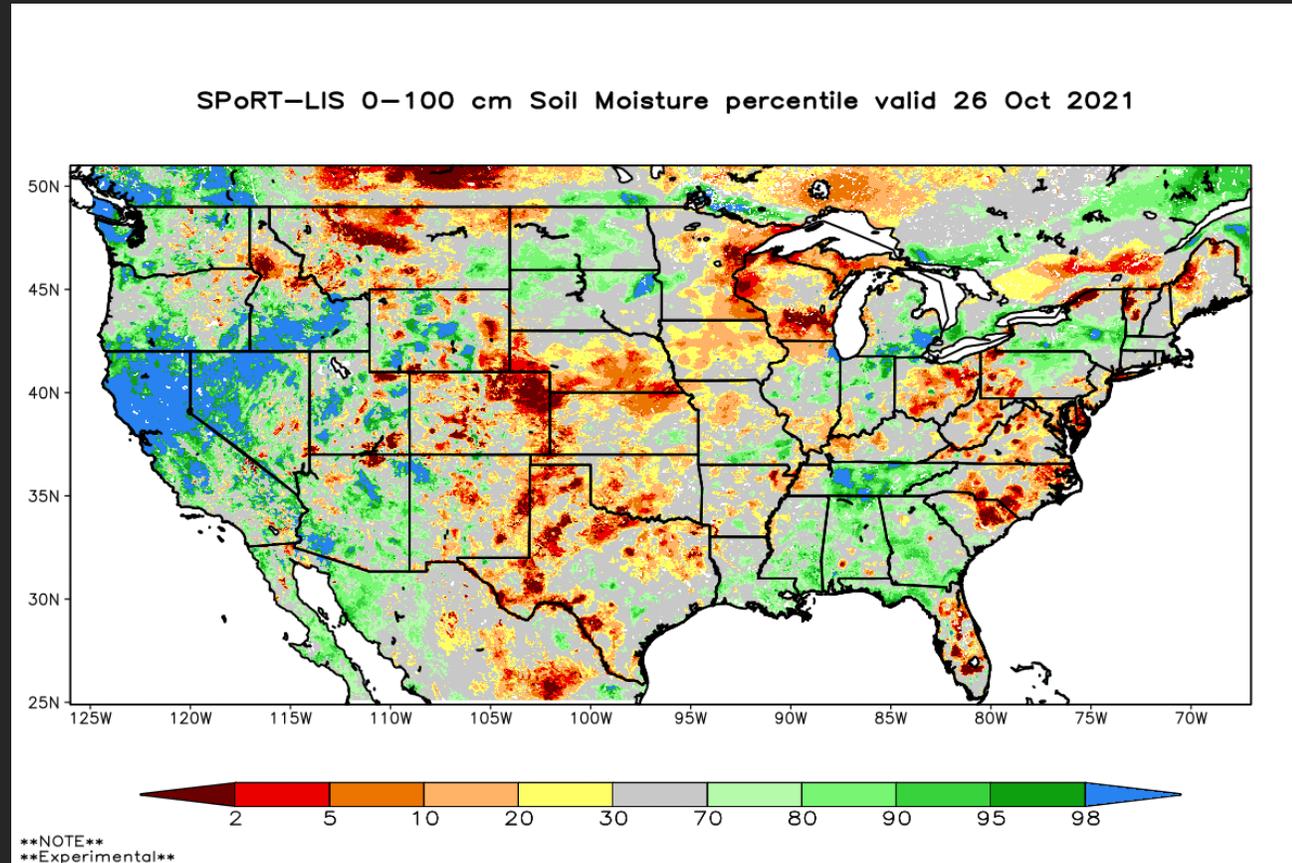
- Except for some rock/land slides and minor flooding this precipitation event was extremely beneficial to the region.
- However, huge precipitation deficits over the past two years have depleted reservoirs to near record low levels.
- Even after this event most reservoirs remain well below normal.

More drought improvements likely across parts of West

<https://climatetoolbox.org/tool/climate-mapper>



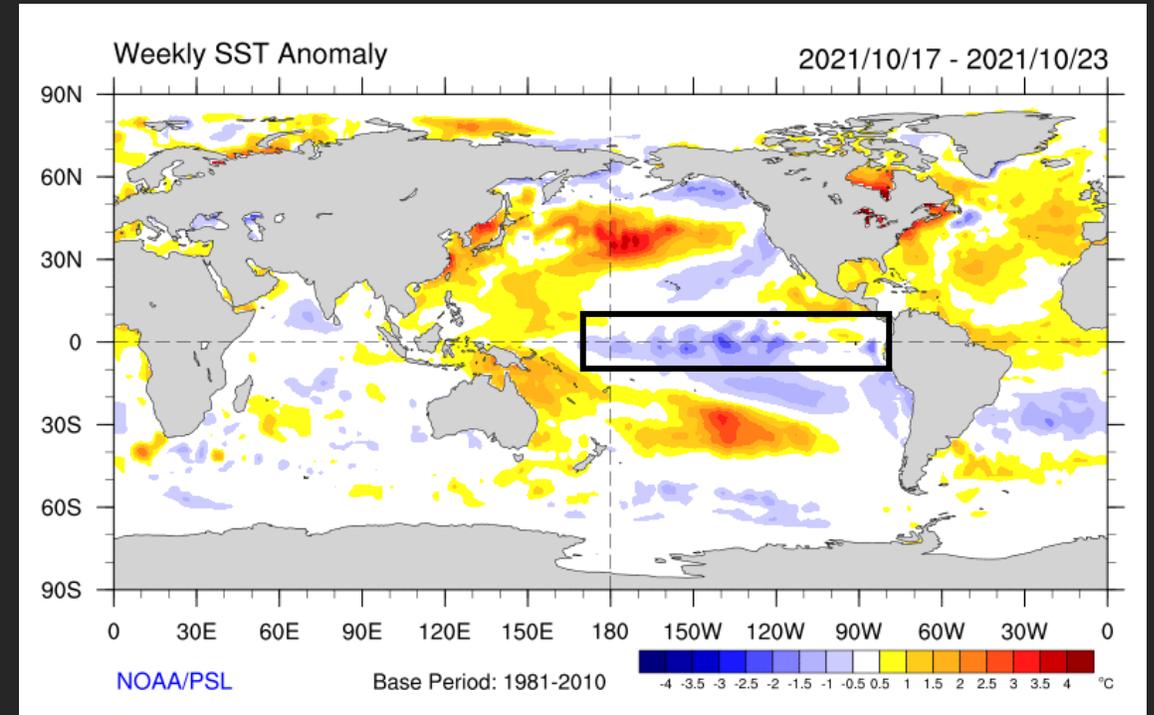
https://weather.msfc.nasa.gov/sport/case_studies/lis_CONUS.html



Wetting of the soils prior to mountain snowpack building is critical for drought improvements.

ENSO Update

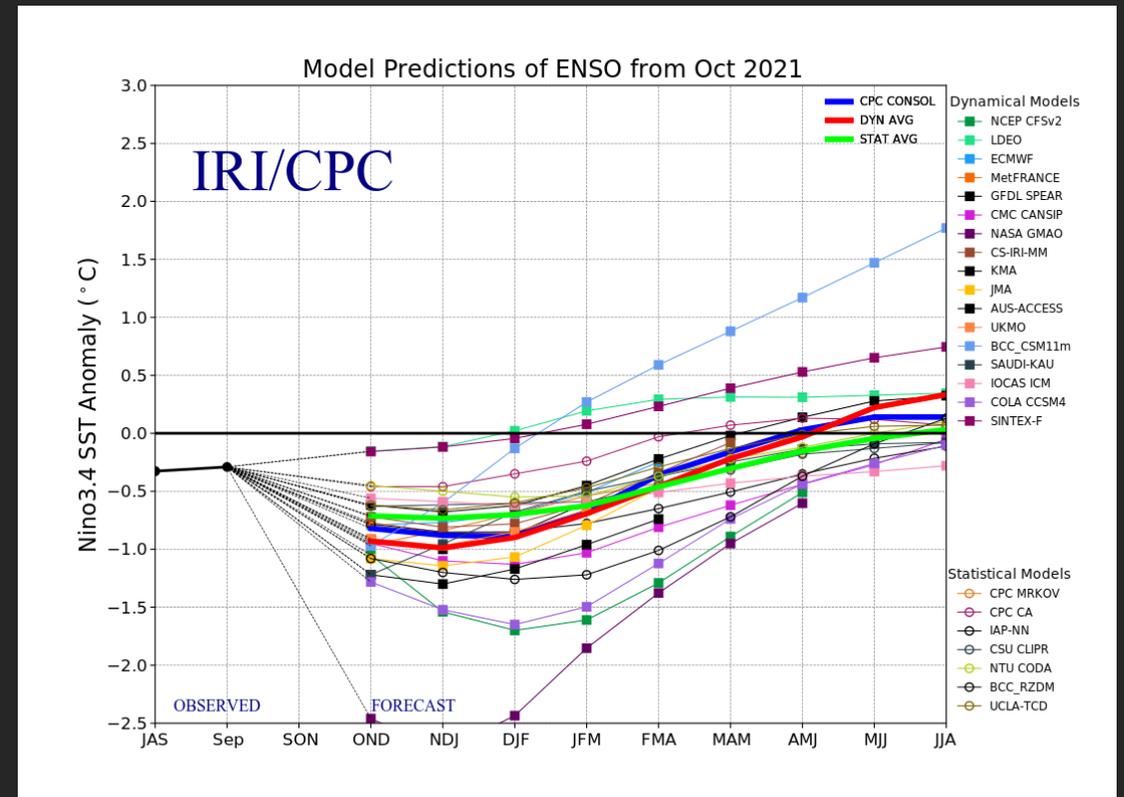
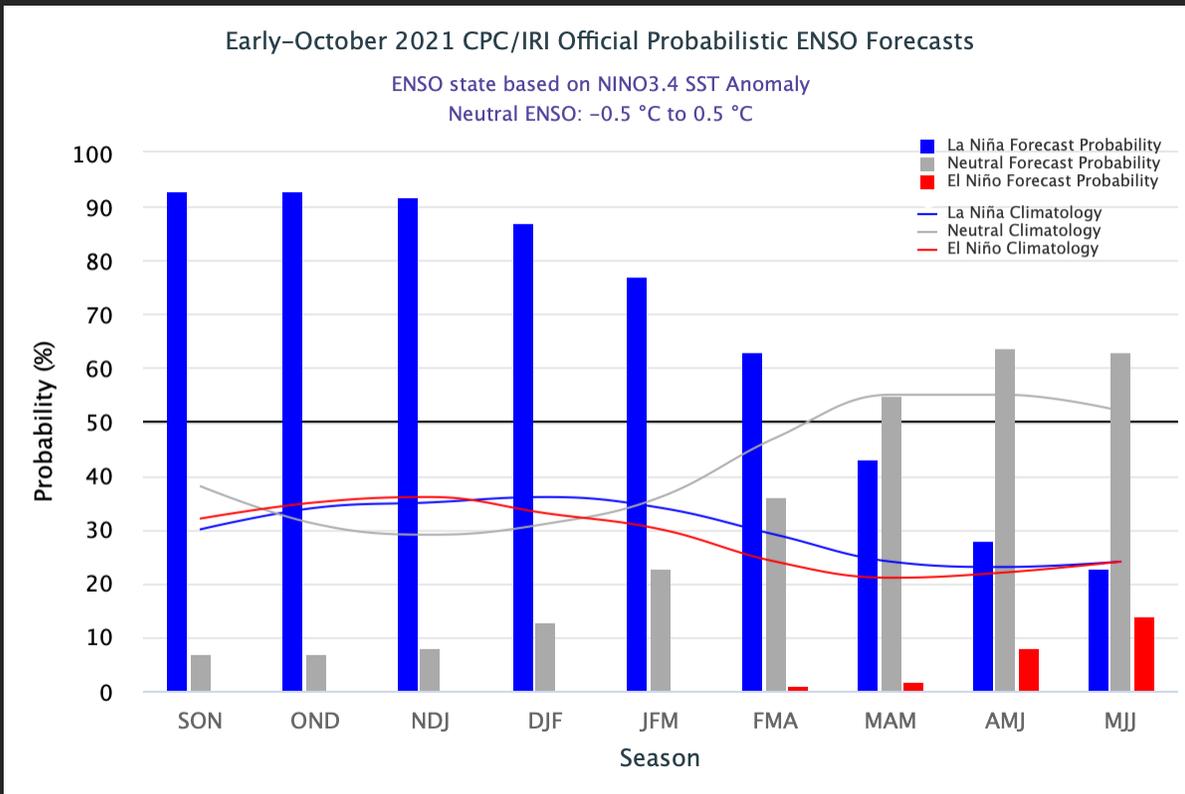
- ENSO Alert System Status: **La Niña Advisory**
- La Niña conditions have developed.
- Equatorial sea surface temperatures (SSTs) are below average across the central and east-central Pacific Ocean.
- The tropical Pacific atmosphere is consistent with La Niña conditions.
- La Niña is expected to continue with an 87% chance in December 2021- February 2022.



Source: Climate Prediction Center

<https://psl.noaa.gov/map/clim/sst.shtml>

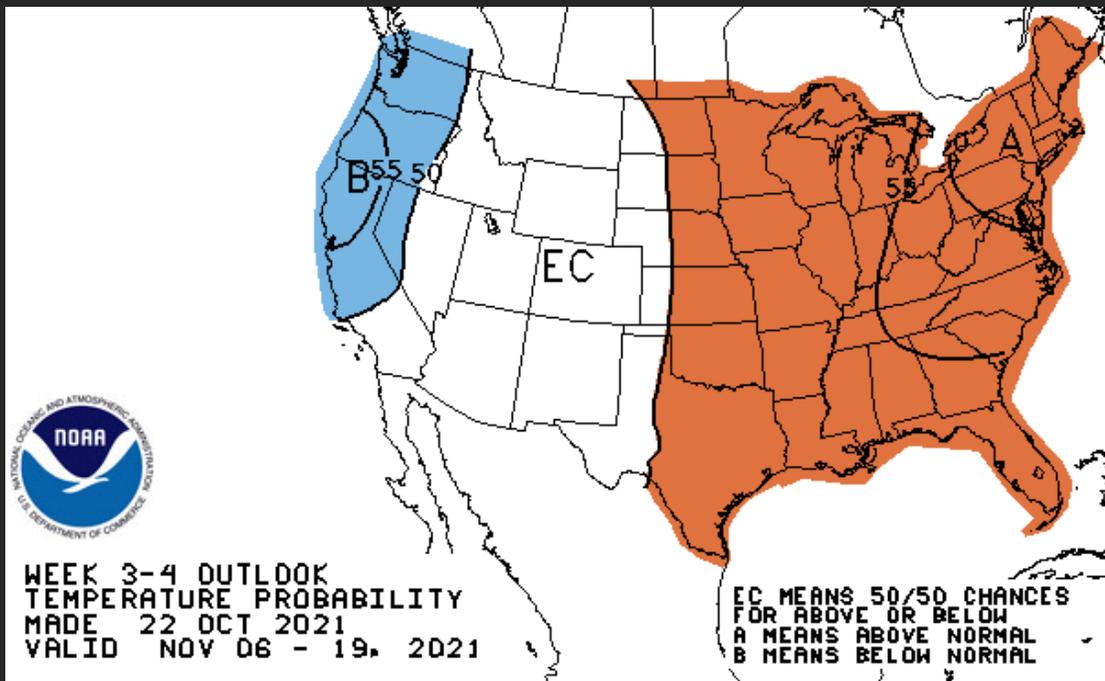
ENSO Outlook



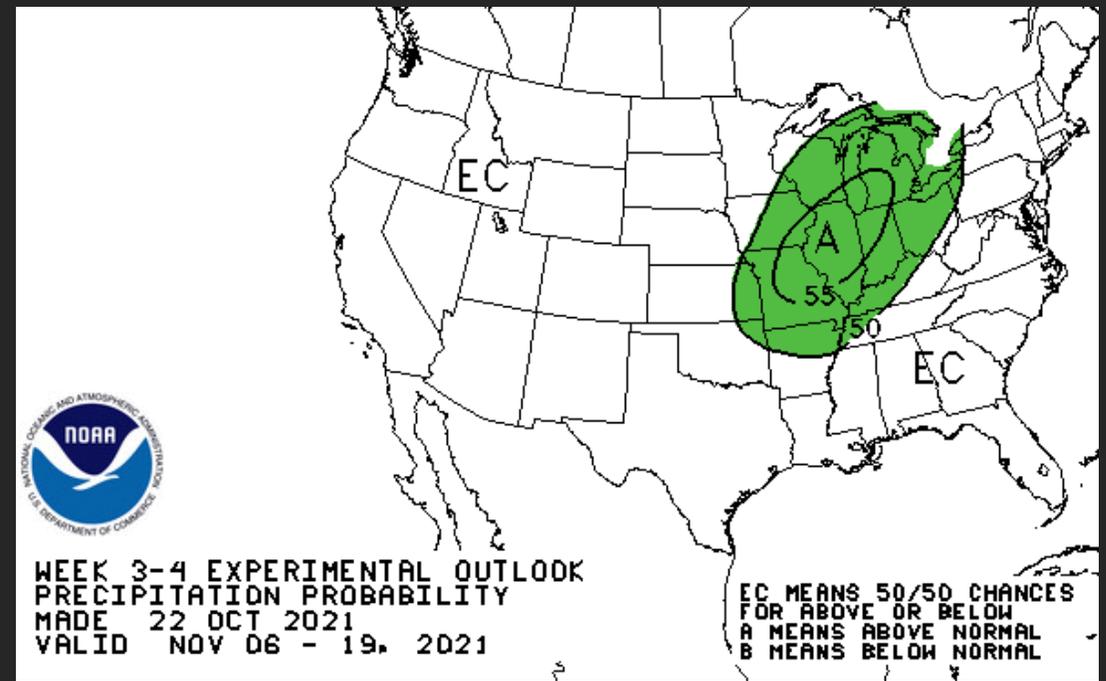
<https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

Week 3-4 Outlook: November 6-19

Temperature Probability



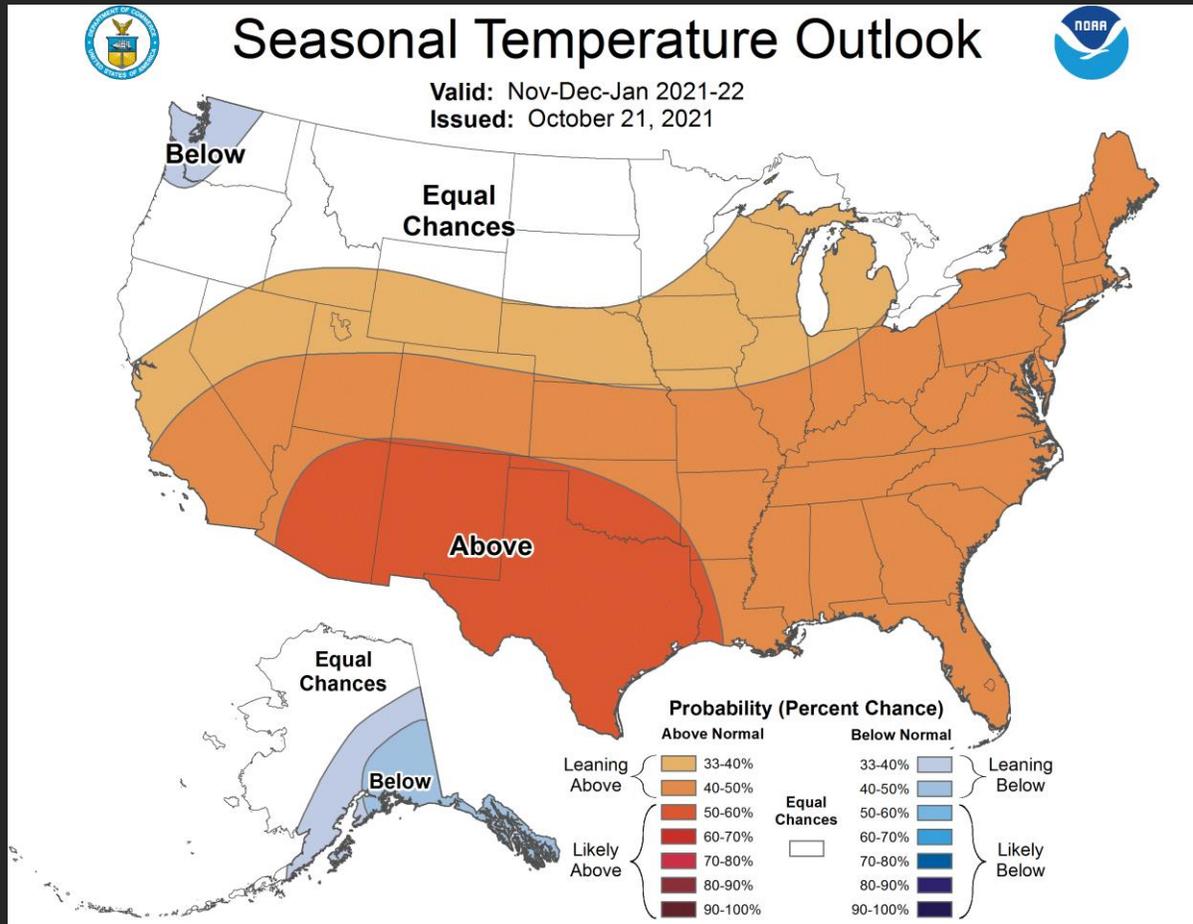
Precipitation Probability



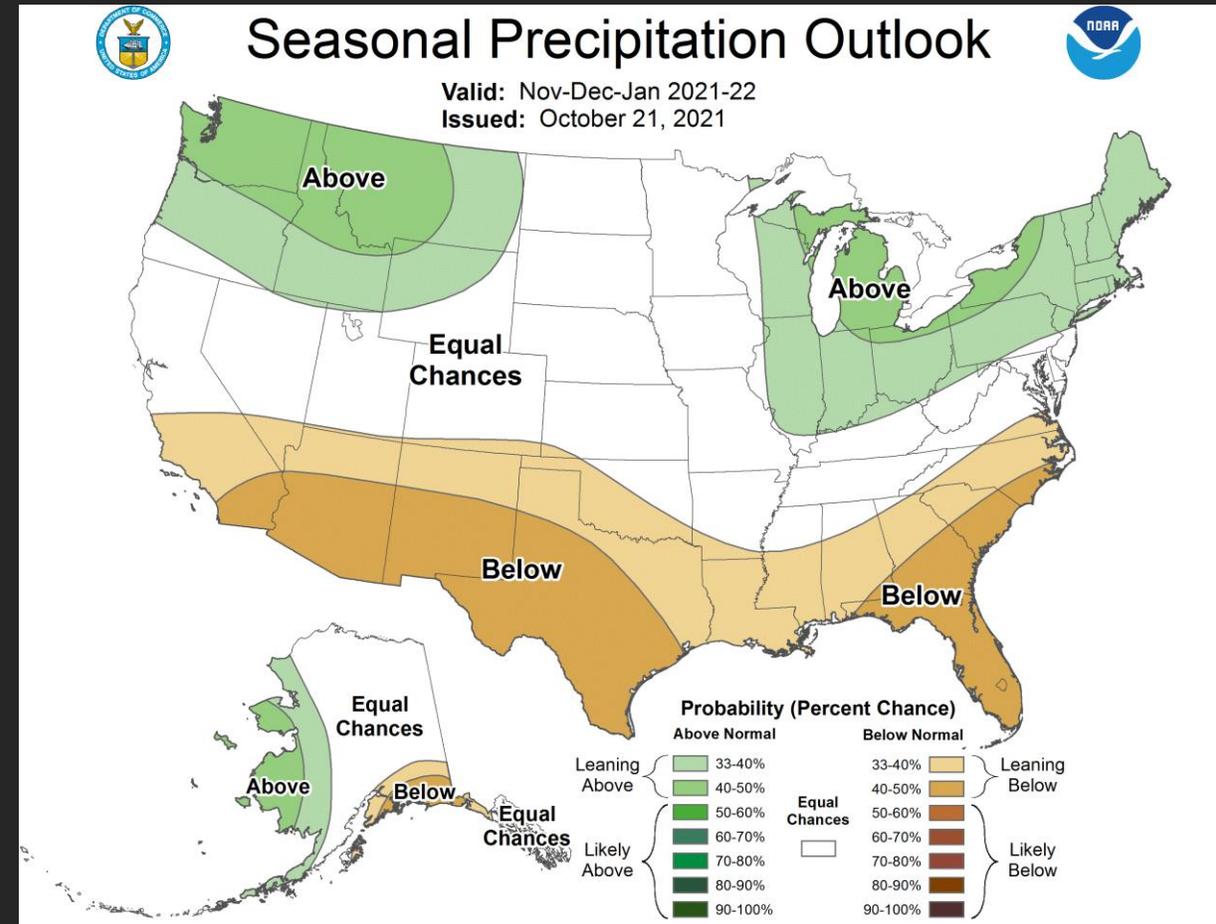
<https://www.cpc.ncep.noaa.gov/products/predictions/WK34/>

Seasonal Outlook: November-January

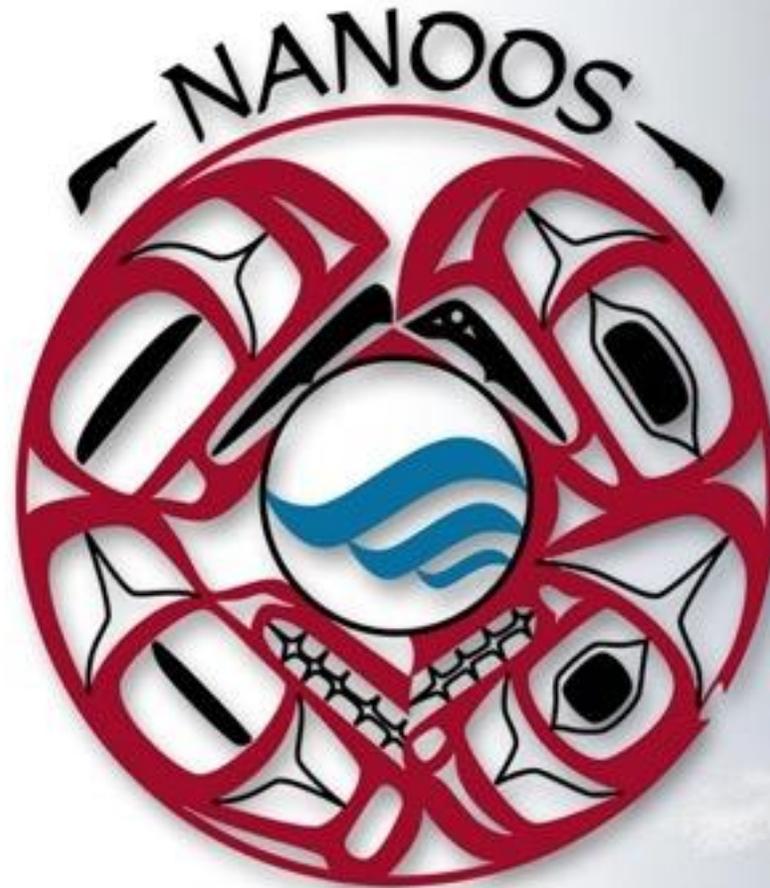
Temperature Probability



Precipitation Probability

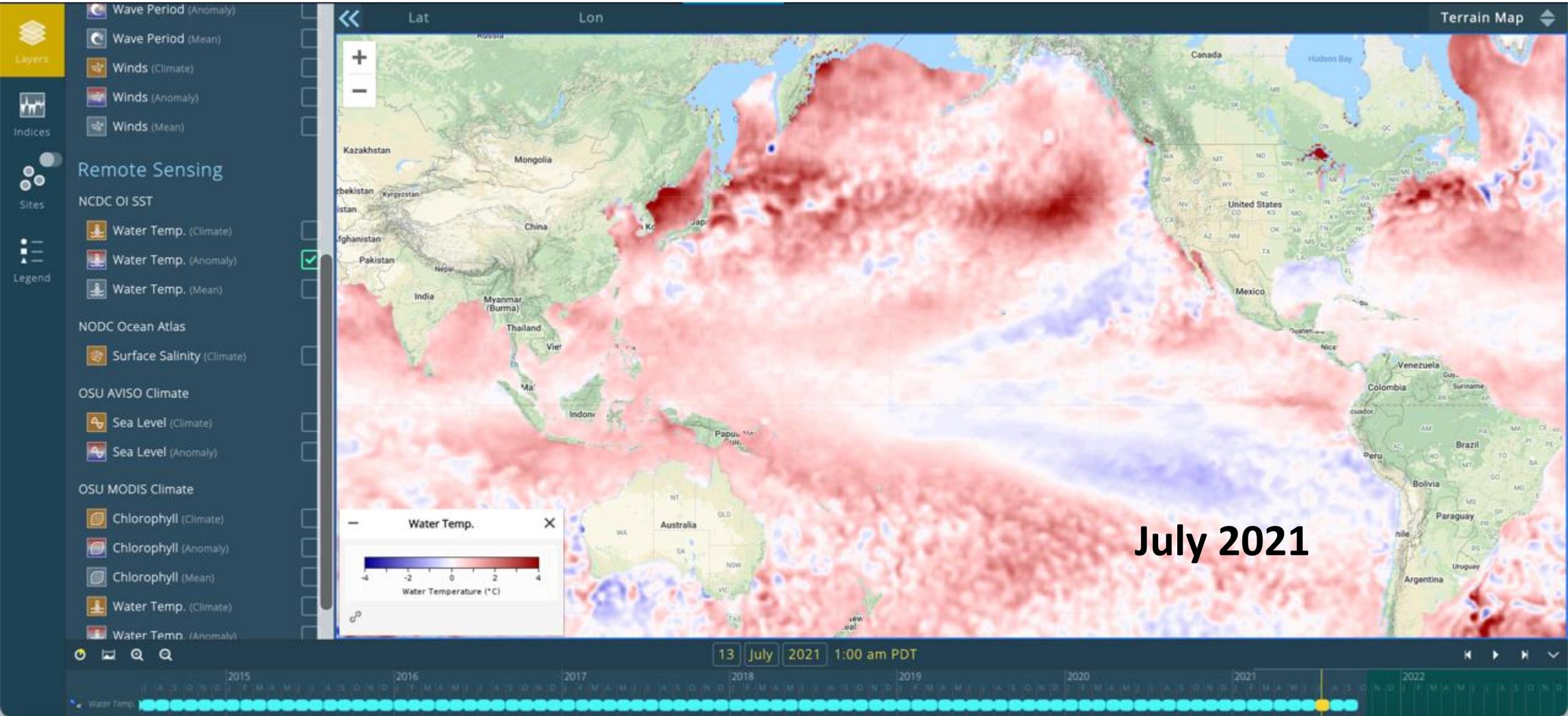


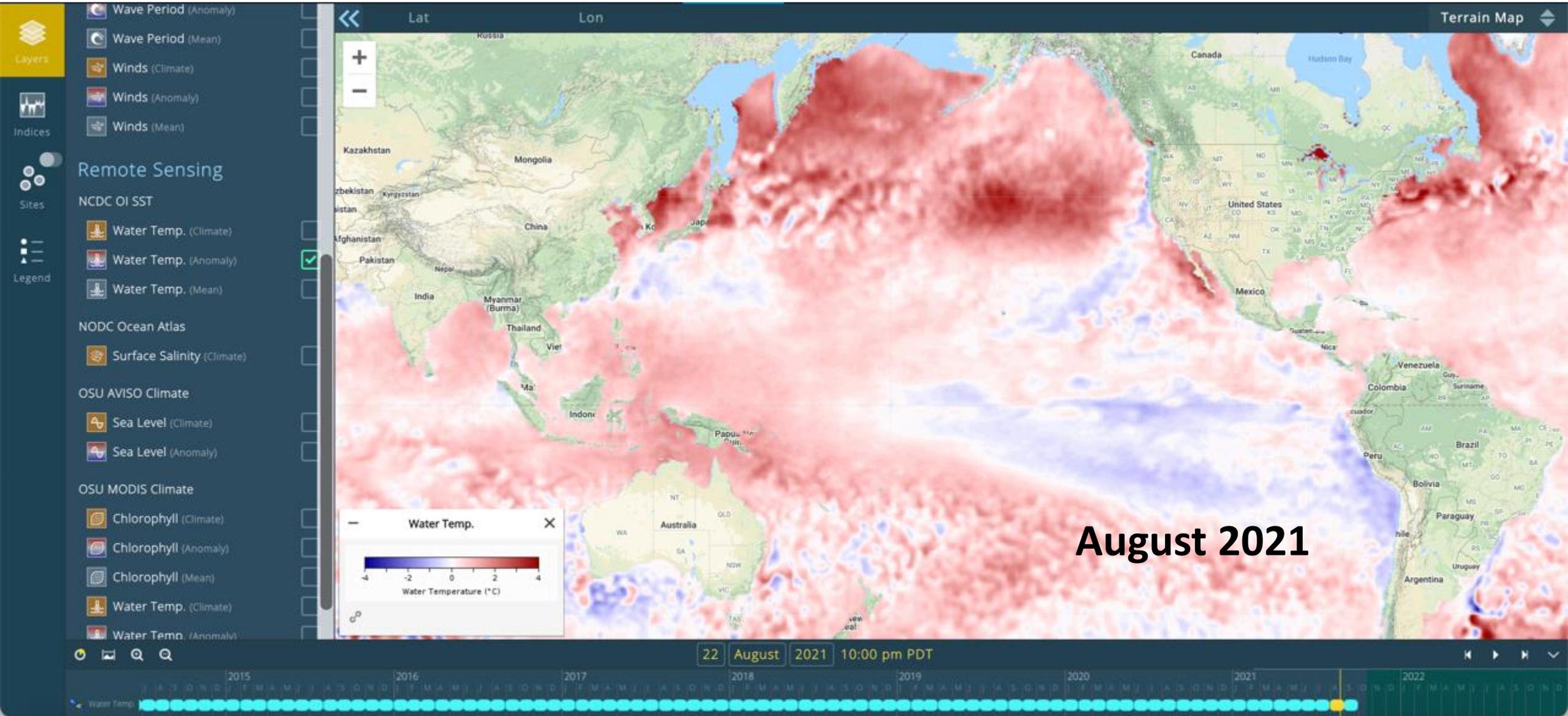
Northwest Association of Networked Ocean Observing Systems



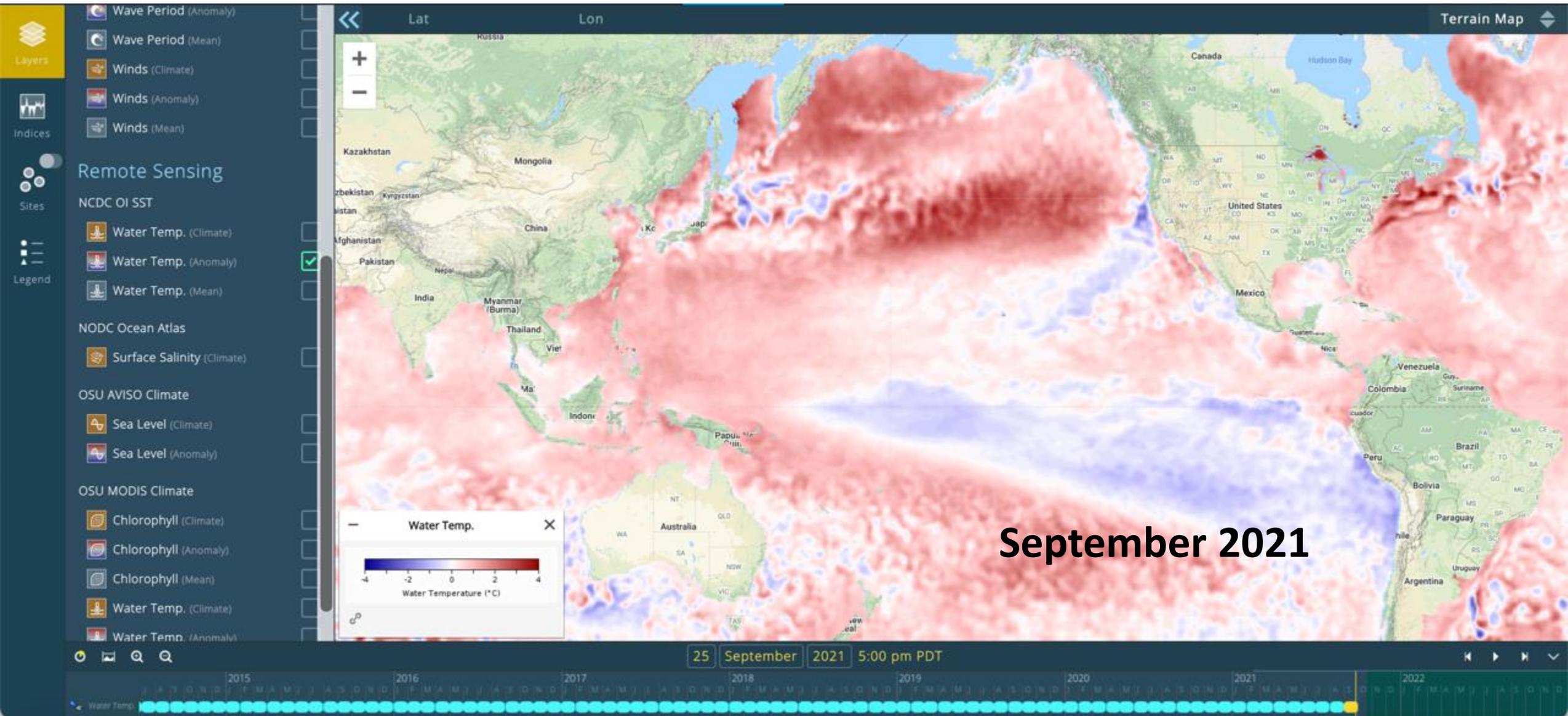
**NOAA West Watch Update 26 October 2021:
Washington / Oregon Observations**

*Jan Newton, NANOOS Executive Director
Roxanne Carini, NANOOS Associate
Anna Boyar, NANOOS Staff*



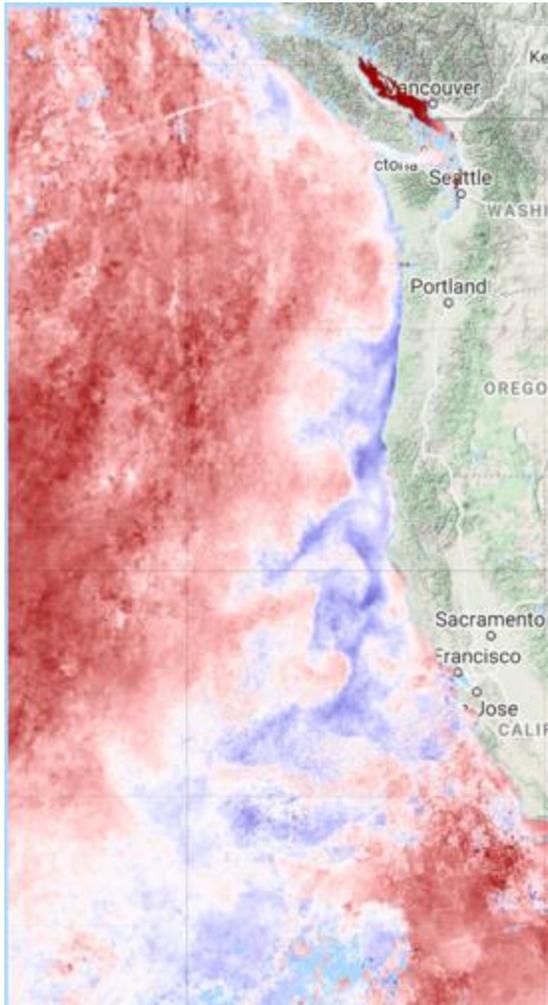


August 2021

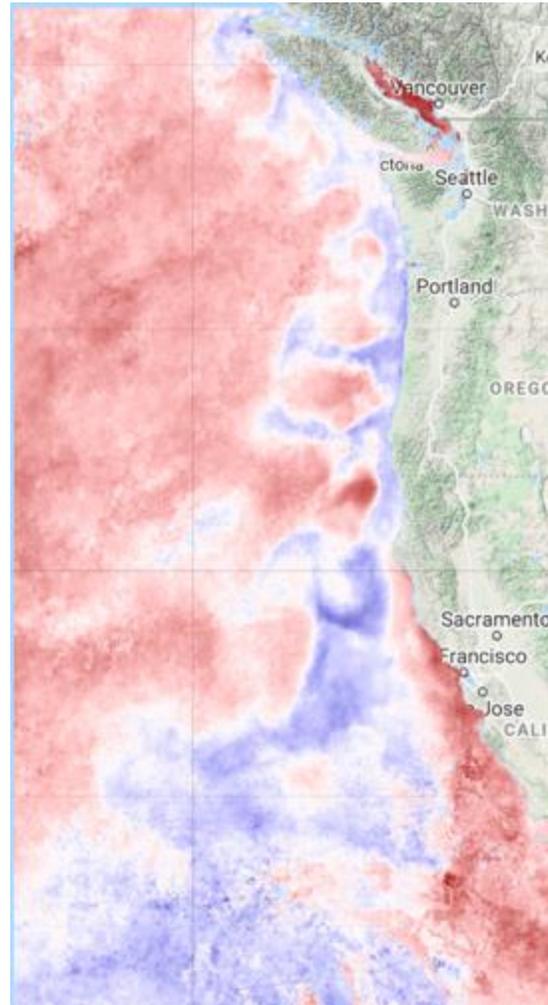


September 2021

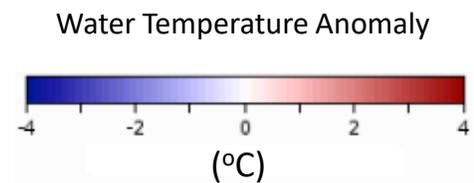
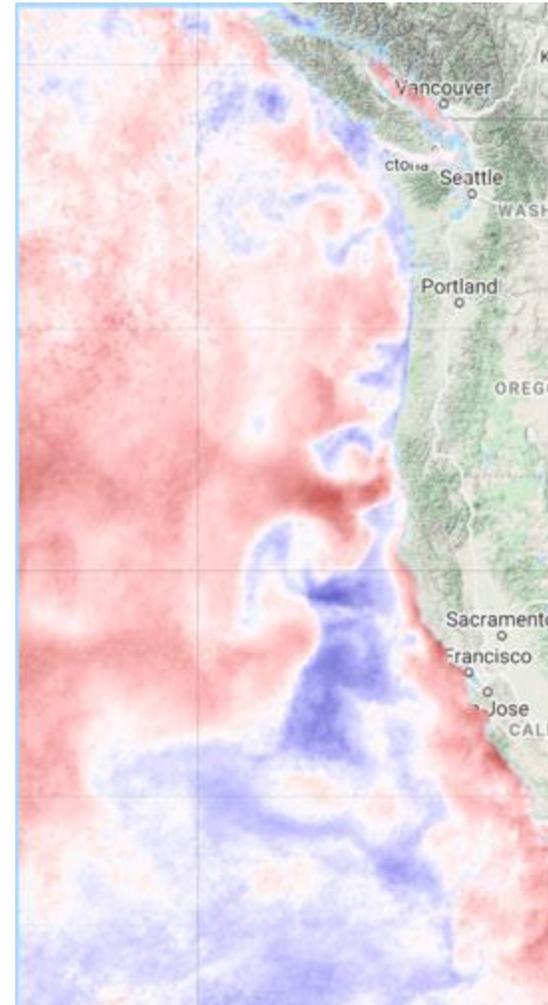
July 2021

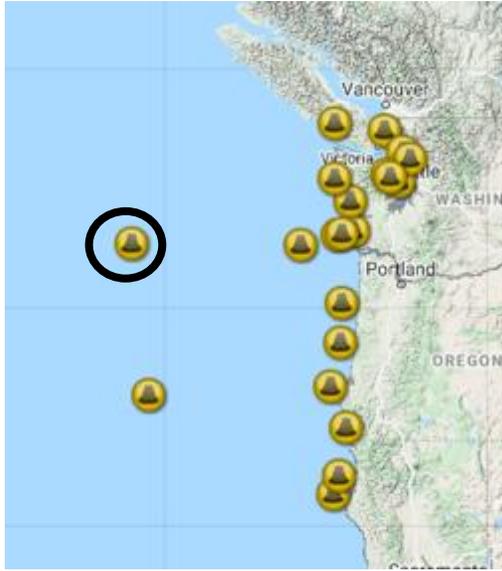


August 2021

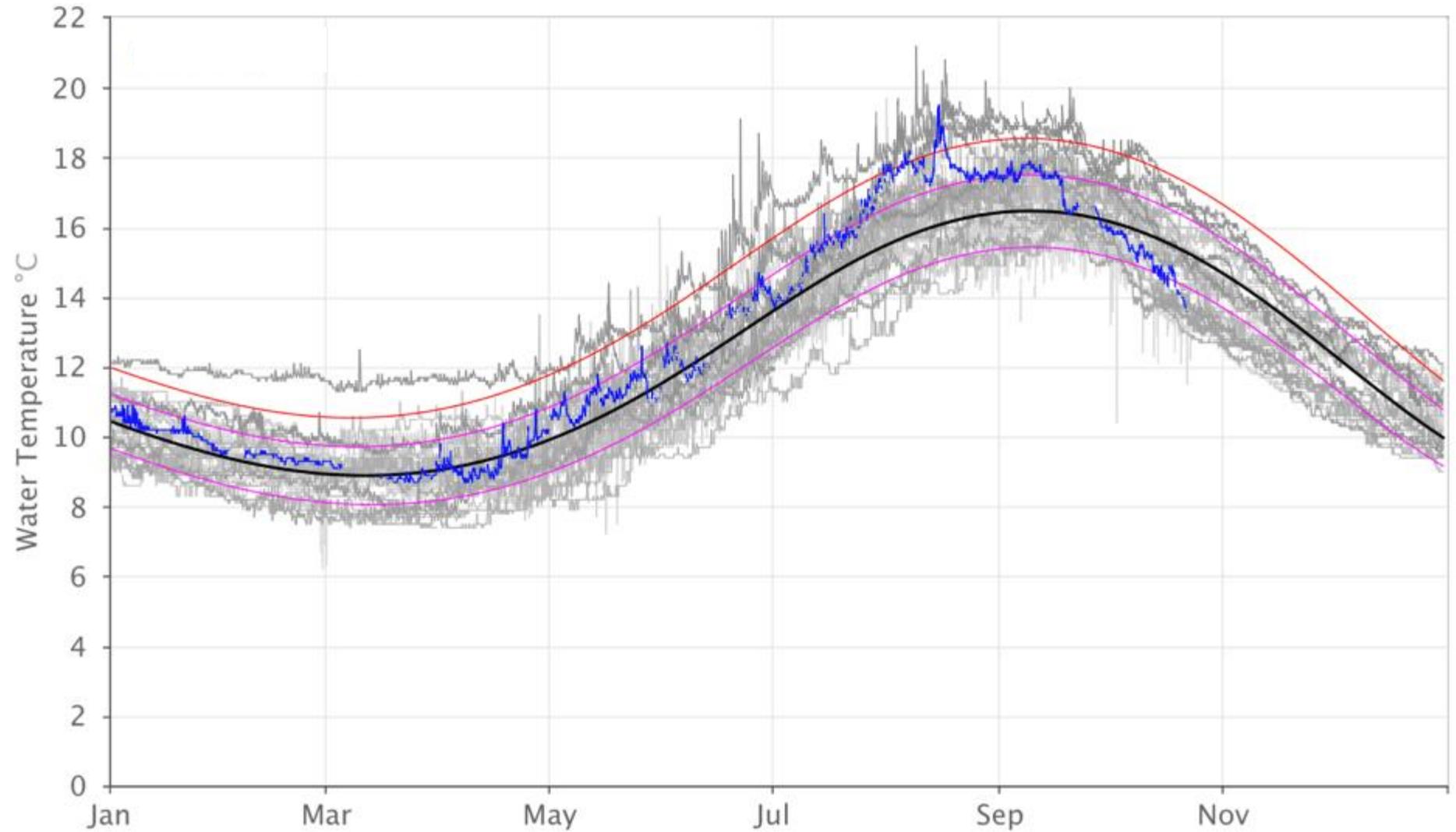


September 2021



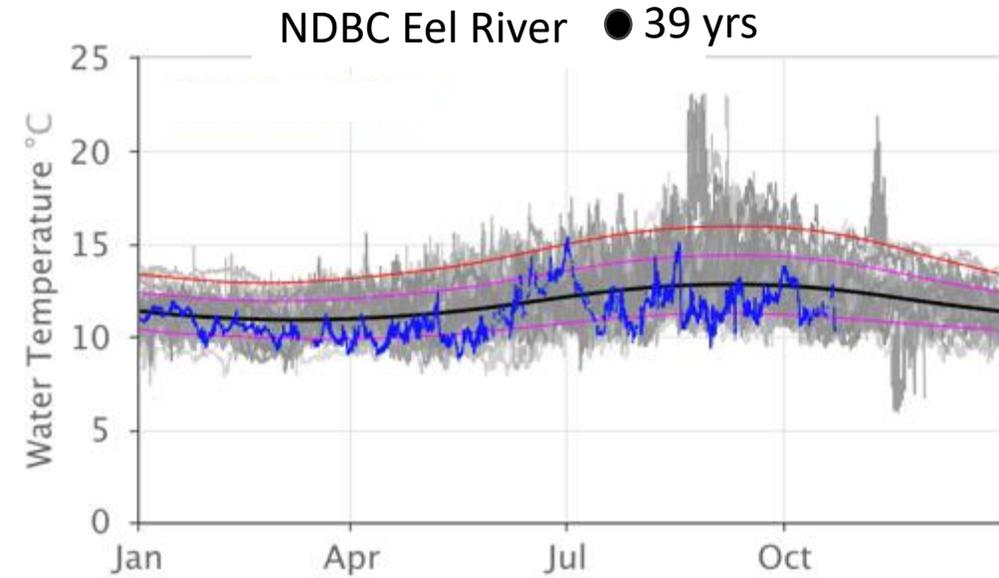
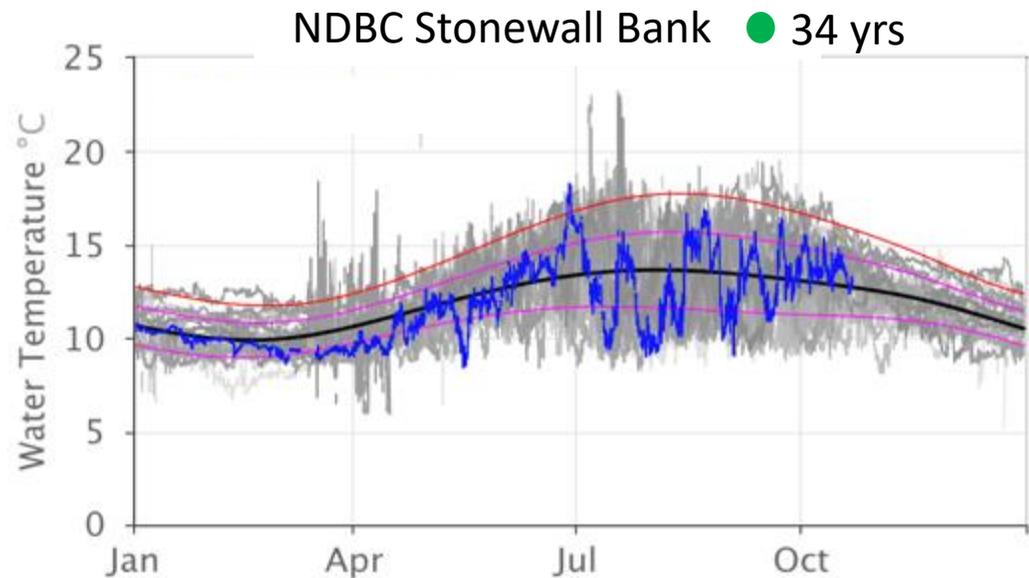
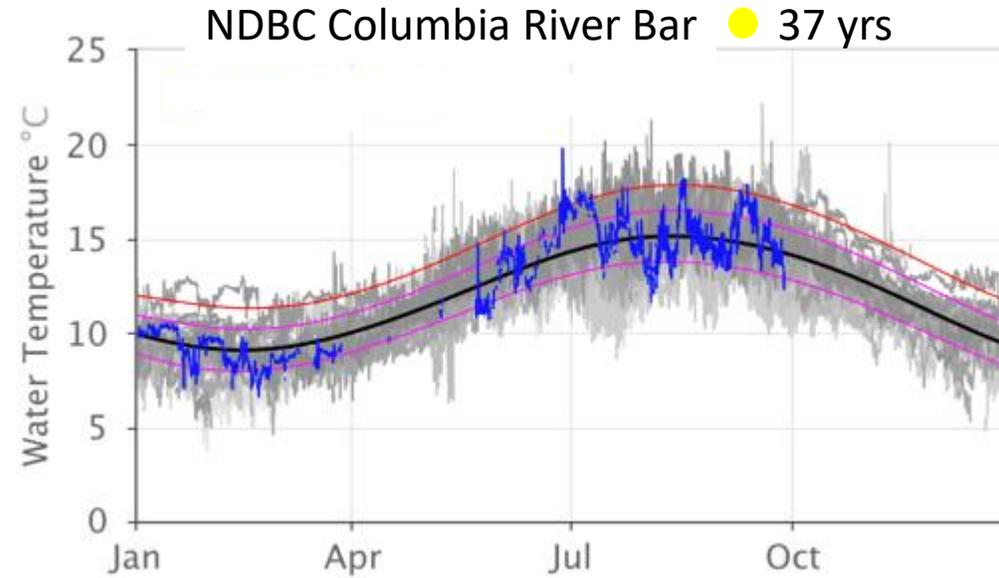
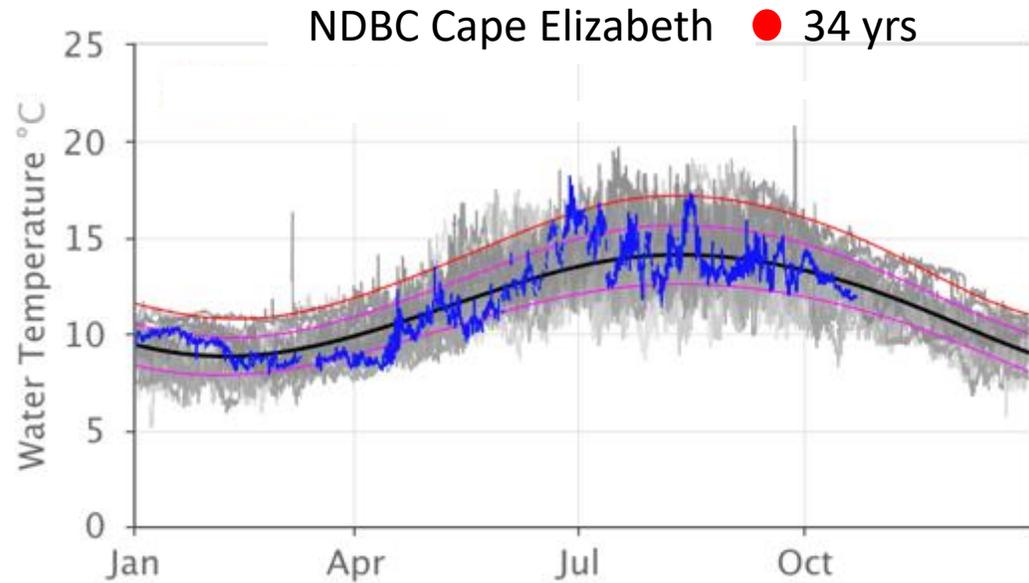


NDBC Washington

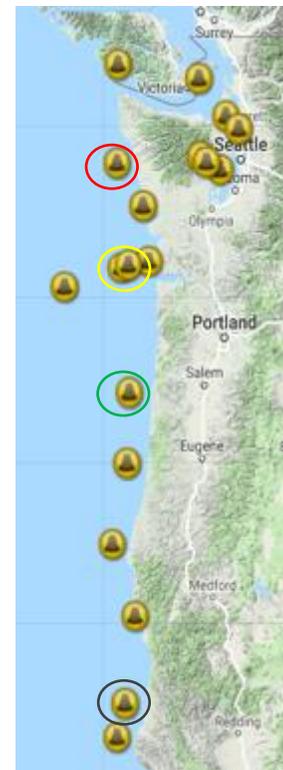


- Seasonal Cycle
n=45 Yrs
- -1 STD
- +1 STD
- +2 STD
- 2021

Sea Surface Temperature



- Seasonal Cycle
- -1 STD
- +1 STD
- +2 STD
- 2021



To summarize, right now we have:*

**20 July 2021*

- Heat
- Hypoxia
- But also, real-time data with which to visualize and track these conditions, allowing informed responses.



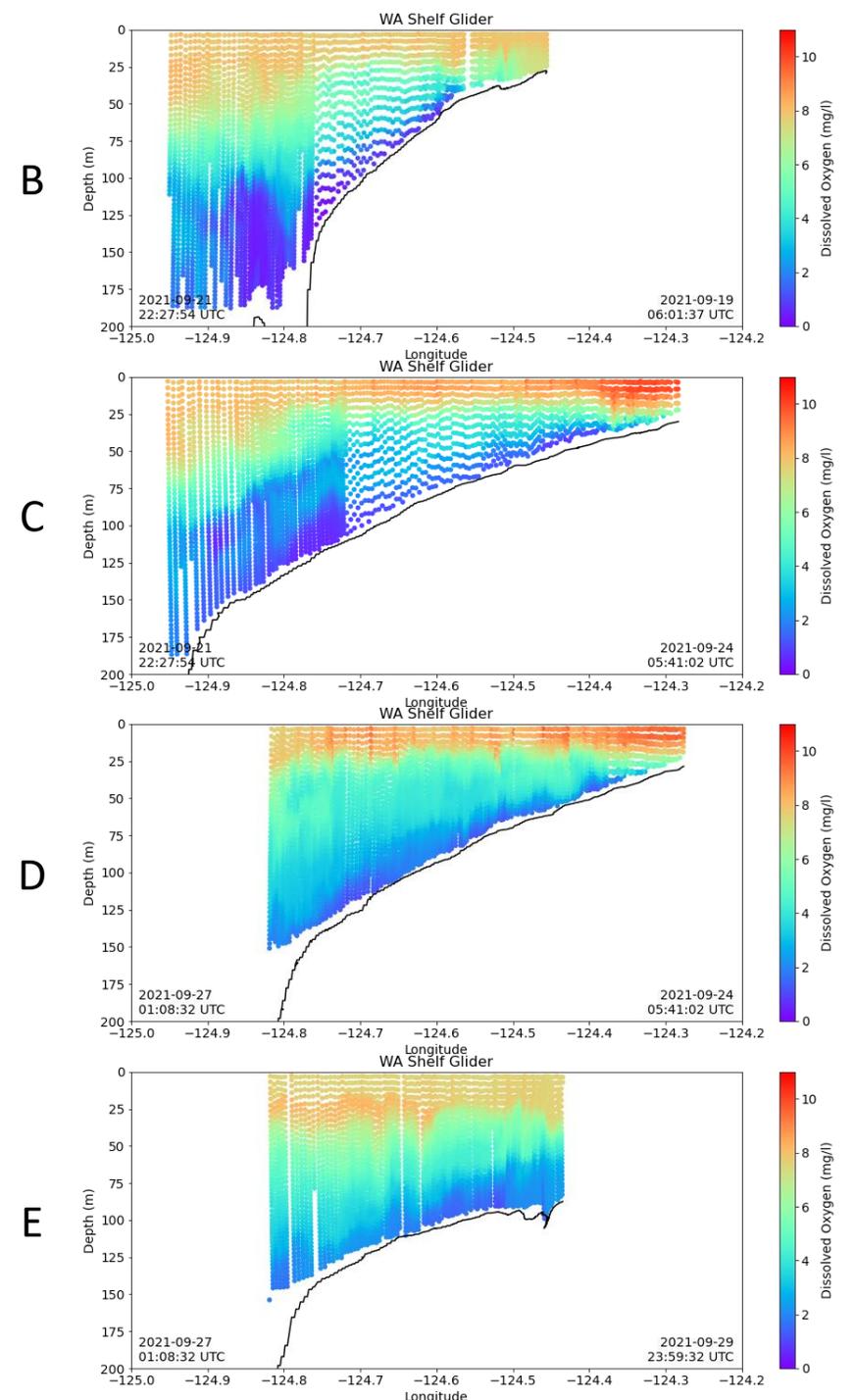
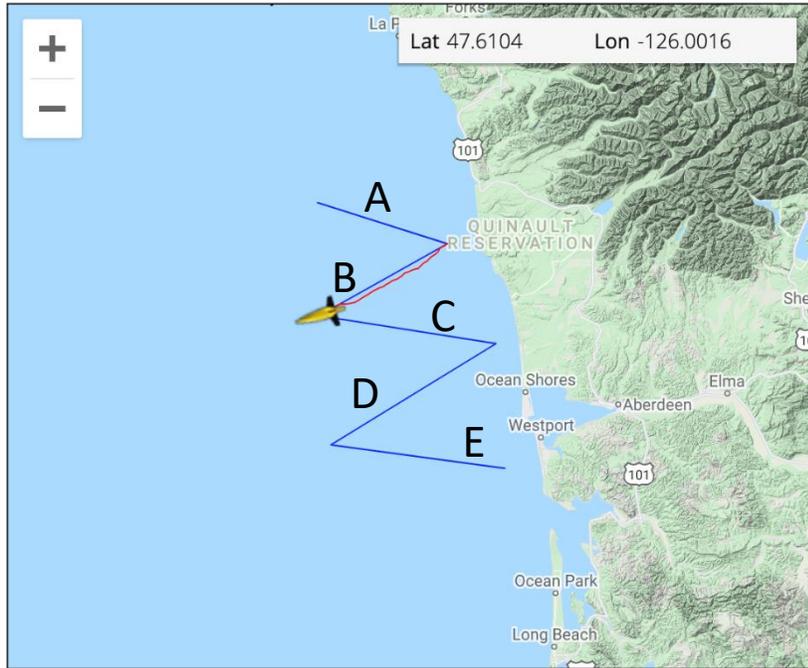
www.nanoos.org



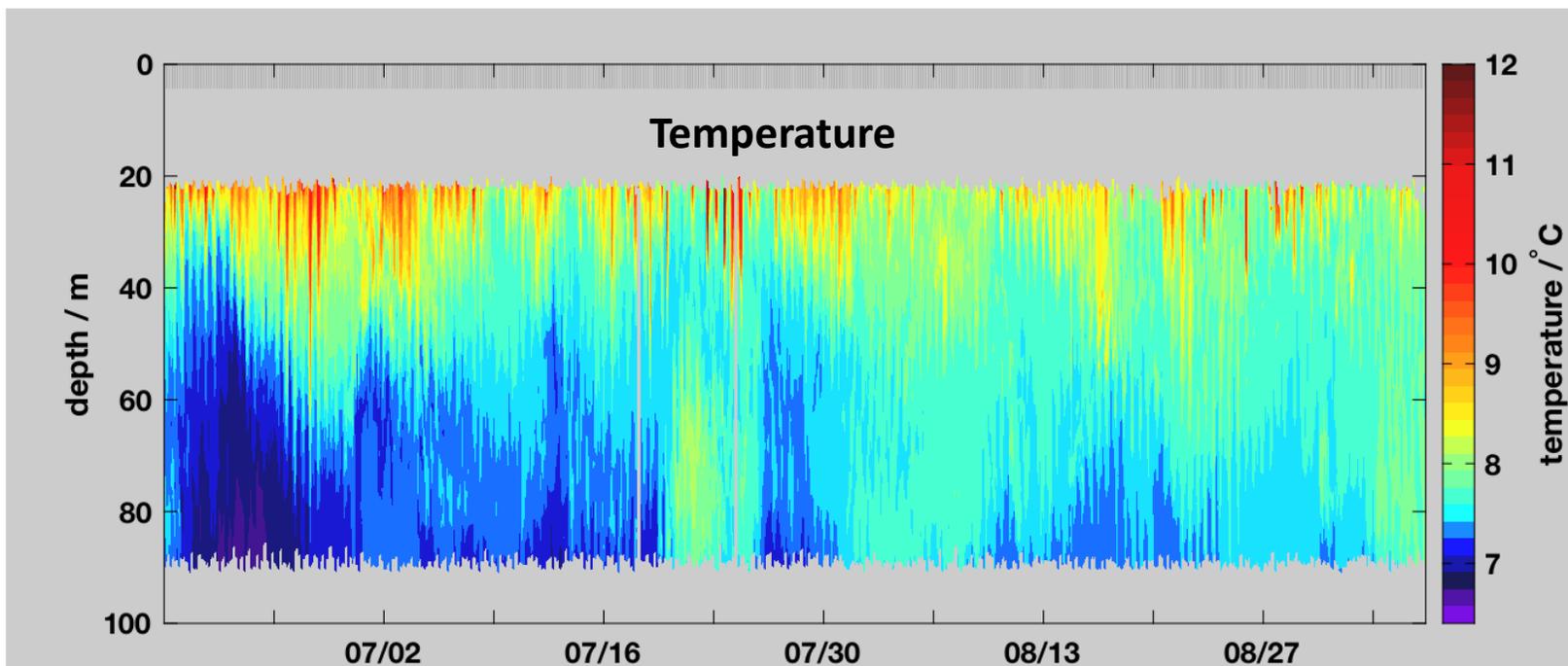
WA Shelf Glider

Jack Barth, Anatoli Erofeev, & Stephen Pierce, OSU
Charles Seaton, CRITFC
Joe Schumacker, QIN

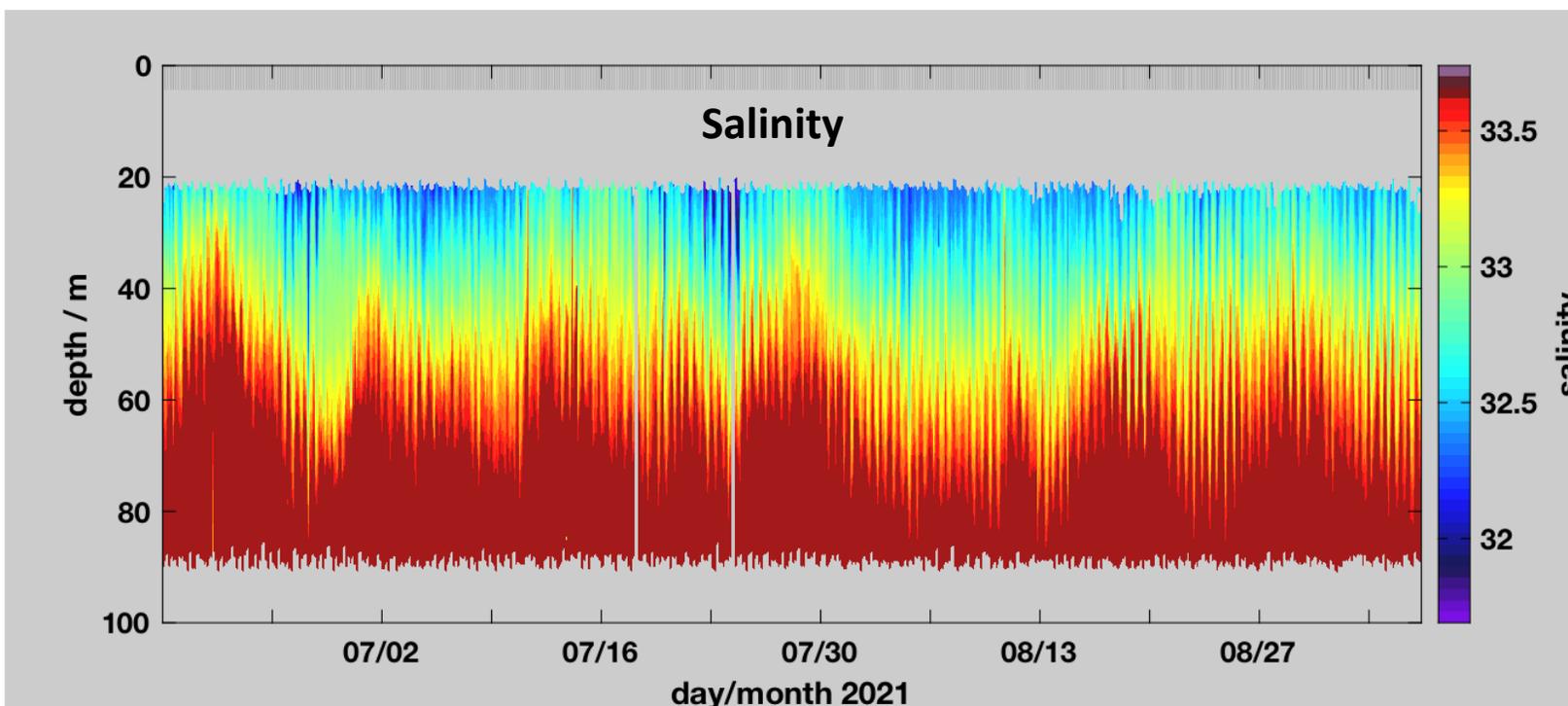
10 days to transit B-C-D-E
19 Sept – 29 Sept



"This mission was concluded just as early fall storms swept through the area helping to bring an end to the "hypoxia season." The glider was successfully recovered during 10-foot seas off Westport, WA. We will conduct maps next year, 2022, in April, July and September."



NEMO
sub-
surface
profiling
mooring

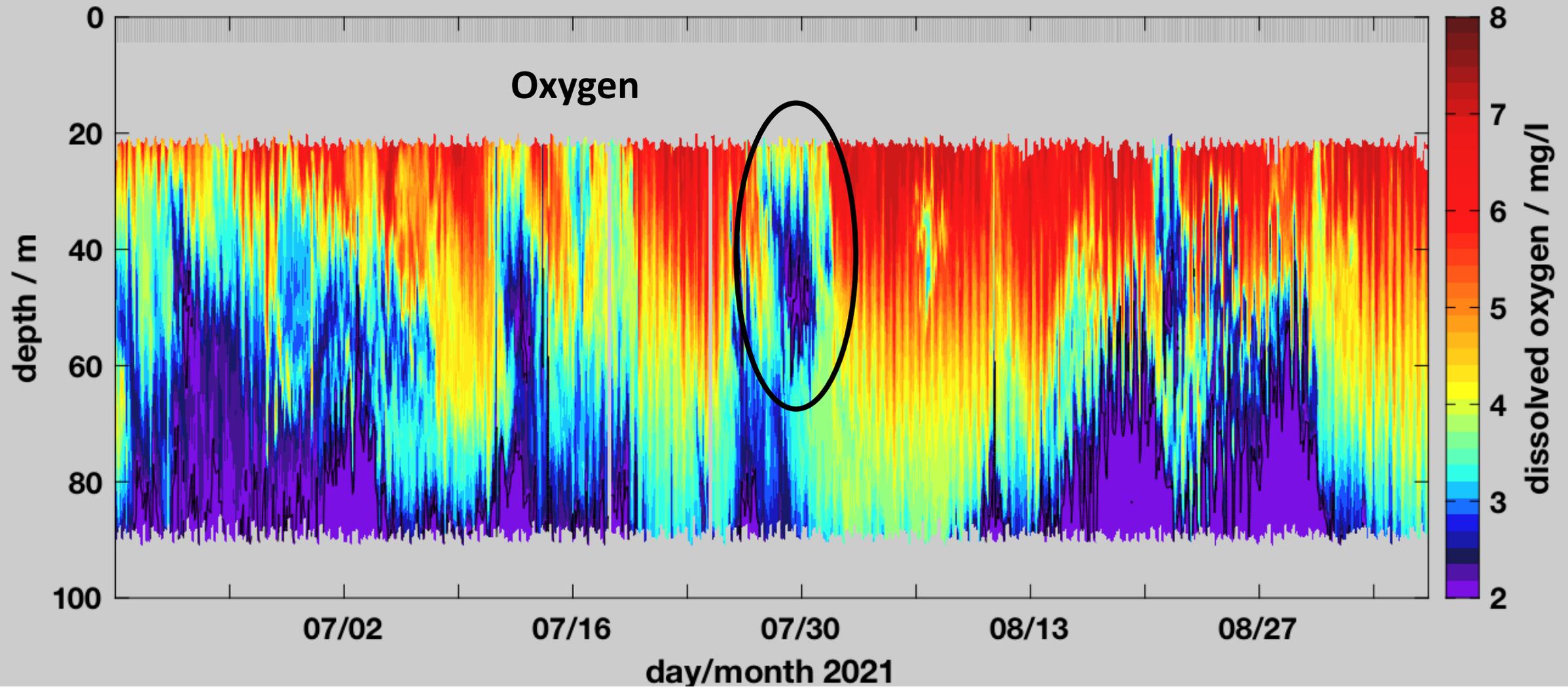


Manalang,
Mickett,
UW-APL

“Internal waves
off the WA shelf”

Alford et al., 2012
Oceanography

Oxygen



To summarize:

- Heat and hypoxia abated
- Incredibly complex ocean dynamics
- Observing data is allowing insights into the highly variable conditions



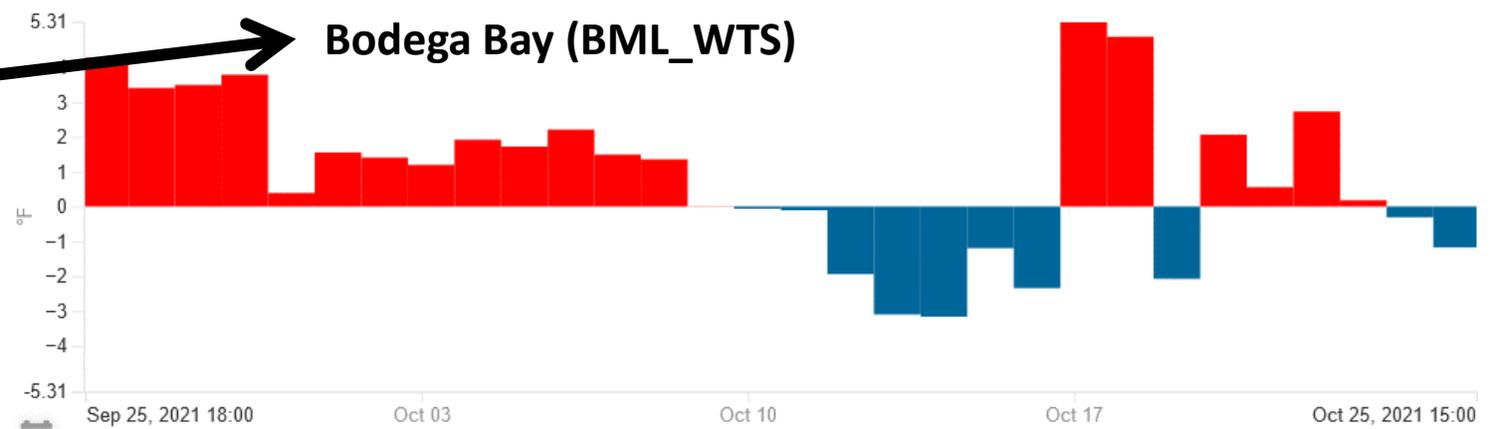
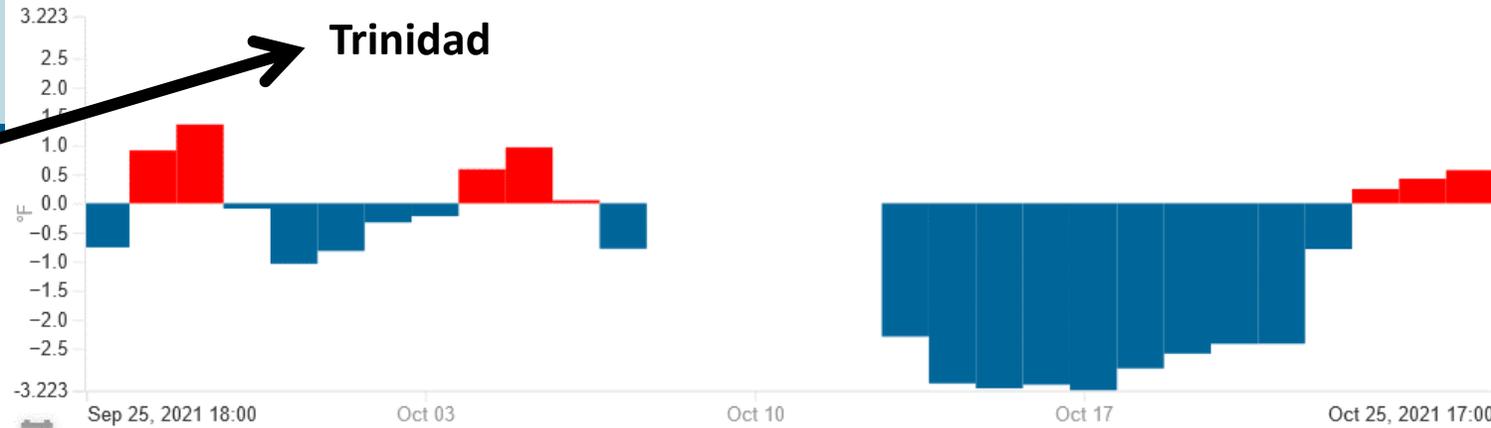
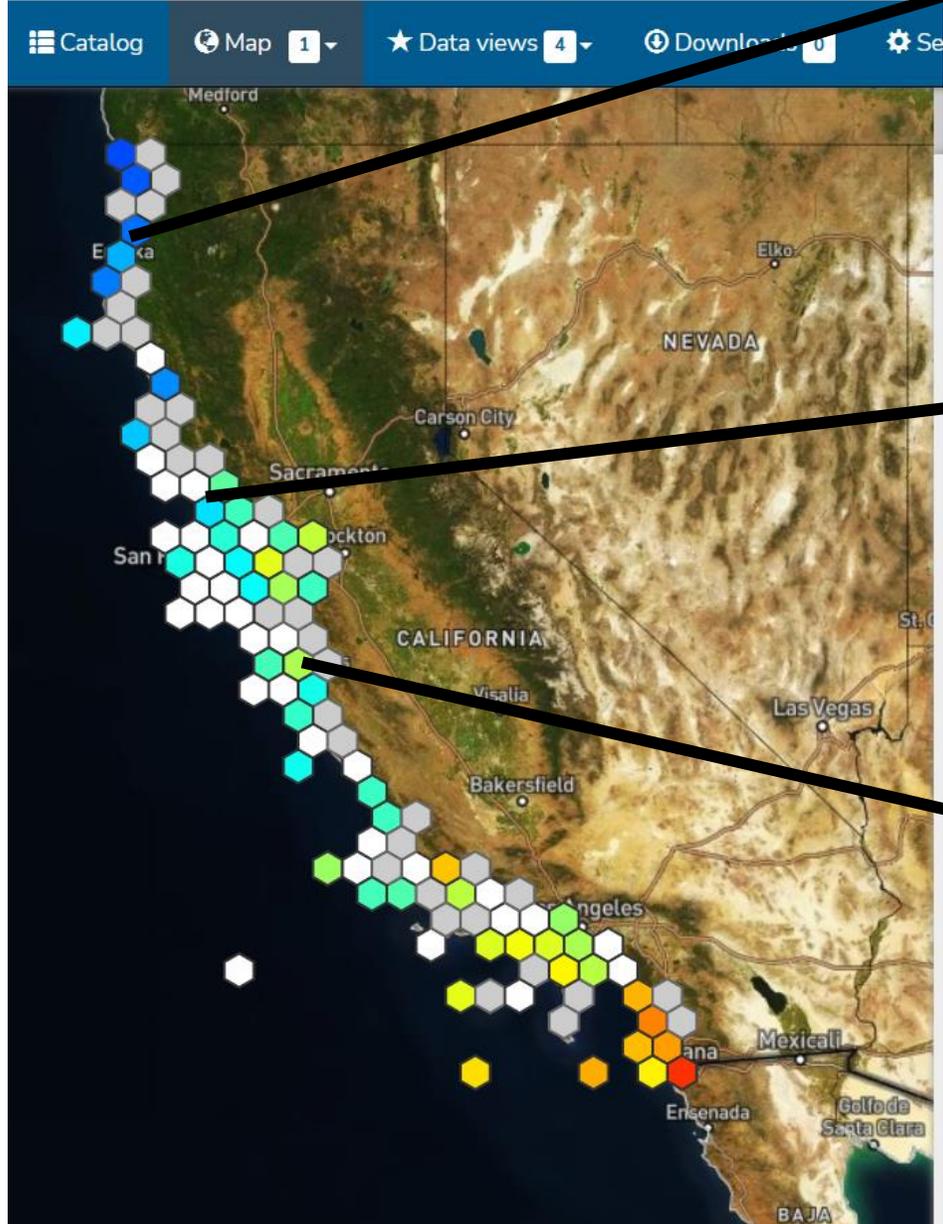
www.nanoos.org



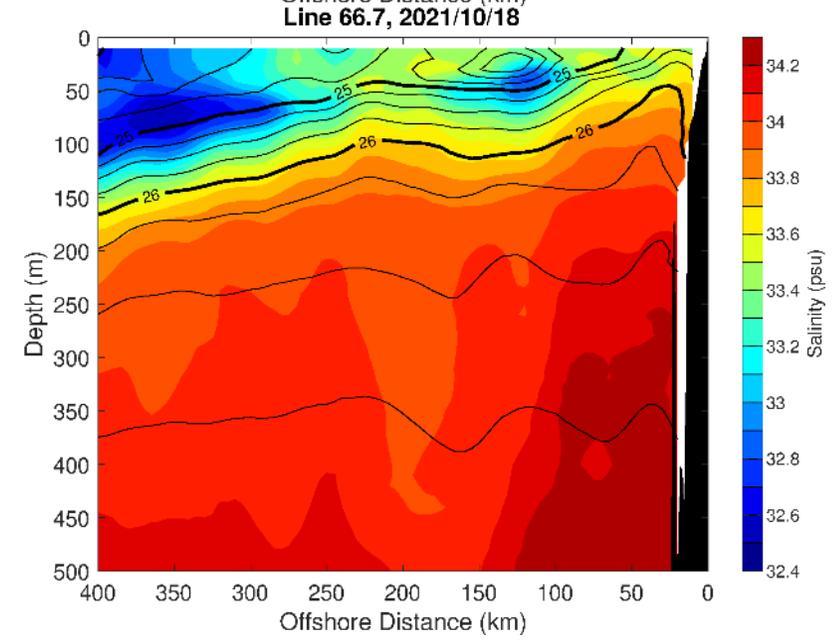
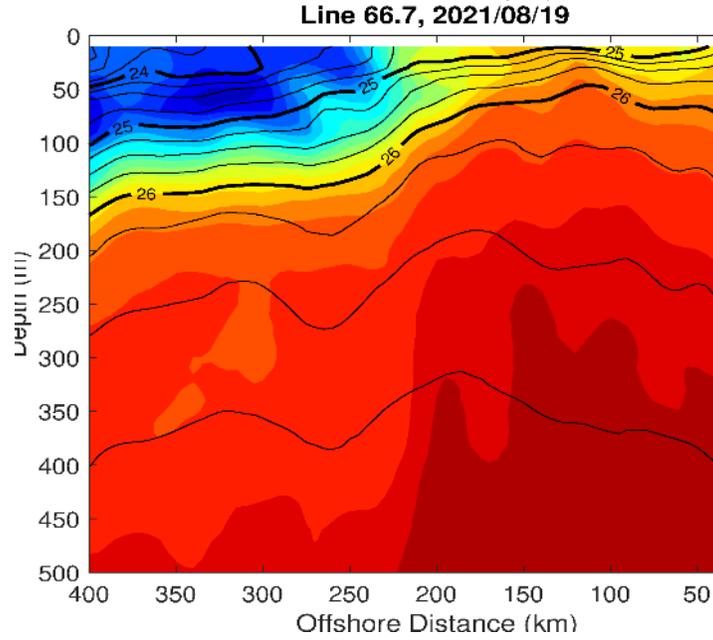
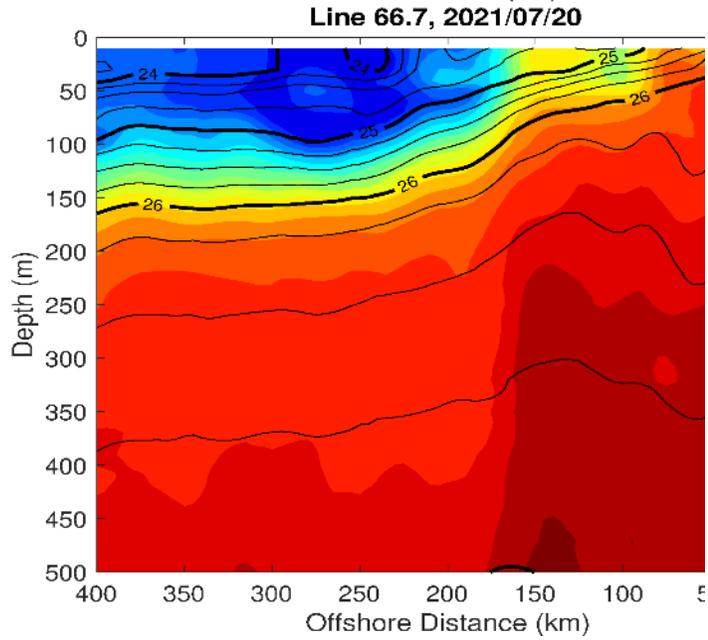
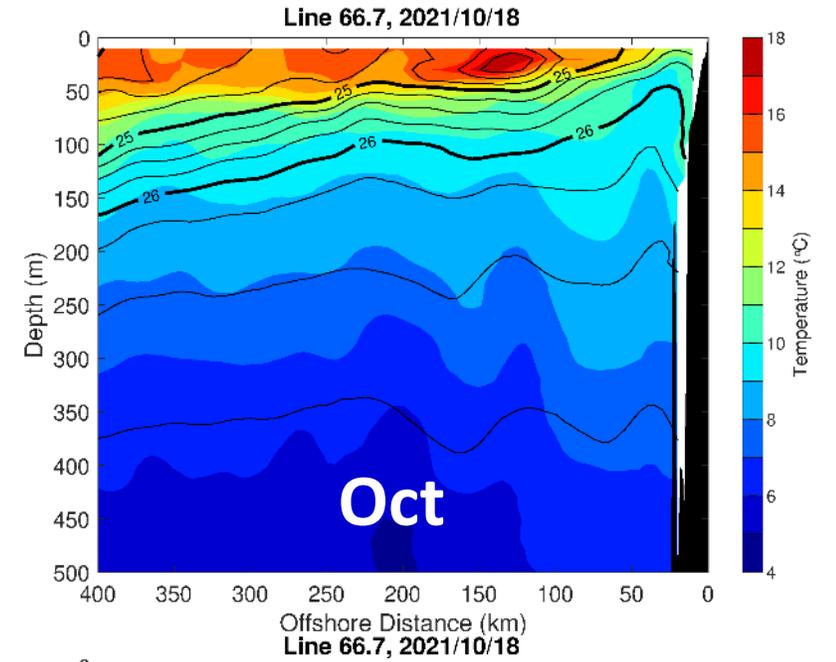
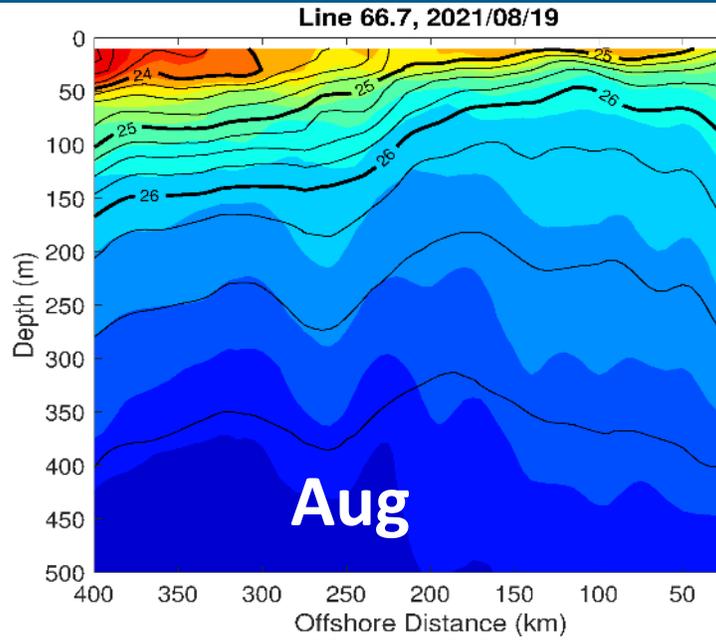
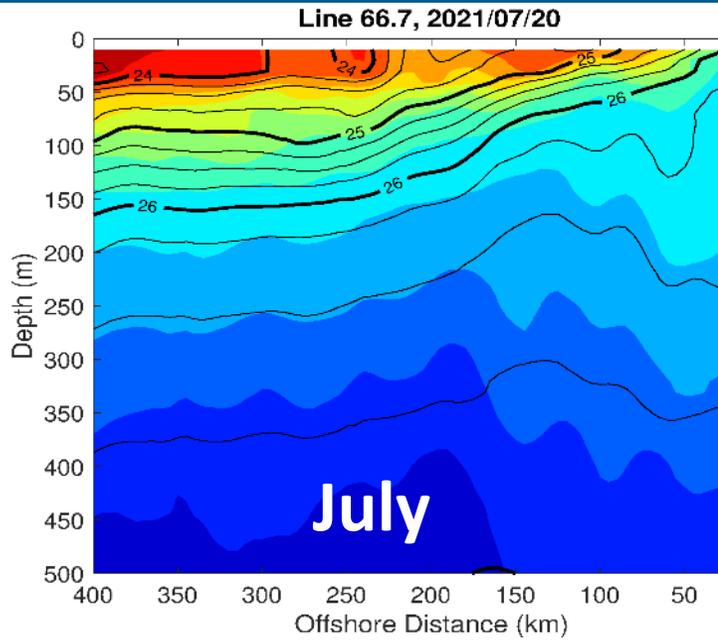


The Central and Northern California Ocean Observing System: West Watch Update

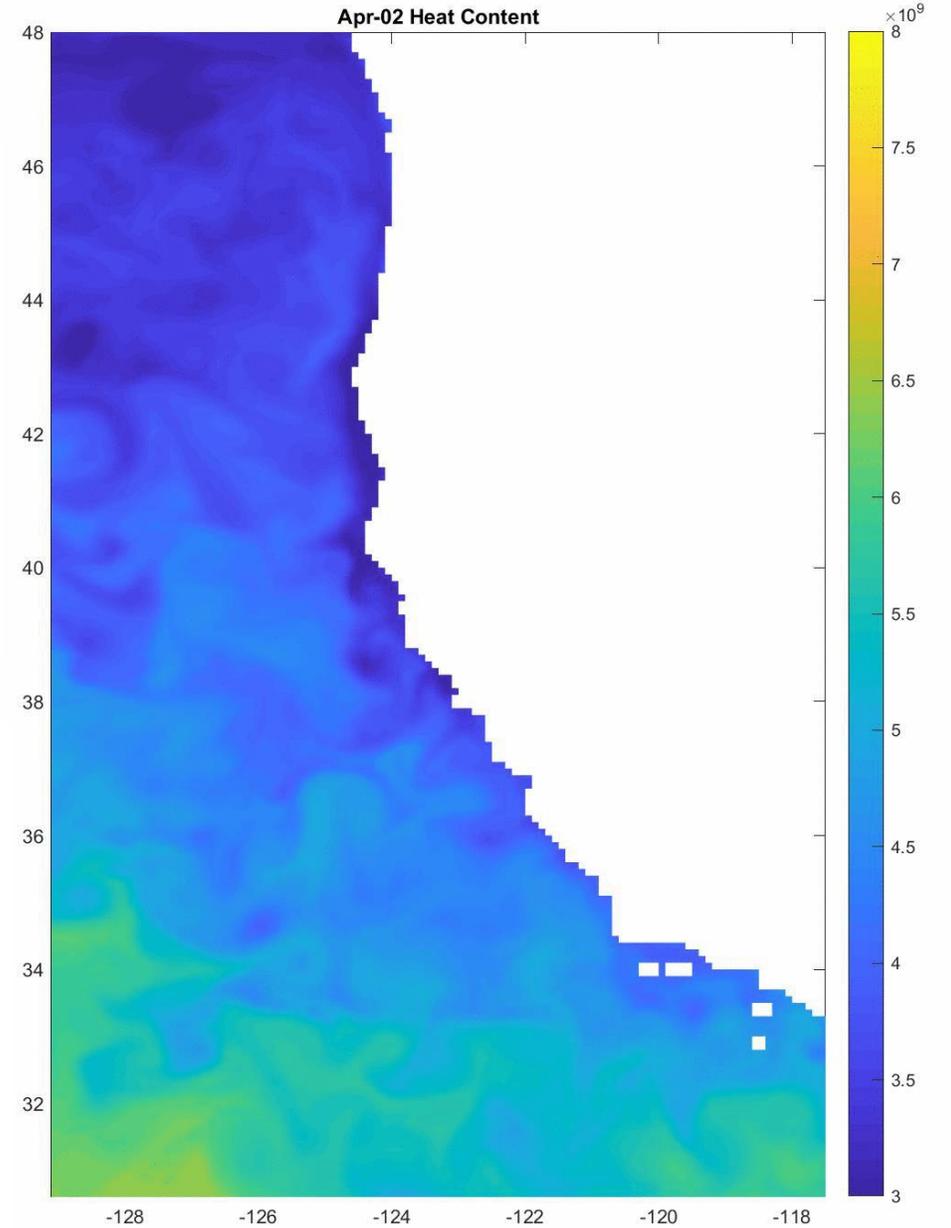
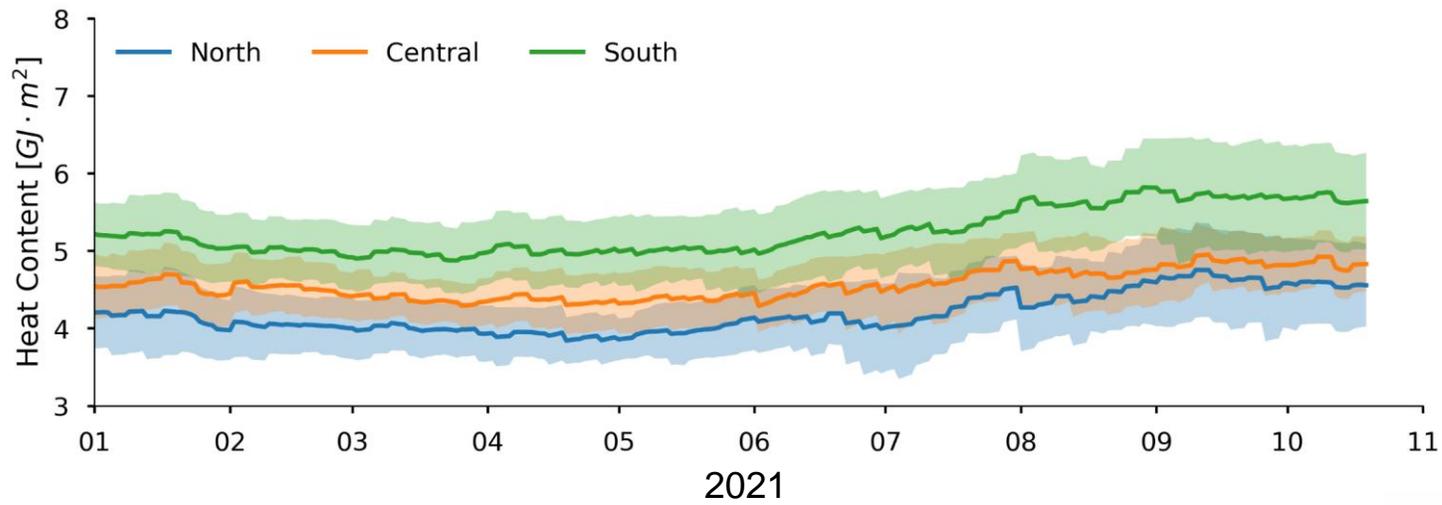
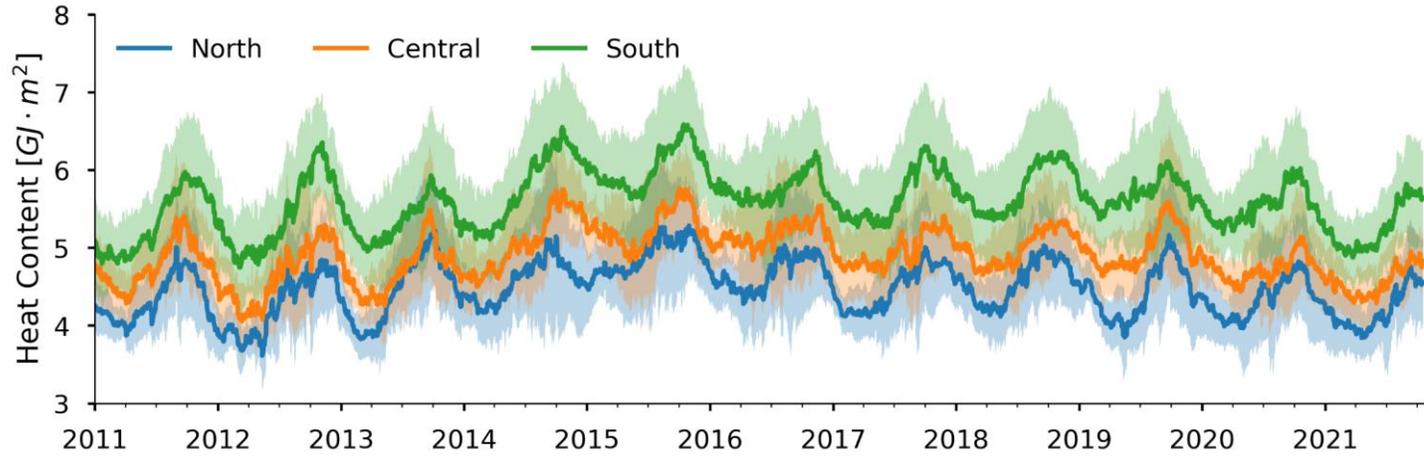


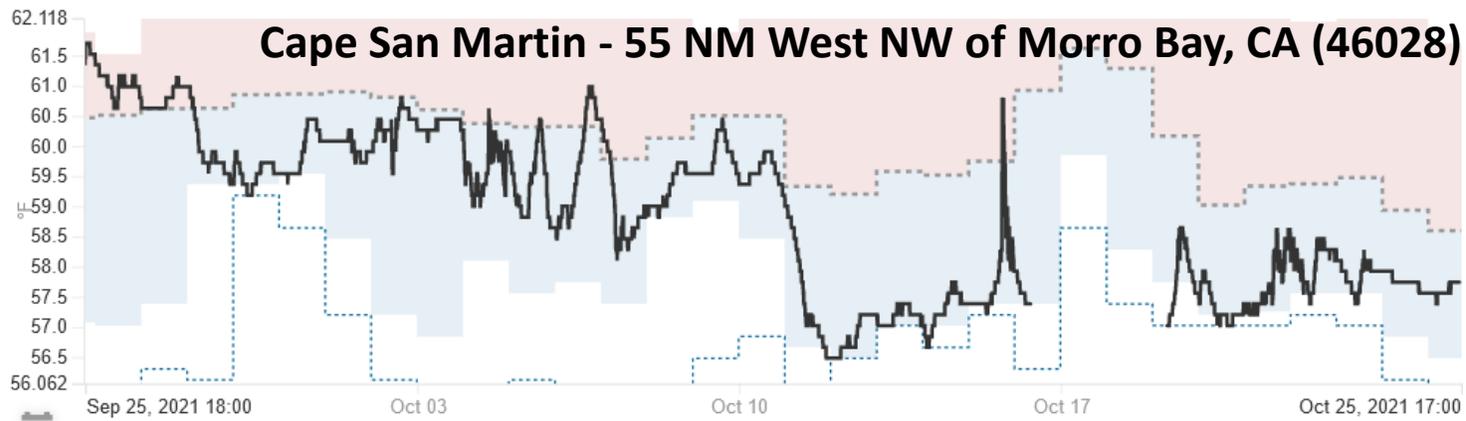
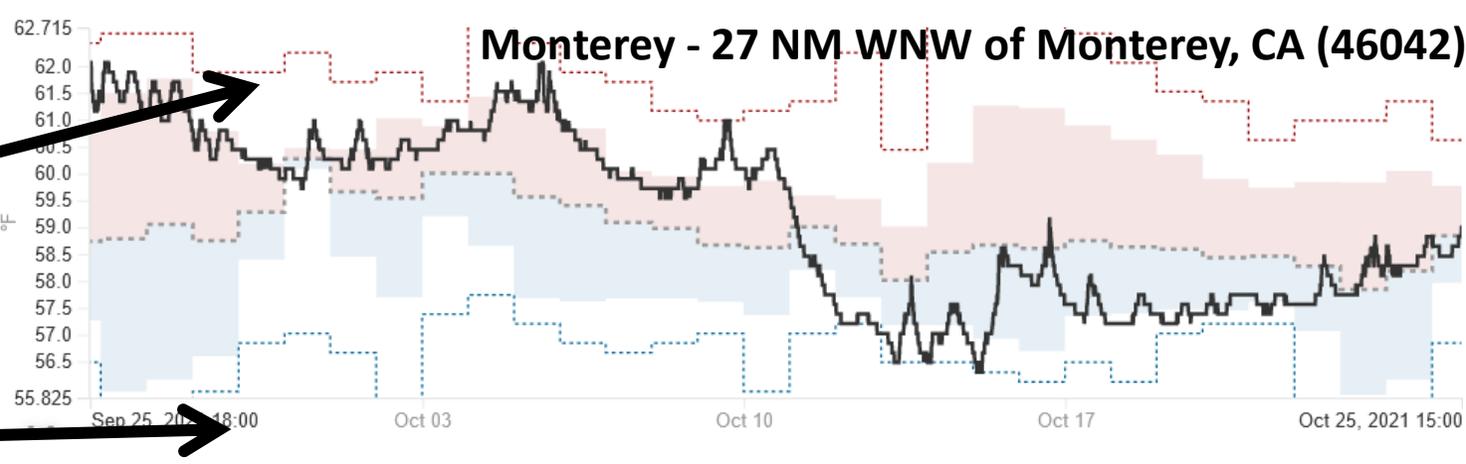
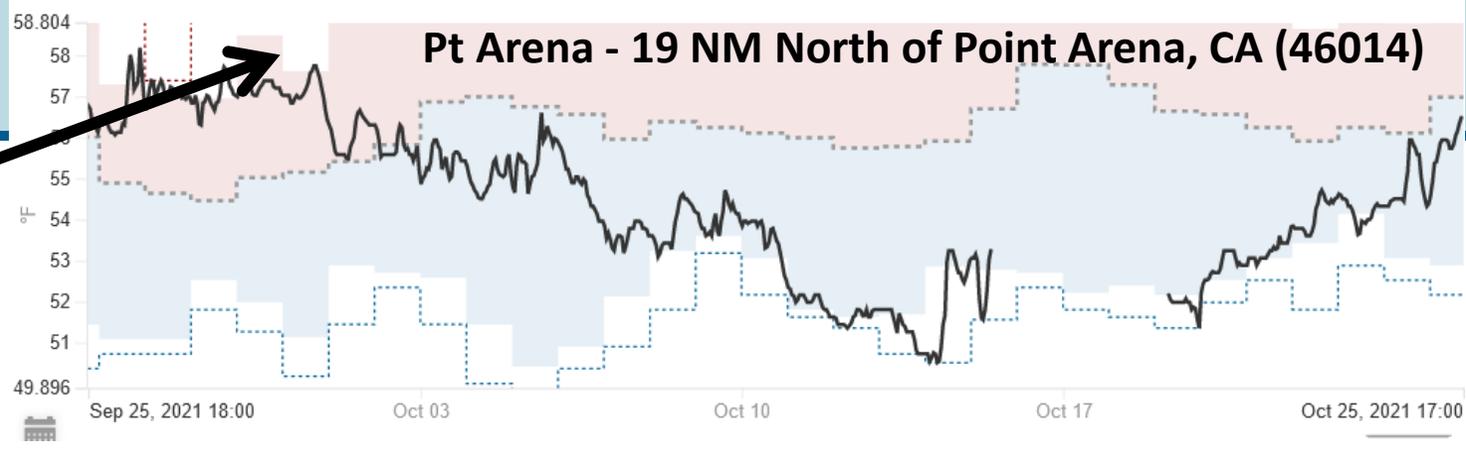
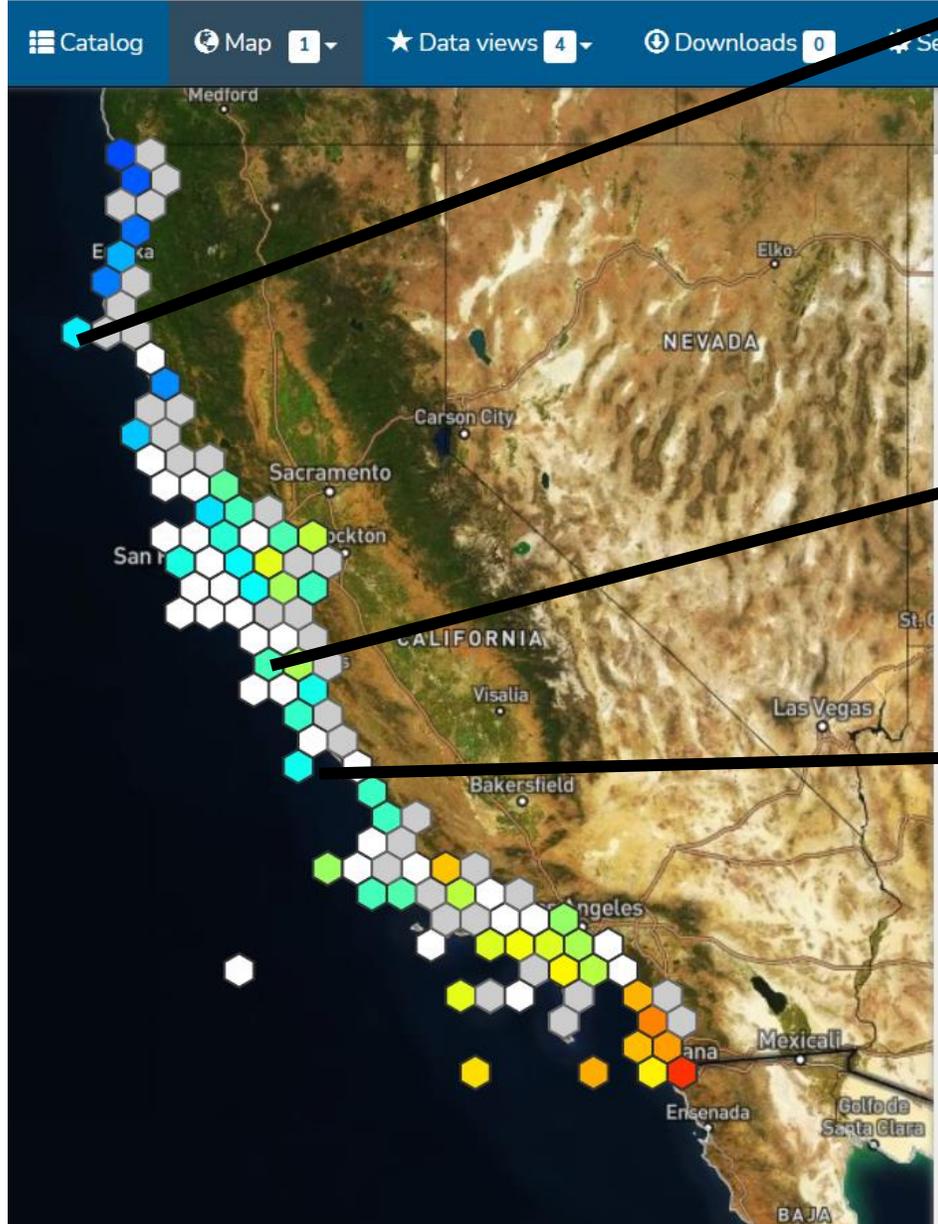


Gliders – Monterey Bay



Heat Content







Watches, Warnings & Advisories

Zoom Out

- [Winter Storm Warning](#)
- [Flood Warning](#)
- [High Surf Warning](#)
- [Flash Flood Watch](#)
- [Flood Advisory](#)
- [High Surf Advisory](#)
- [Small Craft Advisory](#)
- [Hazardous Seas Warning](#)
- [Special Weather Statement](#)
- [Marine Weather Statement](#)
- [Hazardous Weather Outlook](#)

Last Map Update: Mon, Oct. 25, 2021 at 5:52:29 pm PDT

<https://www.weather.gov/mtr/>

HIGH SURF WARNING

11 PM Sunday - 11 AM Tuesday

Published: October 22, 2021



Hazards

- Increased risk of:
 - Sneaker waves
 - Large breaking waves
 - Rip Currents
 - Increased coastal run up

Preparedness/Precautionary Actions

- Stay off coastal jetties
- Keep your eyes on kids & pets
- Never turn your back to the ocean!

Waves & Surf

- Large breaking waves 20 to 30 feet at W/NW facing beaches, locally higher at favored breakpoints.



HIGH SURF

Large waves can wash people off jetties and rocks into the frigid ocean waters. Be very cautious along the coast and on the beaches.

NEVER TURN YOUR BACK TO THE OCEAN.

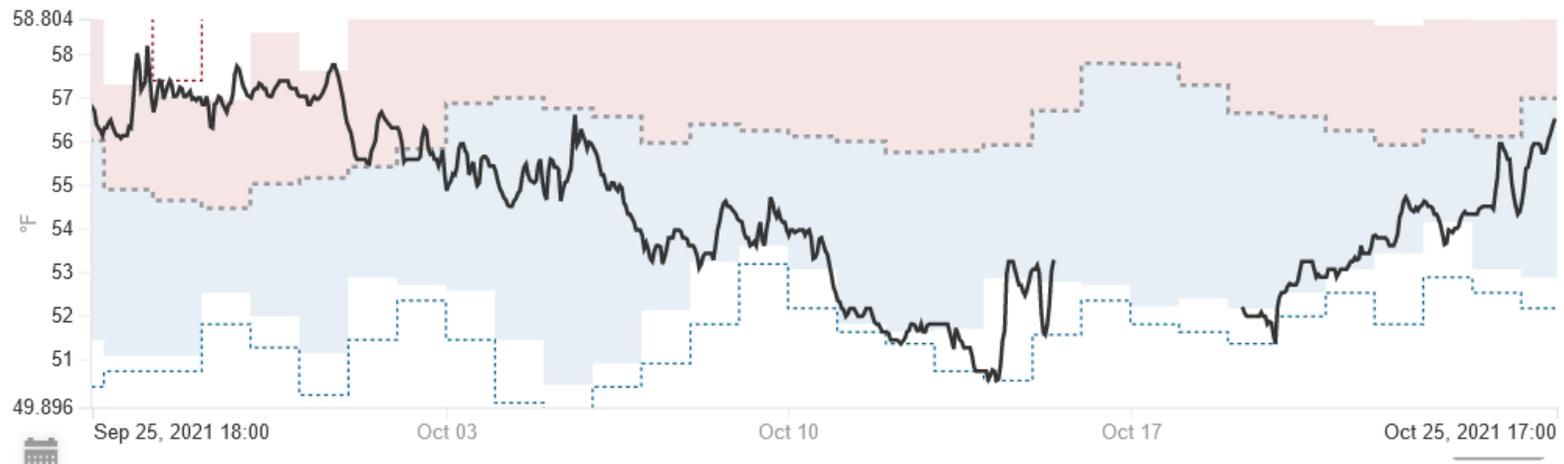
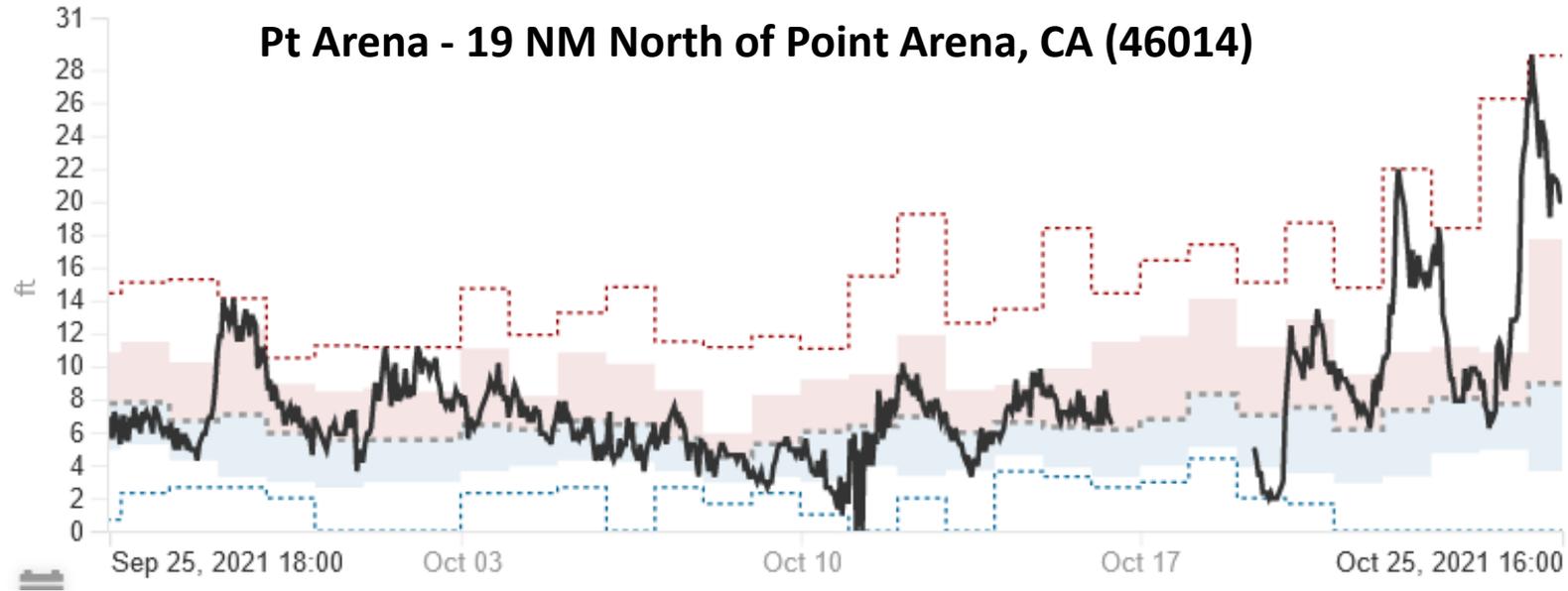


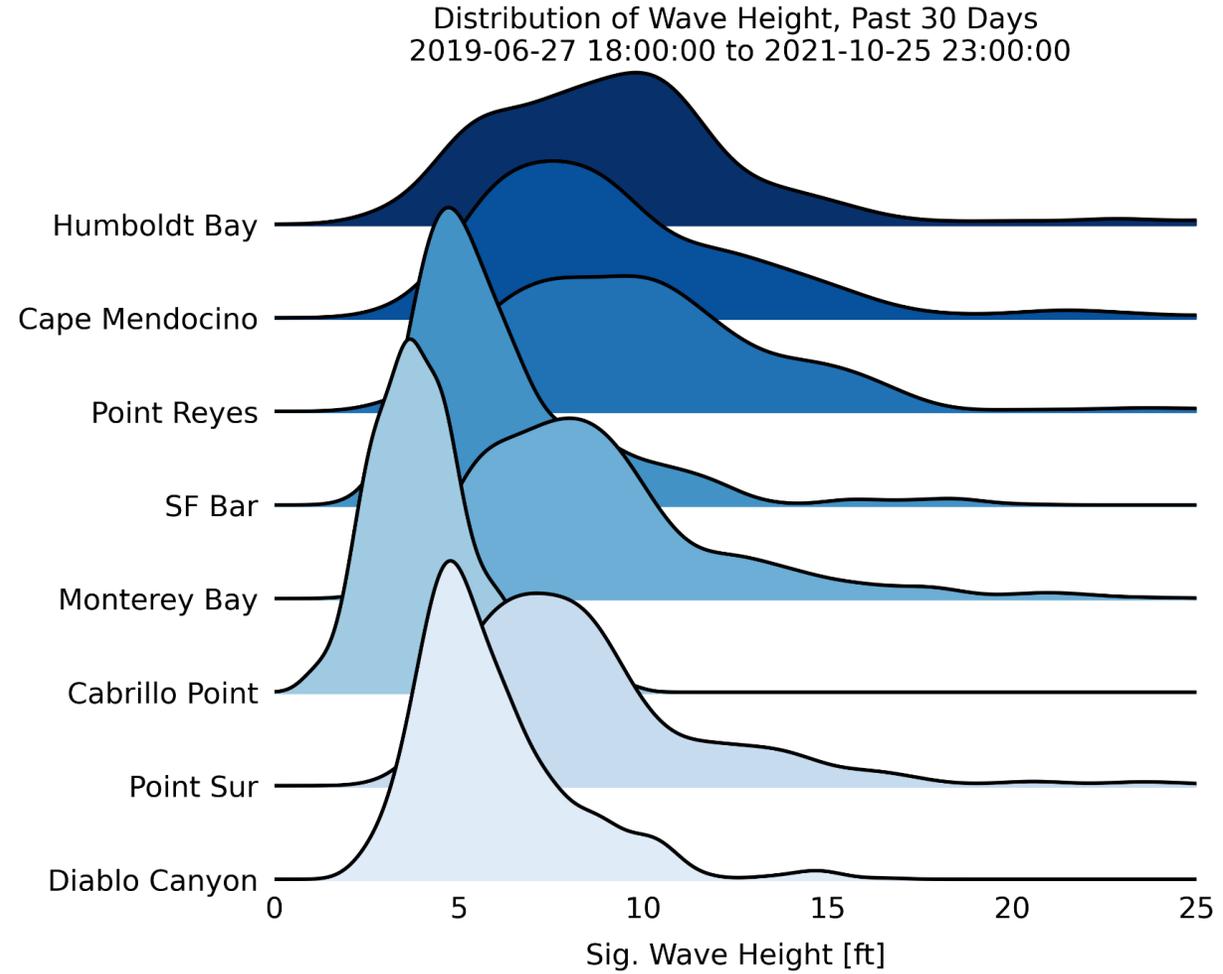
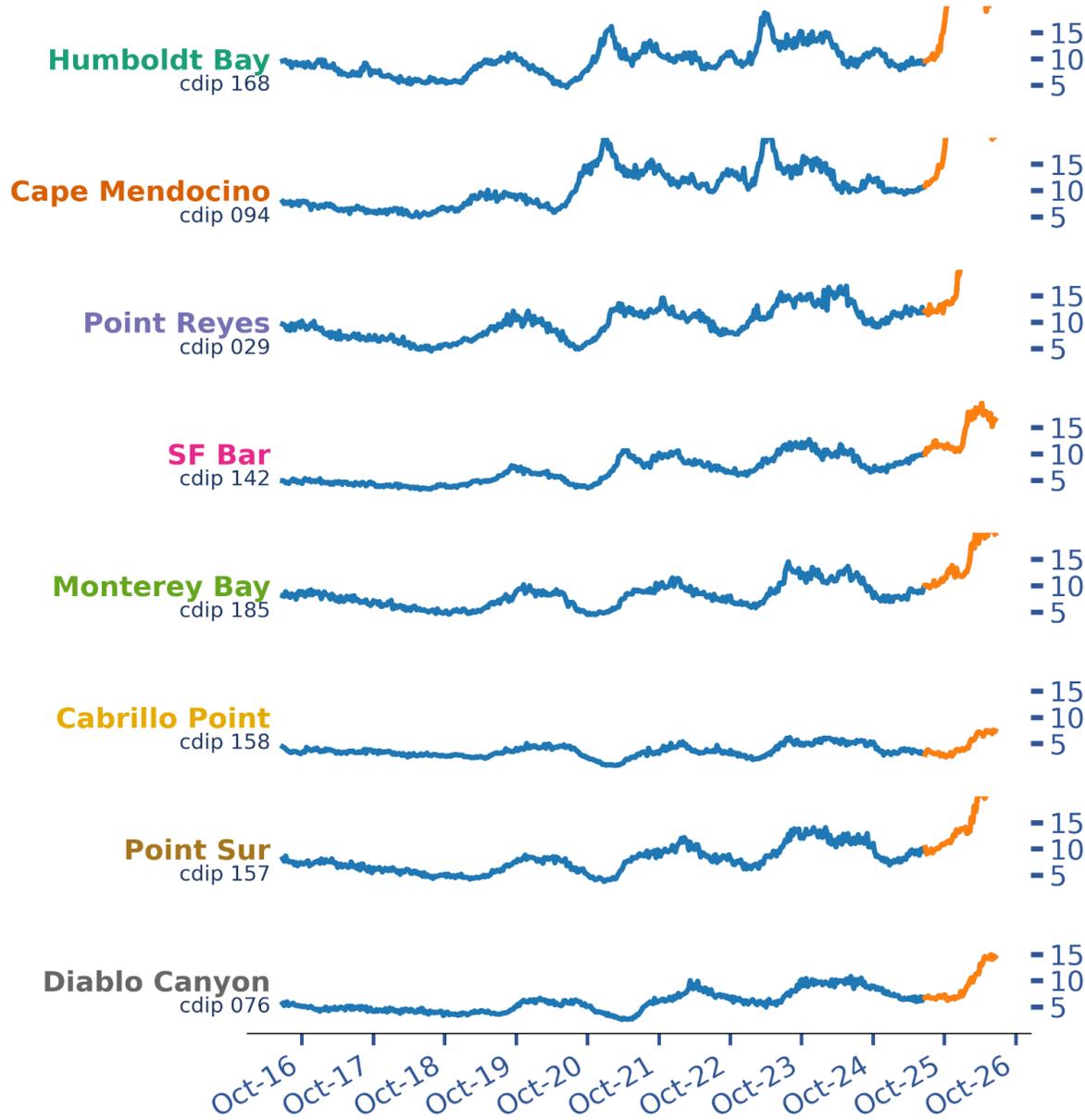
[weather.gov/sanfrancisco](https://www.weather.gov/sanfrancisco)



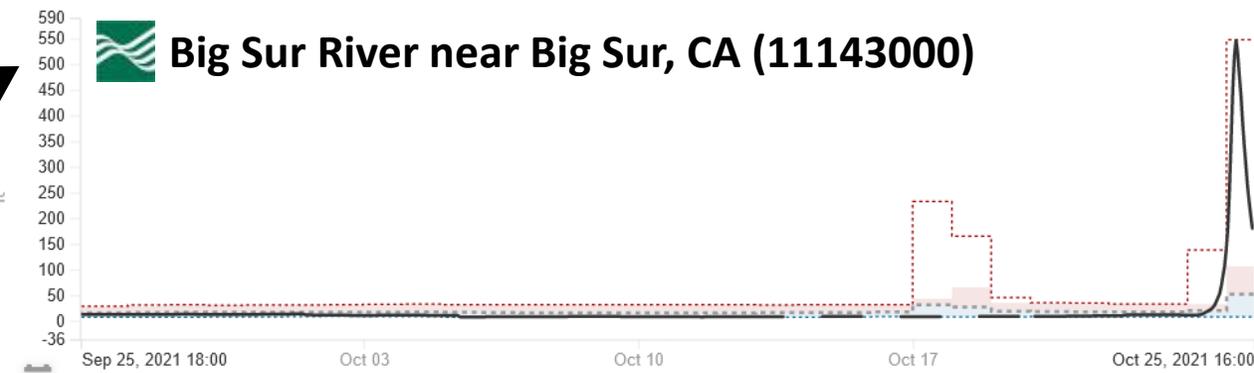
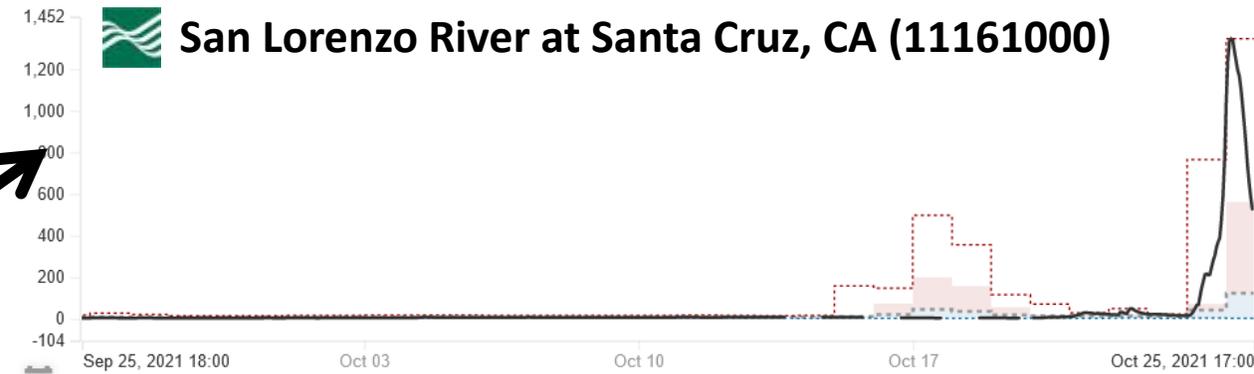
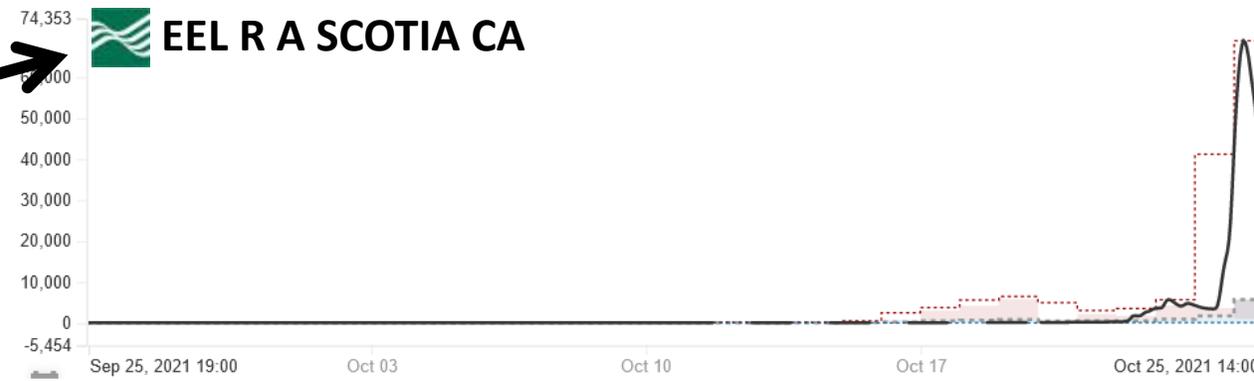
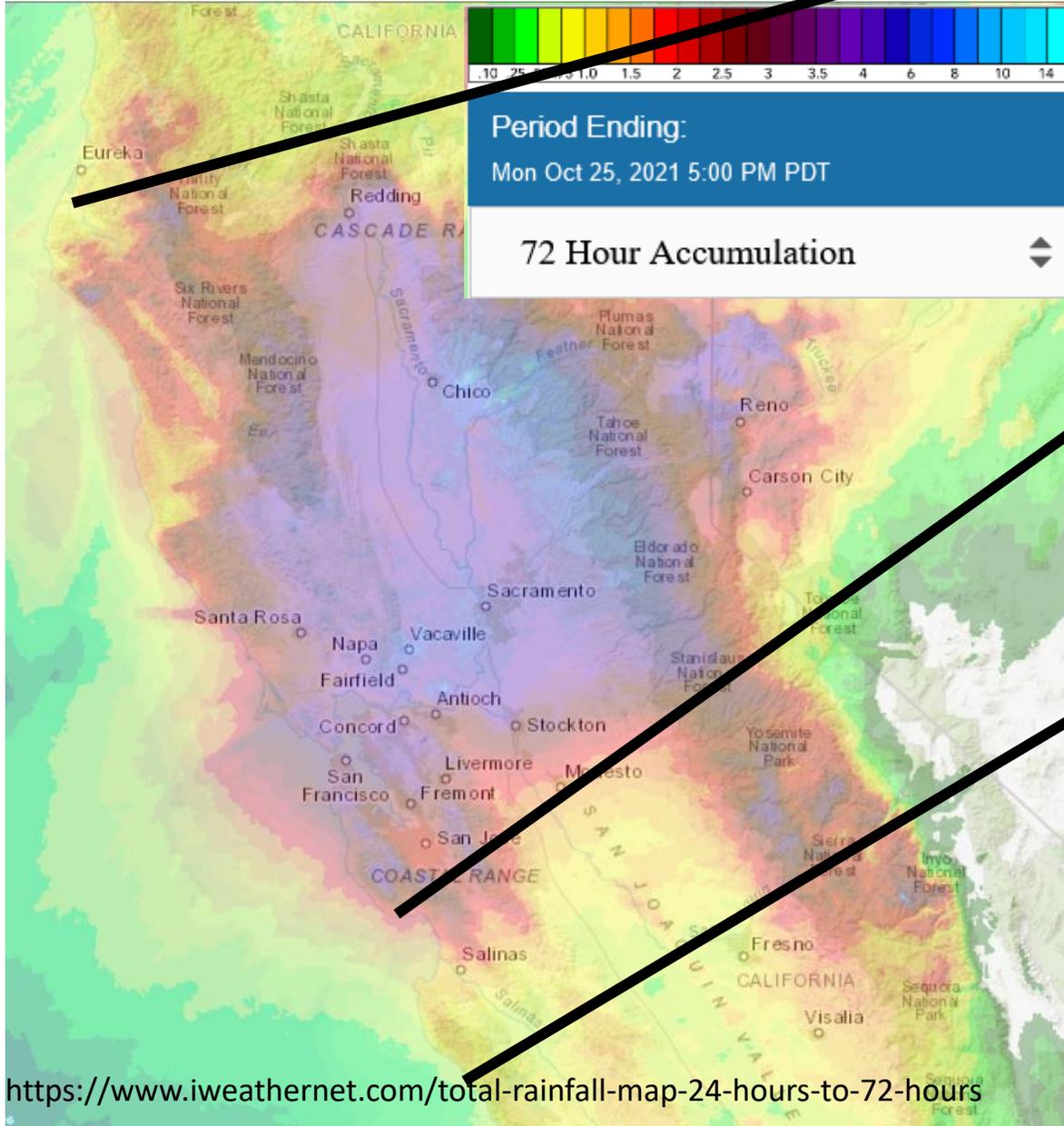
[@NWSBayArea](https://twitter.com/NWSBayArea)

Pt Arena - 19 NM North of Point Arena, CA (46014)





Discharges







SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM



Photo: USCG Petty Officer 3rd Class Alex Gray



Photo: Ringo H.W. Chiu, AP Photo



Photo: USCG Petty Officer 3rd Class Alex Gray

NOAA West Watch Webinar: Southern California

Clarissa Anderson, SCCOOS Executive Director

26-Oct 2021

Huntington Beach Oil Spill

- October 2nd, 2021 oil spill - estimated 25,000 gallons of oil were released from a displaced undersea pipeline off of Huntington Beach; initially thought to be 4-5 x larger.
- 4,000-foot section of Amplify Energy owned 17.7 mile-long pipeline was displaced ~105 feet and had a 13-inch split, running parallel to the pipe. Potentially caused by hooked anchor - still under investigation

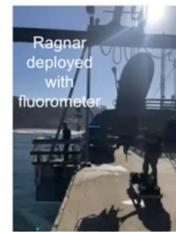


SAN DIEGO COUNTY

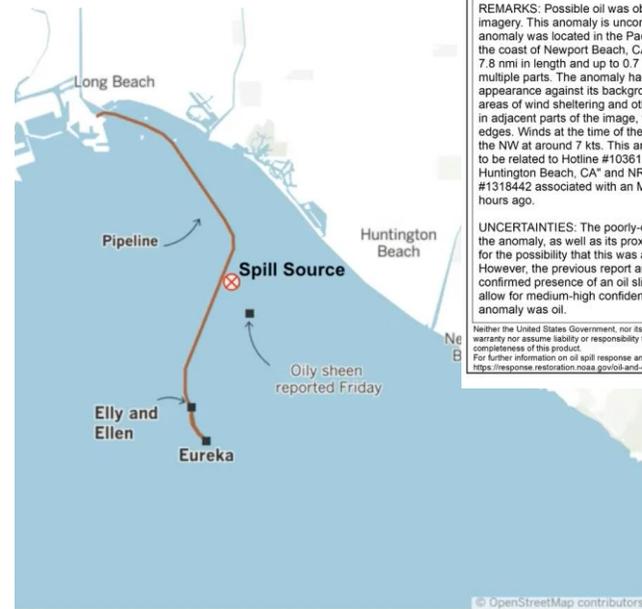
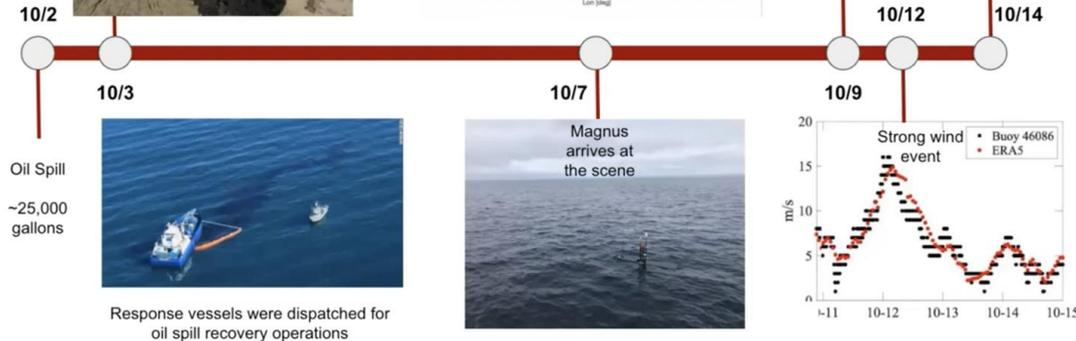
Oil Spill Response Teams Scanning Half of San Diego County Shoreline

Response timeline

NESDIS Marine Pollution Products ($\Delta T \approx 20h$)



Last satellite image from ERMA



MARINE POLLUTION SURVEILLANCE REPORT

Analysis by The National Oceanic and Atmospheric Administration, Satellite and Information Service (NOAA/NSDSIS)

REPORT DATE/TIME: 10/3/2021 0730 (UTC)

DATA SOURCE: SENTINEL1B

MODE: Interferometric Wide (IW) VV

RESOLUTION: 20 meter

IMAGE DATE/TIME: 10/3/2021 0149 (UTC)

■ Possible Oil
■ Possible Thicker Oil
✕ Center Point of Oil Slick: [33°35'44" N/117°56'18" W]

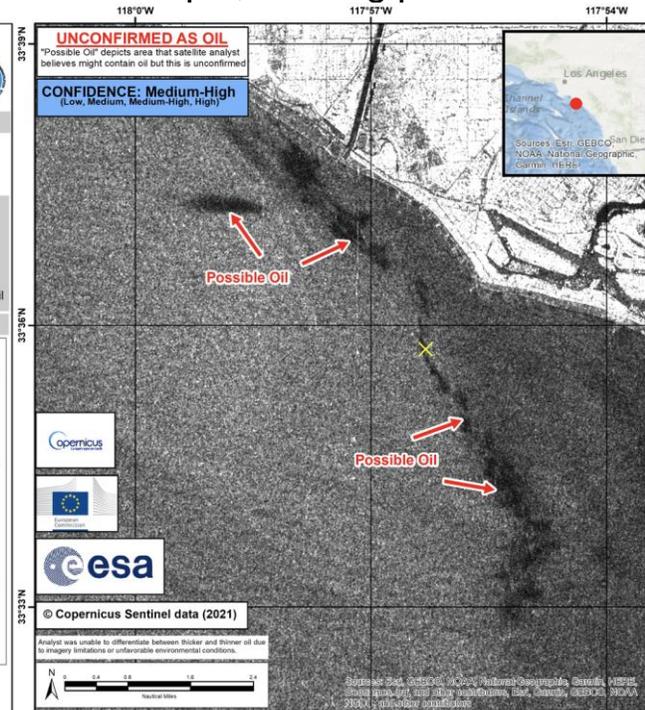
6.03 km² Total Area of Possible Oil

AREA/BLOCK: N/A

REMARKS: Possible oil was observed in satellite imagery. This anomaly is unconfirmed as oil. The anomaly was located in the Pacific Ocean just off the coast of Newport Beach, CA and measured 7.8 nmi in length and up to 0.7 nmi in width in multiple parts. The anomaly had a darker appearance against its background compared to areas of wind sheltering and other false positives in adjacent parts of the image, with poorly-defined edges. Winds at the time of the image were from the NW at around 7 kts. This anomaly is believed to be related to Hotline #10361 "Oil report off Huntington Beach, CA" and NRC report #1318442 associated with an MPSR from 24 hours ago.

UNCERTAINTIES: The poorly-defined edges of the anomaly, as well as its proximity to land, allow for the possibility that this was a false positive. However, the previous report and the earlier confirmed presence of an oil slick in the area allow for medium-high confidence that this anomaly was oil.

Neither the United States Government, nor its employees, make any warranty nor assume liability or responsibility for the accuracy or completeness of this product. For further information on oil spill response and assessment go to <https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills>



Paul Duginiski and Sean Greene LOS ANGELES TIMES

Huntington Beach Oil Spill Response - Community Effort!



Oct. 3, 2021 - Unified command established to respond to the oil spill. Photo credit: USCG.



Jet Propulsion Laboratory
California Institute of Technology



SOUTHERN CALIFORNIA
COASTAL OCEAN
OBSERVING SYSTEM



SCRIPPS INSTITUTION OF
OCEANOGRAPHY

UC San Diego

LIQUID
ROBOTICS
A Boeing Company



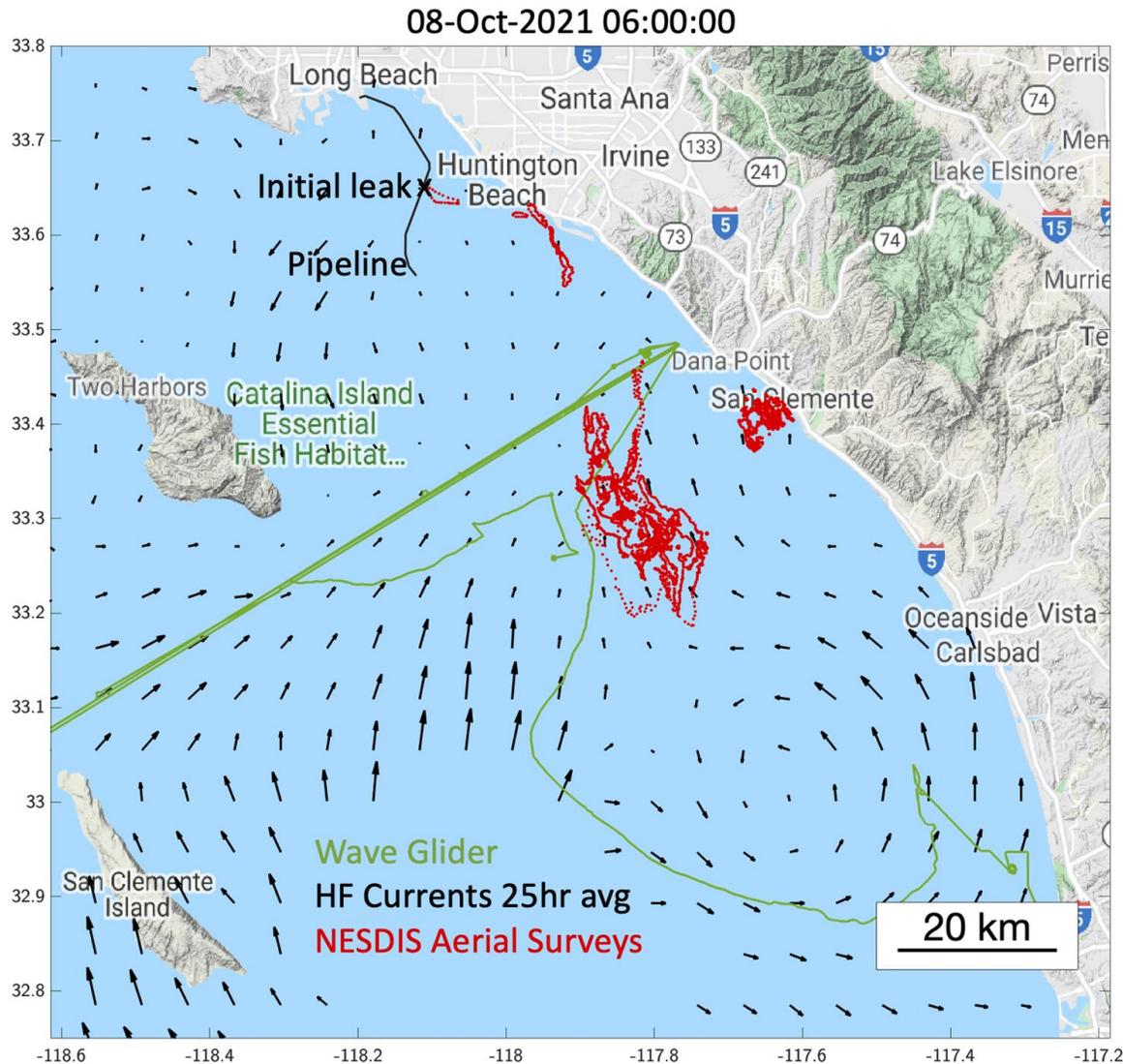
UC DAVIS
VETERINARY MEDICINE
Oiled Wildlife Care Network

Huntington Beach Oil Spill Response - Community Effort!



1. Aircrafts and drones dispatched for overflight assessments - NASA, USCG, Orange County Sheriff
2. Divers and Remotely Operated Vehicles survey the pipeline for potential leaks and damage - Amplify Energy
3. Boats conducting oil recovery operations - USCG
4. Containment Booms deployed - designed to restrict the flow of free-floating oil
5. Shoreline Cleanup Assessment Teams dispatched - crewmembers and volunteers
6. Satellite imagery - NOAA OR&R and NASA JPL
7. Modeling oil trajectory - SCCOOS and SIO CORDC HF Radars provided real-time surface currents, Boeing Liquid Robotics wave glider provided real-time wind and USACE and CA State-funded CDIP wave buoys provided wind data.
8. Animal recovery - The Oiled Wildlife Care Network, UC Davis and The Pacific Marine Mammal Center
9. Community Air Monitoring - South Coast Air Quality Management District, in coordination with the U.S. EPA the OC Health Care Agency, and a contracted environmental consulting firm
10. Boat decontamination sites set up for the public

Huntington Beach Oil Spill Response

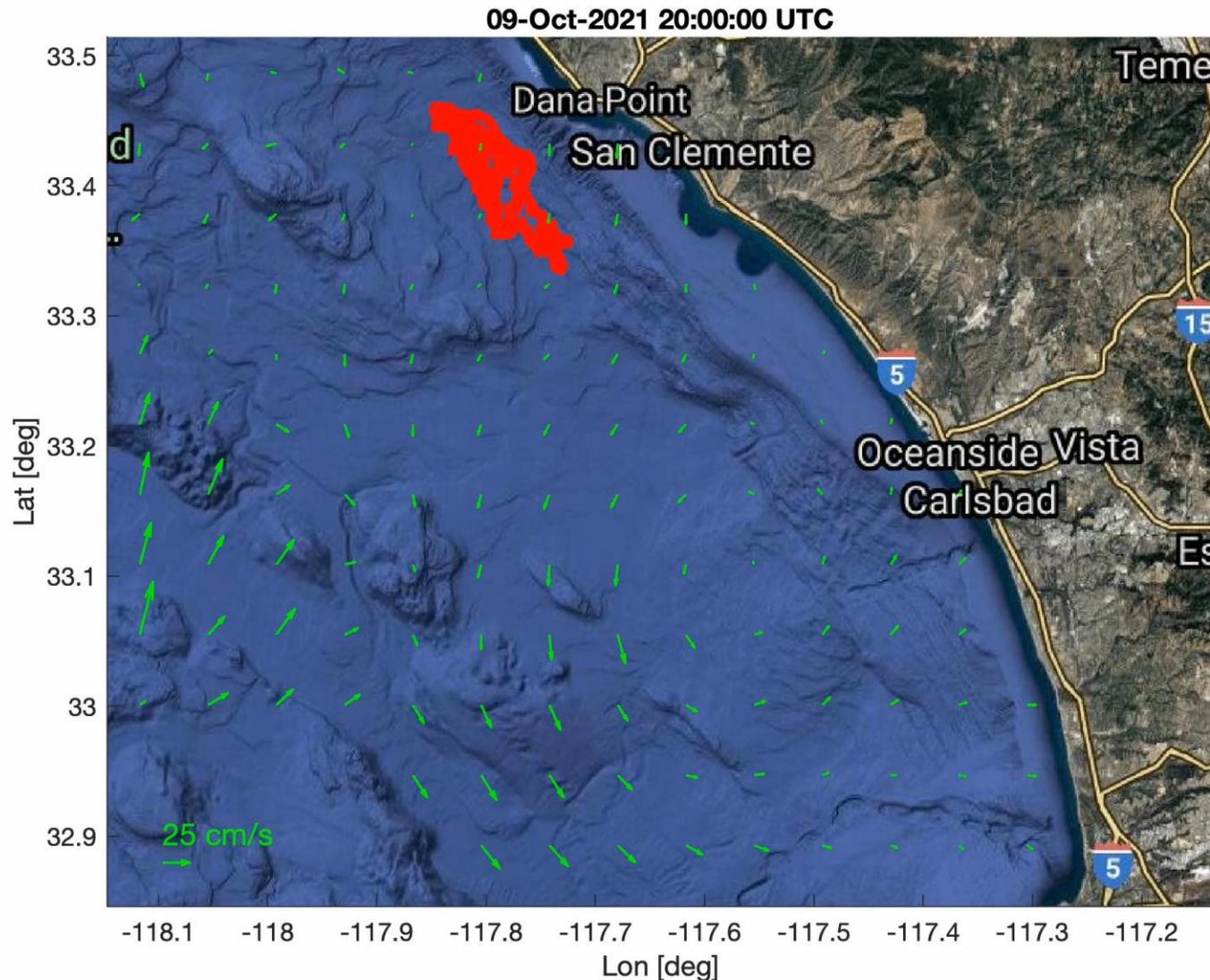


- Accurate winds are needed to help windage computations for the GNOME trajectory forecasts supporting the clean up efforts
- CORDC team at SIO diverted two Boeing Liquid Robotics wavegliders equipped with a Scripps METOC sensing payload and one with a hydrocarbon fluorometer to the offshore location of the oil from the Huntington Beach Spill. This decision was made internally by Scripps after Amy MacFadyen at OR&R had expressed a need for improved winds at the oil location.

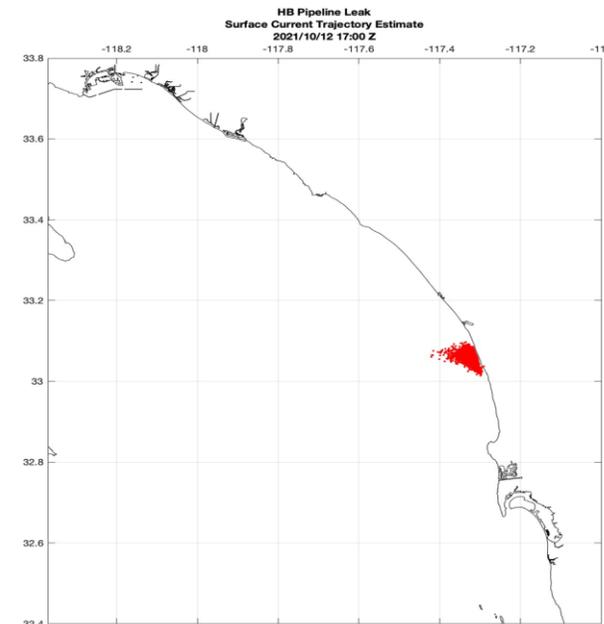
Boeing Liquid Robotics Wave Glider



Huntington Beach Oil Spill Response



- Animation of the trajectory simulation starting from the 10/9/21 RADARSAT-2 pass through 10/12/21
- The random walk model uses **HFR surface currents** with winds from the wave glider and estimated the oil will reach just offshore of Encinitas.



Coastal Data Information Program (CDIP)

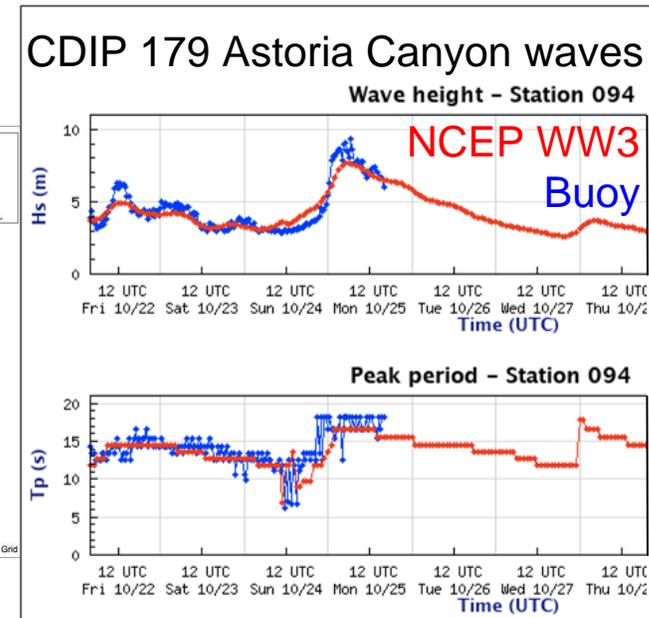
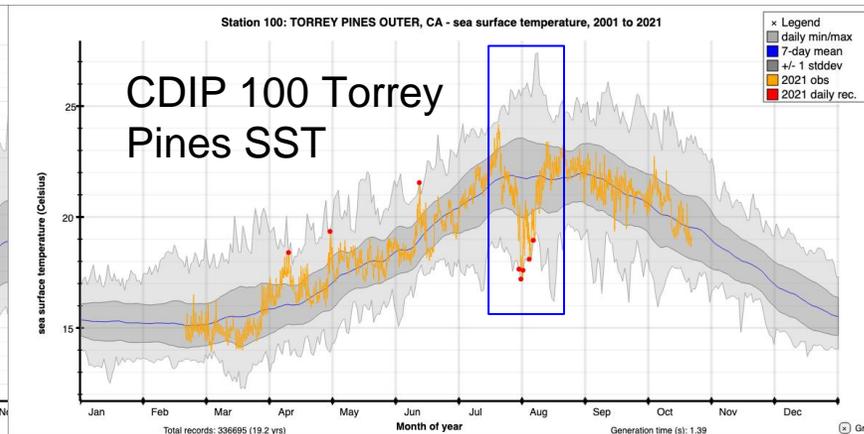
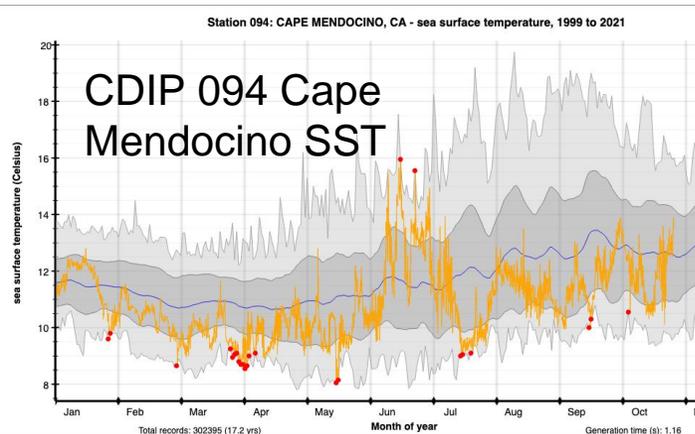
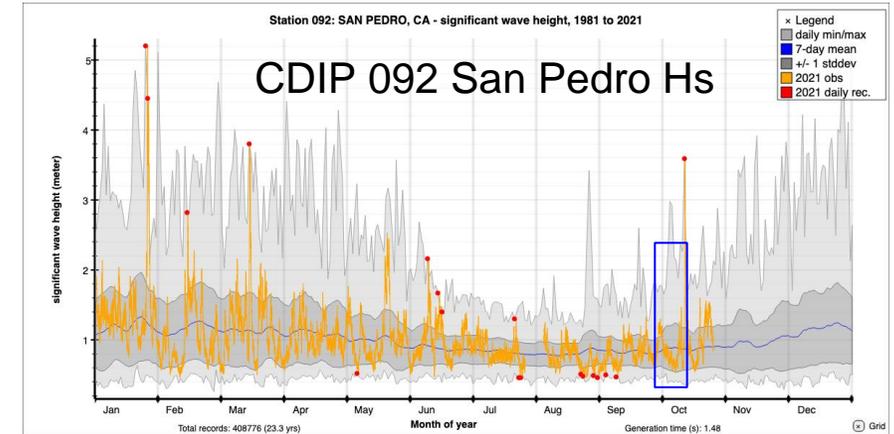


California wave activity in 2021 has been following the long term climate trend.

- Waves were not a factor during the early stage of the oil spill, due to low energy (e.g. CDIP 092).
- Bomb cyclone currently impacting PNW stations
 - - 10.7 m (35 ft) max Hs and 14.1 m (46 ft) largest individual wave measured at CDIP 179 Astoria Canyon, OR

California sea surface temperatures (SST) also following the climate trend.

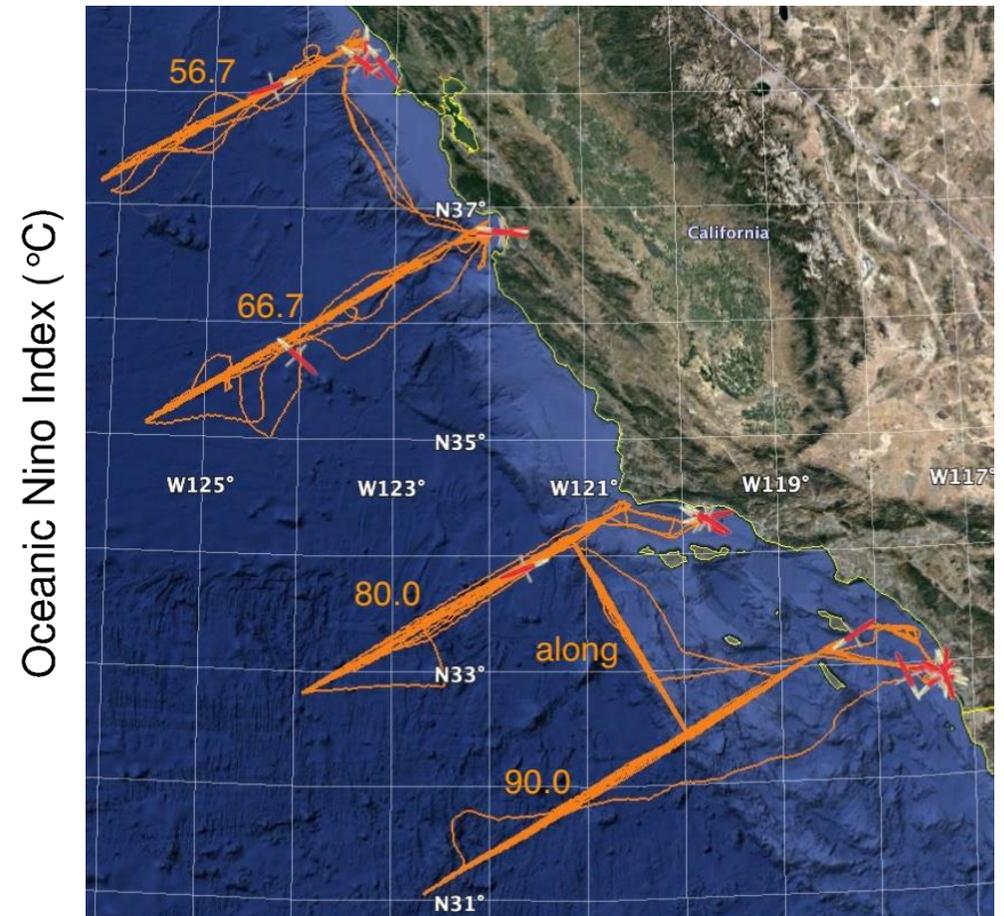
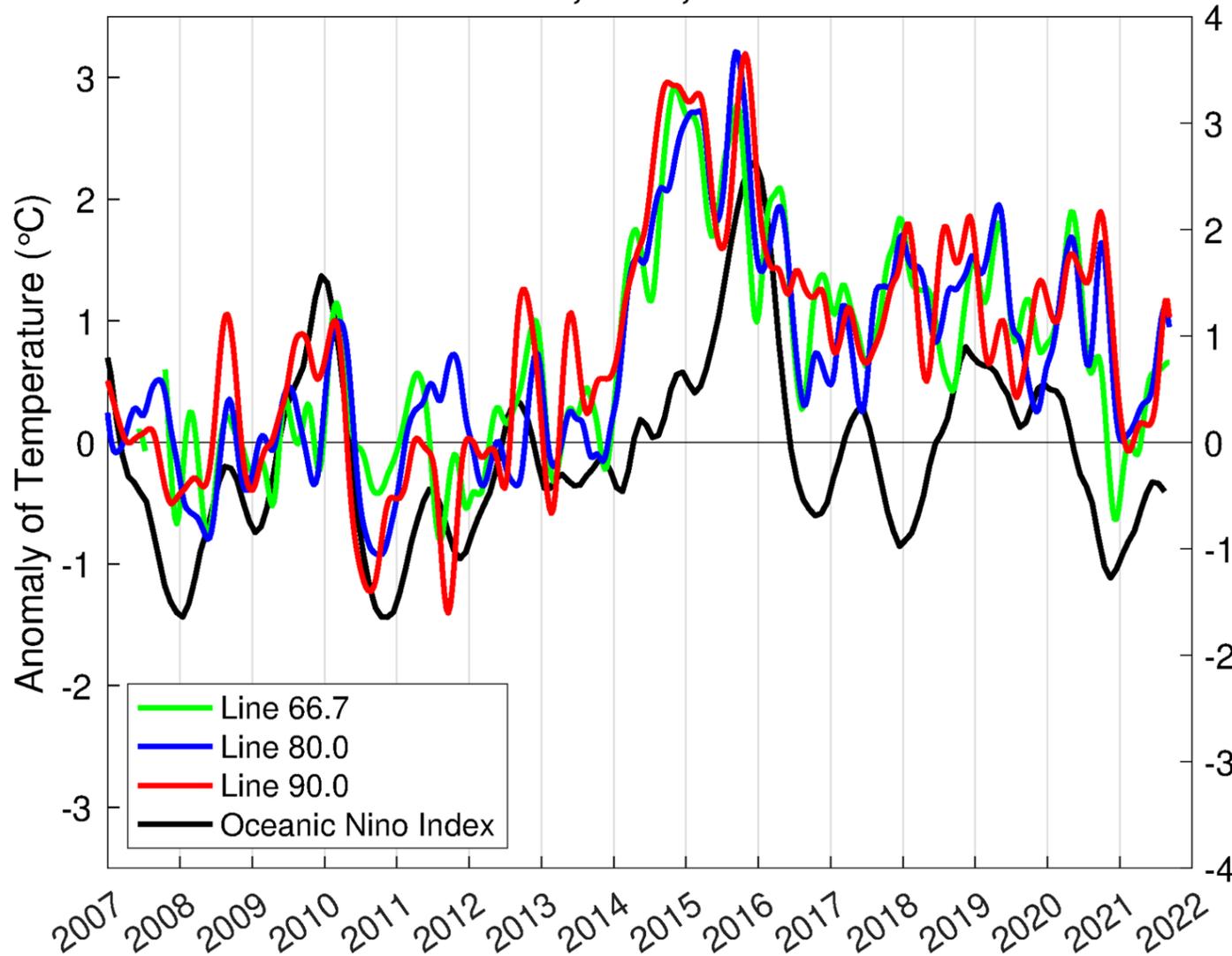
- Notable mid-summer cooling in SD and LA (e.g. CDIP 100).
- SST in LA/LB remains mostly below average since July.
- The two northernmost CA stations were also cooler (e.g. CDIP 094).



California Underwater Glider Network

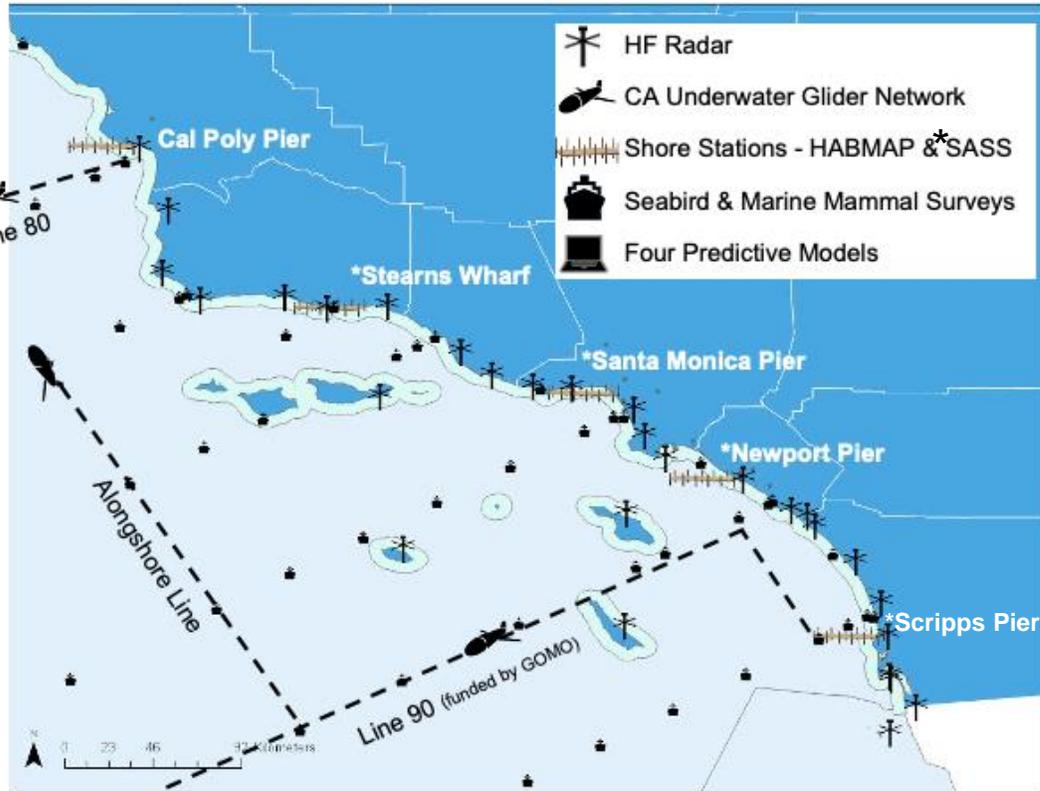


All Lines, 10 m, 0 - 200 km



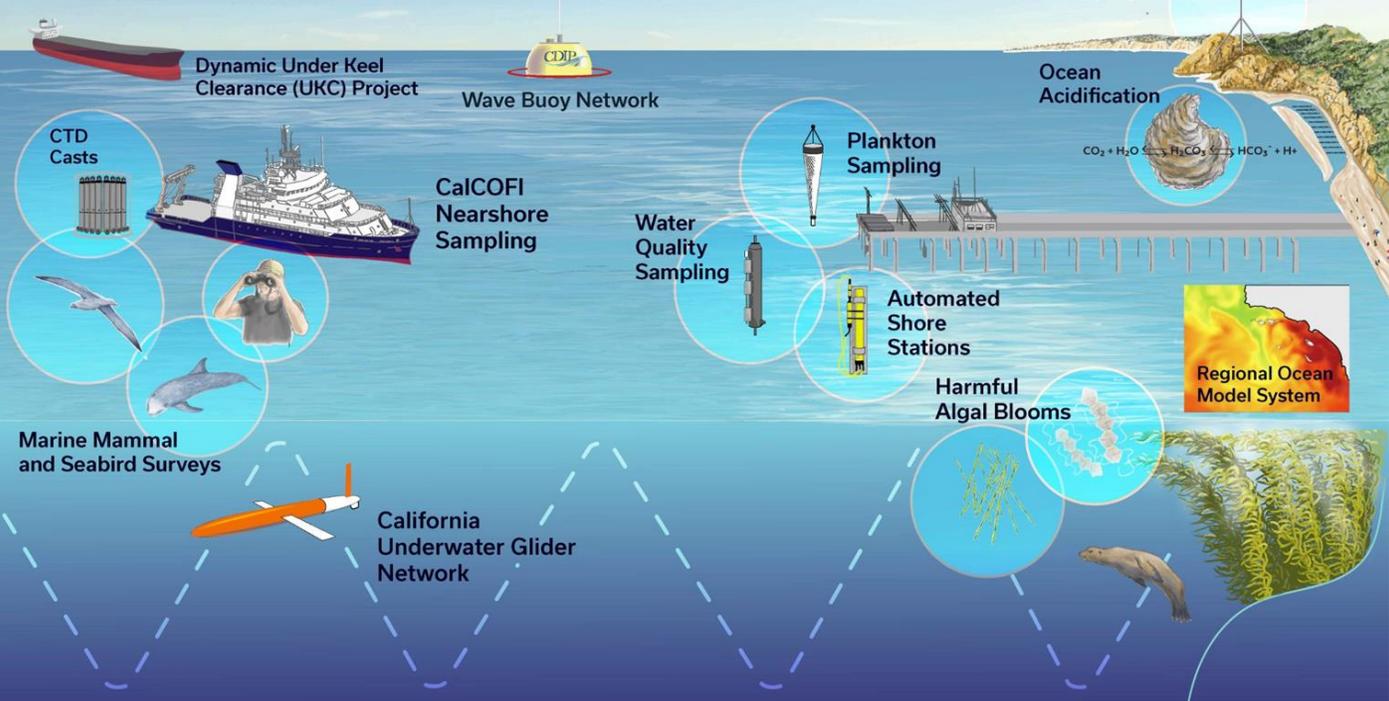


SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM



Southern California Coastal Ocean Observing System

SCCOOS is a Science-Based Decision Support System



Questions?

info@sccoos.org



Next NOAA
West
Watch:

January 27,
2022

Thanks!

Photo: Tahoe Rim Trail, October 7, 2021
Credit: Dan McEvoy