NOAA West Watch

Reporting Regional Environmental Conditions & Impacts in the West

April 20, 2021
Call Agenda

• Project Recap & Updates (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 Recap and Updates

• 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

• The Western Regional Climate Center has agreed to provide funding to support continued quarterly webinars in 2021 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).
Current Drought Conditions

U.S. Drought Monitor
West

Current: 78\% D1-D4, 42\% D3-D4

One year ago:
27\% D1-D4, 0\% D3-D4

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:
Deborah Balmhe
National Drought Mitigation Center

droughtmonitor.unl.edu
Water Year Precipitation

October 1-April 16, 2021
Percent of Average Precipitation

Precipitation Percentile Rankings

https://app.climateengine.org/climateEngine

https://wrcc.dri.edu/wwdt/

https://wrcc.dri.edu/wwdt/
Water Year Precipitation – Atmospheric Rivers

CW3E End of Winter Summary: Meteorological Story

For California DWR’s AR Program

<table>
<thead>
<tr>
<th>AR Strength</th>
<th>AR Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak</td>
<td>15</td>
</tr>
<tr>
<td>Moderate</td>
<td>20</td>
</tr>
<tr>
<td>Strong</td>
<td>11</td>
</tr>
<tr>
<td>Extreme</td>
<td>3</td>
</tr>
<tr>
<td>Exceptional</td>
<td>0</td>
</tr>
</tbody>
</table>

49 atmospheric rivers have made landfall over the U.S. West Coast during WY 2021, a majority of which primarily impacted the Pacific Northwest.

Regions Impacted by Each AR

<table>
<thead>
<tr>
<th>State/Region</th>
<th>AR Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington</td>
<td>45</td>
</tr>
<tr>
<td>Oregon</td>
<td>48</td>
</tr>
<tr>
<td>Northern CA</td>
<td>30</td>
</tr>
<tr>
<td>Central CA</td>
<td>15</td>
</tr>
<tr>
<td>Southern CA</td>
<td>6</td>
</tr>
</tbody>
</table>

*Arrows are placed on the map where each AR was strongest over the coast.*
Spring Precipitation

March 1-April 16, 2021
Percent of Average Precipitation

March 19-April 16, 2021
Precipitation Percentile Rankings

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

https://app.climateengine.org/climateEngine
Atmospheric Circulation Patterns: March 15-April 15

Jet Stream Level Zonal (west-to-east) Wind Anomaly

- Polar jet displaced north into AK and Canada

Mid-atmosphere Pressure Anomaly

- Large ridge of high pressure (H) extending to the PNW coast

https://psl.noaa.gov/data/composites/day/
Spring Temperatures

March 1-April 16, 2021
Mean Temperatures Departures

April 1-16, 2021
Mean Temperatures Departures

https://app.climateengine.org/climateEngine
April 1 Snowpack
April 1 Snowpack

SNOTEL and Cooperative Snow Sensors, April 1, 2021

Data: NRCS
Graphic: Dan McEvoy
Record early April Snow Melt

Snow Water Equivalent Change
March 31-April 15

Snow Water Equivalent Change Records, March 31-April 15

https://www.wcc.nrcs.usda.gov/snow
Upper Colorado River Basin Snow Drought

Snow Water Equivalent in Upper Colorado Region

- Early Peak
- Rapid Melt

Current as of 04/19/2021:
  - % of Median - 72%
  - % Median Peak - 52%
  - Days Since Median Peak - 13
  - Percentile - 15
Cascading Impacts: Dry Autumn + Snow Drought

- Based on soil moisture data since 2008
- Extremely dry autumn; almost no wetting of the soils
- Early response to snowmelt with rapid late March/early April warm period

Upper Colorado

Eastern Sierra Nevada

- Based on soil moisture data since 2008
Cascading Impacts: Dry Autumn + Snow Drought

28-day Streamflow Percentiles
April 18, 2021

Cumulative Streamflow
Sacramento River, CA

https://waterwatch.usgs.gov/
Western states, including Colorado, prepare for possible 1st water shortage declaration

The U.S. Bureau of Reclamation released 24-month projections this week forecasting that less Colorado River water will cascade down from the Rocky Mountains through Lake Powell and Lake Mead.

- Lake Mead projected to fall below 1,075 feet (328 meters) in June 2021
- 1,075 is shortage threshold
- Impacts water deliveries to AZ, CA, CO, NM, UT, and WY
- Lake Powell Apr-Jul inflow forecast: 42% of median
Water Supply Concerns Heading into Summer

- Final allocation for 2020 was 20%
- Final allocation for 2017 was 85%
California State Water Project

Historical SWP Allocations (1996-2019) - Initial vs. Final

Table A Allocation

Year


Initial

Final

https://californiawaterblog.com/2020/05/24/an-introduction-to-state-water-project-deliveries/
Drought One Factor in Summer Fire Danger

- Above normal fire potential focused over the Southwest in June and shifting to California, Great Basin, and east of Cascades in July
- One benefit of dry spring is limiting growth of fine fuels (grasses)
ENSO Alert System Status: La Niña Advisory

- La Niña conditions are present.*
- Equatorial sea surface temperatures (SSTs) are below average from the west-central to eastern Pacific Ocean.
- The tropical atmospheric circulation is consistent with La Niña.
- A transition from La Niña to ENSO-Neutral is likely in the next month or so, with an 80% chance of ENSO-neutral during May-July 2021.*

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/.
ENSO Forecasts

CPC/IRI El Nino forecast:

NMME models + other dynamical models + statistical models

Source: CPC/IRI
April 25-29, 2021 Outlook

Temperature Probability

Precipitation Probability

Source: NOAA/CPC
May 2021 Outlook

Temperature Probability

Precipitation Probability

Source: NOAA/CPC
NANOOS:  [www.nanoos.org](http://www.nanoos.org)  Climatology app

Sea Surface Temperature Anomaly
NCDC Optimum Interpolation SST

January 2021
Sea Surface Temperature Anomaly
NCDC Optimum Interpolation SST

February 2021
NANOOS: www.nanoos.org Climatology app

Sea Surface Temperature Anomaly
NCDC Optimum Interpolation SST

March 2021
NANOOS: www.nanoos.org Climatology app

Sea Surface Temperature Anomaly
OSU Modis

January 2021

February 2021

March 2021

Water Temperature Anomaly

(°C)
NANOOS: [www.nanoos.org](http://www.nanoos.org) Climatology app

Sea Surface Temperature

**NDBC Cape Elizabeth**  ● 34 yrs

**NDBC Columbia River Bar**  ● 37 yrs

**NDBC Stonewall Bank**  ● 34 yrs

**NDBC Eel River**  ● 39 yrs

[Map of monitoring locations]
NANOOS: [www.nanoos.org](http://www.nanoos.org) Climatology app

Puget Sound profiling buoys

Temperature

- Hoodsport Water temperature Anomaly, 2021 - Climatology
- Point Wells Water temperature Anomaly, 2021 - Climatology
- Twanoh Water temperature Anomaly, 2021 - Climatology
- Carr Inlet Water temperature Anomaly, 2021 - Climatology
NANOOS: [www.nanoos.org](http://www.nanoos.org) Climatology app

Puget Sound profiling buoys

Salinity

### Hoodsport Salinity Anomaly, 2021 - Climatology

![Hoodsport Salinity Anomaly, 2021 - Climatology](image1)

### Point Wells Salinity Anomaly, 2021 - Climatology

![Point Wells Salinity Anomaly, 2021 - Climatology](image2)

### Twanoh Salinity Anomaly, 2021 - Climatology

![Twanoh Salinity Anomaly, 2021 - Climatology](image3)

### Carr Inlet Salinity Anomaly, 2021 - Climatology

![Carr Inlet Salinity Anomaly, 2021 - Climatology](image4)
Puget Sound profiling buoys

Dissolved Oxygen

- hypoxia (2 mg/L)
- biological stress (5 mg/L)
- Twanoh (South Hood Canal), 08-Apr-2021 12:15:45
- Hoodsport (South Hood Canal), 08-Apr-2021 12:23:01
- Dabob Bay (North Hood Canal), 08-Apr-2021 12:20:08
- Hansville (near Admiralty Inlet), 08-Apr-2021 12:23:26
- Carr Inlet (South Sound), 08-Apr-2021 12:17:03
- Point Wells (Main Basin), 07-Apr-2021 12:21:16
NANOOS:  www.nanoos.org  Climatology app

Puget Sound profiling buoys

Chlorophyll

Depth (m)

Chlorophyll (mg/m³)

- Twanoh, 08-Apr-2021 12:15:45
- Hoodspor, 08-Apr-2021 12:23:01
- Dabob Bay, 08-Apr-2021 12:20:08
- Hansville (North), 08-Apr-2021 12:23:26
- Carr Inlet, 08-Apr-2021 12:17:03
- Point Wells, 07-Apr-2021 12:21:16
NANOOS: [www.nanoos.org](http://www.nanoos.org) Climatology app

Chlorophyll Anomaly
OSU Modis

January 2021

February 2021

March 2021
NOAA West Watch Update: Apr 2021
Sea Surface Temperature

Eel River

Monterey

Santa Maria

https://data.cencoos.org
Temp Anomaly: Shore Sta.

HSU Trinidad Station

Bodega Bay (BML_WTS)

Moss Landing Marine Laboratories Seawater Intake
sp028-20210218T2317 (platform)

Date range: Feb 18, 2021 19:36 (PST) - Apr 19, 2021 03:10 (PDT)

Metadata: https://data.ioos.us/gliders/erdap/info/sp028-20210218T2317/index.html

Animal ID: None

Depth range: 0.11910519748926163 (m) - 511.92589033203125 (m)

Points: 69,920

Institution: Scripps Institution of Oceanography

Authority: edu.ucsd.scripps

https://data.cencoos.org
M1 and Line 67

https://spraydata.ucsd.edu/climCUGN/
Thank you

hruhl@mbari.org

NOAA West Watch Update

Apr 2021
Salinity Anomaly: Shore Sta.

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

Bodega Bay (BML_WTS)

Moss Landing Marine Laboratories Seawater Intake
NOAA West Watch Webinar: Southern California
Dr. Clarissa Anderson, SCCOOS Executive Director
20-April 2021
California wave activity in 2021 has been following the long term climate trend.

**Significant wave height (Hs) record set at CDIP 092 San Pedro**

Hs = 5.20 m on 25-Jan-2021 (Tp = 9 sec; waves generated by local winds)

*All time maximum (since 1998)*

These climatology plots can be found at [cdip.ucsd.edu](http://cdip.ucsd.edu)
California Sea Surface Temp

Coastal waters were measuring below the climate trend at all buoys.

South of Pt Conception, a transition to warmer conditions in April.

QC Note
CDIP 100 Torrey Pines SST was recently discovered to be ~1 C low.
- Buoy swapped
- Data flagged
- QA improvements (0.2°C tolerance)

These climatology plots can be found at cdip.ucsd.edu
California Underwater Glider Network

Salinity Anomaly
California Underwater Glider Network

Steric Height Anomaly (local effects of SLR/warming)

Highlighted in yellow are SCCOOS funded glider lines.

https://spraydata.ucsd.edu/SoCal-index/

DOI: 10.21238/S8SPRAY7292

Rudnick, SIO
**Pseudo-nitzschia** ‘seriata’ (larger, more toxic size class) and **Pseudo-nitzschia** ‘delicatissima’ (smaller, less toxic size class) were detected above bloom levels on Feb 8th, 15th & 22nd.

**Pseudo-nitzschia** ‘seriata’ was detected above bloom levels on Feb 15th (14,200 cells/L)

[Image: C-HARM Probability of Pseudo-nitzschia Bloom for Feb 2021]

[Image: Newport Pier HAB and DA Data]

[Image: Santa Monica Pier HAB and DA Data]

[Image: Ocean Observing Region]

[sccoos.org/california-hab-bulletin]
Newport Pier *Lingulodinium polyedra* bloom

Crescent Beach in Laguna on Mar 17 2021. Photo: Girardeau, Orange County Outdoors.

Manhattan Beach Pier, Mar 2021. Photo: Girardeau, Orange County Outdoors.
CA IFCB Network - HAB Automated Early-Warning System

By this summer 11 Imaging FlowCytobot (IFCB) units will be deployed on California piers, offshore moorings, and research cruises, for automated, real-time HAB monitoring in coastal waters.

Upcoming New IFCB Deployments:
April 2021
- Scripps Pier
- Del Mar Mooring
May 2021
- Newport Pier
- MBARI M1 Mooring
June 2021
- Stearns Wharf
- Bodega Pier
- Trinidad Pier

Top: Socially distanced in-person IFCB training workshop at Scripps Institution of Oceanography on 11-Feb 2021. Bottom Left image: Instillation of an IFCB at Scripps Pier. Bottom Right image: McLane Laboratories, Inc. building six new IFCBs as part of the California network.
Coastal Solutions Workshop: Coastal Flood Modeling, Prediction, and Observations for the U.S. West Coast

March 31st and April 1st, 2021 - two day virtual workshop
>100 Participants

Coastal Hazards: Southern California Case Studies
- CDIP Buoy-Driven CA Wave Model - J. Behrens, SIO
- Imperial Beach Flood Forecast System - M. Merrifield, SIO
- Resilient Futures: San Diego Bay - A. Rodriguez, SIO
- Operational Total Water Level forecasts for the U.S. west coast - USGS and NOAA NCEP
- TESLA (Time-varying Emulator for Short- and Long-term Analysis of coastal flooding) - P. Ruggiero, OSU
- Coastal Storm Modeling System (CoSMoS) - P Barnard, USGS
- Compound Coastal Flood Modeling at Surfside-Sunset - B. Tang, UCLA
- Climate-based statistical Modeling of Monthly Mean Sea Level - S. Ortega, Universidad de Cantabria

oceanvasions.org/2021-west-coastal-solutions
Questions?
Dr. Clarissa Anderson
clrander@ucsd.edu
San Diego sea level has risen by ~10 inches since 1906, slightly faster than the estimated global rate. Difference likely due to local ground motion.


oceanvisions.org/2021-west-coastal-solutions
• Next webinar: Tuesday, July 20th 2021

THANK YOU!