NOAA West Watch

Reporting Regional Environmental Conditions & Impacts in the West

July 21, 2020
Call Agenda

• 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

• 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 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).
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• **Regional Climate and ENSO brief (Dan McEvoy)**

• Guest speaker: Dr. Drew Lucas: *Technology Demonstration to Observe Bloom Triggers: A SCCOOS Pilot Project*

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  – Additional impacts to share?
Widespread Western US Drought

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

https://droughtmonitor.unl.edu/
Climate Anomalies – Past 3 Months

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

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

Evaporative Demand Drought Index (EDDI)
4/16/2020 to 7/17/2020

https://climatetoolbox.org/tool/Climate-Mapper
https://app.climateengine.org/climateEngine
Southwest Monsoon Update

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

https://climas.arizona.edu/sw-climate/monsoon/tracker
Southwest Monsoon Update

Percent of Area in Precip Categories: 6-15-2020 to 7-19-2020
Arizona and New Mexico

25%
Small area near or above normal

https://climas.arizona.edu/sw-climate/monsoon/tracker
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

https://psl.noaa.gov/data/composites/day/
Wildfire Season Update

Current Large Incidents
July 20, 2020

Hog Fire
7/19/2020

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

https://fsapps.nwrc.gov/
Significant Wildland Fire Potential Outlook

https://www.predictiveservices.nifc.gov/outlooks/outlooks.htm
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 (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/.
Sea Surface Temperatures

Weekly SST Anomaly

2020/07/12 - 2020/07/18

NOAA/PSL Base Period: 1981-2010

°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 Nino forecast:
NMME models + other dynamical models + statistical models

Source: CPC/IRI
August 1\textsuperscript{st}-14\textsuperscript{th} 2020 U.S. Outlook

Temperature Probability

Precipitation Probability

Source: NOAA/CPC
August-October 2020 Outlook

Temperature Probability

Precipitation Probability

Source: NOAA/CPC
Northwest Association of Networked Ocean Observing Systems

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

Jan Newton, NANOOS Executive Director

www.nanoos.org
NANOOS: www.nanoos.org Climatology app

Sea Surface Temperature Anomaly
NCEI Optimum Interpolation SST

May 2020
NANOOS:  www.nanoos.org  Climatology app

Sea Surface Temperature Anomaly
NCEI Optimum Interpolation SST
NANOOS: [www.nanoos.org](http://www.nanoos.org) Climatology app

Sea Surface Temperature Anomaly

*OSU Modis*

![Images of Sea Surface Temperature Anomaly for April, May, and June 2020]
Sea Surface Temperature

NDBC Washington

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

Sea Surface Temperature

- **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
Puget Sound profiling buoys

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

April 2020

May 2020

June 2020

Chlorophyll Anomaly

*OSU Modis*
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.cenkoos.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
Imaging Flow Cytobot (IFCB)
Thank you
hruhl@mbari.org

NOAA West Watch Update
July 2020
Red Tide Bulletin: Spring 2020

Author: Clarissa Anderson, SCCOOS and Megan Hepner-Medina, SCCOOS.
Published: May 8th, 2020.
Updated: May 12th, 2020.
More data may be added to the bulletin as it becomes available.
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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 Lenthal, Dale Robinson, Richard Stumpf, Alexander Tardy, Michelle Tomlinson, Nick Wegner
SCCWRP: Jayme Smith
WHOI: Heidi Sosik
Public: Susan Emrich, Gary Cotter

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

sccoos.org/california-hab-bulletin/red-tide/
History of Dinoflagellate Blooms

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

Credit: KC Alfred

Credit: M Latz

Prof. Michael Latz, SIO
History of Dinoflagellate Blooms

Scripps Pier Chlorophyll 1983-2020

5 year mean 2008-2013 = 3.09 μg/l
Median = 1.58 μg/l

Blooms:
2020 – 1,319.20 μg/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

Rain Event
Upwelling at coast, Rising Temp, High Chlorophyll, Low oxygen
Line 90 – strong thermocline & oxycline

Del Mar Mooring – L. Poly 1000 cells/mL
SIO Pier – L Poly 9M cells/L
TJ Lagoon – Hypoxic
Los Pen. - Hypoxic

SIO Pier – Low DO, low pH
## Bloom Timeline

<table>
<thead>
<tr>
<th>Date</th>
<th>Event/Location</th>
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**Glider Line 90** 18-April to 4-May – PI: Dan Rudnick, SIO
Timeline

Rain Event
Upwelling at coast, Rising Temperatures, High Chlorophyll, Low oxygen

Line 90 – strong thermocline & oxycline

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

1-Apr
3-Apr
5-Apr
7-Apr
9-Apr
11-Apr
13-Apr
15-Apr
17-Apr
19-Apr
21-Apr
23-Apr
25-Apr
27-Apr
1-May
3-May
5-May
7-May
9-May
11-May
13-May
15-May
17-May
19-May
21-May
23-May
25-May
27-May
29-May
31-May

- Rain Event
- Rising Temperatures
- High Chlorophyll
- Line 90 – strong thermocline & oxycline

Del Mar Mooring – L. Poly >1000 cells/mL
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TJ Lagoon – Hypoxic
Los Pen. - Hypoxic
SIO Pier – Low DO

Imaging FlowCytobot (robotic microscope)
PIs: Heidi Sosik (WHOI), Andrew Barton, SIO Uwe Send, SIO
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PIs: Sarah Giddings, SIO, Lisa Levin, SIO, & Jeff Crooks
NOAA NCCOS Coastal Hypoxia Research Program
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SOAR miniDOT Oxygen Logger - PI: Jenn Smith, SIO
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Video: Gary Cotter

Mean open-ocean pH

SOAR Seafet - PI: Jenn Smith, SIO
What’s Next?

- 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.

68.2% Yes
25.2% No
Not sure

Photo: Stan Moniz
• Next webinar: Tuesday, October 20\textsuperscript{th} 2020

THANK YOU!