Pacific Northwest Harmful Algal Blooms Bulletin

May 4, 2020 HAB risk = ✔

HAB risk key:

- ✔ = *low*
- ⚠ = *medium*
- ✖ = *high*

JISAO Joint Institute for the Study of the Atmosphere and Ocean

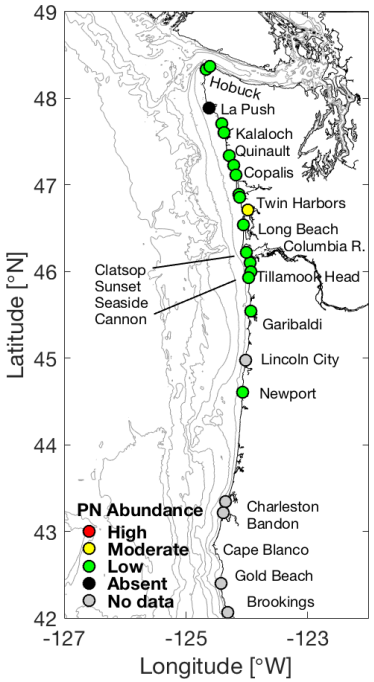
School of Oceanography, University of Washington

ORHAB Partnership

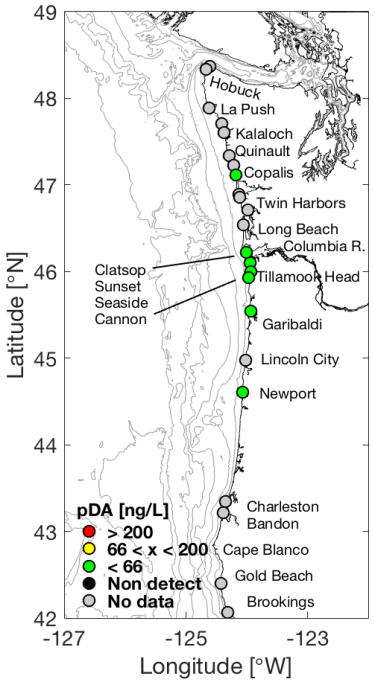
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

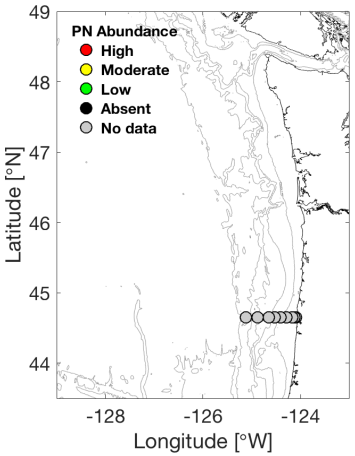


(particulate domoic acid)

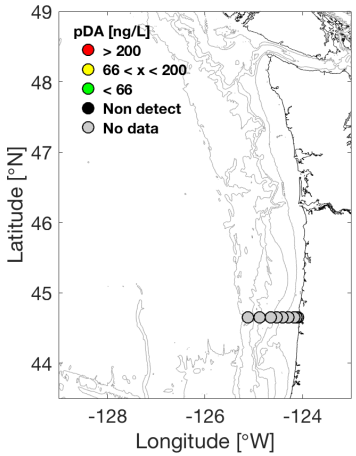


Offshore Sampling

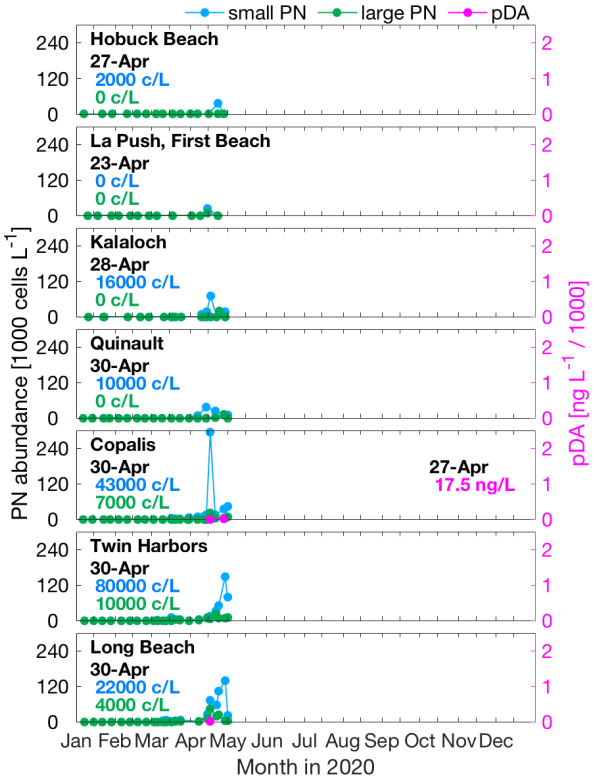
(*Pseudo-nitzschia*)



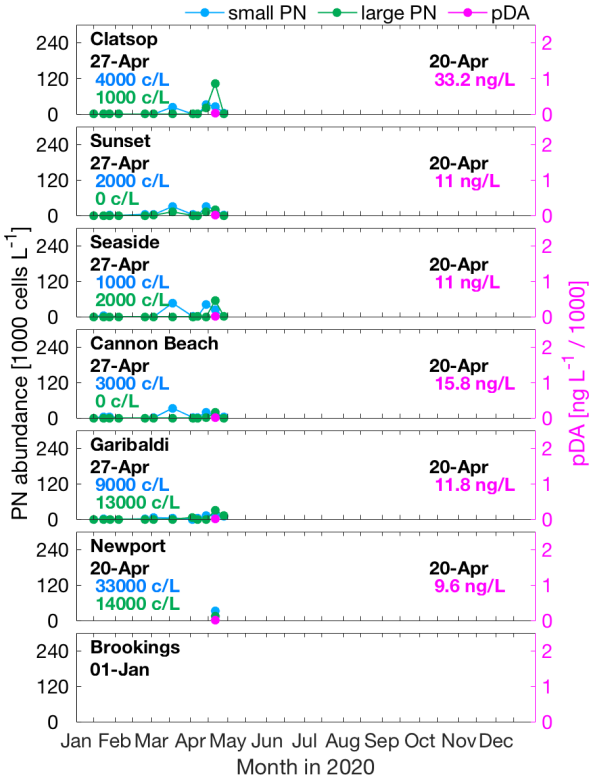
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



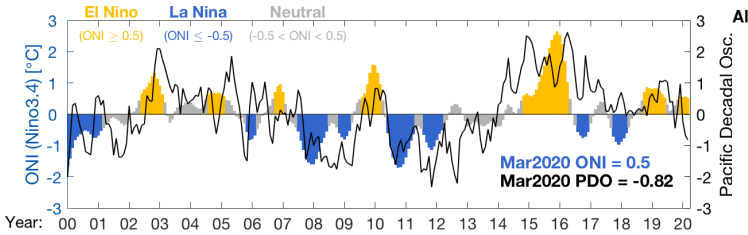
OR *Pseudo-nitzschia* & Domoic Acid



Pseudo-nitzschia (*PN*) abundances are quantified for large and small cell morphologies using light microscopy. Threshold values: 50,000 cells/L for large *PN*; 1,000,000 cells/L for small *PN*; which trigger additional testing for seawater particulate domoic acid (pDA). Seawater pDA values >200 ng/L lead to toxin accumulation in shellfish such as razor clams. Sampling sites, colored by relative *PN* abundance (*high:* > threshold value for either cell morphology; *moderate:* > 1/3 threshold; *low:* < 1/3 threshold) and pDA, are shown in the upper left two panels. "*No data*" indicates that there were no data within the previous 15 days. Time series of *PN* abundance (cells per liter = c/L) and pDA at select beaches are shown in the upper right main two panels. Offshore samples (lower left) are collected and analyzed at ~2 week intervals during late summer/early fall. Additional samples are collected by a remotely operated Environmental Sample Processor (ESP) that is moored off La Push, WA, in late spring and late summer.

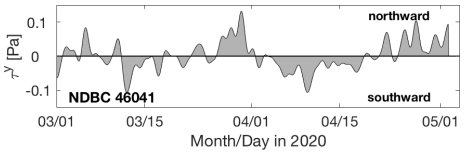
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented here. However, the information presented here aids coastal managers in better understanding and predicting the onset, duration, and magnitude of toxin outbreaks as well as their impacts.

Pacific Ocean Indices



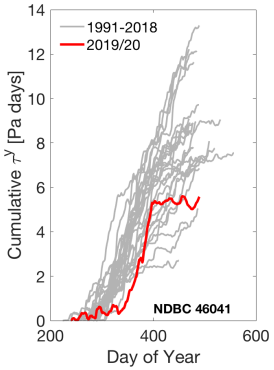
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

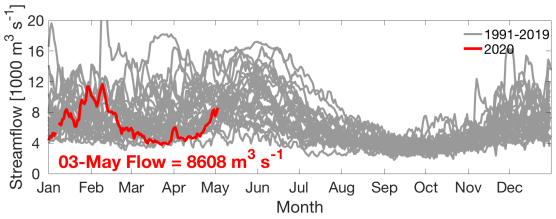


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with fluctuating winds) rather than in years with sustained upwelling or downwelling winds.

Cumulative Wind Stress

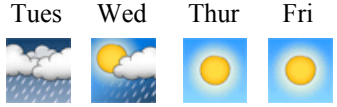


Columbia River Discharge



The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

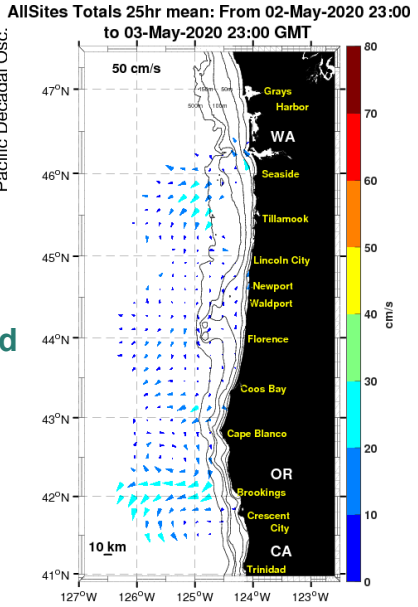
Marine Weather Forecast



Tues - SE wind, 10 kt
Wed - SW wind, 10 kt
Thur - N wind, 10 kt
Fri - NE wind, 10 kt

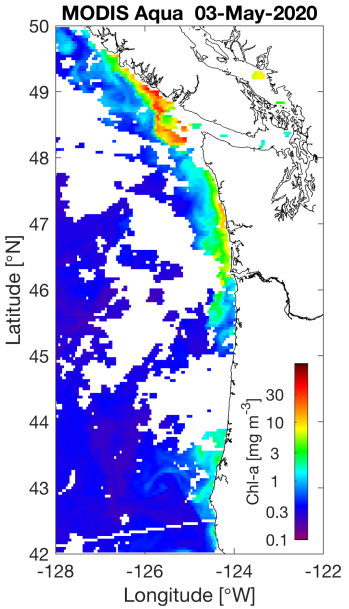
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

Ocean Surface Currents



Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

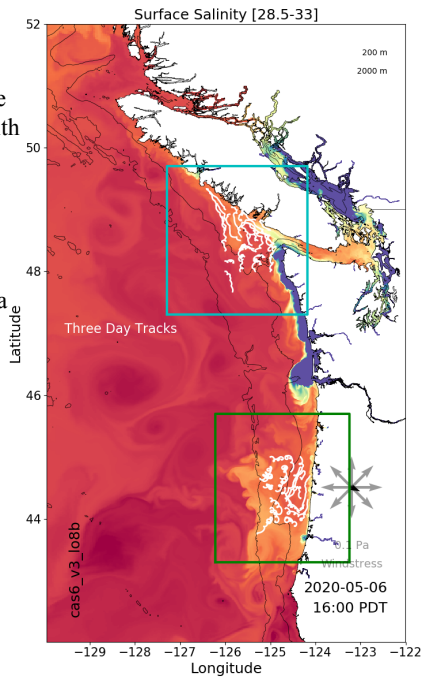
Satellite Chlorophyll-*a*

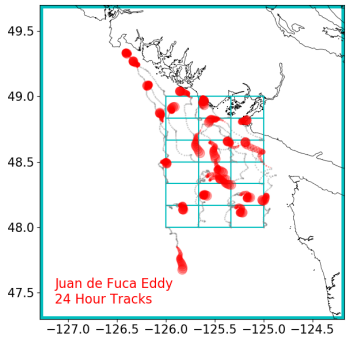


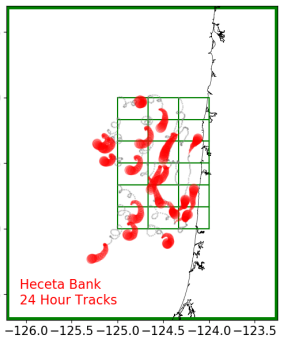
Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

LiveOcean Forecast Model

Model predicted sea surface salinity with particles released near the Juan de Fuca eddy and Heceta Bank and tracked three days into the future.







Summary - Following persistent upwelling-favorable conditions in the first half of April, winds changed to predominantly downwelling-favorable, and have remained so for the past ~10 days. This change resulted in shoreward and northward currents near shore. Only a few partially clear satellite images have been available. As expected, regions of elevated chlorophyll-*a* have decreased substantially, though remnants remain evident near the Juan de Fuca eddy, associated with the Columbia River plume, and off central OR. *Pseudo-nitzschia* (*PN*) cell abundances also decreased in all of the recent OR beach samples. As of 27-Apr, highest abundances were at Cape Meares (large: 13,000 cells/L; small: 9,000 cells/L). In WA, *PN* cell abundances have been higher but remain below threshold values; they consist primarily of small morphology cells. Highest numbers of *PN* have generally been observed in southern WA, e.g., Long Beach (large: 3,000 cells/L; small: 146,000 cells/L on 28-Apr); Tokeland (large: 28,000 cells/L; small: 146,000 cells/L on 30-Apr); and Twin Harbors (large: 10,000 cells/L; small: 80,000 cells/L on 30-Apr). Seawater particulate domoic acid (pDA) has been detectable, but relatively low, off both WA (Copalis: 17.5 ng/L on 27-Apr) and OR (Clatsop: 33.2 ng/L on 20-Apr). No recent offshore samples have been collected and the *PN* species have not been identified. Since 25-Apr, WA razor clam DA concentrations remain low (≤4 ppm). Note that PSP levels in razor clams were greater than regulatory limits at La Push and elevated at Hogsback (near Quinault) as of 23-Apr. In OR, razor clam DA was 9.8 ppm at Clatsop South Jetty, and 7 ppm at Coos Bay North Jetty as of 1-May.

Forecast - ENSO neutral conditions continue, and are expected to persist through summer. The most recent PDO value remains negative. Predominantly northward winds will continue until Wednesday and will then change to southward, initiating a new period of upwelling. High pressure is then expected to remain in place through the weekend. There is a possibilty that northward winds may start again the following Monday. The return to upwelling-favorable conditions with offshore surface flow will fuel new phytoplankton blooms and should keep shellfish beaches safe from any DA outbreaks in the short term. Managers should reassess and exercise caution during any periods of northward winds that follow the upwelling period, but at present the perceived risk of a rapid DA outbreak is low.