Pacific Northwest Harmful Algal Blooms Bulletin

Mar 25, 2020 HAB risk = ✔

HAB risk key:

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

JISAO Joint Institute for the Study of the Atmosphere and Ocean

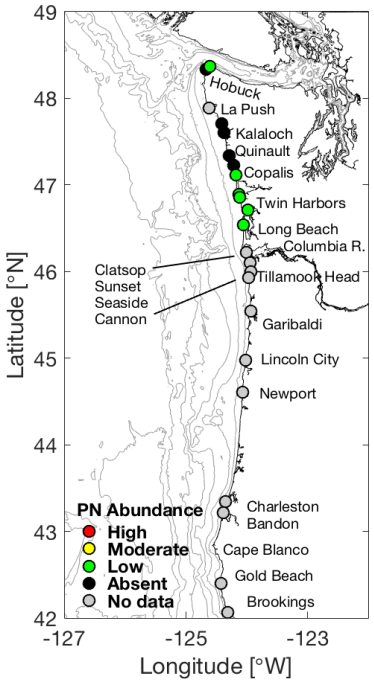
School of Oceanography, University of Washington

ORHAB Partnership — Oregon Harmful Algal Bloom

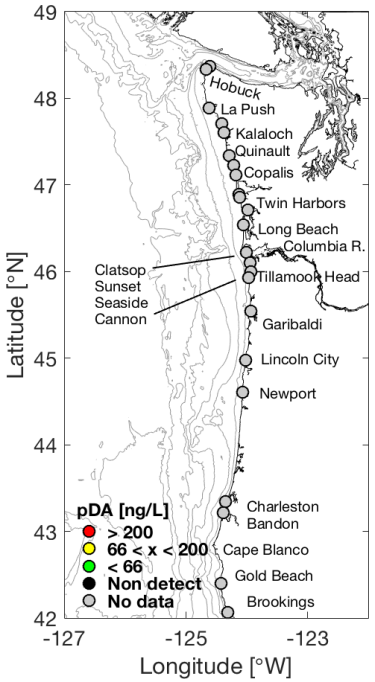
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

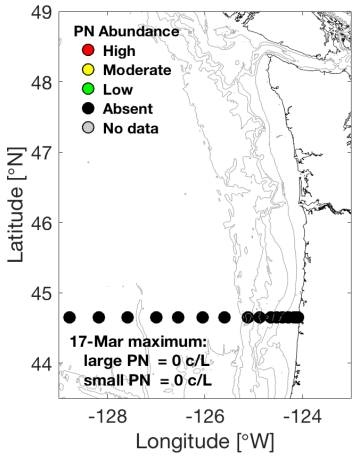


(particulate domoic acid)

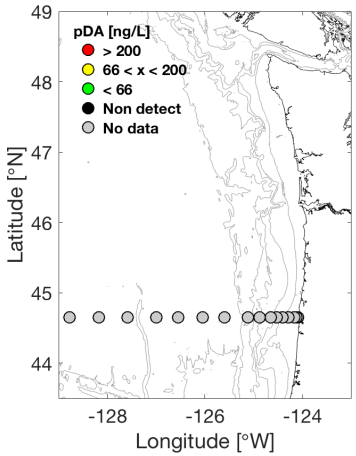


Offshore Sampling

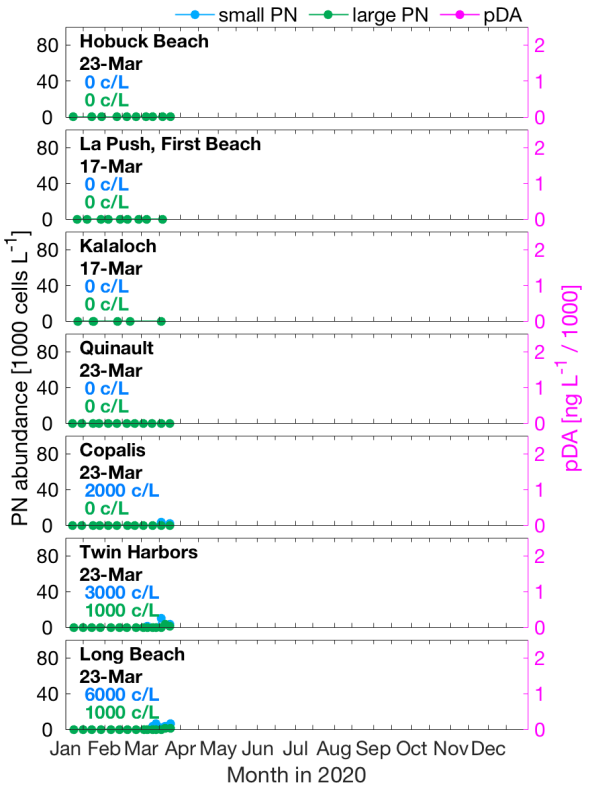
(*Pseudo-nitzschia*)



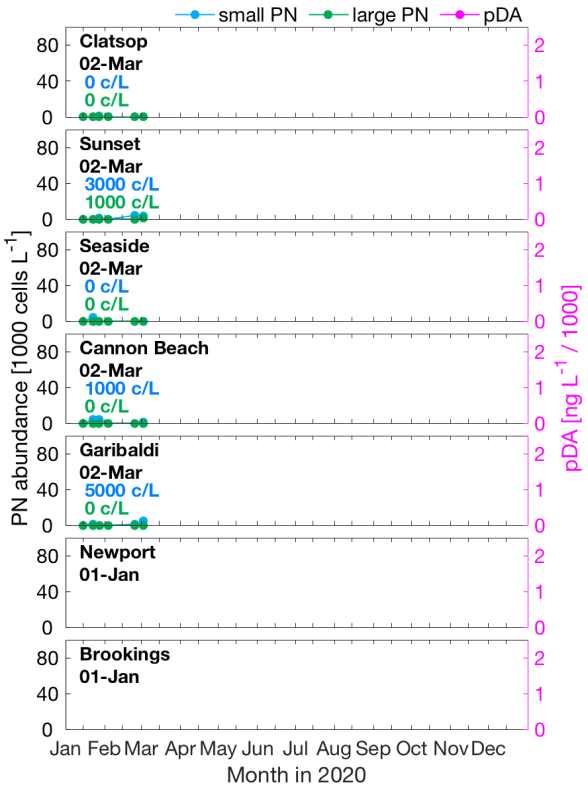
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



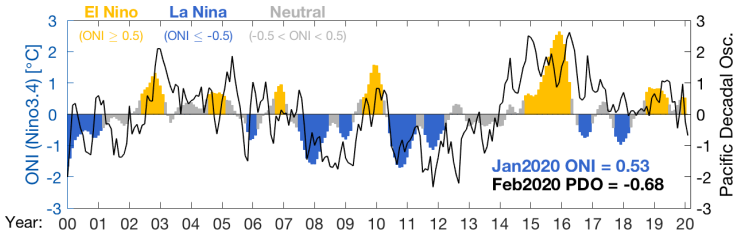
OR *Pseudo-nitzschia* & Domoic Acid



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.

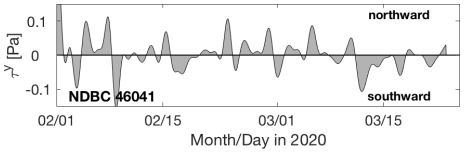
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented 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



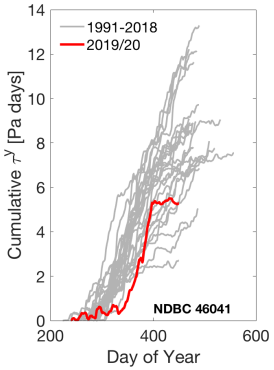
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

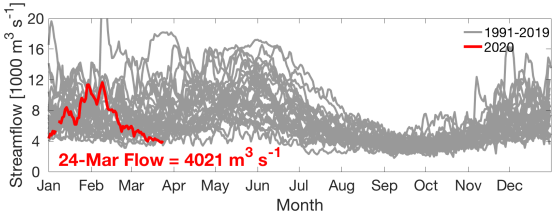


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress

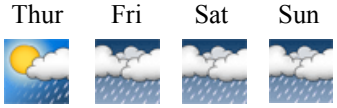


Columbia River Discharge



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.

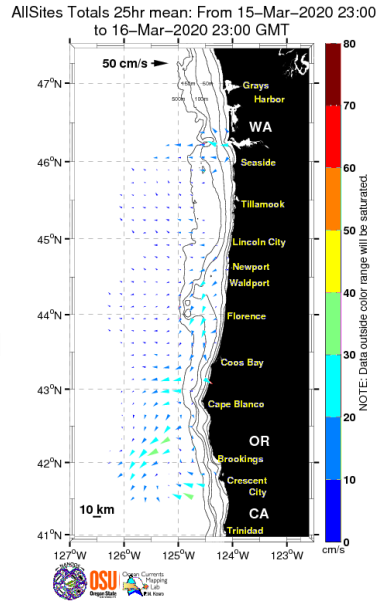
Marine Weather Forecast



Thur - SW wind, 10 kt
Fri - S wind, 15 kt
Sat - S wind, 10 kt
Sun - SW wind, 15 kt

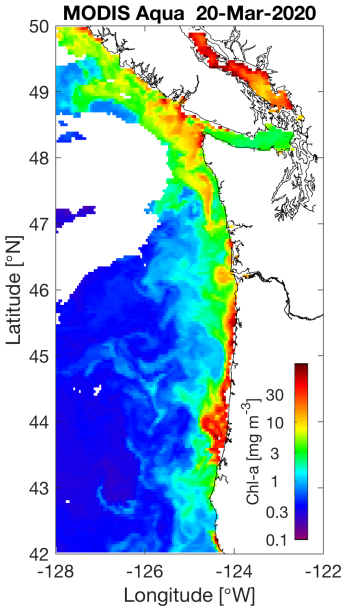
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

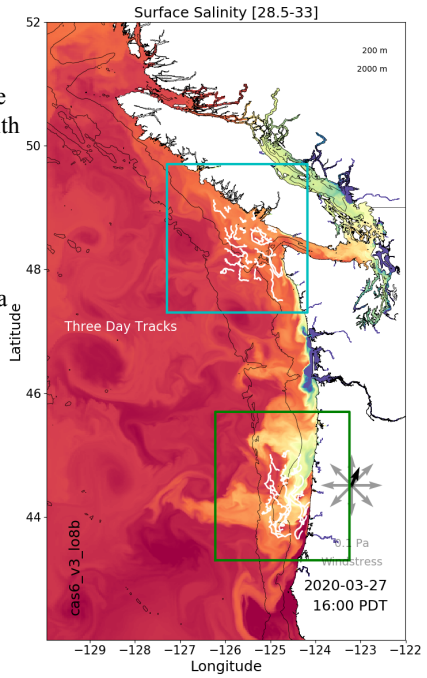
Satellite Chlorophyll-*a*

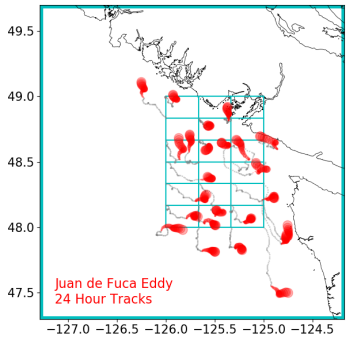


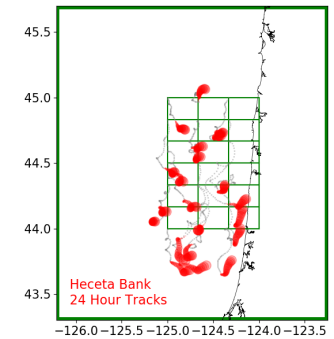
Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

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 - Winds began fluctuating in early February. Since then, southward wind events have resulted in a transition to moderate upwelling conditions along the coast as confirmed by hydrographic transects off Newport, OR, on 19-Feb and 15-Mar. The Newport Line samples from 15-Mar indicated the lack of a concentrated phytoplankton bloom and contained no *Pseudo-nitzschia* (*PN*) cells. More recently, clear skies have resulted in satellite images showing elevated chlorophyll-*a* nearshore. A mix of small and large morphology *PN* cells have also started to appear at beaches, albeit in low abundance in both WA and northern OR. Highest abundances were on 23-Mar at Neah Bay, WA, (4,000 cells/L small *PN*) and throughout southern WA (e.g., Long Beach: 1,000 cells/L large *PN*, and 6,000 cells/L small *PN*). In OR, cell counts were highest at Garibaldi (5,000 cells/L small *PN* on 2-Mar). As a result of the low *PN* cell counts, no seawater particulate domoic acid (pDA) samples were analyzed. Similarly, the absence of *PN* cells in the recent samples collected offshore in OR precluded species identification. Razor clams from WA beaches had low DA values (≤4 ppm) as of 11-Mar. In OR, DA concentrations in razor clams from near Coos Bay continued to decrease and were just over the regulatory limit (21 ppm on 16-Mar). An unofficial sample from Newport, OR, contained 30 ppm DA on 16-Mar; a Sunset Beach sample was at 19 ppm on that same date.

Forecast - Although the recent ONI value is somewhat elevated, the state of the combined ocean-atmosphere system is consistent with ENSO neutral conditions. Such conditions are expected to continue through spring and into summer. The most recent PDO value is negative. In the short-term, northward winds are expected to return to the region on Thursday. This will force any plankton north and shoreward as indicated by the LiveOcean forecast. No large storms are currently forecast, but winds are expected to remain northward for an extended period through the weekend. Thus, *PN* cells will likely increase in abundance at beaches during this time. Current conditions and the low *PN* abundances suggest there is relatively low risk for a toxin outbreak. However, conditions can change quickly. Given expected decreases in monitoring activity due to COVID-19, we recommend exercising caution, including pDA testing if *PN* abundances increase to sufficient levels.