Pacific Northwest Harmful Algal Blooms Bulletin

Aug 15, 2020 HAB risk = ✖

HAB risk key:

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

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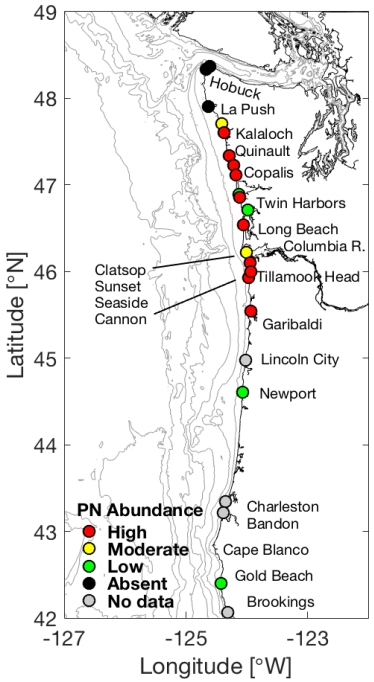
School of Oceanography, University of Washington

ORHAB Partnership — Oregon Harmful Algal Bloom

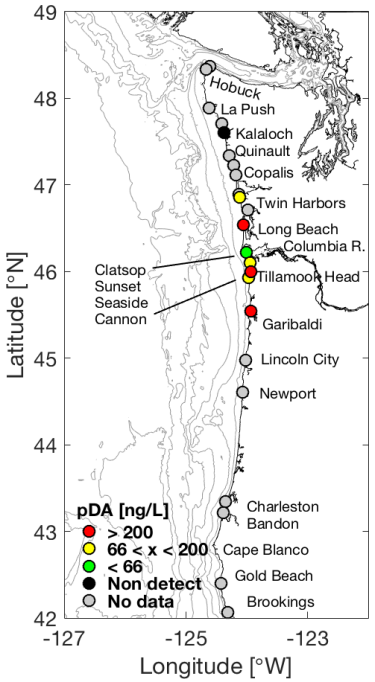
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

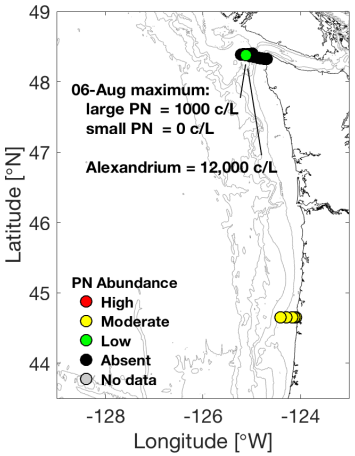


(particulate domoic acid)

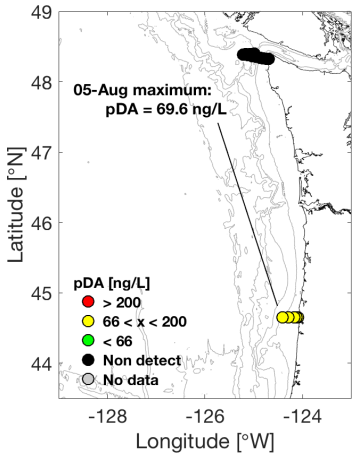


Offshore Sampling

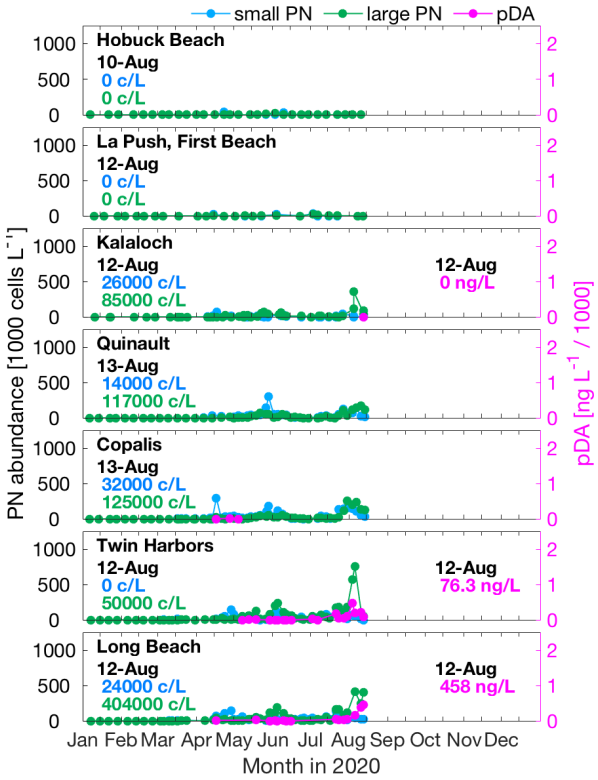
(*Pseudo-nitzschia*)



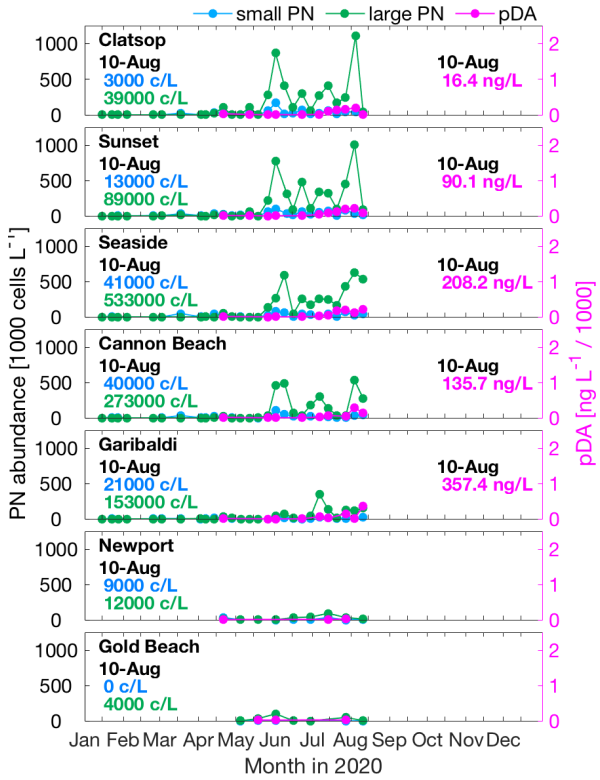
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



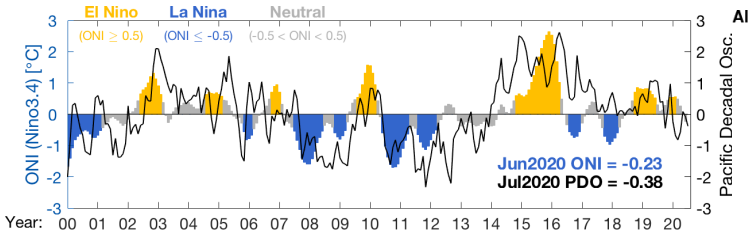
OR *Pseudo-nitzschia* & Domoic Acid



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.

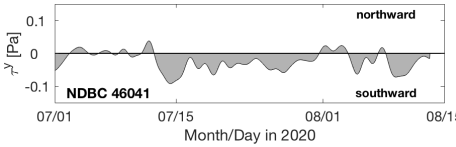
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



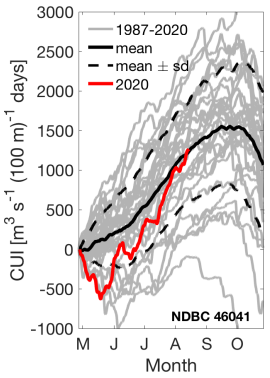
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

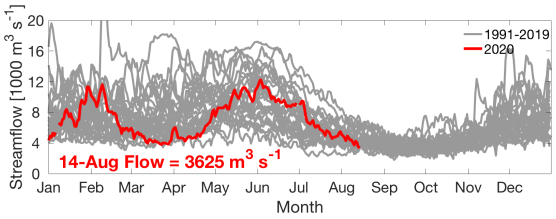


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress

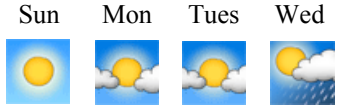


Columbia River Discharge



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.

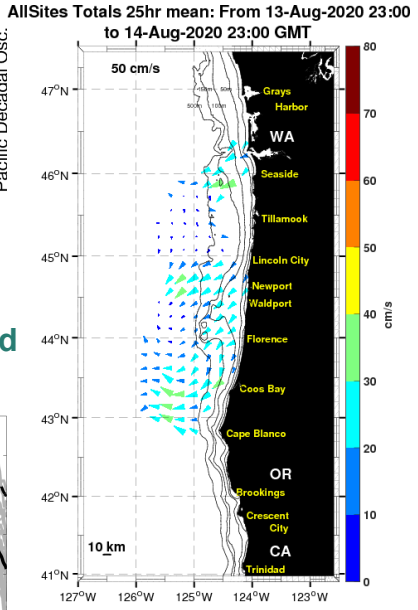
Marine Weather Forecast



Sun - S wind, 15 kt
Mon - SE wind, 5 kt
Tues - W wind, 5 kt
Wed - W wind, 10 kt

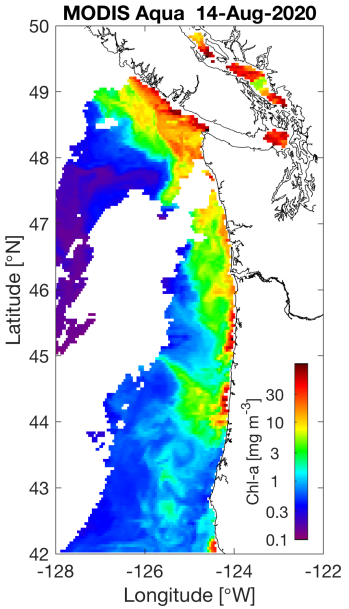
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

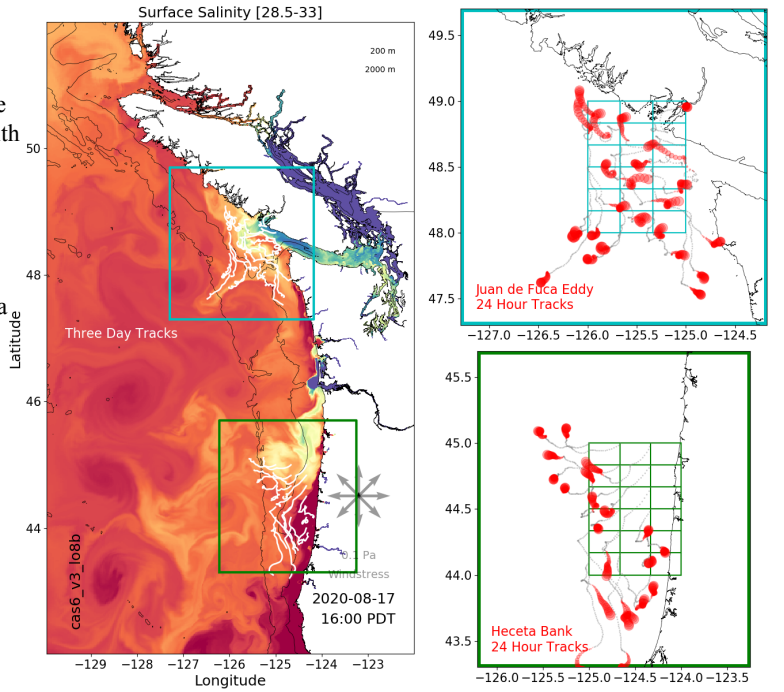
Satellite Chlorophyll-*a*



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 - Upwelling-favorable winds have been reasonably strong for the past month with only a few short reversals. This has fueled phytoplankton blooms including *Pseudo-nitzschia* (*PN*). Satellite imagery confirm high chlorophyll-*a* concentrations all along the coast of WA and northern OR. *PN* abundance recently increased following northward winds at the beginning of August. At present, *PN* cells are primarily large morphology, but small morphology cells are also present. Seawater particulate domoic acid (pDA) concentrations at beaches also increased during this event. The highest recent *PN* abundances were in northern OR (Seaside: 533,000 cells/L large *PN* on 10-Aug) and in southern WA (Long Beach: 404,000 cells/L large *PN* on 12-Aug). Where measured, seawater pDA was also elevated with highest values at Long Beach, WA (458 ng/L) on 12-Aug, and Garibaldi, OR (357 ng/L) on 10-Aug. Other beaches have recently been >200 ng/L pDA (Seaside, 10-Aug). Particulate DA was undetectable in samples collected offshore of northern WA on 10-Aug. Those samples contained only 1,000 cells/L of large *PN* at a single site, but notably also contained up to 12,000 cells/L of *Alexandrium* at multiple sites. Relative abundance estimates from samples collected offshore of Newport, OR, on 5-Aug indicated that large *PN* were common with pDA >60 ng/L. The *PN* species are not yet identified. WA razor clam DA is currently low, but samples collected 8-Aug showed increases at Quinault (to 3 ppm) and Copalis Beaches (to 4 ppm). In OR, Clatsop razor clam samples had increased from 3.7 ppm to 12 ppm as of 7-Aug; Newport and Gold Beach razor clams were <9 ppm DA.

Forecast - ENSO neutral conditions will continue through summer, and may transition to La Niña conditions this fall. The recent PDO value remains weakly negative. Generally we would expect the recent upwelling conditions to help keep beaches free of toxins. However, upwelling-favorable coastal winds will reverse to downwelling-favorable on Sunday and will remain so for ~2 days (see LiveOcean), forcing plankton and toxins shoreward and northward. The extended forecast suggests the possibility of additional downwelling winds later in the week. Since *PN* cells are already present in high abundance, and seawater pDA values are >200 ng/L at multiple beaches, we expect shellfish toxin concentrations to continue increasing in response to these events. Extreme caution and additional sampling/testing during upcoming harvests will be necessary to ensure safety.