Pacific Northwest Harmful Algal Blooms Bulletin

Aug 25, 2022 HAB risk = ⚠

HAB risk key:

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

School of Oceanography, University of Washington

Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES

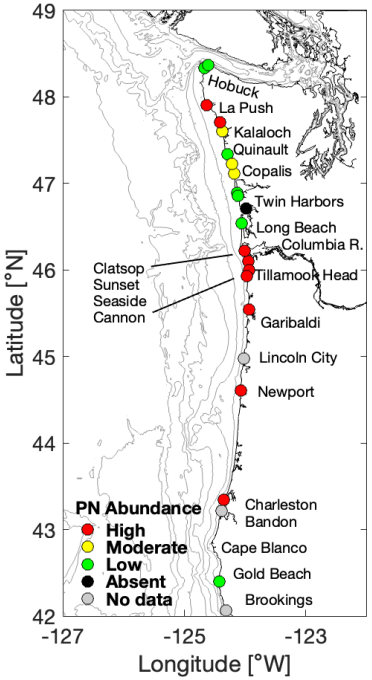
ORHAB PARTNERSHIP

NANOOS

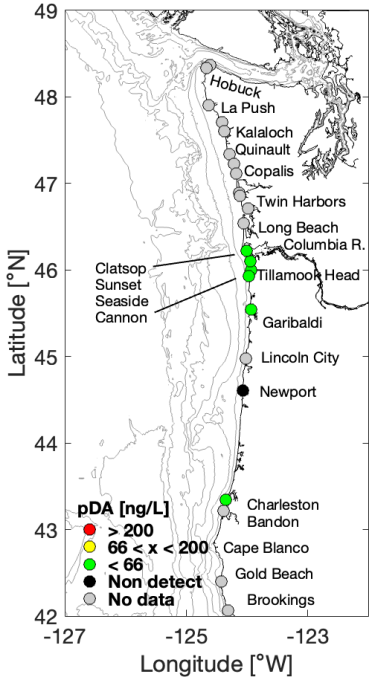
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

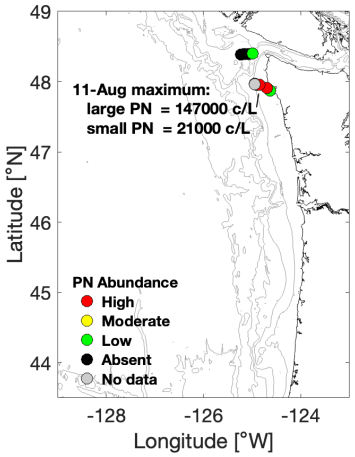


(particulate domoic acid)

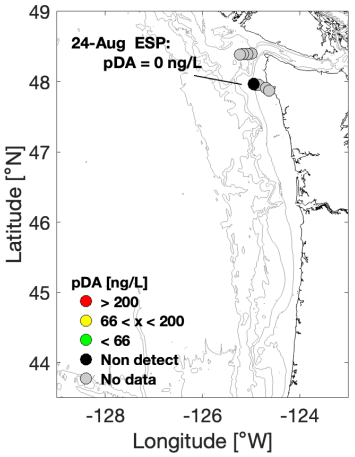


Offshore Sampling

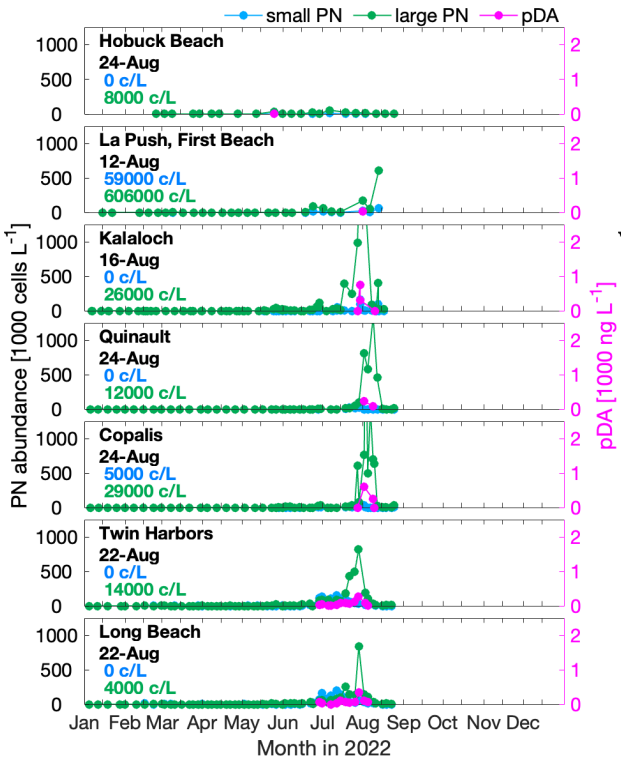
(*Pseudo-nitzschia*)



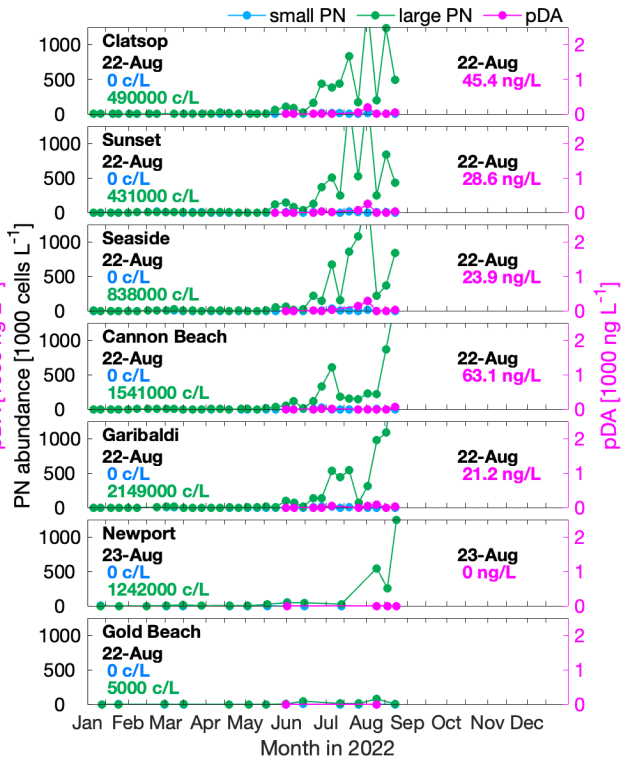
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



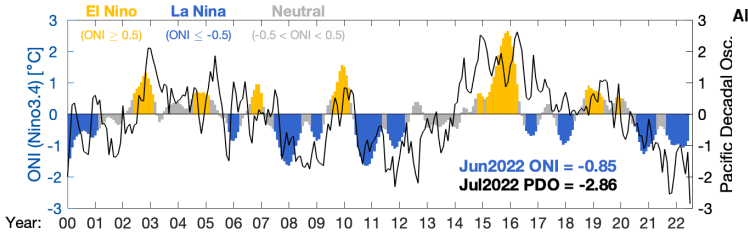
OR *Pseudo-nitzschia* & Domoic Acid



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.

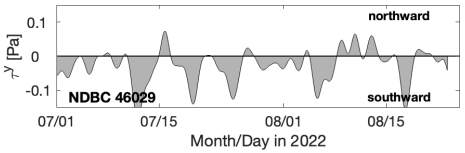
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



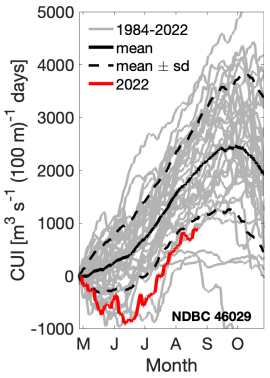
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

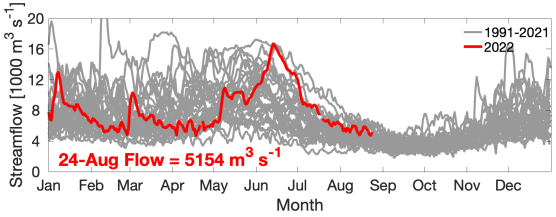


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress



Columbia River Discharge



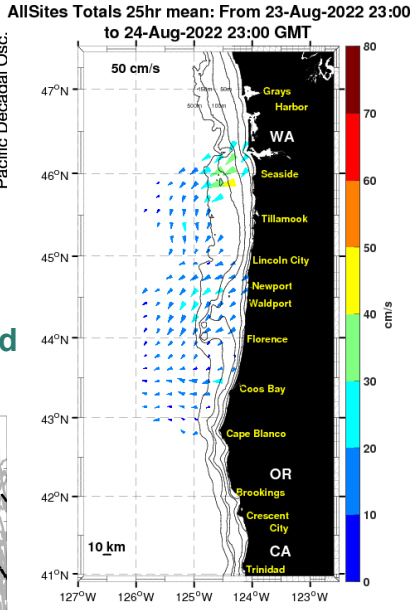
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Fri - NW wind, 10 kt
Sat - NW wind, 15 kt
Sun - NW wind, 10 kt
Mon - NW wind, 10 kt

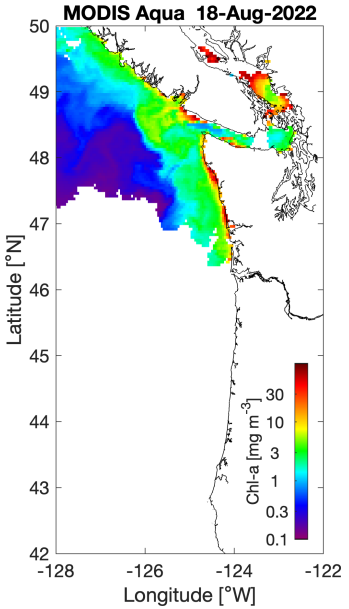
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

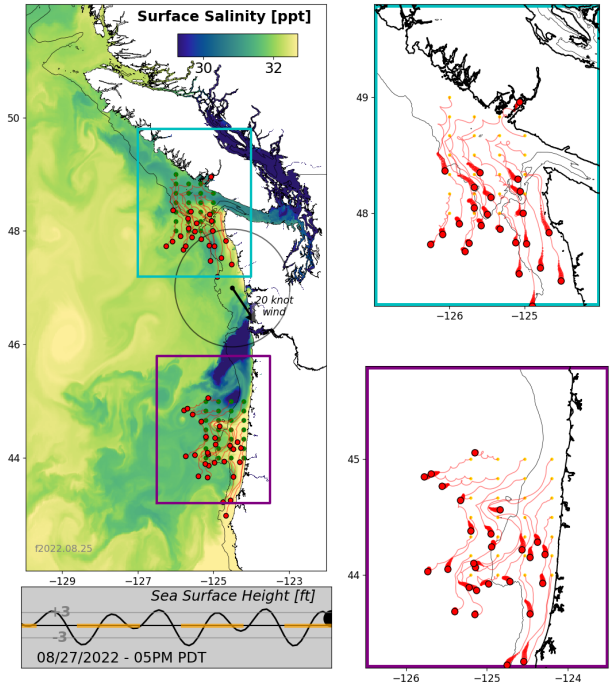
Satellite Chlorophyll-*a*



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. Red dots indicate particle end points.



Summary - Coastal winds have been intermittently upwelling-favorable during the past few weeks. These conditions helped lead to toxin production by species of *Pseudo-nitzschia* (*PN*) off the WA coast at the end of July, though the toxins have recently dissipated at beaches. Winds have resumed short-lived upwelling-favorable pulses after a period of sustained weak downwelling. Surface ocean currents appear generally weak, except during the stronger southward wind events. Available satellite images show elevated chlorophyll-*a* all along the coast, with somewhat higher values evident near the edge of the seasonal eddy off northern WA. Primarily large morphology *PN* were in high abundance along the WA coast in early August, but have since declined at many beaches. Large *PN* continue to increase at OR beaches. In WA, *PN* were most abundant at La Push, First Beach on 12-Aug (606,000 cells/L). In OR, *PN* were most abundant at northern beaches (>1,000,000 cells/L) on 22-23-Aug. Seawater particulate domoic acid (pDA) peaked in late July / early August, with values >200 ng/L from Seaside, OR, to Kalaloch, WA (max ~757 ng/L at Kalaloch on 29-Jul). More recent values have been substantially lower (<65 ng/L) or unquantifiable. Samples collected offshore of northern WA on 11-Aug contained large *PN* up to 147,000 cells/L near La Push. The ESP off La Push has been detecting relatively low pDA concentrations (e.g., ~23 ng/L on 17-Aug). Razor clam DA was 20 ppm on 10-Aug at Kalaloch; samples from central WA beaches were ≤17 ppm as recently as 22-Aug. Recent razor clam DA samples from OR beaches remain below detection limits.

Forecast - The current La Niña conditions are expected to continue but weaken into the winter months. The most recent PDO value is strongly negative. The weather forecast suggests that winds will remain primarily upwelling-favorable, but with an onshore component through the weekend. The forecast beyond that remains uncertain. The risk of a toxic *PN* event over the next few days is likely low if the winds remain primarily southward. However, the extent of any offshore toxins is unknown. Since the phytoplankton community can change rapidly and since central WA razor clams are near harvest closure limits, we recommend caution, especially during any upcoming wind relaxations or northward wind reversals. Relying on additional cell observations and pDA analyses if *PN* increase again should help keep harvests safe.