Pacific Northwest Harmful Algal Blooms Bulletin

Oct 23, 2023 HAB risk = ✔

HAB risk key:
- ✔ = *low*
- ⚠ = *medium*
- ✖ = *high*

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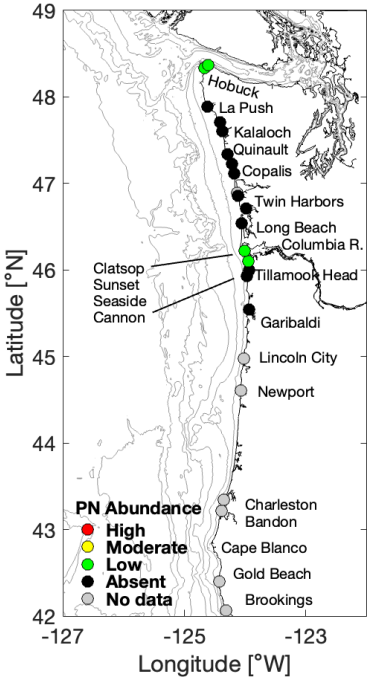
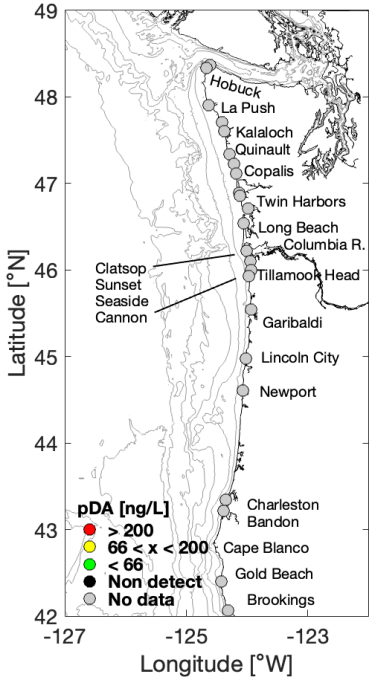
Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES
ORHAB PARTNERSHIP
NANOOS

Beach Sampling

(*Pseudo-nitzschia*)

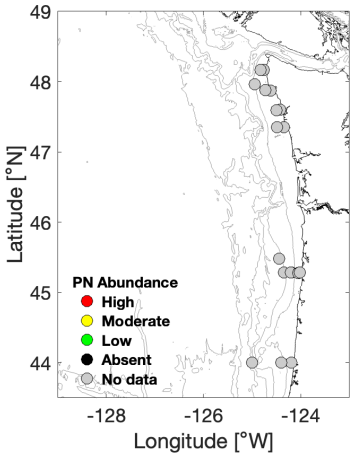


(particulate domoic acid)

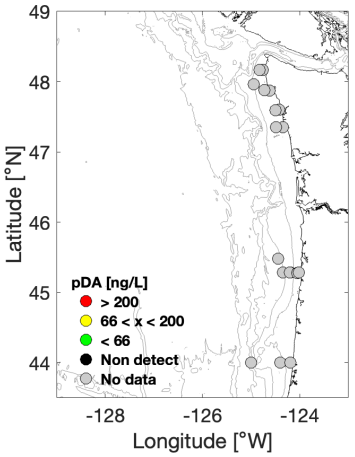


Offshore Sampling

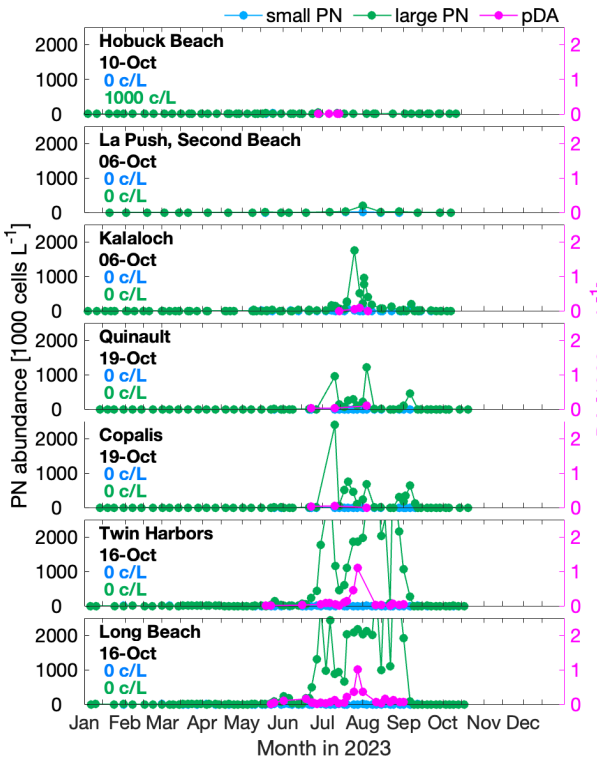
(*Pseudo-nitzschia*)



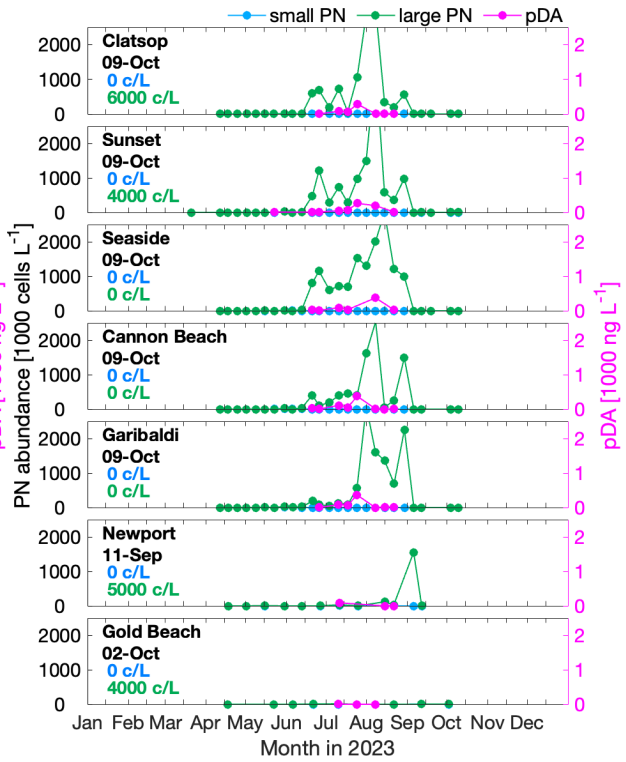
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



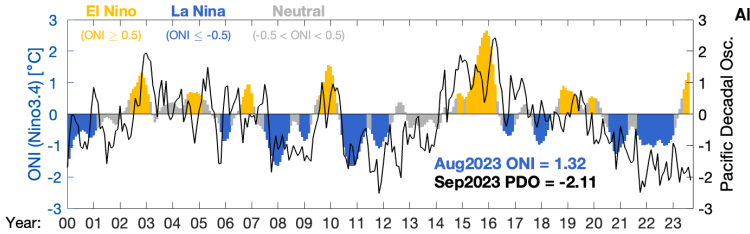
OR *Pseudo-nitzschia* & Domoic Acid



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.

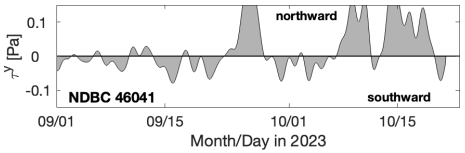
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



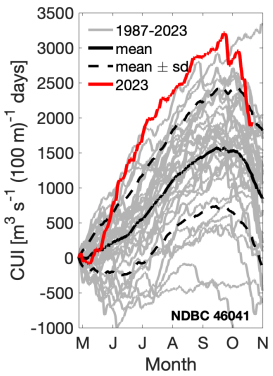
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

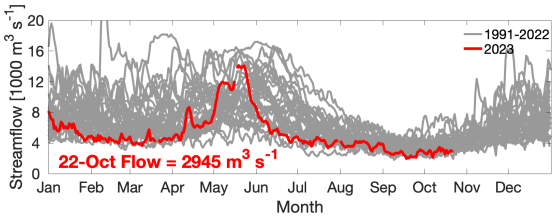


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress



Columbia River Discharge



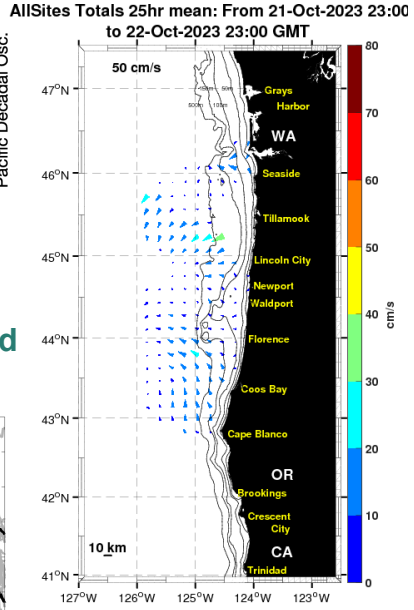
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Tues - W wind, 15 kt
Wed - NE wind, 15 kt
Thur - SE wind, 10 kt
Fri - NE wind, 15 kt

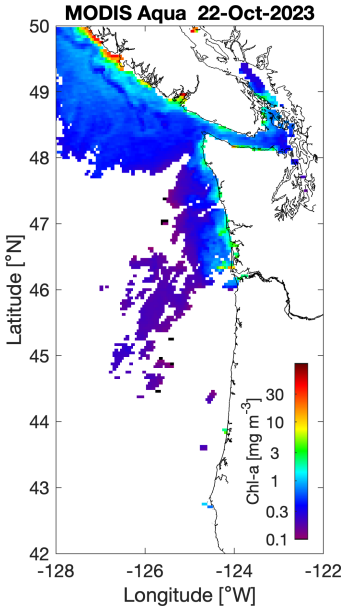
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

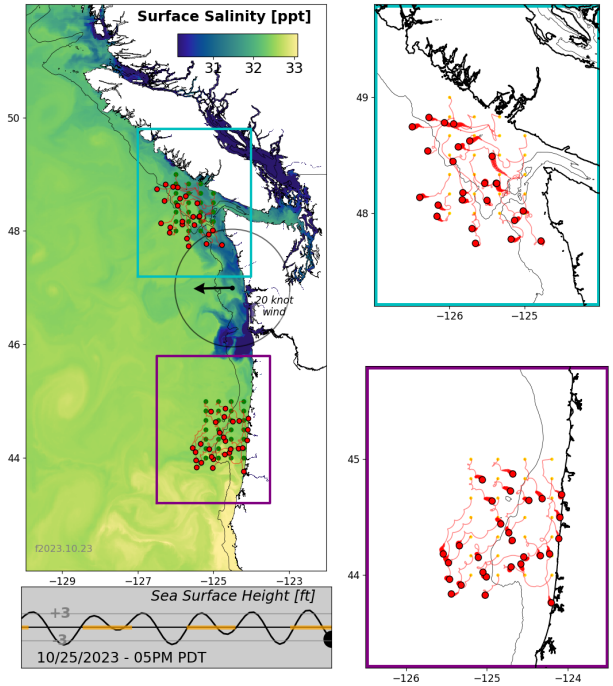
Satellite Chlorophyll-*a*



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. Red dots indicate particle end points.



Summary - Northward winds have dominated the coastal region over the last two weeks. Outflow from the Columbia River is at its seasonal low. According to the LiveOcean model, the majority of plume water now resides along the Washington coast. Clear satellite images have been scant, but available images indicate low chlorophyll-a concentrations in a narrow band along the Oregon and Washington shore. Shelf bottom-water temperature has warmed at coastal moorings (not shown), as the colder, upwelled water continues its seasonal retreat. Surface ocean currents now appear relatively weak. *Pseudo-nitzschia* (*PN*) cells continue to be largely absent in samples collected at area beaches. The only recent non-zero values were at Neah Bay (11,000 cells/L large morphology *PN*), and Hobuck Beach (1,000 cells/L large *PN*), WA, on 10-Oct. Non-zero cell abundances in OR were found at Clatsop South Jetty (6,000 cells/L large *PN*), and at Sunset Beach (4,000 cells/L large *PN*) on 9-Oct. No recent offshore samples have been collected, and given the low *PN* abundances at beaches, no samples have been analyzed for particulate domoic acid (pDA) concentrations. Domoic acid (DA) concentrations continue to decrease in razor clams. The highest recent values at WA beaches were 17 ppm at Twin Harbors on 5-Oct, and 14 ppm at Copalis Beach on 8-Oct. In OR, razor clam samples from Sunset Beach contained 13 ppm DA as of 20-Oct.

Forecast - El Niño conditions continue, are likely to be strong during the winter months, and are expected to persist through spring. The PDO remains strongly negative. Weather forecasts indicate that a low-pressure system will inundate the region Tuesday, and that variable winds at the coast will follow that storm during the remainder of the week. At present, it appears that the along-shelf wind component will continue to be generally weak until the weekend, when stronger upwelling-favorable winds begin to enter the forecast. Along-shelf ocean currents are therefore likely to be similarly weak, increasing the potential for toxin production by *PN*. However, few if any *PN* cells have been observed either offshore or at beaches in recent samples. The overall risk of a domoic acid outbreak appears low. Since the generally weak along-shelf ocean currents that now exist are likely to continue under the variable wind forecast, any increasing *PN* abundances at area beaches should be closely monitored and pDA samples should be collected as needed.