Pacific Northwest Harmful Algal Blooms Bulletin

Sep 15, 2022 HAB risk = ✖

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

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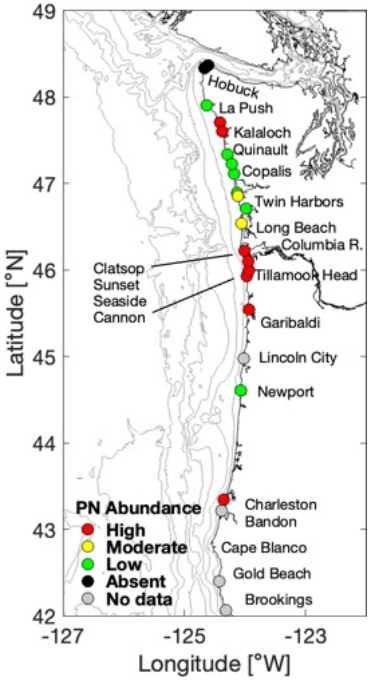
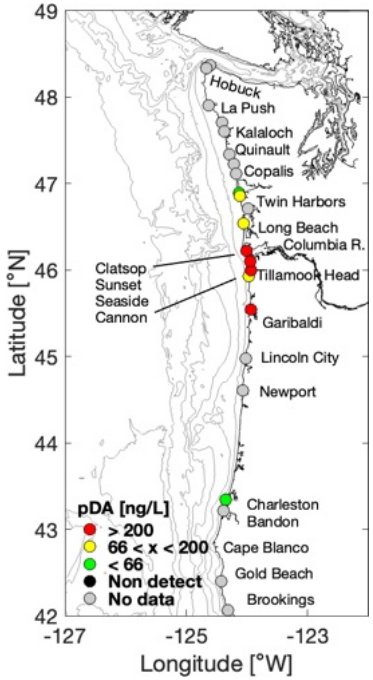
Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES
ORHAB PARTNERSHIP
NANOOS

Beach Sampling

(*Pseudo-nitzschia*)

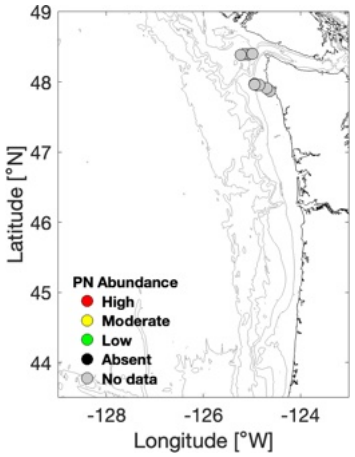


(particulate domoic acid)

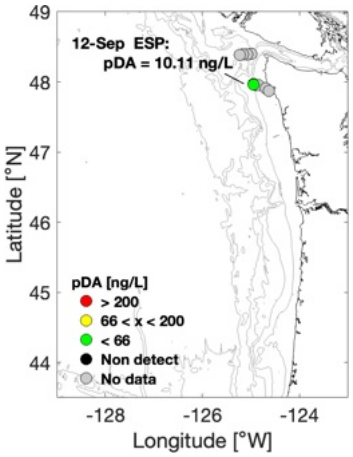


Offshore Sampling

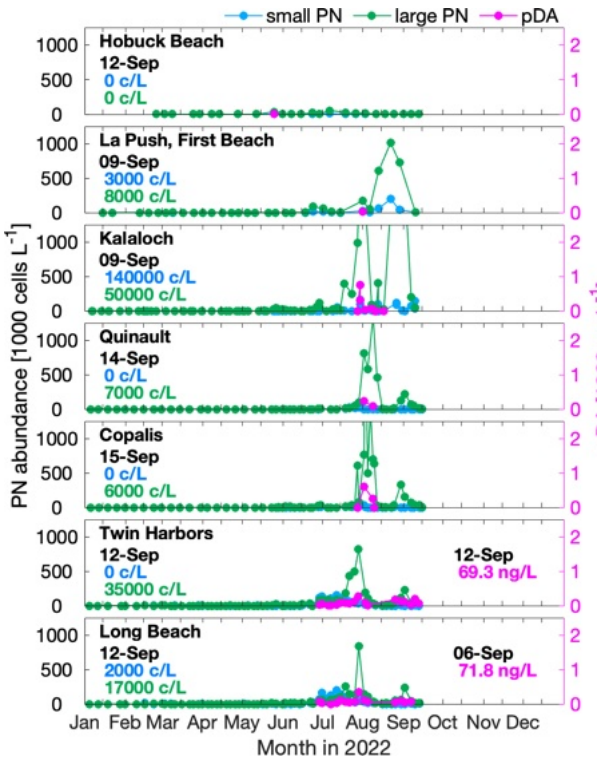
(*Pseudo-nitzschia*)



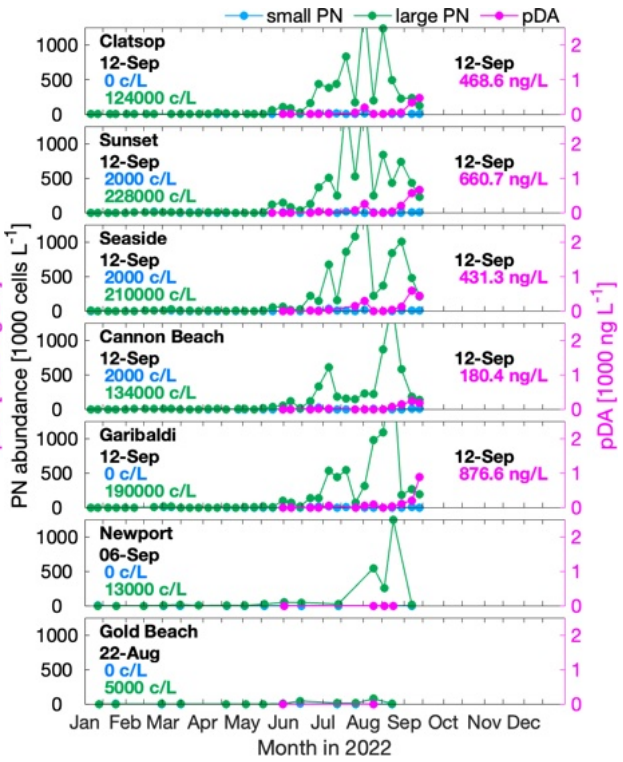
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



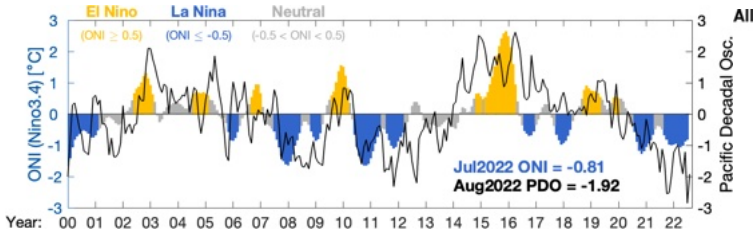
OR *Pseudo-nitzschia* & Domoic Acid



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.

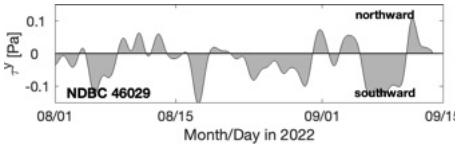
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



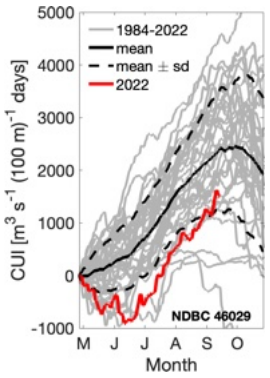
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

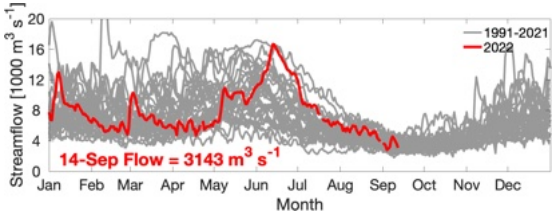


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress

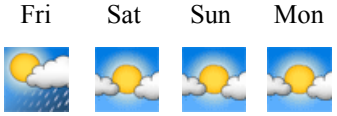


Columbia River Discharge



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.

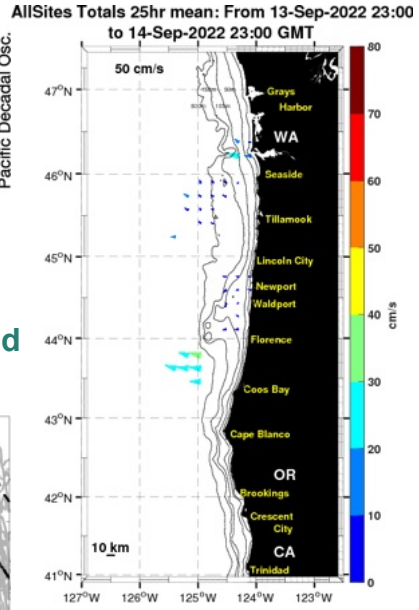
Marine Weather Forecast



Fri - W wind, 10 kt
Sat - light wind, 5 kt
Sun - N wind, 10 kt
Mon - N wind, 5 kt

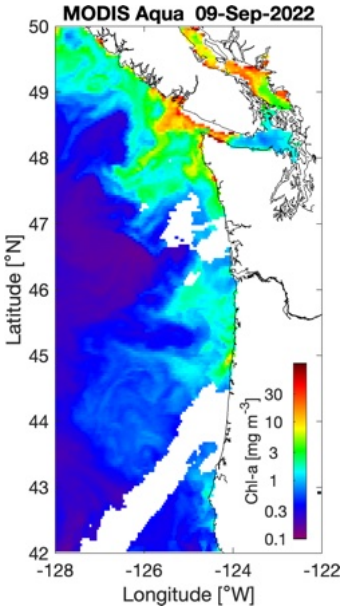
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

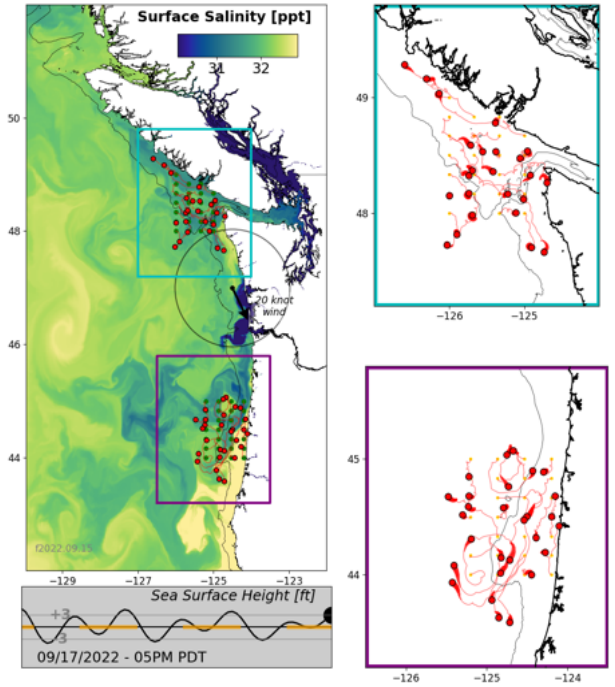
Satellite Chlorophyll-*a*



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 - Intermittent winds have continued over the last few weeks, though with a stronger upwelling-favorable component. As a result, *Pseudo-nitzschia* (*PN*) and domoic acid concentrations increased at beaches. More recently, *PN* abundances have waned somewhat in WA but toxins are still significant there, and also in OR. Satellite images show elevated chlorophyll-*a* along the coast, with highest concentrations off northwest WA. Outside of periods of stronger winds, surface ocean currents appear weak with little net along-coast transport. Primarily large morphology *PN* continue to dominate at most beaches. Highest abundances in WA were at Kalaloch and Ruby beaches on 9-Sep (50,000–62,000 cells/L large *PN*). Reports from southern WA and OR beaches indicate an increase in the proportion of *P. australis*-like cells to >40% of the *PN* community. *PN* abundances remain high (>200,000 cells/L) at northern OR beaches. Seawater particulate domoic acid (pDA) decreased to moderate levels <100 ng/L at southern WA beaches as of 12-Sep, but a sample from Twin Harbors was 191 ng/L on 9-Sep. Particulate DA at northern OR beaches ranged from 180–877 ng/L on 12-Sep. The ESP off La Push, WA, has been measuring low concentrations of pDA, with a high of ~34 ng/L on 9-Sep. No other recent offshore samples were available. Razor clam DA was as high as 20 ppm on 5-Sep at Quinault area beaches. Values decrease south of there to 5–8 ppm at Twin Harbors and Long Beach as recently as 7-Sep. In OR, razor clams at Sunset Beach had increased to 16 ppm on 9-Sep.

Forecast - The current La Niña conditions are expected to continue through the winter months. The most recent PDO value is strongly negative. The weather forecast suggests that winds will be variable this week. By the weekend, stronger upwelling-favorable winds are predicted, but there is considerable uncertainty beyond that. Conditions appear similar to those that have led to the waxing and waning of *PN* and pDA twice already this season, with wind reversals fueling toxigenic *PN*. The increased proportion of *P. australis*-like cells in southern WA and OR, and the high pDA concentrations in OR are concerning. Quantifiable DA concentrations in mussels were recorded at Westport and Tokeland, WA, on 12-Sep, indicating an ongoing toxic event. Because of the significant levels of seawater pDA, large *PN* cells, and high DA in clams in this environmental setting, extreme caution is advised.