Pacific Northwest Harmful Algal Blooms Bulletin

Oct 09, 2023 HAB risk = ✔

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

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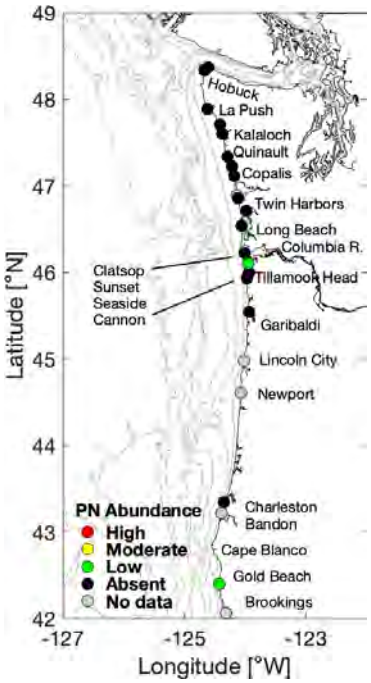
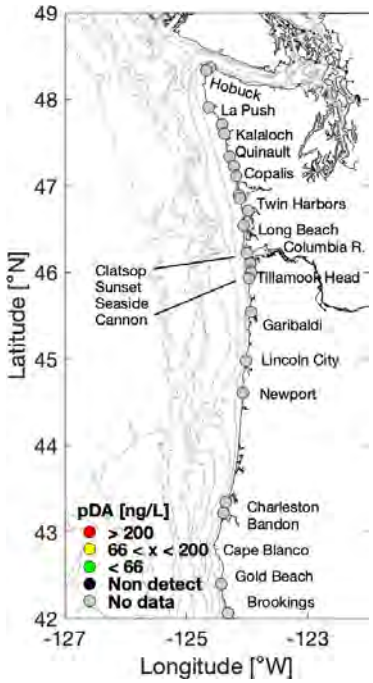
Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES
ORHAB PARTNERSHIP
NANOOS

Beach Sampling

(*Pseudo-nitzschia*)

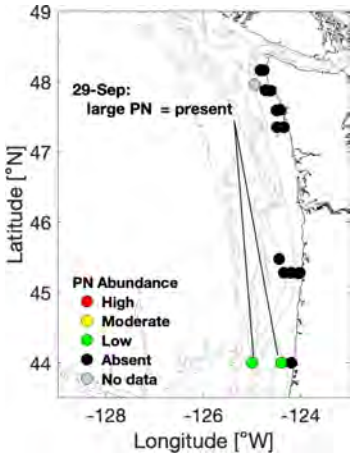


(particulate domoic acid)

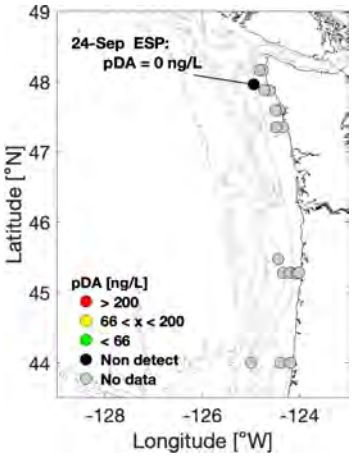


Offshore Sampling

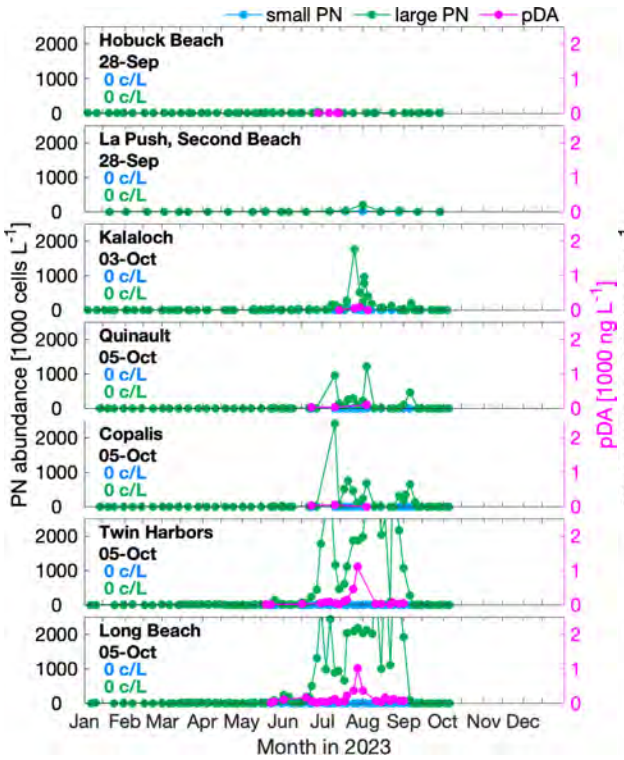
(*Pseudo-nitzschia*)



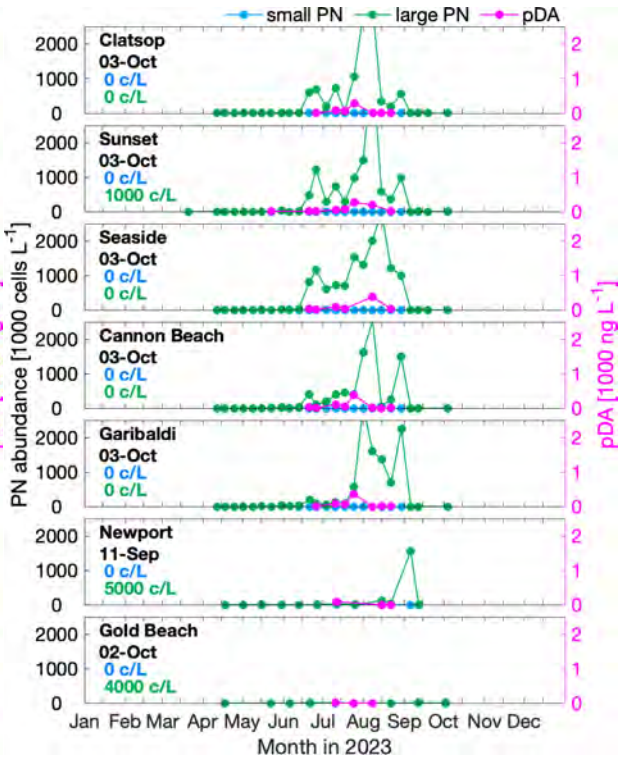
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



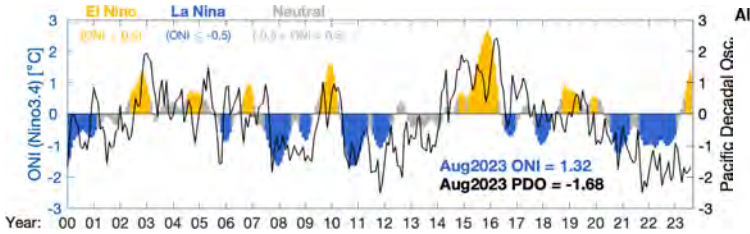
OR *Pseudo-nitzschia* & Domoic Acid



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.

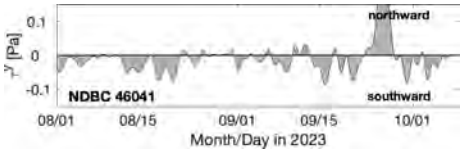
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



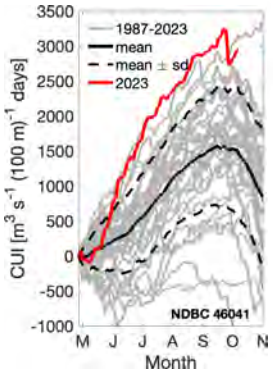
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

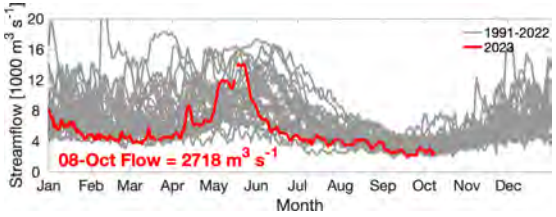


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress

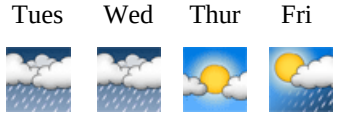


Columbia River Discharge



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.

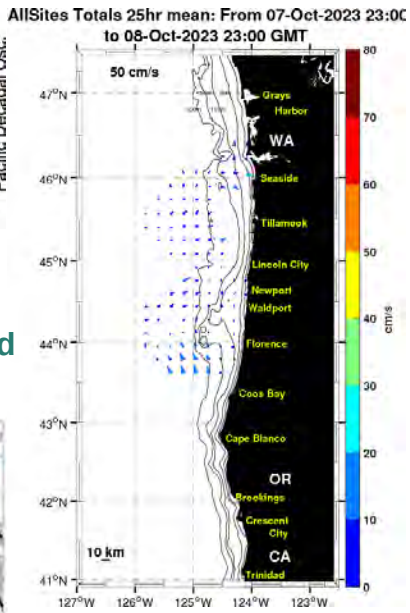
Marine Weather Forecast



Tues - S wind, 25 kt
Wed - W wind, 15 kt
Thur - SE wind, 10 kt
Fri - S wind, 10 kt

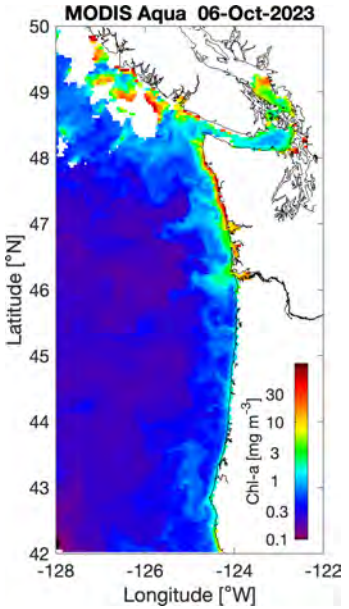
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

Ocean Surface Currents



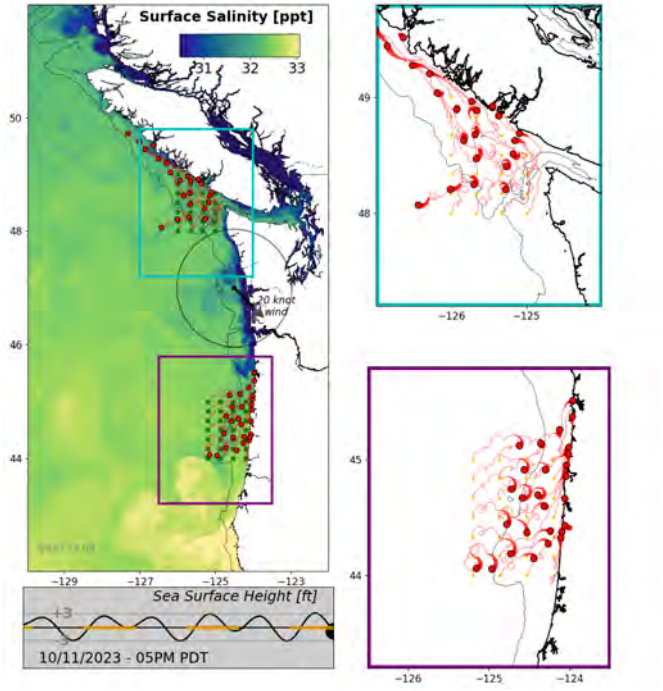
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

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 - The first storm of the fall season passed by the region in late September. Despite that, virtually no *Pseudo-nitzschia* (*PN*) cells were observed at beaches during or after the storm. Since then, coastal winds have reverted to a generally southward direction and surface ocean currents have also been directed southward, suggesting the continuation of upwelling conditions. Additional storms will be required before ocean conditions switch to seasonal downwelling. Recent satellite images indicate moderate chlorophyll-*a* concentrations in northern OR and southern WA that appear to be associated with the Columbia River plume; higher values are evident close to shore off northern WA. Cells of *PN* continue to be largely absent in samples collected at area beaches. The only recent non-zero values were at Neah Bay, WA, on 27-Sep (3,000 cells/L large *PN*), Sunset Beach, OR, on 3-Oct (1,000 cells/L large *PN*), and Gold Beach, OR, on 2-Oct (4,000 cells/L large *PN*). Recent offshore samples have also contained few *PN* cells. *Pseudo-nitzschia* were absent in samples collected along the Newport Hydrographic Line, off Newport, OR, on 22-Sep. Samples collected at multiple Olympic Coast National Marine Sanctuary nearshore moorings on 28–29-Sep also contained no *PN*. Additional samples collected off Cape Meares, OR, and Heceta Head, OR, on 29-Sep contained very few large-type *PN* cells. Domoic acid (DA) continues to depurate in razor clams. The highest recent values at WA beaches were 19 ppm at Copalis on 24-Sep, and 17 ppm at both Quinault on 23-Sep and at Mocrocks on 1-Oct. In OR, razor clam samples from Sunset Beach had decreased to 9.2 ppm as of 4-Oct.

Forecast - El Niño conditions are building and are expected to persist throughout winter. The PDO remains negative. Weather forecasts indicate that the downwelling-favorable winds that began this weekend should last for most of the week. Longer term forecasts suggest a short break from the storms on Thursday, with the likelihood of another storm system by the weekend. Few *PN* cells existed last week at beaches or where sampled offshore. It is possible that the upwelling-favorable conditions late last week could have given rise to new *PN* blooms. With the northward winds experienced this past weekend, samples collected early this week should provide a good indicator of that. Conditions suggest there is low risk of an imminent domoic acid outbreak in the near future.