Pacific Northwest Harmful Algal Blooms Bulletin

Sep 25, 2023 HAB risk = ⚠

HAB risk key:

- ✓ = *low*
- ⚠ = *medium*
- ✗ = *high*

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Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES

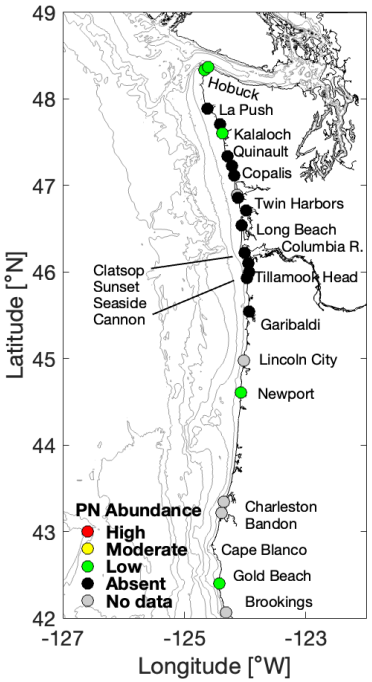
ORHAB PARTNERSHIP

NANOOS

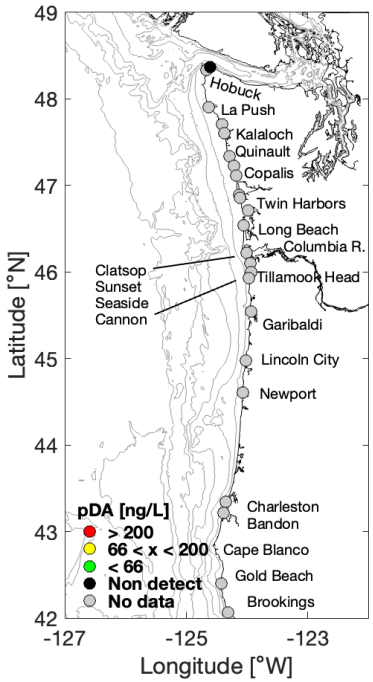
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

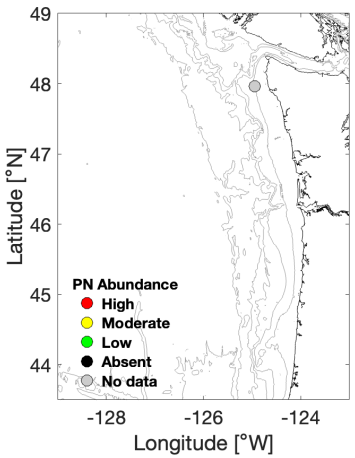


(particulate domoic acid)

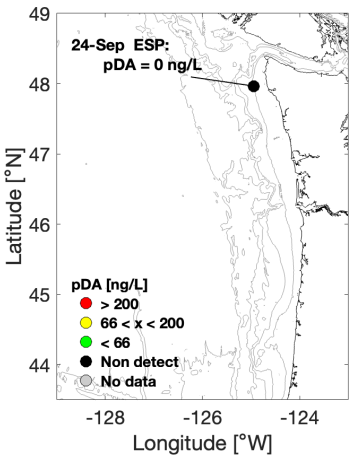


Offshore Sampling

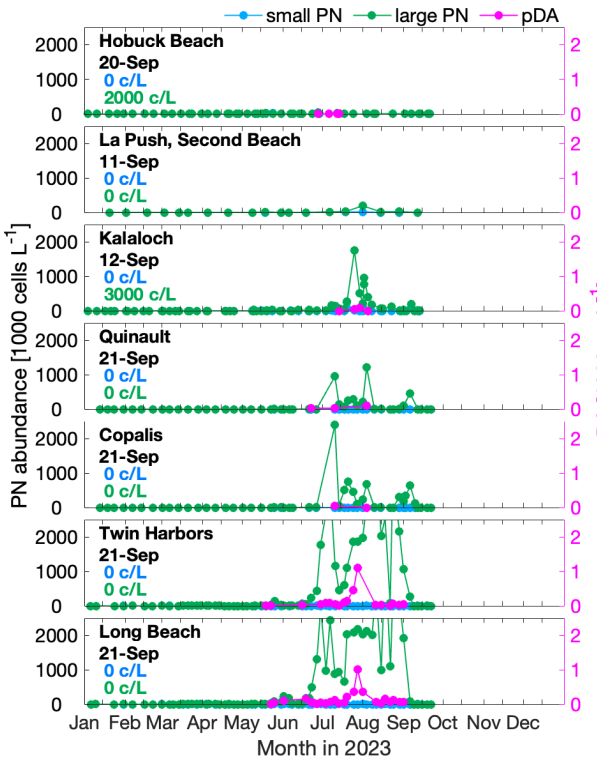
(*Pseudo-nitzschia*)



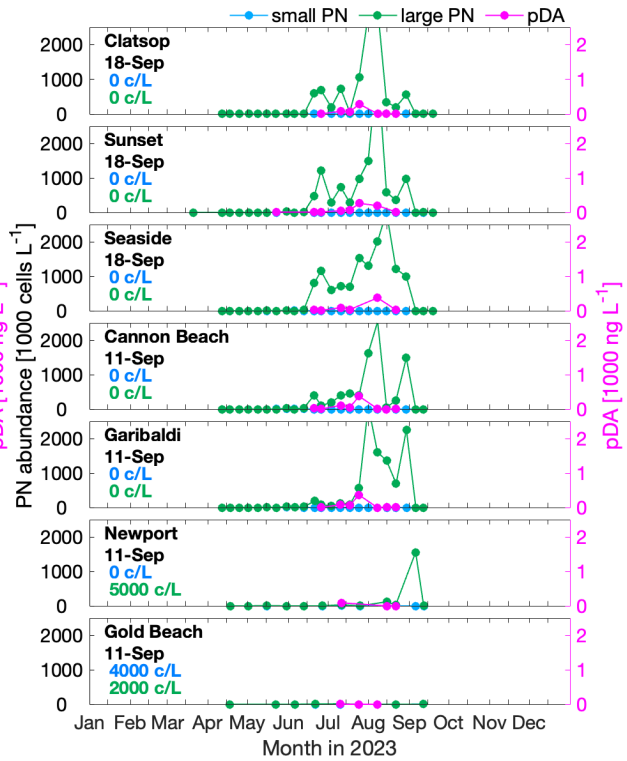
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



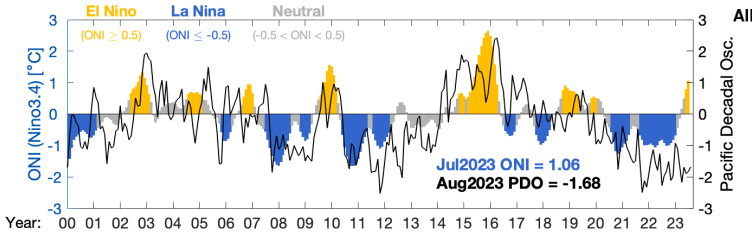
OR *Pseudo-nitzschia* & Domoic Acid



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.

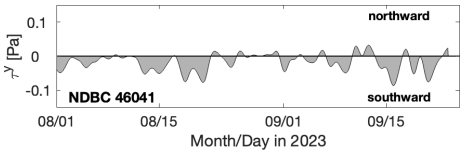
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



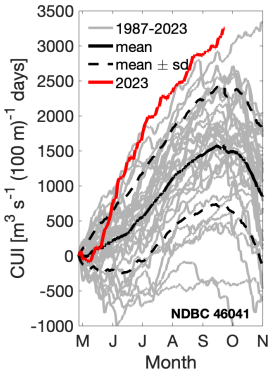
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

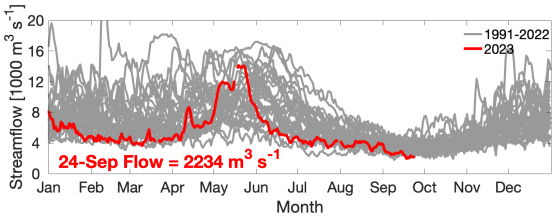


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress

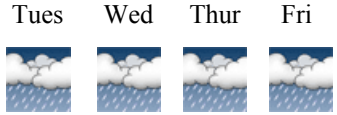


Columbia River Discharge



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.

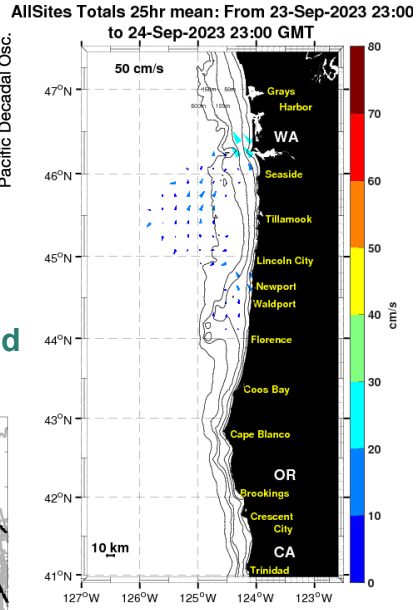
Marine Weather Forecast



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

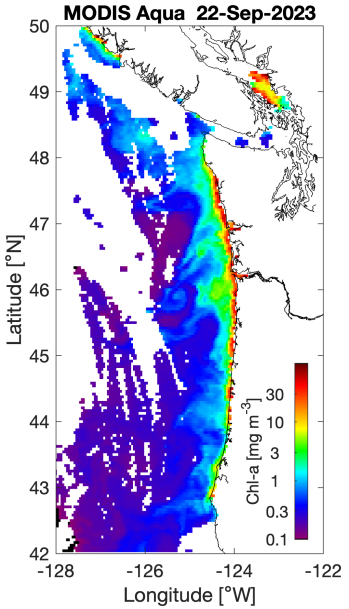
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

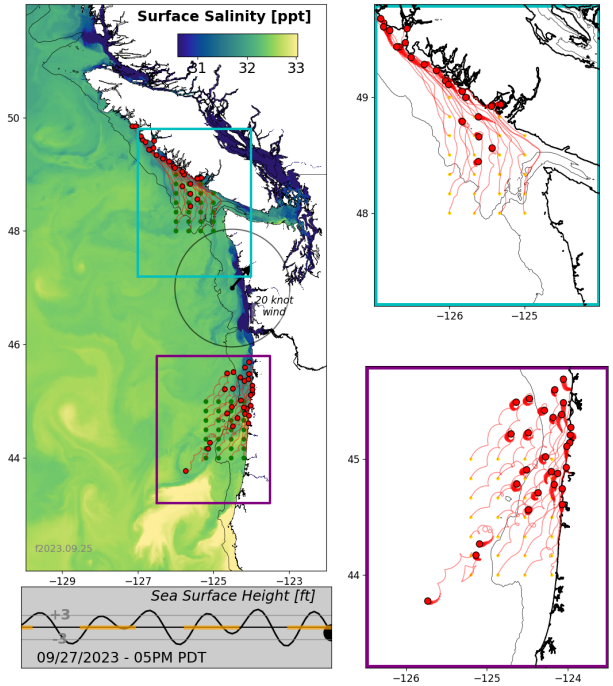
Satellite Chlorophyll-*a*



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 - Winds and along-shelf surface ocean currents weakened during the last week of August and early September. Stronger upwelling-favorable winds returned in early to mid September and likely contributed to the abrupt decreases in *Pseudo-nitzschia* (*PN*) cell abundances observed at that time. August *PN* abundances were commonly in excess of 1,000,000 cells/L, but both large and small morphology *PN* cells essentially disappeared from area beaches after the first week in September. The first large storm of the season has just inundated the region. This will drive any existing offshore *PN* cells and toxins northward and onshore. Recent satellite images suggest that moderate chlorophyll-a concentrations exist all along the coast, but are more widespread off WA and northern OR. Outflow from the Columbia River is at its annual low point, and the resulting plume is small. The highest recent cell abundances were at Twin Harbors, WA (4,000 cells/L large *PN)* on 18-Sep, and at South Jetty, OR (8,000 cells/L large *PN)* on 11-Sep. Given the relative lack of *PN* cells, seawater particulate domoic acid (pDA) concentrations have not been recently quantified. The ESP mooring offshore of northwest WA has not detected pDA since 28-Aug. Razor clam DA concentrations peaked in August and appear to be decreasing, though with some fluctuations. The highest recent DA values in WA razor clams were 19 ppm at both Quinault and Copalis beaches on 14-Sep. In OR, razor clams from Sunset Beach had 18 ppm DA as of 15-Sep, and samples from Newport contained 32 ppm DA as of 1-Sep.

Forecast - El Niño conditions currently exist and are expected to persist throughout winter. The PDO remains negative. Weather forecasts suggest that winds should generally remain northward (downwelling-favorable) through Thursday as a series of fronts pass by. Longer-term forecasts indicate a return to generally southward (upwelling-favorable) winds by Saturday. A NOAA Ecosystem cruise will be conducting offshore sampling throughout the coming days, but the status and extent of any offshore *PN* and toxins is presently unknown. Given that, and the fact that razor clam DA concentrations are very near to the closure limits, means we must recommend caution. Beach samples collected this week should serve as excellent indicators for the upcoming harvest period since the northward winds that started this past weekend should deliver any offshore toxic *PN* cells to area beaches where they may be detected.