Pacific Northwest Harmful Algal Blooms Bulletin

Apr 15, 2024 HAB risk = ✔

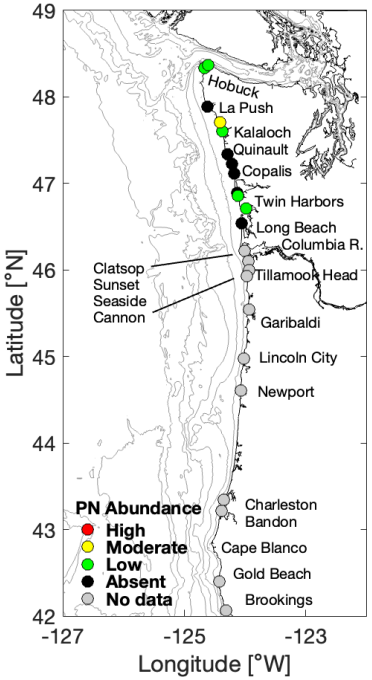
HAB risk key:
- ✔ = *low*
- ⚠ = *medium*
- ✖ = *high*

Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES

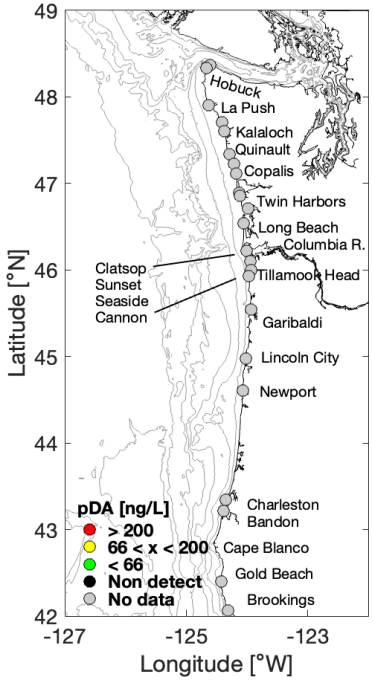
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

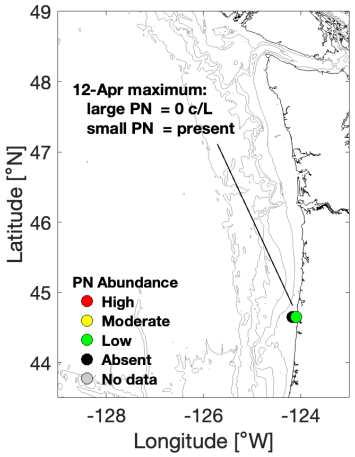


(particulate domoic acid)

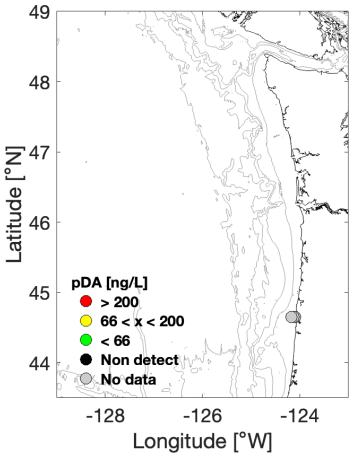


Offshore Sampling

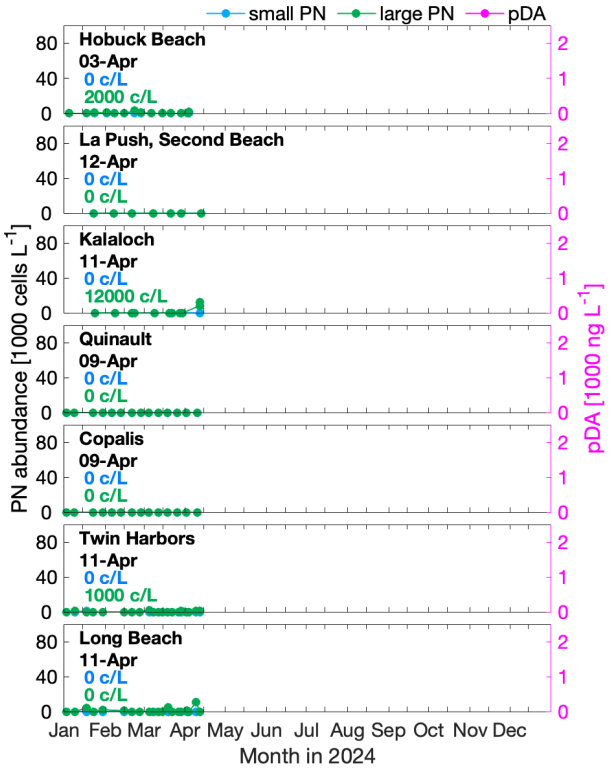
(*Pseudo-nitzschia*)



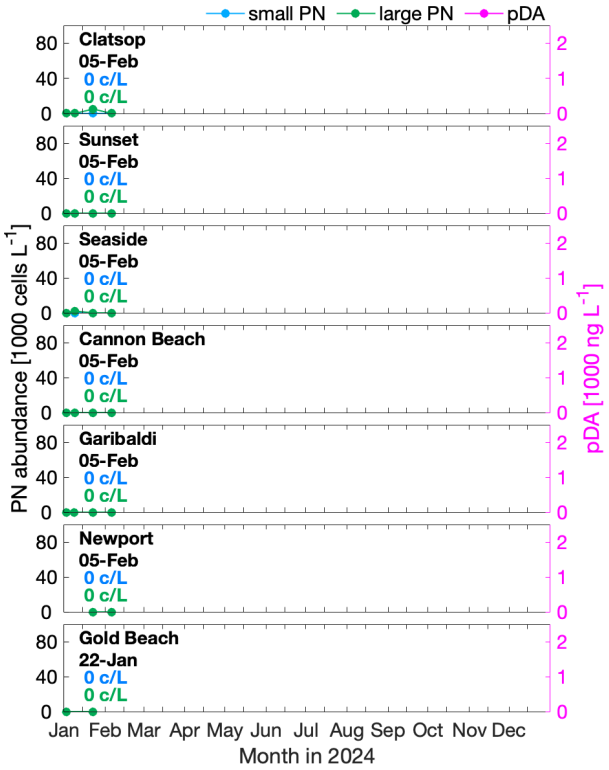
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



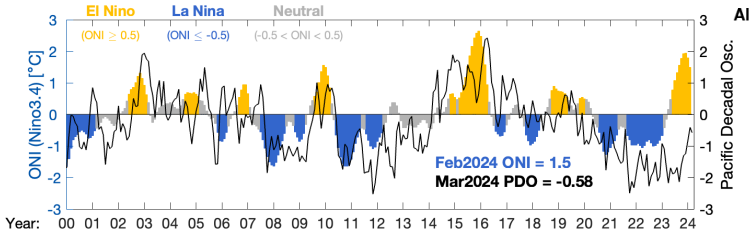
OR *Pseudo-nitzschia* & Domoic Acid



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.

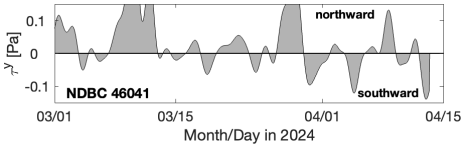
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



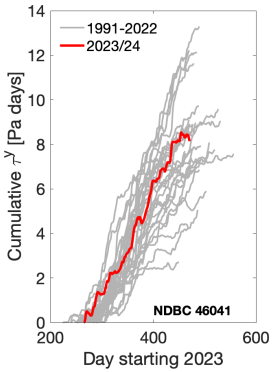
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

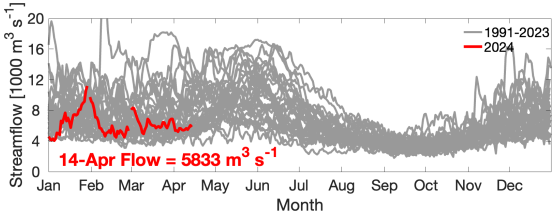


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress



Columbia River Discharge



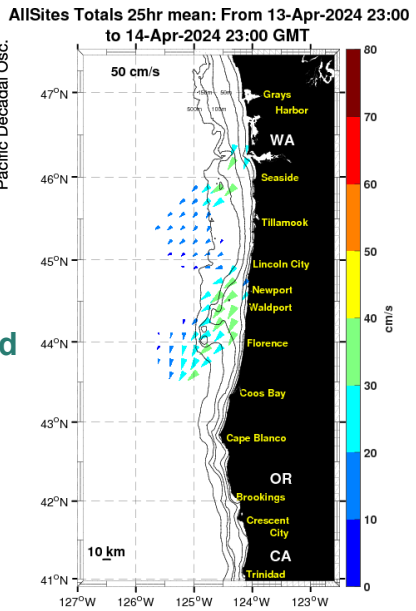
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Tues - NW wind, 10 kt
Wed - NE wind, 10 kt
Thur - N wind, 15 kt
Fri - E wind, 10 kt

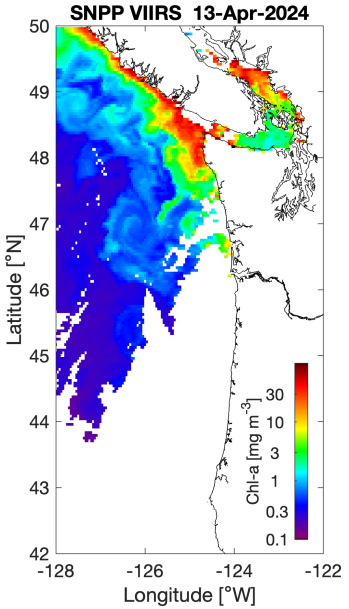
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

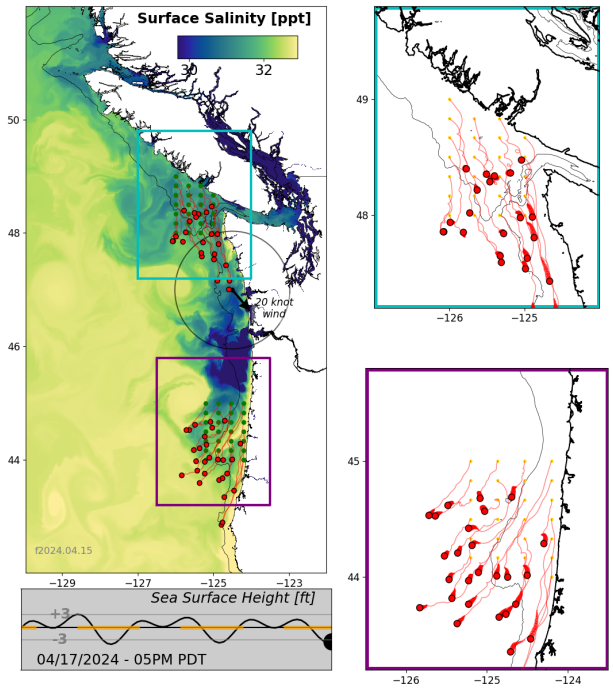
Satellite Chlorophyll-*a*



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 have continued to fluctuate over last couple of weeks, but with increasingly frequent southward pulses. They have remained largely southward (upwelling-favorable) since Friday. According to the LiveOcean model, Columbia River plume water is being swept south and new tidal pulses now flow into northern OR with the regionally southward currents. Mid-shelf bottom temperatures have cooled by roughly 0.5 C. The coastal ocean is transitioning to large-scale upwelling. Satellite images show elevated chlorophyll-*a* concentrations primarily off WA, with highest values off Juan de Fuca Strait. *Pseudo-nitzschia* (*PN*) cells also began to increase at some WA beaches this past week. The highest concentrations were 21,000 cells/L of large size *PN* at Ruby Beach on 11-Apr. Samples from Kalaloch, Tokeland, and Long Beach all contained large *PN* >10,000 cells/L last week. No recent *PN* observations are available from OR beaches. Samples collected from 1–5 nm offshore of Newport, OR, on 12-Apr, contained two chains of small *PN* cells at the site closest to shore. No *PN* were detected offshore at the 3 and 5 nm sites. Given the low *PN* concentrations, seawater particulate domoic acid (pDA) has not yet been quantified. Razor clam DA values are generally low. The highest recent value in WA was 5 ppm DA at Twin Harbors on 31-Mar. In OR, the only site with recently detected DA was Gold Beach, where razor clams contained 39 ppm as of 12-Apr. It is unclear if those concentrations were newly acquired or remnant values; the prior razor clam sample from that area contained 54 ppm on 3-Nov, and DA has not been detected in mussel samples during the interim period.

Forecast - El Niño conditions currently exist, but continue to dissipate. Neutral conditions are expected by May, and La Niña conditions should develop by July. The PDO index remains weakly negative. Coastal winds are forecast to be generally upwelling-favorable through the end of the week. This should deliver newly upwelled water to the coast to fuel plankton blooms, including *PN*. Northward (downwelling-favorable) winds are possible near the end of the week, but they should not persist very long. Stronger northward winds could arrive mid next week, but uncertainty at that time horizon is high. Managers should expect higher *PN* concentrations at beaches especially during wind reversals. Risk appears low, but pDA samples associated with any elevated *PN* concentrations will help to confirm this assessment.