Pacific Northwest Harmful Algal Blooms Bulletin

Apr 30, 2024 HAB risk =

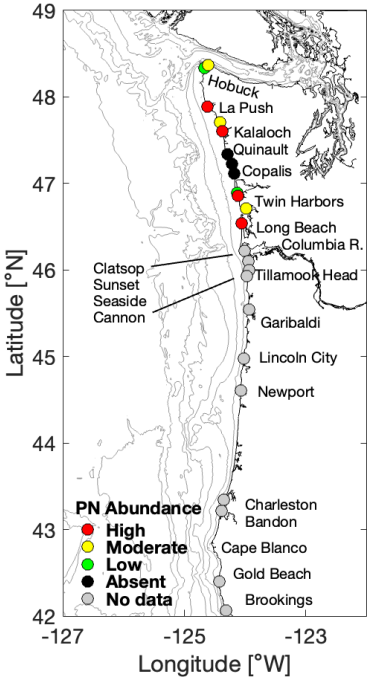
HAB risk key:
- = *low*
- = *medium*
- = *high*

Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES

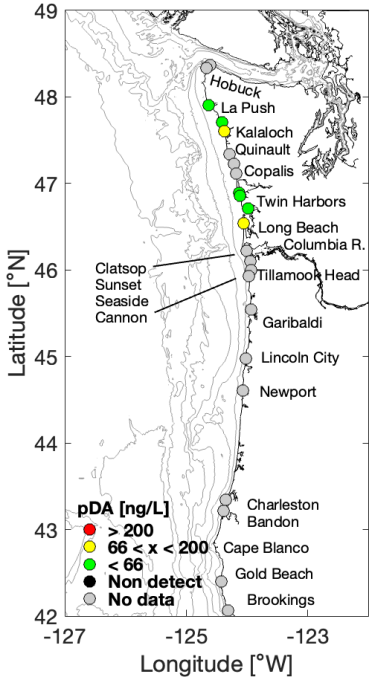
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

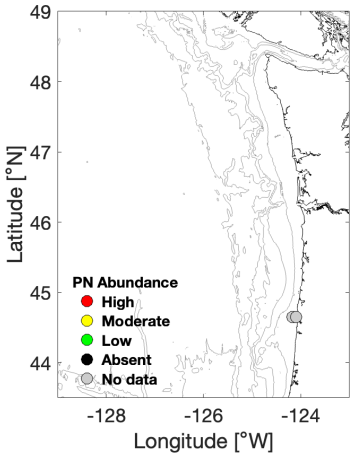


(particulate domoic acid)

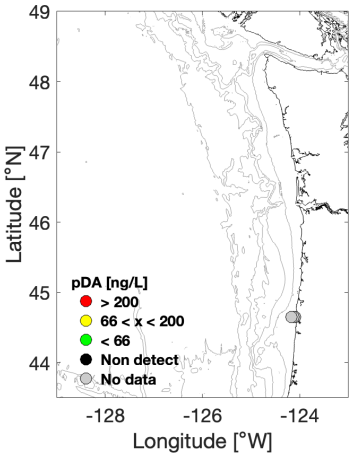


Offshore Sampling

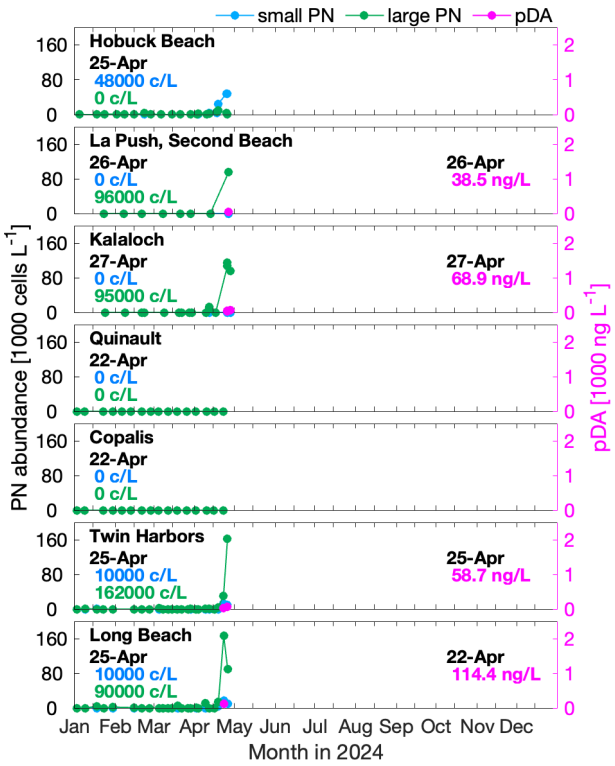
(*Pseudo-nitzschia*)



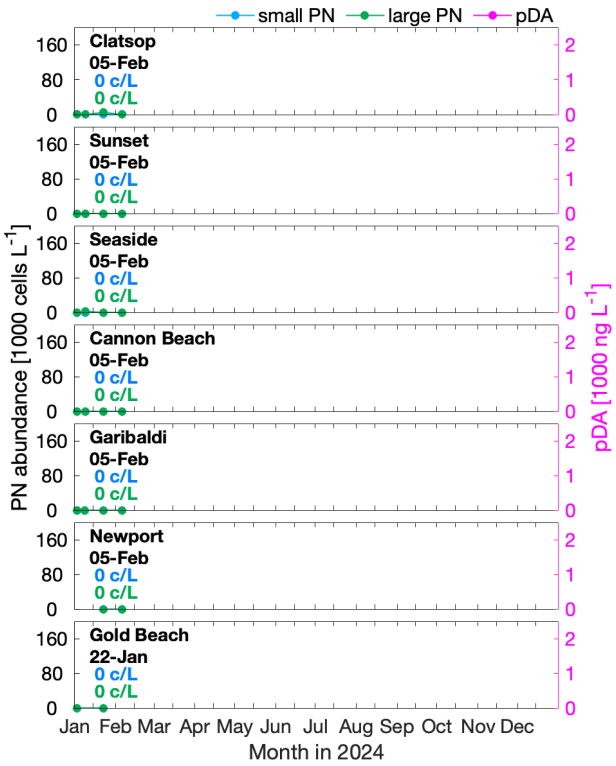
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



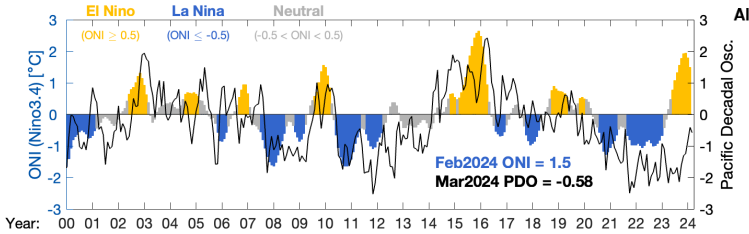
OR *Pseudo-nitzschia* & Domoic Acid



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.

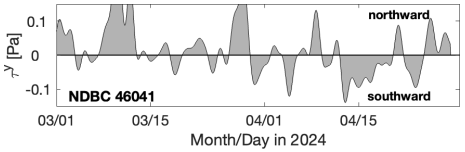
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



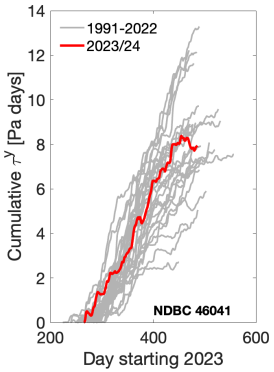
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

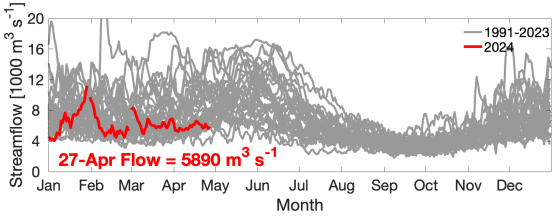


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress



Columbia River Discharge



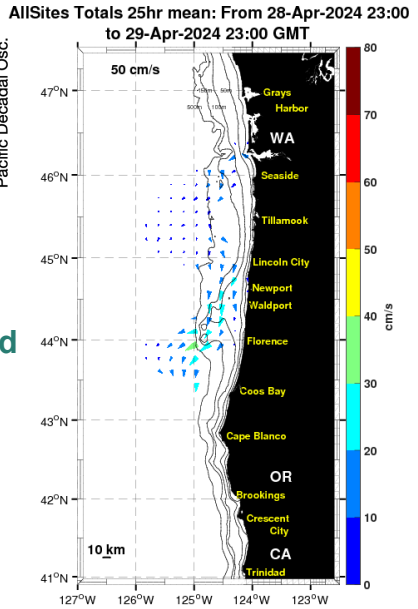
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Wed - S wind, 10 kt
Thur - N wind, 10 kt
Fri - S wind, 10 kt
Sat - NW wind, 10 kt

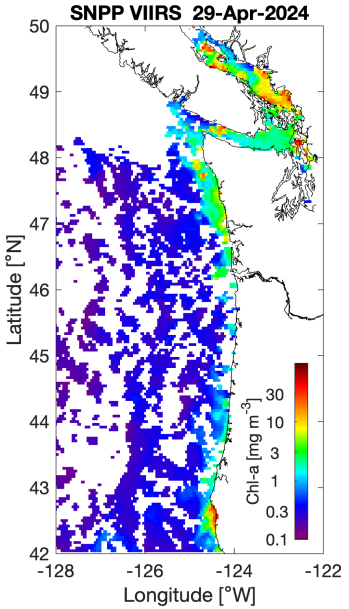
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

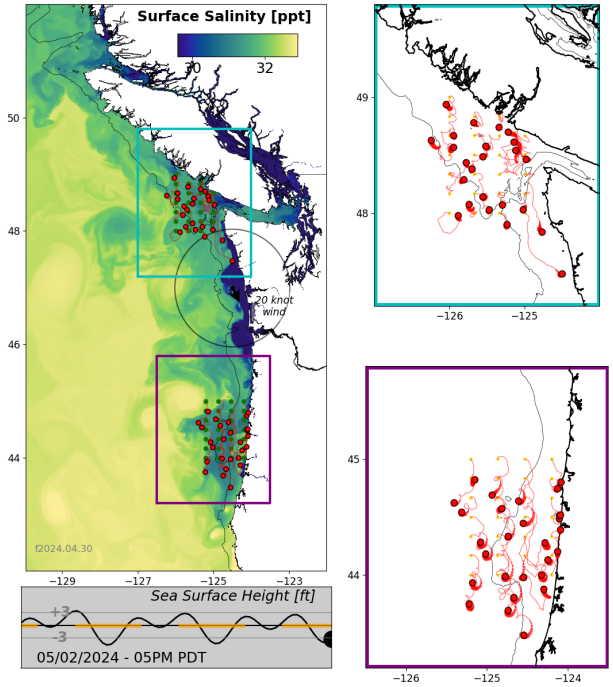
Satellite Chlorophyll-*a*



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 - A stable pattern of upwelling-favorable winds existed for ~1 week, aiding in the spring transition to large-scale upwelling. Northward winds have since returned, and now alternate between primarily shoreward and northward as additional fronts pass. Elevated chlorophyll-*a* was evident in satellite imagery prior to the weather shift, particularly off northwest WA; more recent clear images have been sparse. According to the LiveOcean model, the Columbia plume has tendrils off both WA and OR; surface ocean currents appear relatively weak. With the upwelling and subsequent return to northward winds, both large and small morphology *Pseudo-nitzschia* (*PN*) cells appeared in greater concentration at the coast last week. Highest concentrations of large size *PN* were >160,000 cells/L at Long Beach on 22-Apr, and at Twin Harbors on 25-Apr, with ~10% of the cells categorized as *P. australis*-like. Kalaloch and La Push also had ~100,000 cells/L large *PN* on 25-Apr. Small size *PN* were more common farther north: 48,000 cells/L at Hobuck, and 95,000 cells/L at Neah Bay on 25-Apr. No recent cell observations are available from OR beaches or from offshore. Seawater particulate domoic acid (pDA) was present in moderate concentrations at many WA sites. Long Beach, WA, samples contained 114 ng/L pDA on 22-Apr, while the other WA beaches contained <70 ng/L pDA. The most recent razor clam samples from 13-Apr contained ≤7 ppm DA at Copalis, Mocrocks, and Long Beach. In OR, no updates were reported since 12-Apr, when only southern OR razor clams contained detectable DA, likely a residual from a past bloom.

Forecast - El Niño conditions currently exist, but continue dissipating. Neutral conditions are expected by May, and La Niña conditions are favored to develop by July. The PDO remains weakly negative. Winds are forecast to continue fluctuating north-south in the short-term. Longer-term forecasts indicate similar fluctuations extending into next week. Winds could return to upwelling-favorable by mid next week, but substantial uncertainty exists in those predictions. The presence of *P. australis*-like cells, which are often highly toxic, is notable. With pDA present at beaches, the possibility of continued north-south wind fluctuations for the foreseeable future, and the lack of offshore information, caution is advisable. Continued pDA testing, especially prior to and during the anticipated digs starting 6-May, is recommended to help ensure safe harvests.