Pacific Northwest Harmful Algal Blooms Bulletin

June 2, 2024 HAB risk =

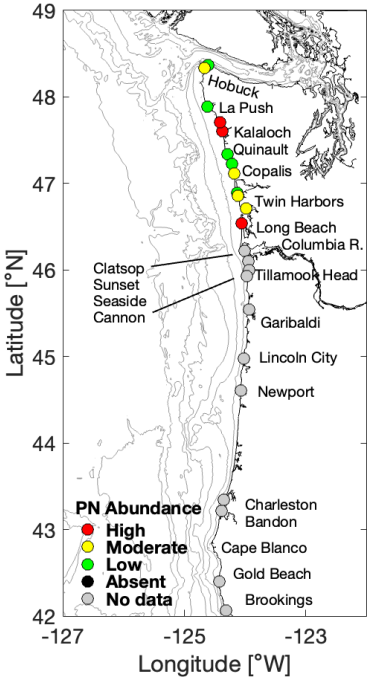
HAB risk key:
- *= low*
- *= medium*
- *= high*

Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES

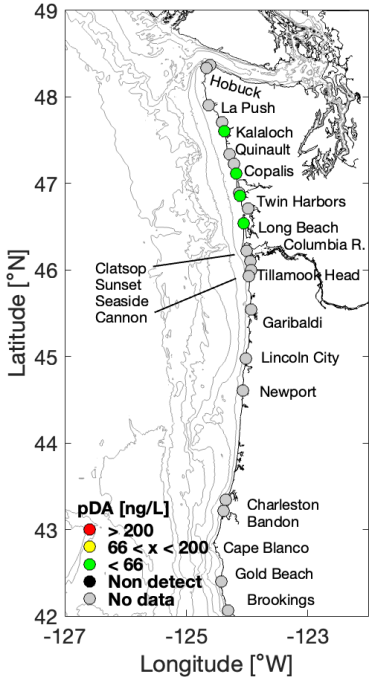
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

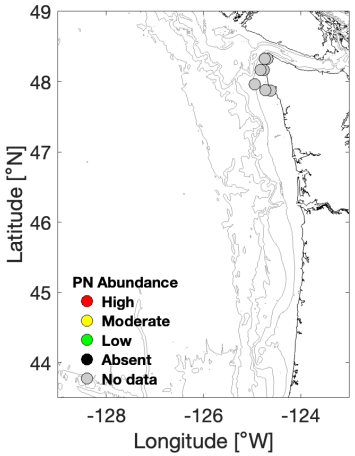


(particulate domoic acid)

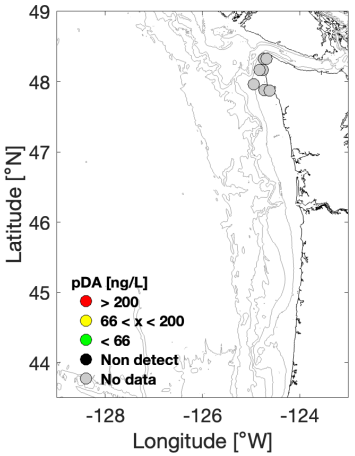


Offshore Sampling

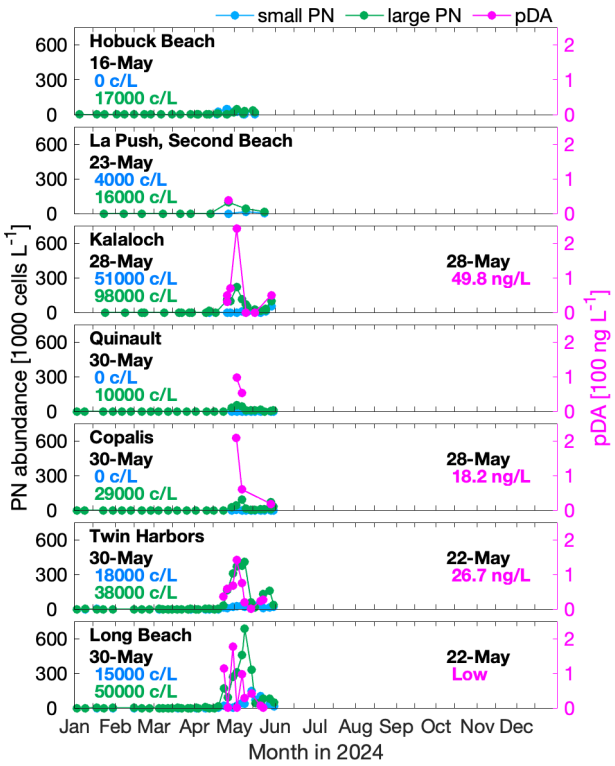
(*Pseudo-nitzschia*)



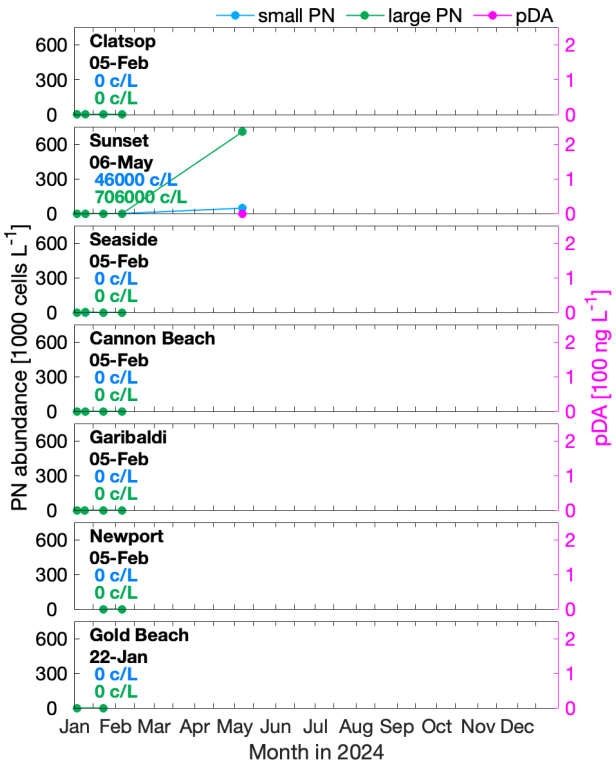
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



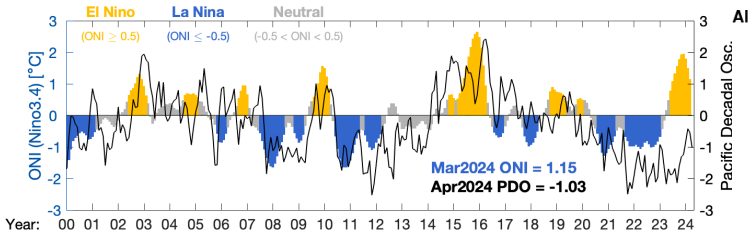
OR *Pseudo-nitzschia* & Domoic Acid



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.

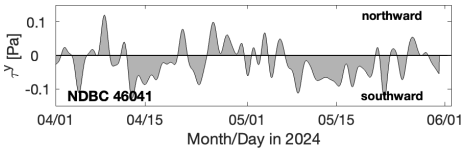
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



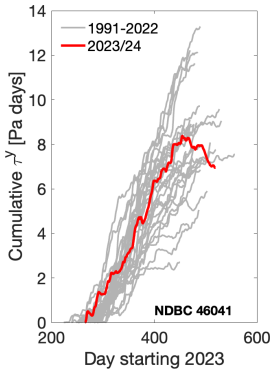
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

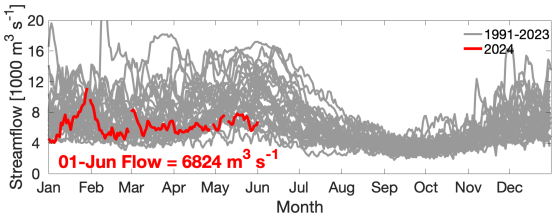


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress



Columbia River Discharge



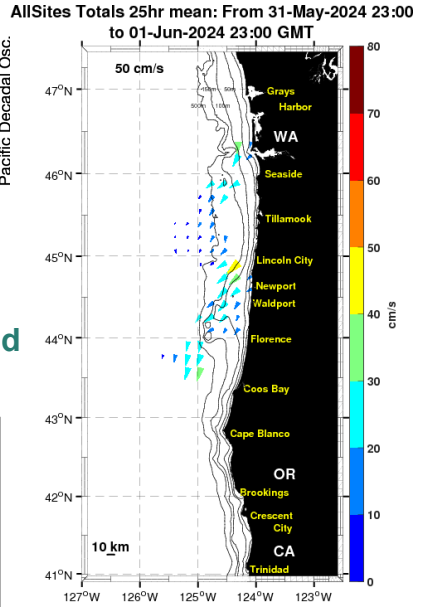
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Mon - SW wind, 15 kt
Tues - SW wind, 25 kt
Wed - NW wind, 10 kt
Thur - NW wind, 10 kt

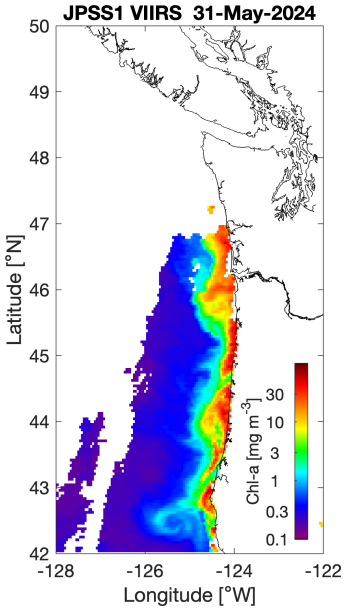
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

Ocean Surface Currents



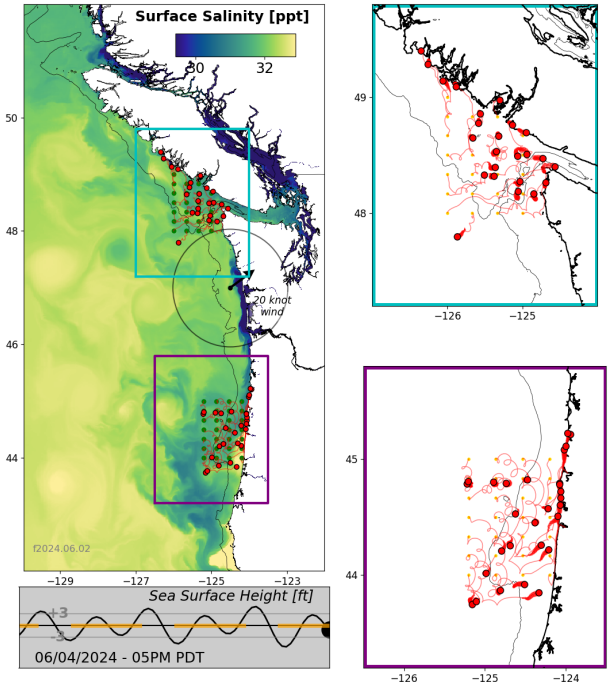
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

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 - Fluctuating winds, including a moderate downwelling-favorable event, were prominent over the last two weeks. As a result, surface along-shelf currents weakened and the coastal band of chlorophyll-*a* appeared confined closer to shore in recent satellite images. Southward currents persist according to the LiveOcean model, but have been particularly weak off northwest WA. Concentrations of *Pseudo-nitzschia* (*PN*) cells, that had decreased during the prior upwelling period, rebounded somewhat at many sites during the recent wind fluctuations. Highest *PN* concentrations were found at Twin Harbors on 27-May (161,000 cells/L large *PN*), and Ruby Beach, WA, on 24-May (135,000 cells/L large *PN*); Kalaloch and Long Beach had large-size *PN* concentrations approaching 100,000 cells/L during that same period. Particulate domoic acid (pDA) concentrations, while detectable, have remained relatively low, with the highest recent values (~50 ng/L) at Kalaloch on 28-May. A NOAA Ecosystem cruise is sampling offshore waters throughout the region, but results are not yet available. Updates to the WA razor clam DA concentrations are pending. The most recent values ranged from 7–9 ppm from Quinault Beach to the Willapa Spits on 13-May. OR razor clams had similar DA concentrations, with samples from Newport and Coos Bay at 10–13 ppm, and Gold Beach at 14 ppm as of 31-May. Crabs collected 22-May off southern OR had increased DA concentrations in viscera (≤13 ppm). Blooms of *Alexandrium* have also impacted OR and WA over the last couple of weeks, with paralytic shellfish toxin concentrations exceeding regulatory closure limits at multiple sites.

Forecast - El Niño conditions currently exist, but neutral conditions are expected imminently. La Niña conditions are favored to develop by August. The PDO remains negative. Unseasonably strong storms, with high winds and heavy rains, will impact the region through Tuesday. Seas approaching 12 ft are forecast during this period. Winds should turn southward Wednesday in the wake of the storms; longer-term forecasts currently suggest upwelling-favorable conditions will then persist through at least next weekend. With the forecast strength and duration of the current storms, it is certain that any offshore HABs and toxins will be swept shoreward and northward during the early part of the week. We recommend continued caution and pDA testing during what is likely the final spring razor clam harvest period.