Pacific Northwest Harmful Algal Blooms Bulletin

May 26, 2022 HAB risk =

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

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

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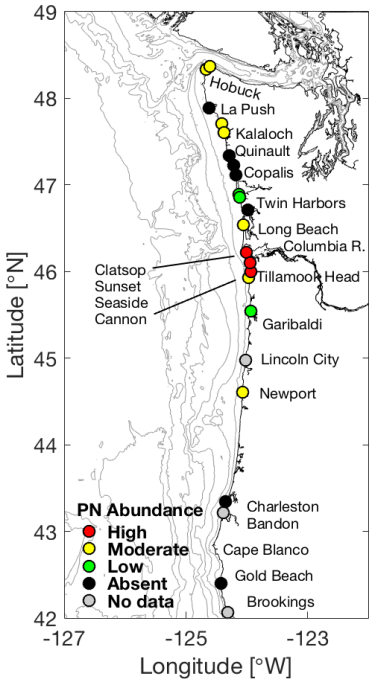
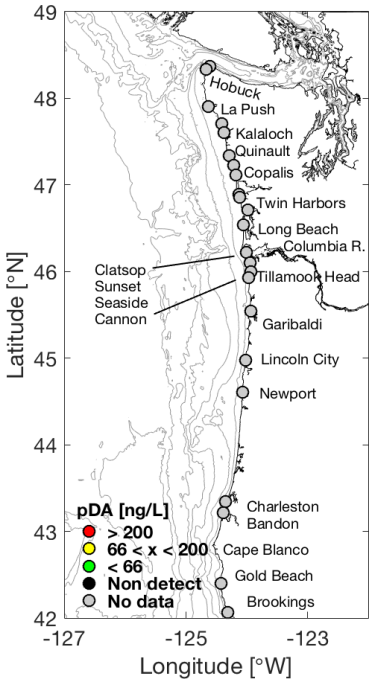
Beach Sampling

(*Pseudo-nitzschia*)

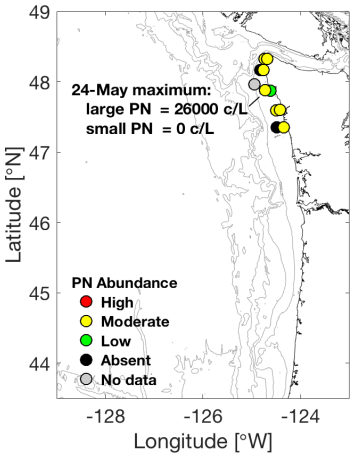


(particulate domoic acid)

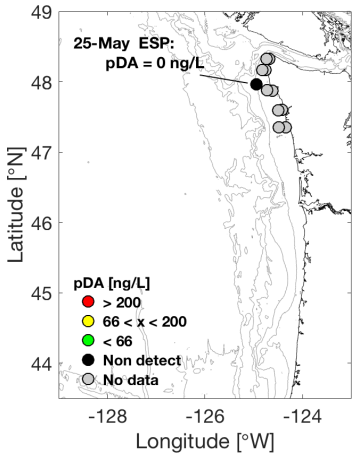


Offshore Sampling

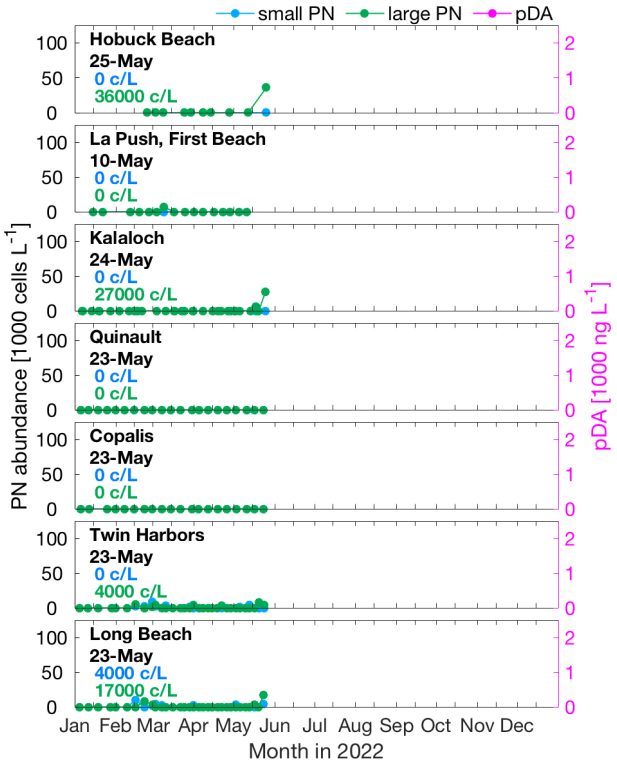
(*Pseudo-nitzschia*)



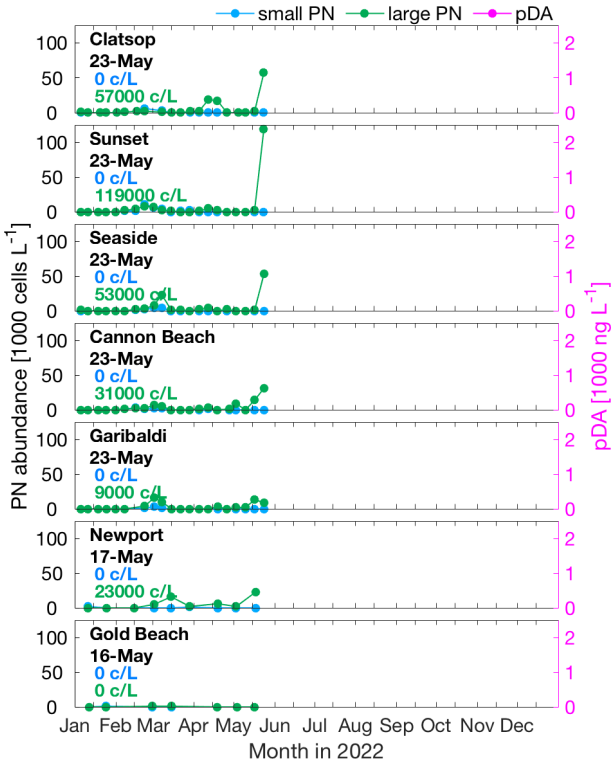
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



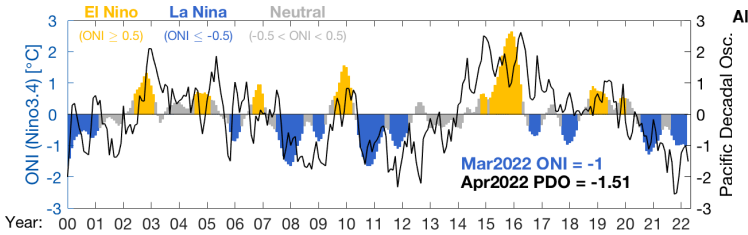
OR *Pseudo-nitzschia* & Domoic Acid



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.

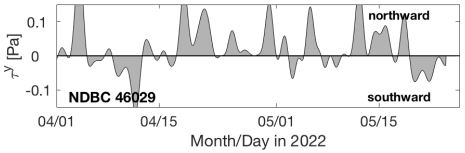
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



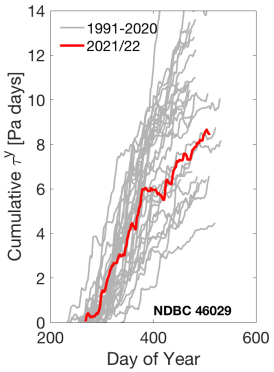
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

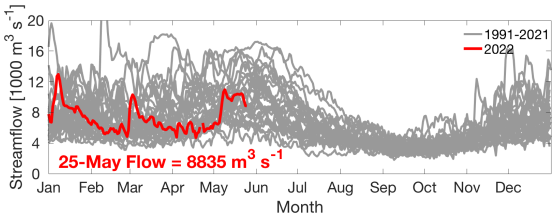


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress



Columbia River Discharge



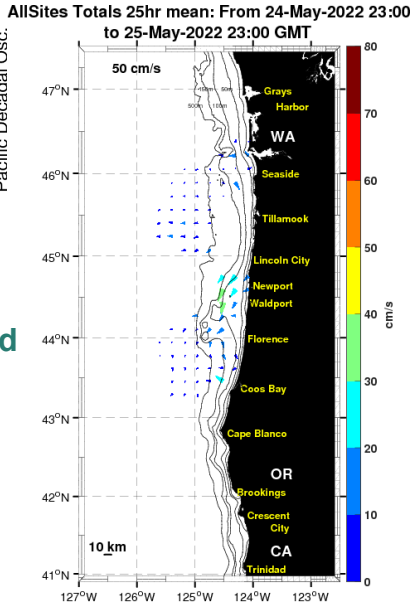
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Fri - SW wind, 15 kt
Sat - variable, 15 kt
Sun - NW wind, 15 kt
Mon - NW wind, 10 kt

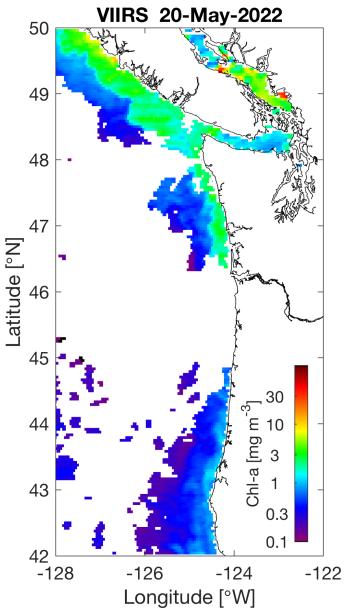
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

Ocean Surface Currents



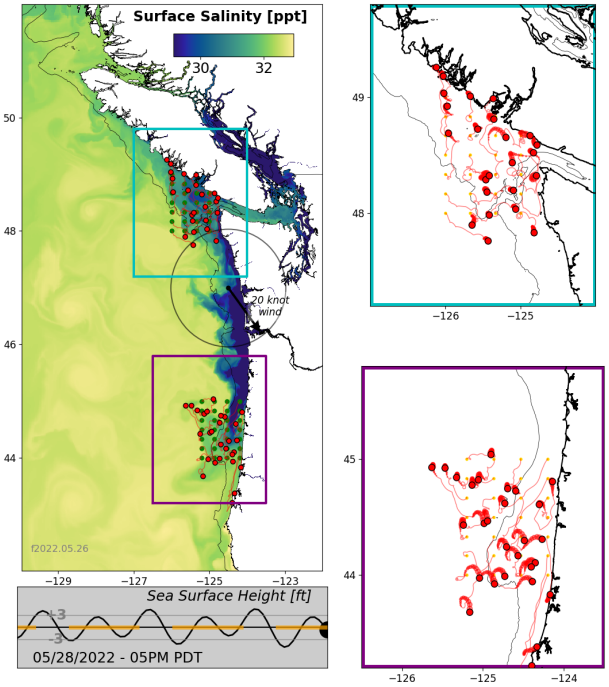
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

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 - Significant upwelling-favorable winds arrived last week as predicted, but they did not last. Instead, variable and northward winds have now re-emerged. Surface ocean currents strengthened during the upwelling event, but additional southward winds will be required before strong upwelling is fully established. Low salinity Columbia River plume water is concentrated in southern WA and northern OR (see the LiveOcean model). Available satellite images indicate an increase in chlorophyll-*a* along the coast, with highest values in WA and north of Cape Blanco, OR. Primarily large morphology *Pseudo-nitzschia* (*PN*) cells have appeared at beaches in greater numbers. Highest abundances were at Sunset Beach, OR (119,000 cells/L) on 23-May. WA beaches also had elevated *PN* concentrations, with highs at Hobuck and Neah Bay (36,000 cells/L and 46,000 cells/L) on 25-May. Seawater particulate domoic acid (pDA) has not been measured at beaches. Offshore samples collected off northern WA from 21-24 May contained large-celled *PN* up to 26,000 cells/L. The ESP moored off La Push, WA, recorded a pDA concentration of ~14 ng/L on 20-May, but values since then have been unquantifiable. WA and OR razor clam DA concentrations remain low. Samples collected at WA beaches were generally ≤4 ppm as recently as 18-May. In OR, razor clam samples from Gold Beach indicated that DA levels had decreased from 52 ppm in early Feb to 20 ppm on 23-May. No other recently sampled OR sites had quantifiable DA levels.

Forecast - The current La Niña conditions are expected to continue through the summer with a weakening trend before potentially building again in the fall months. The most recent PDO value is negative and it is expected to remain so. A series of storms will impact the region through Saturday and will give rise to continued variable winds. After Saturday, winds are forecast to be primarily shoreward but with an upwelling-favorable component. It remains to be seen how strong the upwelling-favorable component will get, but the current trend is for moderate southward winds next week. *PN* abundances increased quickly following the recent upwelling event, and we generally expect that to continue. Based on current and forecast conditions, the perceived risk of large toxic *PN* event is relatively low. However, since spring conditions and the phytoplankton community can change quickly, we recommend pDA sampling at beaches to help ensure safe harvests.