Pacific Northwest Harmful Algal Blooms Bulletin

Apr 21, 2021 HAB risk =

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

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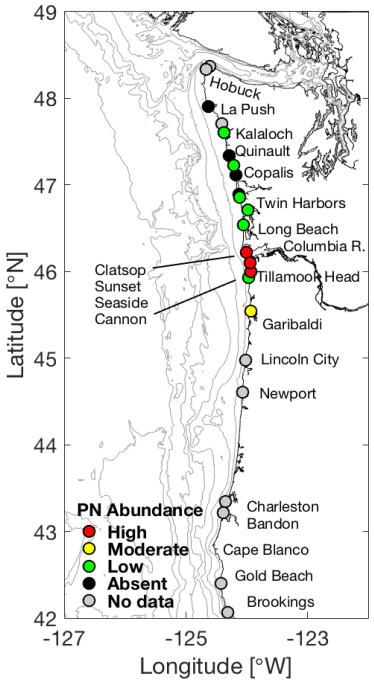
Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES
ORHAB PARTNERSHIP
NANOOS

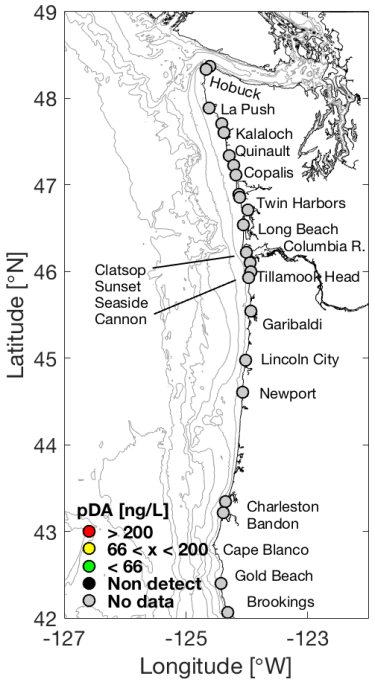
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

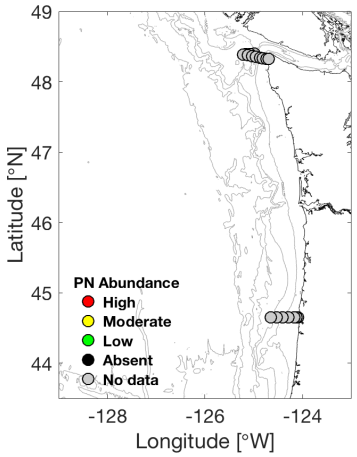


(particulate domoic acid)

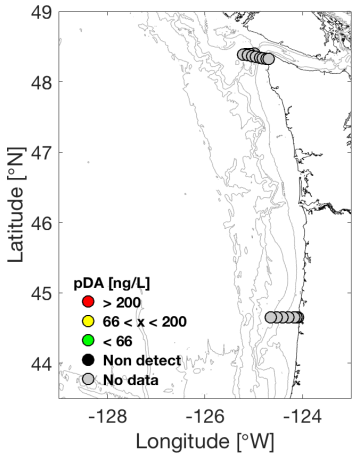


Offshore Sampling

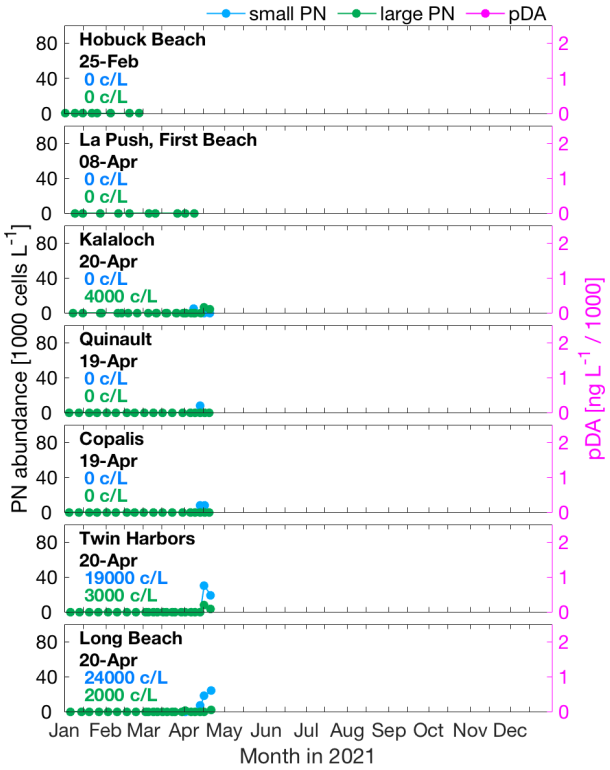
(*Pseudo-nitzschia*)



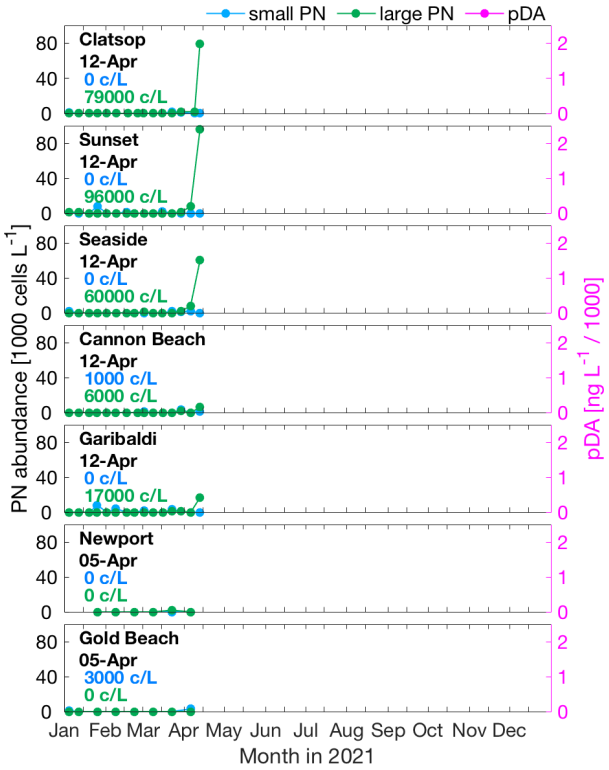
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



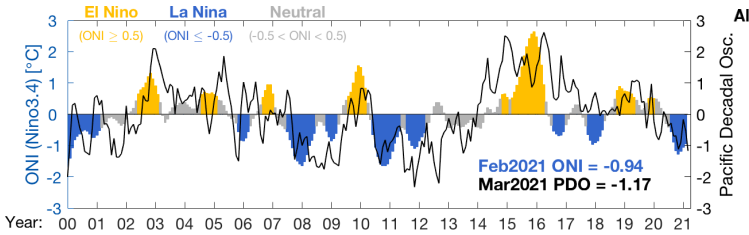
OR *Pseudo-nitzschia* & Domoic Acid



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.

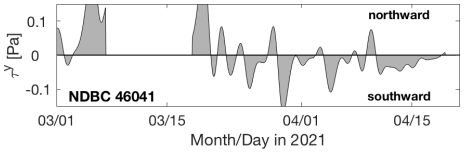
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



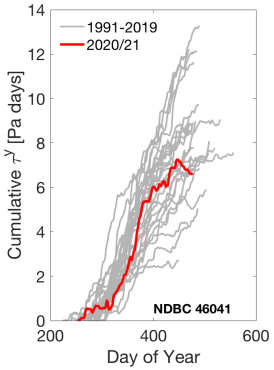
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

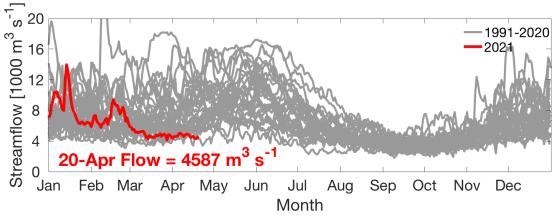


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress



Columbia River Discharge



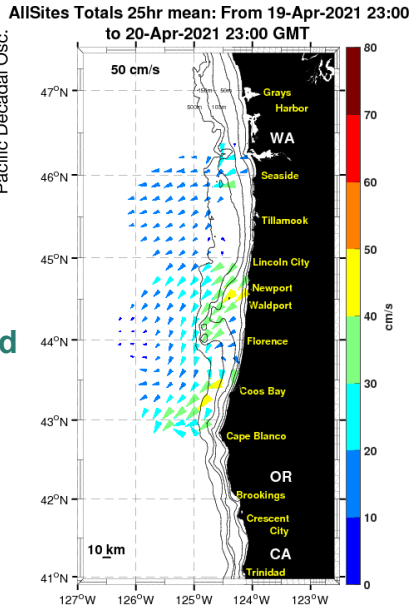
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Thur - NW wind, 20 kt
Fri - SW wind, 10 kt
Sat - SW wind, 10 kt
Sun - SW wind, 10 kt

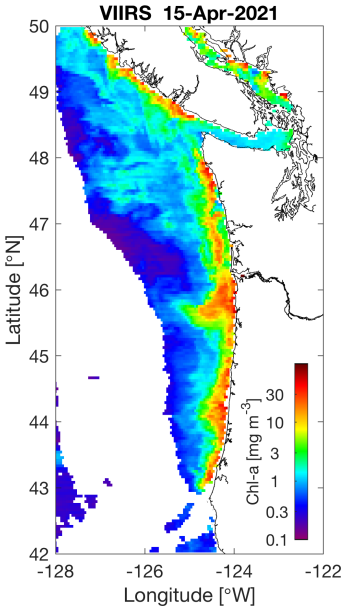
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

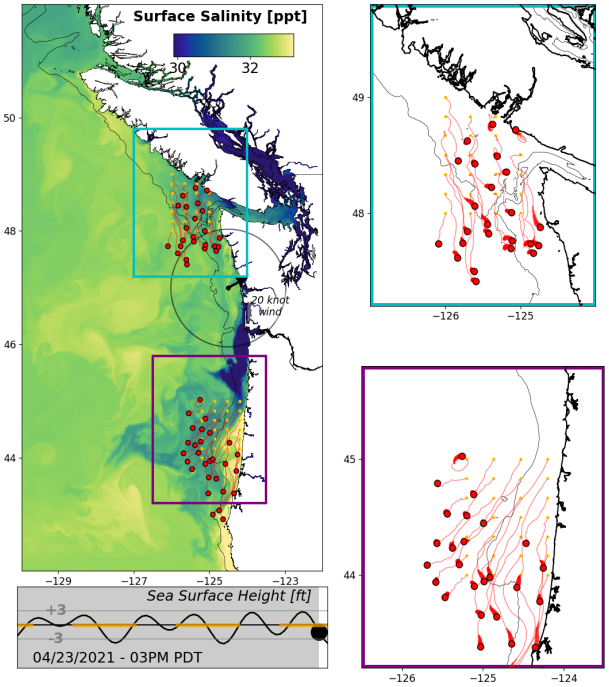
Satellite Chlorophyll-*a*



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 - Coastal winds have been predominantly southward (upwelling-favorable) for the last two weeks, but not particularly strong. Recent satellite imagery show elevated chlorophyll-*a* along the coast with a persistently elevated signal near La Push, WA, that streams south from there, a common feature. Chlorophyll-*a* is also elevated throughout most of OR north of Cape Blanco; high values are not far from shore. *Pseudo-nitzschia* (*PN*) have been relatively sparse at WA beaches. Highest values of small *PN* were 30,000 cells/L at Twin Harbors on 15-Apr, and 24,000 cells/L at Long Beach on 20-Apr. Large *PN* cells were also present at those sites and at Kalaloch as of 15-Apr (≤8,000 cells/L). In OR, large morphology *PN* cells rapidly increased in abundance to ≥60,000 cells/L at the three northernmost beaches (Columbia River South Jetty, Sunset, and Seaside) on 12-Apr. Small morphology *PN* were also present at Cannon Beach on 12-Apr. Seawater particulate domoic acid (pDA) has not been quantified. Offshore samples have also not been analyzed recently. Washington and Oregon razor clam DA concentrations continue to generally decrease, but with fluctuations. From 13–18 Apr, only Quinault Beach, WA, had samples below the 20 ppm limit. In OR, razor clams from Coos Bay North Jetty were at 15 ppm as of 16-Apr and a sample collected south of Florence was at 10 ppm on 19-Apr. Sunset Beach, OR, razor clam DA remains extremely high (62 ppm) as of 16-Apr.

Forecast - The current La Niña conditions are transitioning to an ENSO neutral state that is expected to persist through the summer months. The PDO index remains negative. The recent summer-like weather and upwelling-favorable conditions will remain until Friday. Coastal winds will then switch to onshore and northward (downwelling-favorable) as a front arrives. These winds will push plankton and any marine toxins shoreward and northward (continue to check the LiveOcean forecast). Winds will remain northward and onshore for a few days; stronger northward winds are forecast to arrive by Tuesday. This situation poses a significant risk given the recent upwelling-fueled *PN* blooms present throughout OR and those that potentially exist just offshore of WA. Lacking any pDA data from offshore or from beaches, and given the already elevated toxin concentrations in razor clams, we recommend extreme caution and continued monitoring to ensure safety. This moderate risk situation could easily be categorized as high risk if seawater toxin concentrations were known to be elevated.