Pacific Northwest Harmful Algal Blooms Bulletin

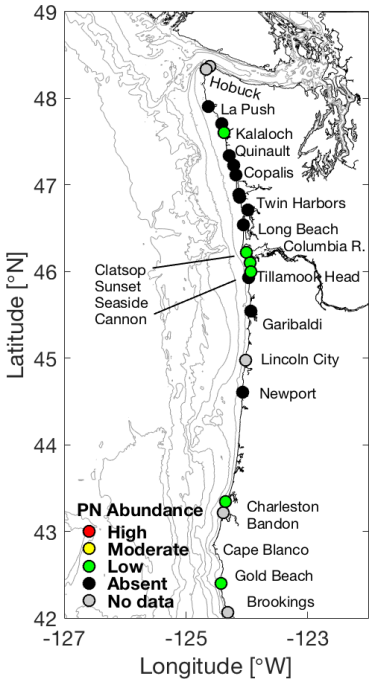
Apr 11, 2021 HAB risk =

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

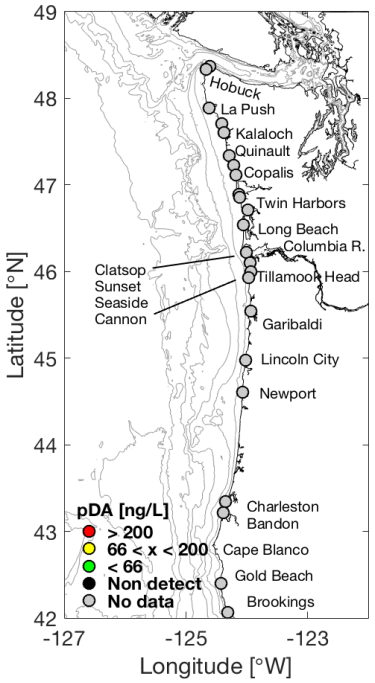
School of Oceanography, University of Washington
Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES
ORHAB PARTNERSHIP
NANOOS

Beach Sampling

(*Pseudo-nitzschia*)

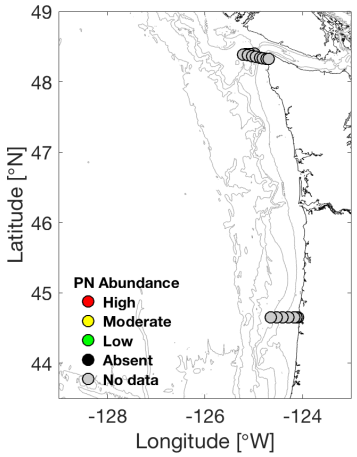


(particulate domoic acid)

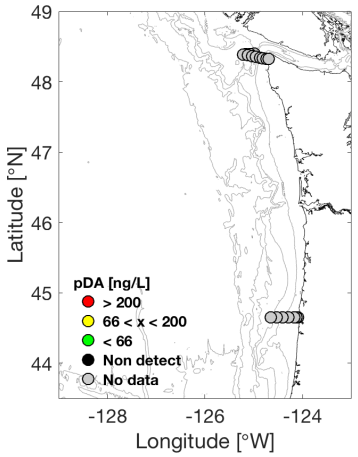


Offshore Sampling

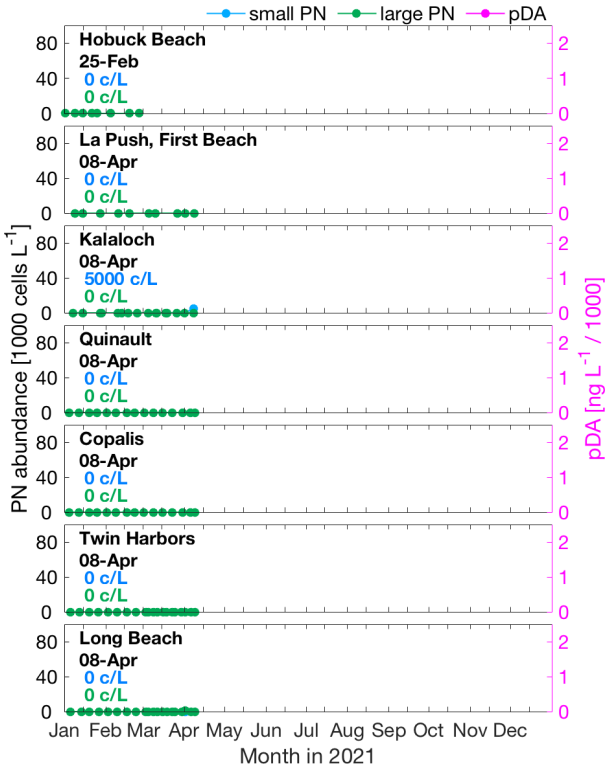
(*Pseudo-nitzschia*)



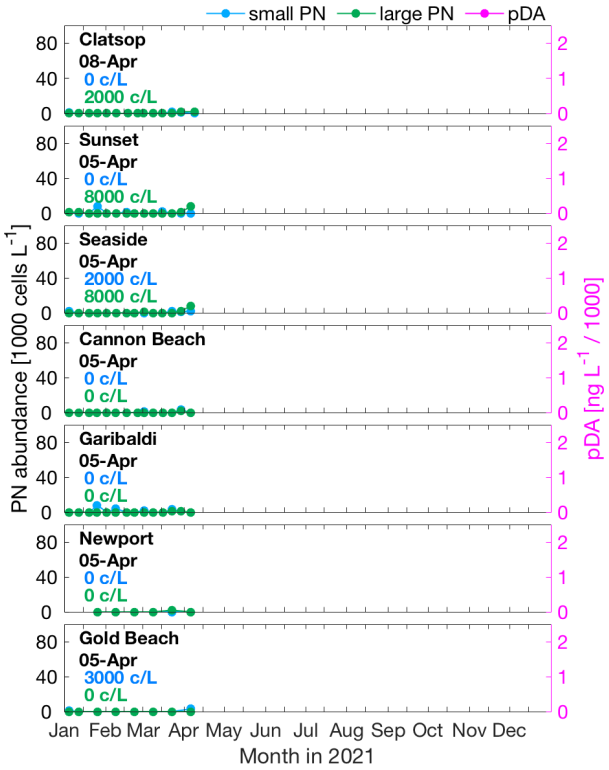
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



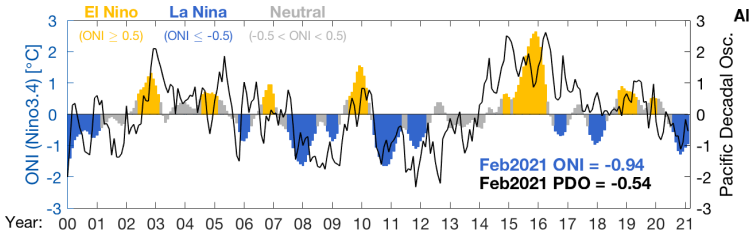
OR *Pseudo-nitzschia* & Domoic Acid



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.

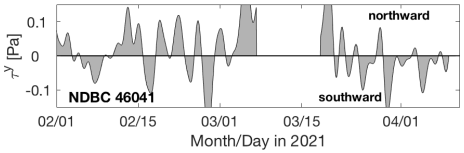
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



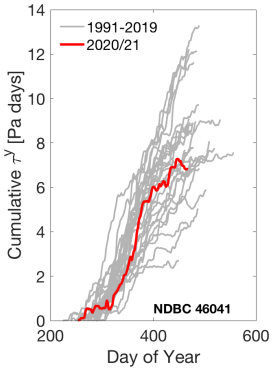
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

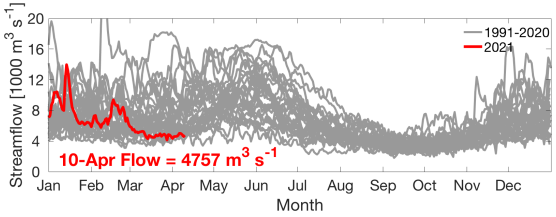


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress



Columbia River Discharge



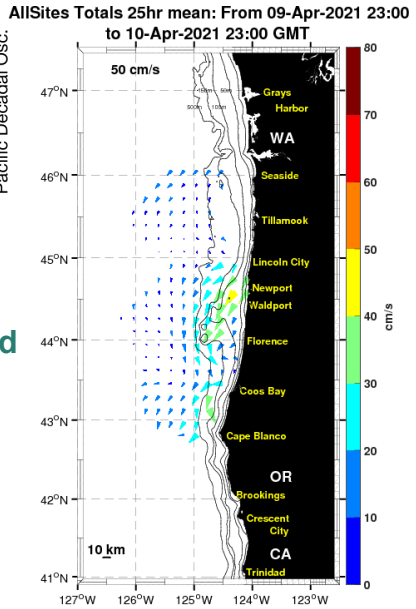
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Mon - NE wind, 10 kt
Tues - NE wind, 10 kt
Wed - NE wind, 10 kt
Thur - NE wind, 10 kt

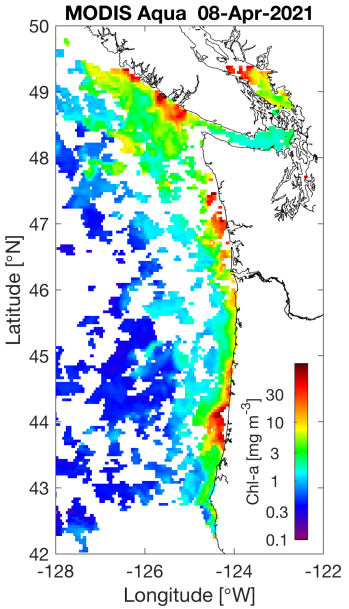
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

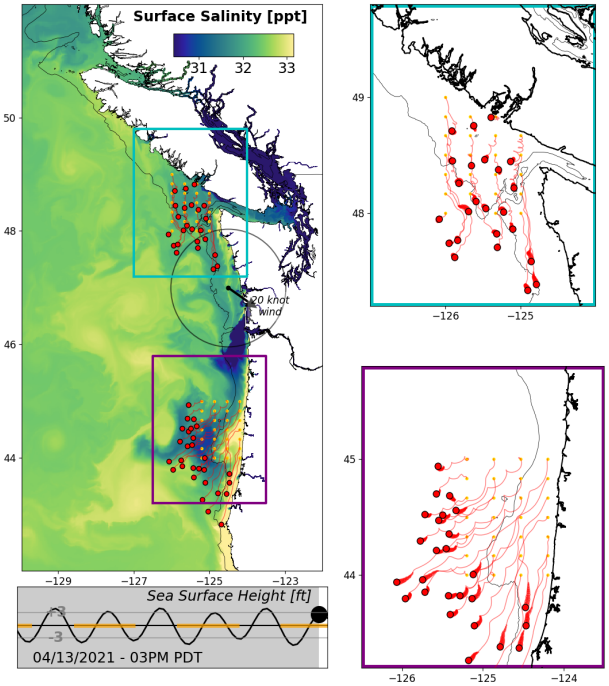
Satellite Chlorophyll-*a*



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.



Summary - In late March coastal winds switched to predominantly upwelling-favorable. Since then ocean currents have been pushing a significant amount of riverine water south and offshore. During the past week, relatively cold bottom water (~8 °C) was observed on the shelf near Newport, OR, consistent with upwelling. The recent available satellite imagery shows elevated chlorophyll-*a* all along the coast north of Cape Blanco, OR, with highest concentrations near Newport, OR, and Grays Harbor, WA. So far, both large and small morphologies of *Pseudo-nitzschia* (*PN*) cells have been relatively sparse at all beaches. Highest concentrations were at Sunset and Seaside Beach, OR on 5-Apr (8,000 cells/L of large morphology cells) and at Kalaloch Beach, WA on 7-Apr (5,000 cells/L of small morphology cells). As a result of the relatively low *PN* cell abundances, no seawater particulate domoic acid (pDA) samples have been analyzed. Offshore samples have also not been analyzed recently. Washington and Oregon razor clam DA concentrations continue to slowly decrease from highs obtained during the fall 2020 event. Samples from most WA beaches remain elevated over the 20-ppm threshold. The exception was Mocrocks, WA, where razor clam samples were ≤19 ppm as of 1-Apr. In OR, razor clam DA was 19 ppm at Coos Bay North Jetty on 2-Apr, but samples collected at sites north of there remain exceptionally high.

Forecast - The current La Niña conditions are transitioning to an ENSO neutral state that is expected to persist through the summer months. The recent PDO value is negative. Coastal winds are presently upwelling-favorable and should remain so all week. Additional plankton blooms, including *PN*, are likely during this time. The extended forecast suggests the possibility of a switch to northward winds (downwelling-favorable) next Saturday, but that remains too far into the future for certainty. For now, the expected southward and offshore ocean flows should keep beaches free of new marine toxins during the upcoming week. Thus, the risk of a toxic *PN* bloom appears low throughout the upcoming week, but we recommend consulting the LiveOcean forecasts near the week's end as conditions may change. The current risk is with the lingering high concentrations of DA in shellfish from the fall 2020 event.