



# Pacific Northwest Harmful Algal Blooms Bulletin

May 9, 2021 HAB risk =

HAB risk key:

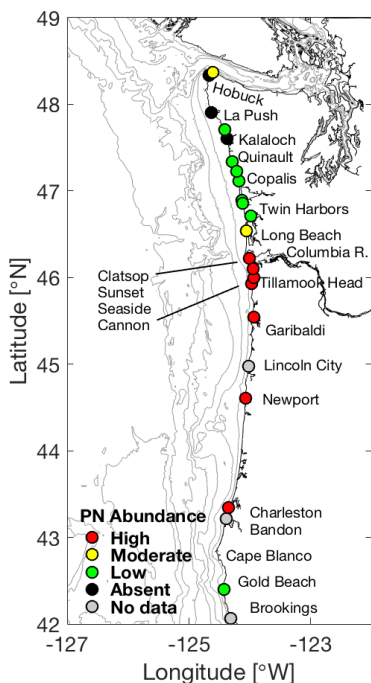
- = low
- = medium
- = high



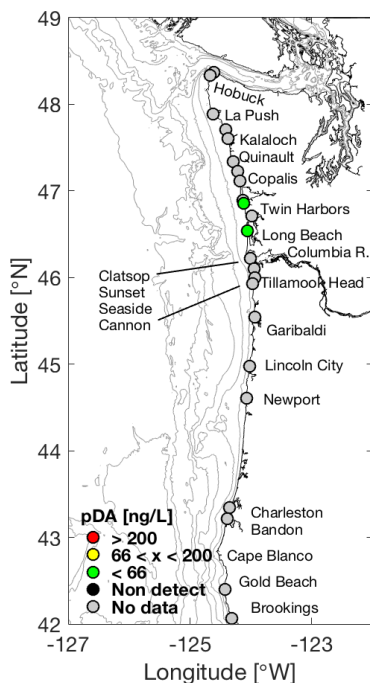
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

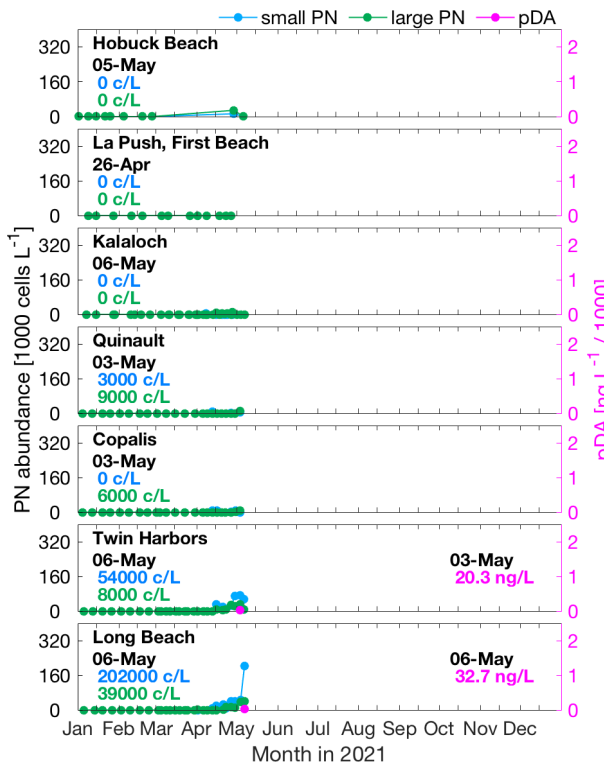
(*Pseudo-nitzschia*)



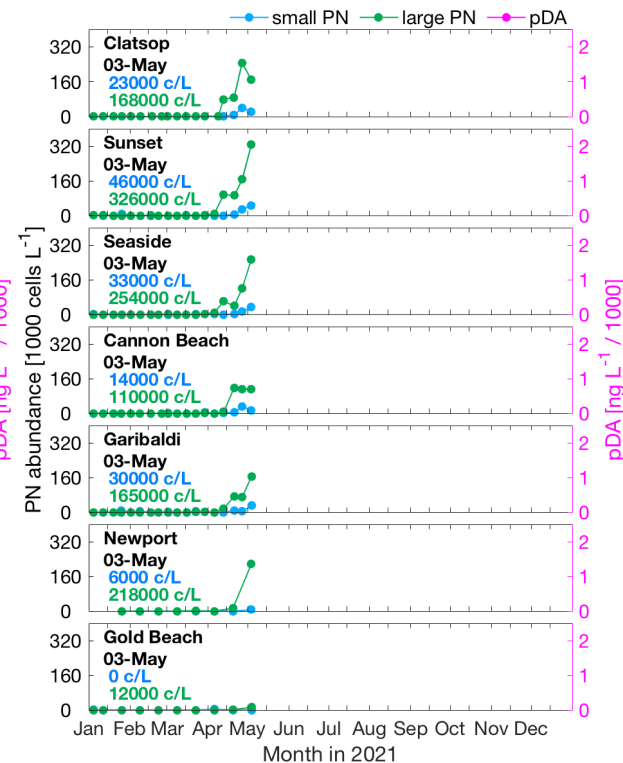
(particulate domoic acid)



## WA *Pseudo-nitzschia* & Domoic Acid

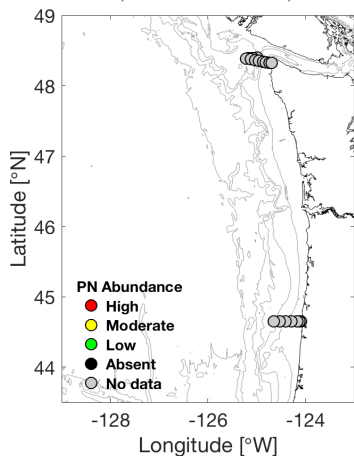


## OR *Pseudo-nitzschia* & Domoic Acid

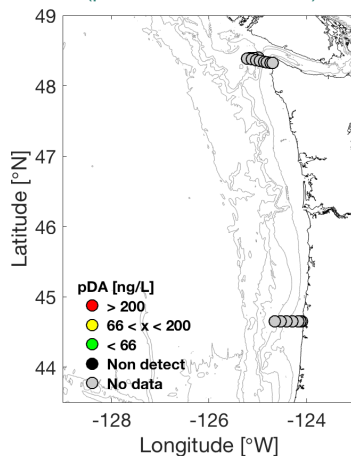


## Offshore Sampling

(*Pseudo-nitzschia*)



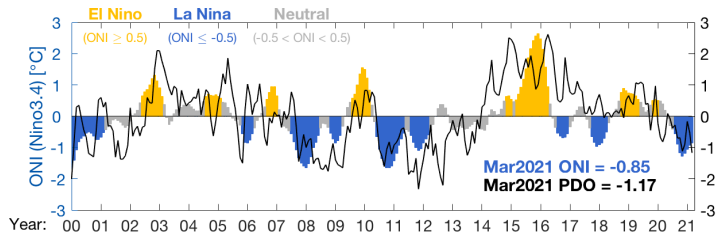
(particulate domoic acid)



*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.

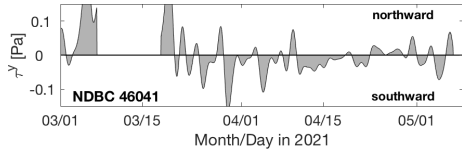
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information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



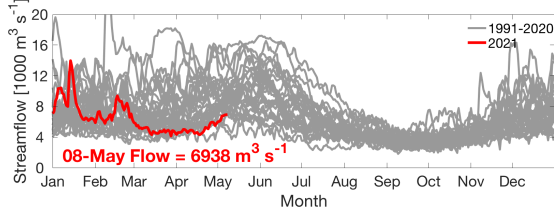
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## North-south Wind Stress



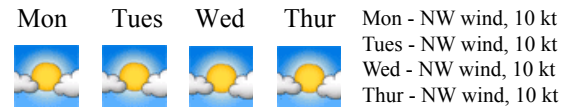
Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cumulative upwelling index (i.e. during years with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

## Columbia River Discharge



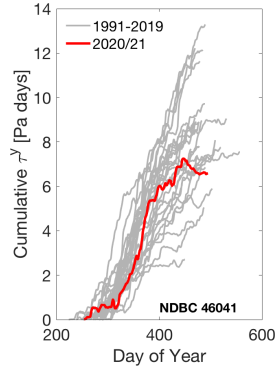
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

## Marine Weather Forecast

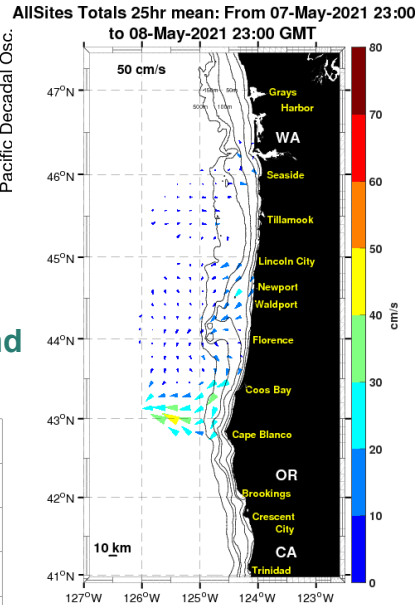


Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

## Cumulative Wind Stress

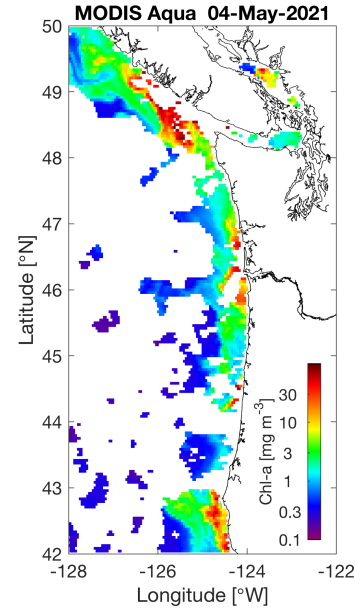


## Ocean Surface Currents



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.

**Summary** - Coastal winds have remained weak over the last few weeks and have fluctuated in direction, leading to somewhat sluggish ocean currents. Satellite imagery continue to show elevated chlorophyll-a along the coast with higher signals off northwest WA, near the Columbia River, and more recently in southern OR.

*Pseudo-nitzschia* (PN) cells have continued increasing at most sites throughout WA and OR. As of 3-May, the highest values (>150,000 cells/L) have been in northern and central OR where PN are primarily large morphology cells, though small cell types are present at most sites. In WA, small cells are more abundant, with highest abundances in southern WA (202,000 cells/L at Long Beach on 6-May). Seawater particulate domoic acid (pDA) was recently quantified with low values (<33 ng/L) at Long Beach and Twin Harbors, WA. Although pDA has not yet been quantified at OR beaches, razor clam DA concentrations continue to decrease despite the high PN abundances present there, suggesting that those PN cells are not producing high DA. No recent offshore samples have been analyzed and the PN species composition offshore and at beaches is unknown, though OR beach monitoring has suggested the presence of some *P. australis*-like cells. Razor clam samples in WA continue to slowly decrease in DA concentration. As of 4-May, DA concentrations were ≤19 ppm at Kalaloch, Quinalt, and Mocrocks. In OR, razor clam samples from Newport were at 17 ppm, while samples collected south of Newport were ≤10 ppm as of 30-Apr. Razor clams from Sunset Beach, OR, had dropped to 47 ppm on that same date.

**Forecast** - The current La Niña conditions are transitioning to an ENSO neutral state that is expected to persist through summer. The PDO index remains negative. The recent weak and onshore coastal winds will become predominantly upwelling-favorable by Monday. Longer-term forecasts suggest that winds will remain upwelling-favorable throughout the week, though the possibility of short northward reversals remains. These conditions should provide upwelled nutrients to enhance phytoplankton blooms. The risk of highly toxic PN is thus likely low earlier in the week. However, since we lack toxin and PN species information where large morphology PN cells are in highest abundance, we still recommend caution and continued monitoring as the week progresses - the PN community can transition rapidly. Continue to rely on the LiveOcean forecast for updates throughout the week.

## LiveOcean Forecast Model

