



# Pacific Northwest Harmful Algal Blooms Bulletin

Oct 11, 2021 HAB risk =

HAB risk key:

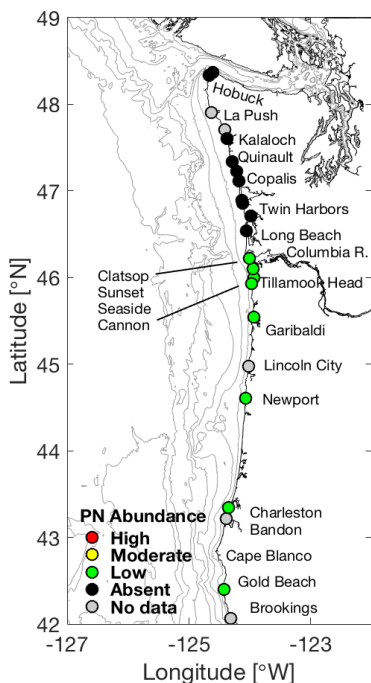
- = low
- = medium
- = high



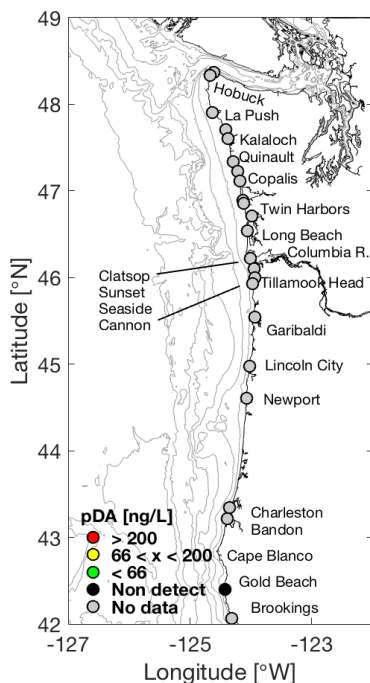
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

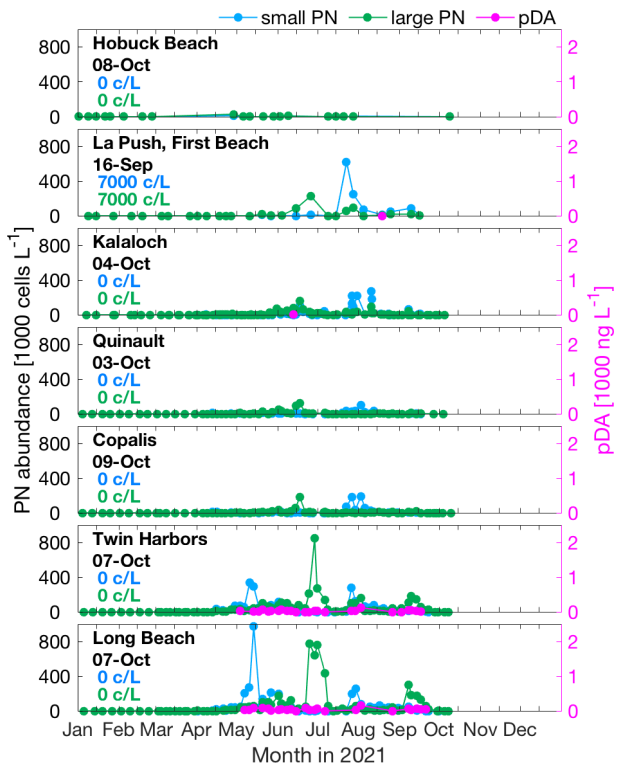
(*Pseudo-nitzschia*)



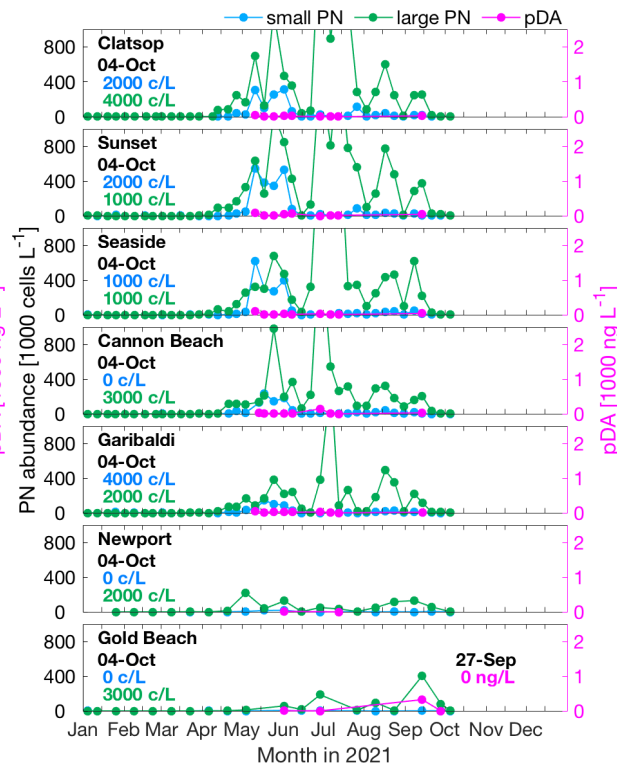
(particulate domoic acid)



## WA *Pseudo-nitzschia* & Domoic Acid

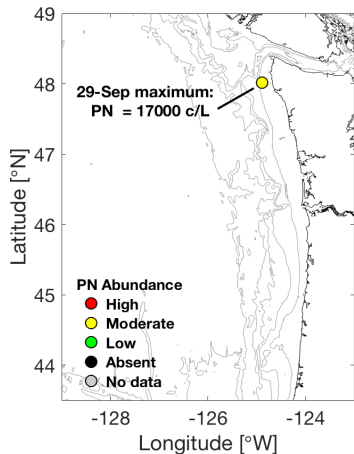


## OR *Pseudo-nitzschia* & Domoic Acid

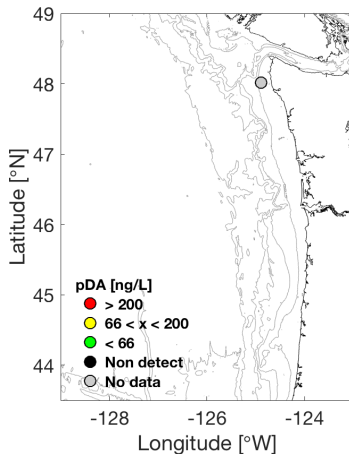


## Offshore Sampling

(*Pseudo-nitzschia*)



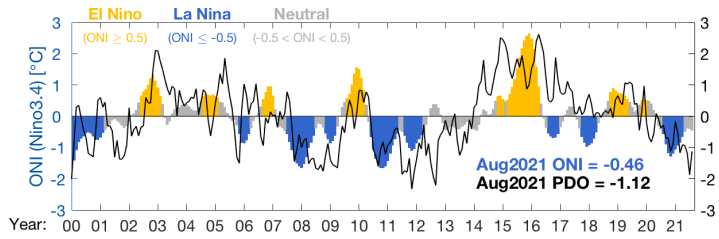
(particulate domoic acid)



*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. 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.

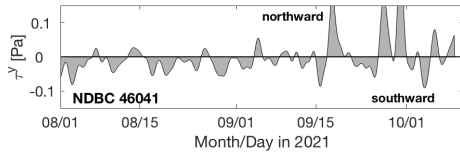
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information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



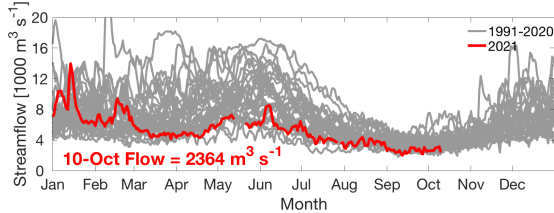
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## 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



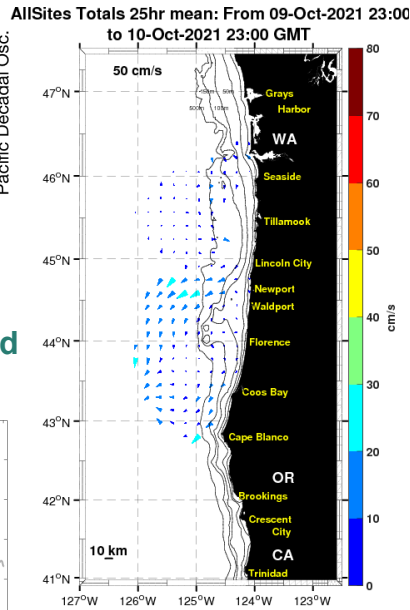
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

## Marine Weather Forecast



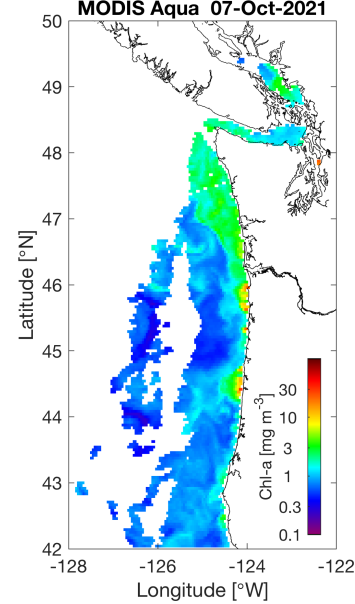
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

## Ocean Surface Currents



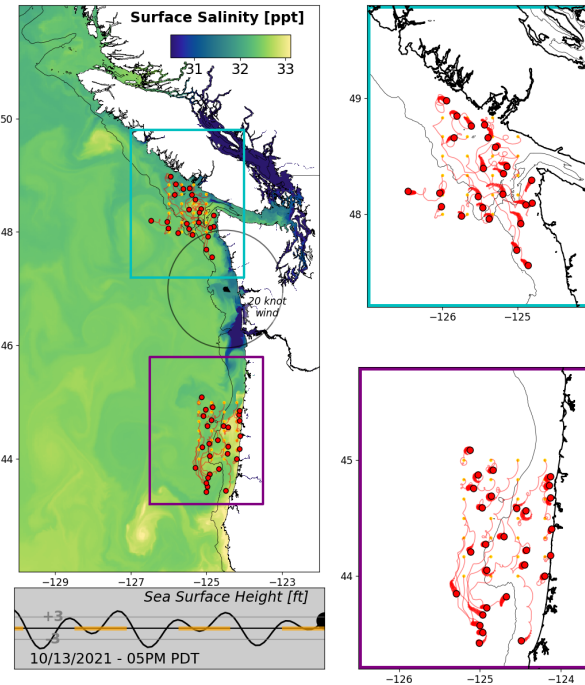
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

## 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 coastal winds continue to impact the region. Ocean currents are weak, but remain predominantly southward as the system transitions to a winter state. Recent stronger storms appear to have dispersed local phytoplankton blooms. Satellite images indicate moderate chlorophyll-a concentrations throughout the region. *Pseudo-nitzschia* (PN) cells were absent from WA beaches during the first week of Oct and large- and small-morphology PN cells appeared in very low abundance at OR beaches on 4-Oct. The highest PN abundances in OR were <5,000 cells/L for both large and small sized cells at all sites. Offshore samples collected 25–30 Sep from central OR to northern WA during a large storm documented very few PN cells, with a high of 17,000 cells/L off La Push, WA. A seawater sample from Gold Beach, OR, collected 27-Sep contained no detectable particulate domoic acid (pDA). As a result of the generally low PN abundances, no other recent pDA samples have been analyzed. As of 26-Sep, WA razor clam DA was ≤7 ppm at Copalis, Mocrocks, Twin Harbors, and Long Beach. In OR, razor clams contained <10 ppm DA at Sunset and Newport, and DA was not detected in mussel samples from Gold Beach on 24-Sep.

**Forecast** - Neutral ENSO conditions will continue, and are likely to transition to a weak La Niña this winter. The PDO index remains negative. Weather forecasts once again suggest more of the same: expect fluctuating winds punctuated by stronger storm fronts having a generally northward component. These downwelling-favorable winds will force plankton and any toxins northward and onshore (continue to refer to the LiveOcean forecast). Given the recent low abundances of PN cells at beaches throughout the region, it appears that prior recent storms were effective at dissipating coastal PN blooms. The immediate risk of a new large-scale DA event thus appears low. Coastal currents remain generally southward, but are very weak. Thus the possibility of a southern DA source getting pushed northward into the region by storm-forced currents still exists. The likelihood of that scenario, however, continues to diminish as storms pass without triggering detectable increases in DA at area beaches. The phytoplankton community can transition quickly, so continued monitoring of PN abundances, and pDA concentrations where appropriate, will help to ensure safe harvests.