



# Pacific Northwest Harmful Algal Blooms Bulletin

Nov 20, 2023 HAB risk =

HAB risk key:

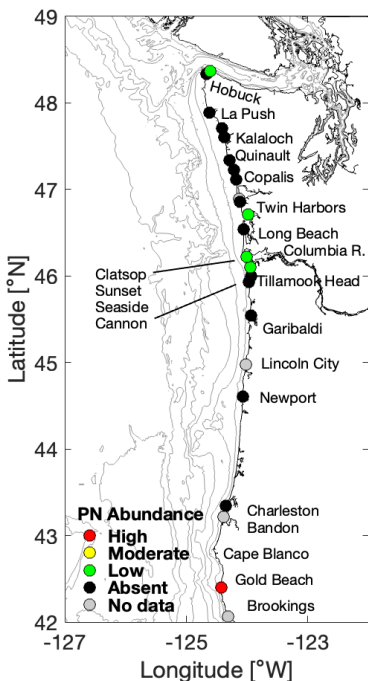
- = low
- = medium
- = high



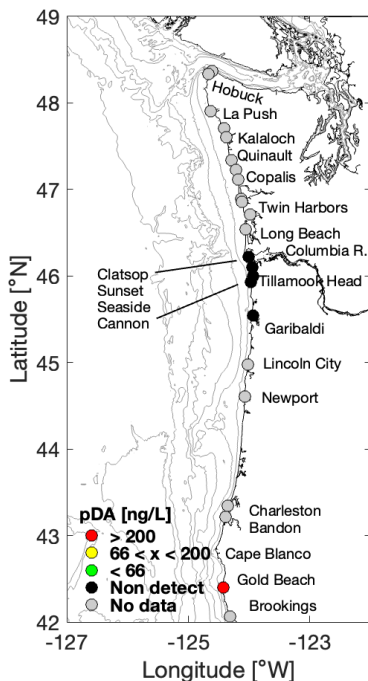
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

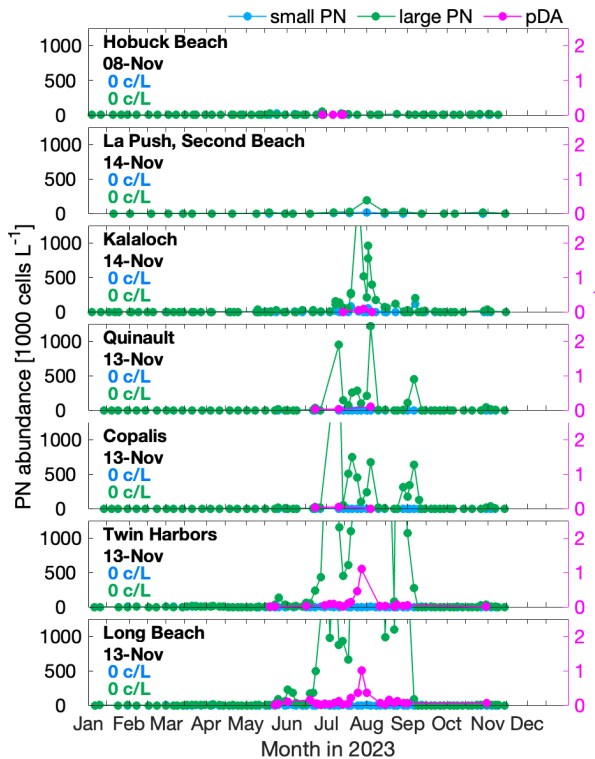
(*Pseudo-nitzschia*)



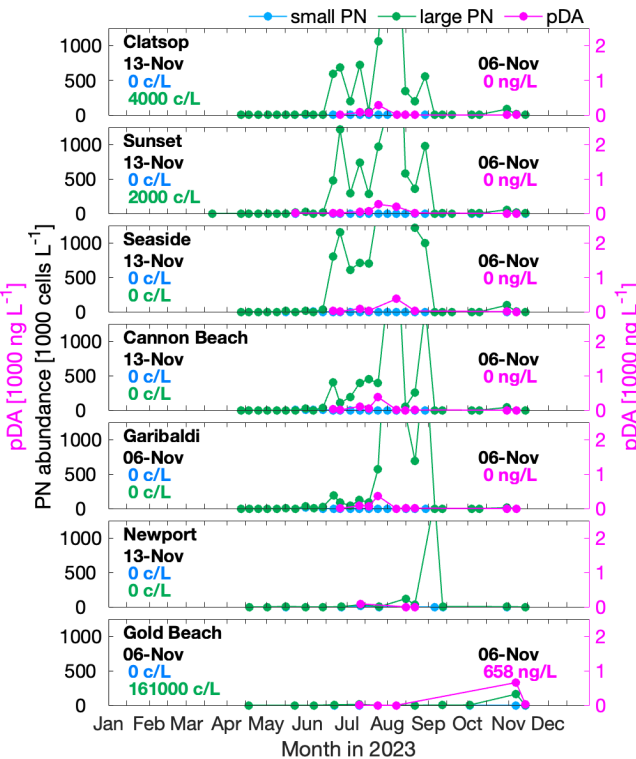
(particulate domoic acid)



## WA *Pseudo-nitzschia* & Domoic Acid

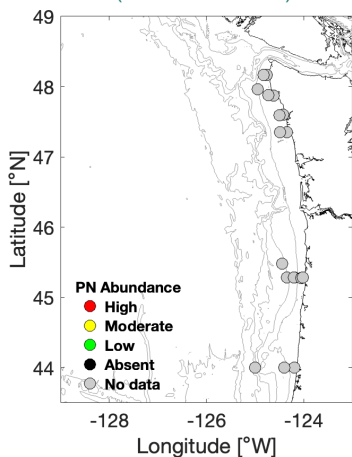


## OR *Pseudo-nitzschia* & Domoic Acid

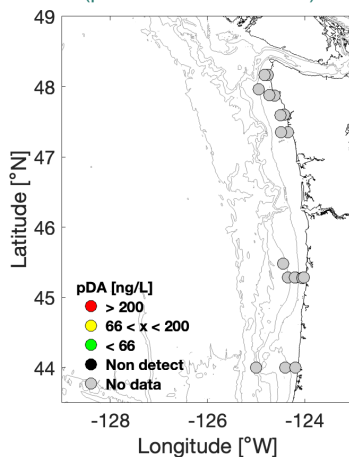


## Offshore Sampling

(*Pseudo-nitzschia*)



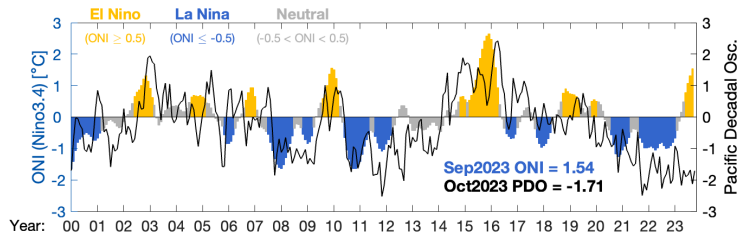
(particulate domoic acid)



*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.

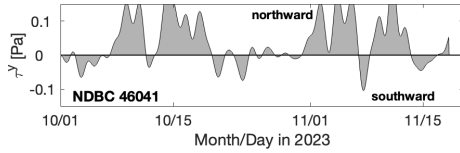
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information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



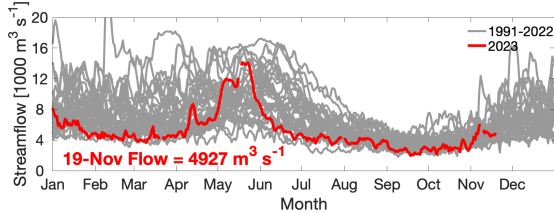
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## North-south Wind Stress



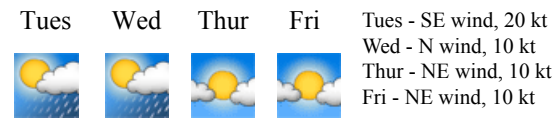
Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cumulative upwelling index (i.e. during years with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

## Columbia River Discharge



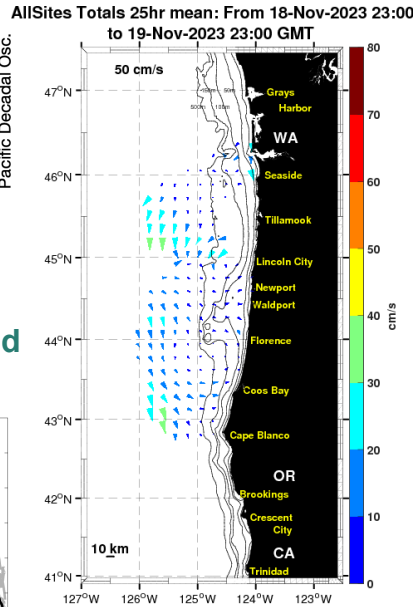
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

## Marine Weather Forecast



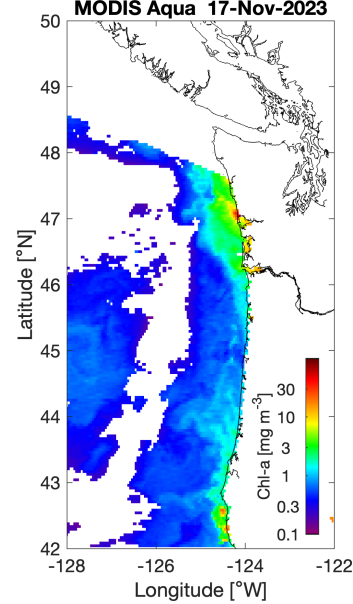
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

## 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

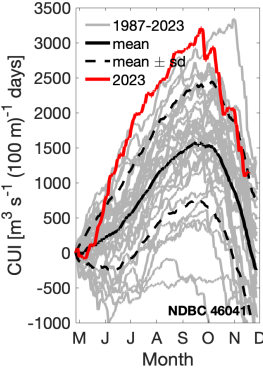


Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

**Summary** - The past week brought relatively clear skies and weak, but southward (upwelling-favorable) winds. As a result, more satellite images were available. A broad color signature exists off WA that is associated with the sediment-laden Columbia River plume (see LiveOcean). The southward winds have not been strong enough to separate the plume water from shore. *Pseudo-nitzschia* (PN) concentrations in WA and northern OR decreased rapidly following early November storms. The most recent samples from 13-Nov contained very few or no PN at beaches throughout WA and OR. Highest concentrations in WA were 14,000 cells/L large PN at Tokeland on 8-Nov, and 4,000 cells/L large PN at Columbia River South Jetty, OR, on 13-Nov. However, a Gold Beach, OR, sample collected just after the passage of two strong storms the week prior (6-Nov) contained 161,000 cells/L large PN with particulate domoic acid concentrations (pDA) of 658 ng/L; pDA was not detected at any other sites. A follow-up 13-Nov Gold Beach sample contained only 2,000 cells/L large PN and 35 ng/L pDA. No offshore samples were available. Satellite imagery from 15-Nov indicate that moderate chlorophyll-a existed in a narrow band off southern OR. Values had increased by 17-Nov, with chlorophyll tendrils extending past Cape Blanco as far north as central OR. Razor clam toxin concentrations continue to decrease in WA, with highest values (11 ppm) at Mocrocks as of 3-Nov. In OR, Sunset and Coos Bay North Jetty razor clams contained <8 ppm DA as of 20-Nov. Significant DA was also recently detected in OR crab viscera samples. Highest values were 9.5 ppm from just south of Heceta Head on 14-Nov, and 13 ppm near Gold Beach on 8-Nov.

**Forecast** - El Niño conditions continue, are likely to be strong during the winter months, and are expected to persist through spring. The PDO remains strongly negative. Northward winds Monday and Tuesday will change to southward by Wednesday and are expected to remain so through the weekend. Winds offshore of northern CA have been variable; forecasts indicate additional fluctuations there later in the week. Northward advection of toxigenic PN from northern CA could continue to impact OR beaches following wind relaxations or storms. Extreme caution is advised during such periods including through Tuesday of this week and beyond Friday when another storm is inevitable. Risk appears lower in WA. Continued diligent monitoring will help ensure safe harvests.

## Cumulative Wind Stress



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.

## LiveOcean Forecast Model

