



# Pacific Northwest Harmful Algal Blooms Bulletin

Oct 8, 2020 HAB risk =

HAB risk key:

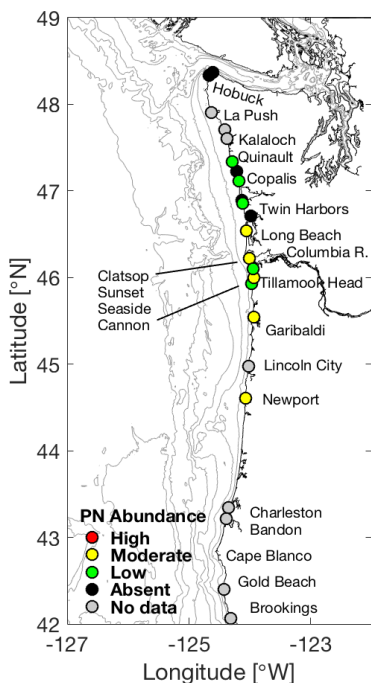
- = low
- = medium
- = high



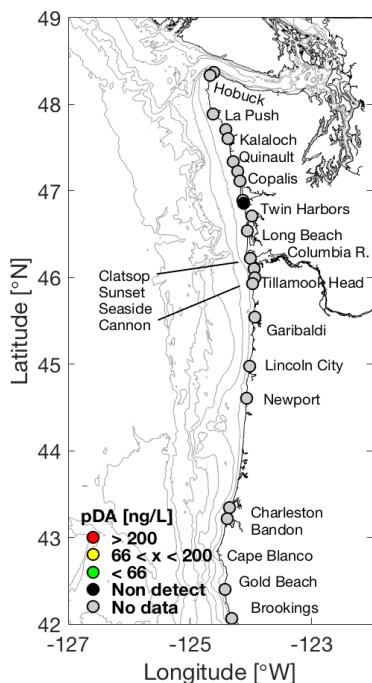
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

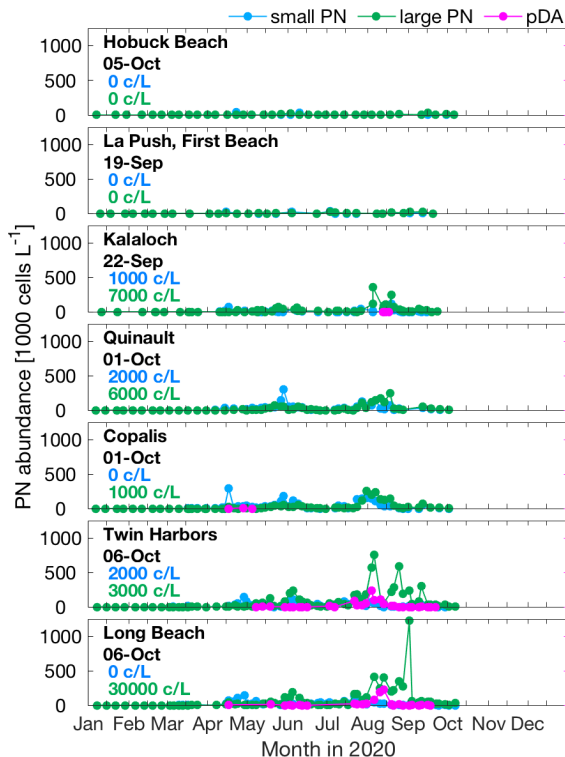
(*Pseudo-nitzschia*)



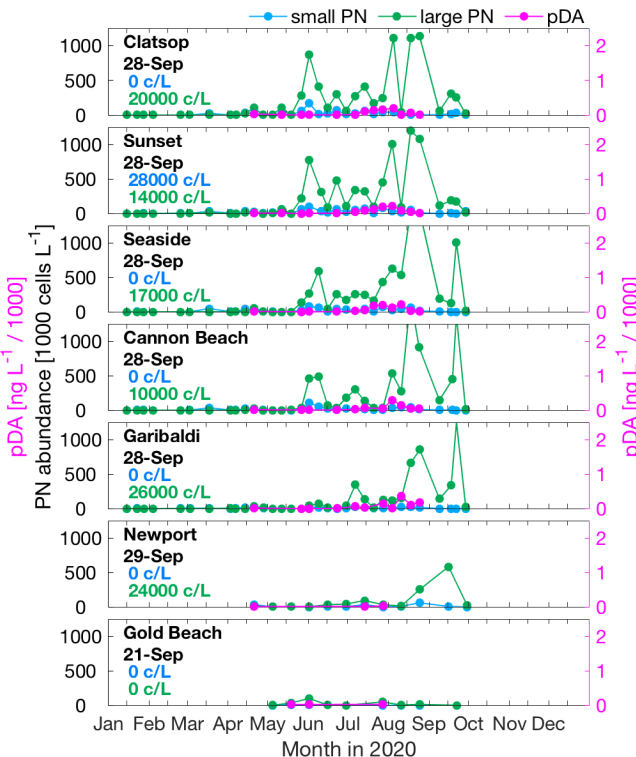
(particulate domoic acid)



## WA *Pseudo-nitzschia* & Domoic Acid

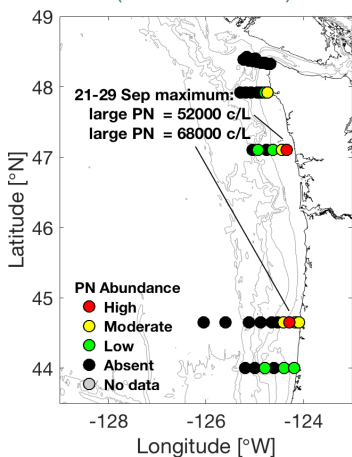


## OR *Pseudo-nitzschia* & Domoic Acid

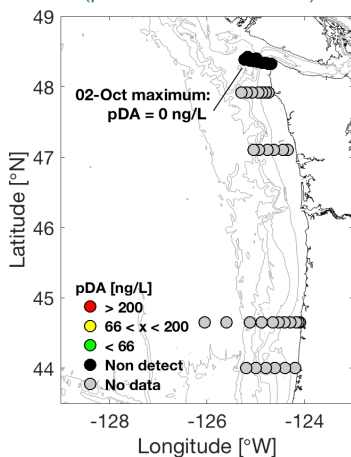


## Offshore Sampling

(*Pseudo-nitzschia*)



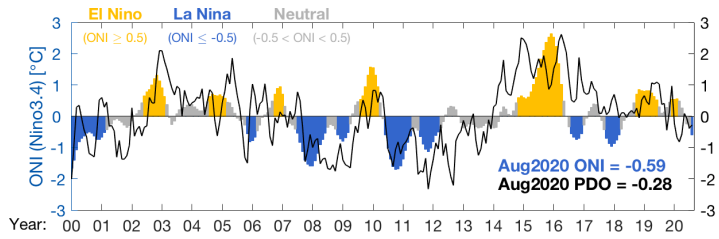
(particulate domoic acid)



*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.

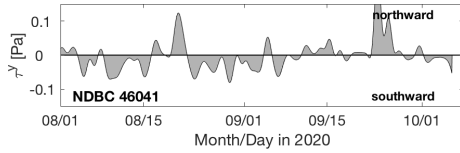
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information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



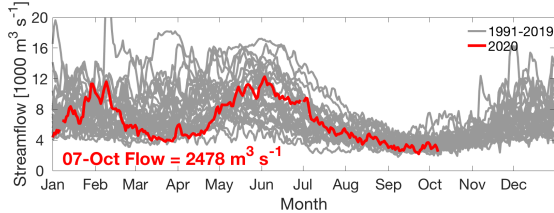
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## 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



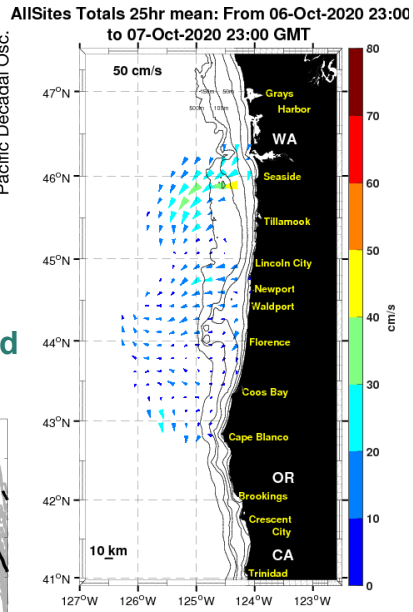
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

## Marine Weather Forecast



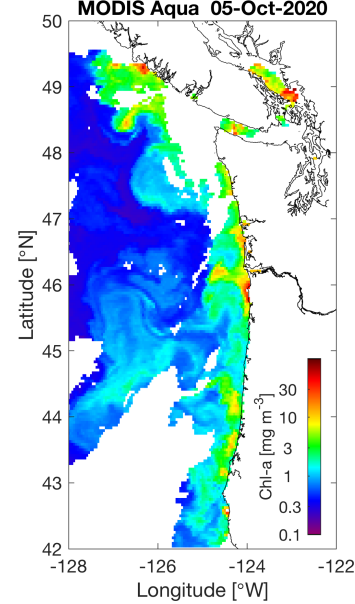
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

## 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

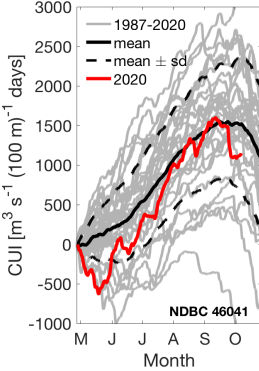


Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

**Summary** - Significant storms in late September were followed by primarily weak and fluctuating winds. Despite this, coastal currents remain southward over the continental shelf. Available satellite imagery suggests that moderate levels of chlorophyll-a continue to be present near the coast throughout the region. Primarily large morphology *Pseudo-nitzschia* (PN) cells are present at most beach sampling sites but with much lower abundances ( $\leq 30,000$  cells/L) than the prior week ( $> 1,000,000$  cells/L). Highest recent abundances have been in Oregon (e.g., Garibaldi: 26,000 cells/L large PN on 28-Sep). In WA, highest PN cell counts on 6-Oct were at Long Beach (30,000 cells/L large PN), and were  $\leq 6,000$  cells/L large PN at other sites. Seawater particulate domoic acid (pDA) concentrations have not been quantified recently due to the low cell abundances. The exception was a 21-Sep sample from Twin Harbors, WA that had no detectable pDA. Offshore samples collected from a NOAA research vessel from 20-30 Sep contained primarily large PN with highest abundances near shore (52,000 cells/L near Quinalt, WA; 68,000 cells/L near Newport, OR). Extremely high abundances of *Alexandrium* were also found off Quinalt and La Push, WA (up to 92,000 cells/L). Samples collected 2-Oct offshore of northern WA contained no PN, but 4,000 cells/L of *Alexandrium* were found at a single site offshore. WA razor clam DA remains low ( $\leq 4$  ppm), with highest values at Twin Harbors on 21-Sep. In OR, Sunset Beach razor clam samples had 6.9 ppm on 2-Oct; Newport, OR, razor clams had 12 ppm DA on 18-Sep; DA was not detected in Gold Beach razor clams on that date.

**Forecast** - La Niña conditions are present and are now expected to remain through spring. The recent PDO value is negative. Coastal winds switched to downwelling-favorable today, and are expected to be strong over the next two days. The extended forecast suggests they will remain primarily northward for a few days with onshore winds on Saturday. Southward winds may return late next week. These conditions will force plankton and any toxins northward and toward shore, as indicated in the LiveOcean forecast. Given the recent weak fluctuating winds, conditions are conducive for toxic HAB events. However, the most recent offshore samples contained no PN off northwest WA, and beach samples have contained low pDA. We thus consider the risk of a large HAB to be relatively low, but recommend diligent monitoring during this extended period of shoreward flow.

## Cumulative Wind Stress



## LiveOcean Forecast Model

