



Pacific Northwest Harmful Algal Blooms Bulletin

Sep 20, 2018 HAB risk =

HAB risk key:

- = low
- = medium
- = high



Joint Institute for the Study of
the Atmosphere and Ocean

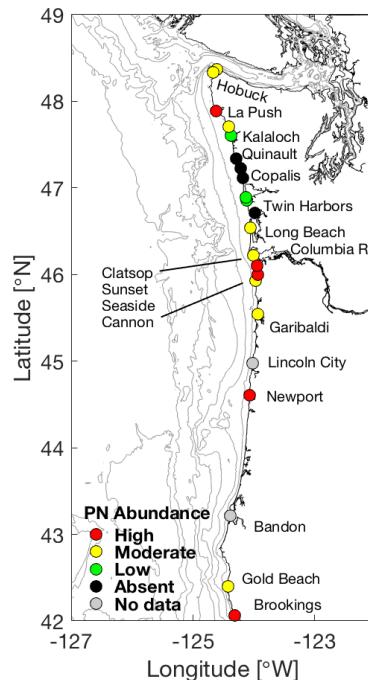
School of Oceanography
University of Washington



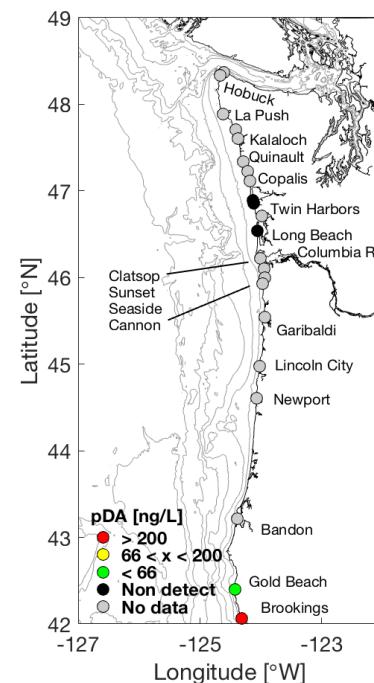
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

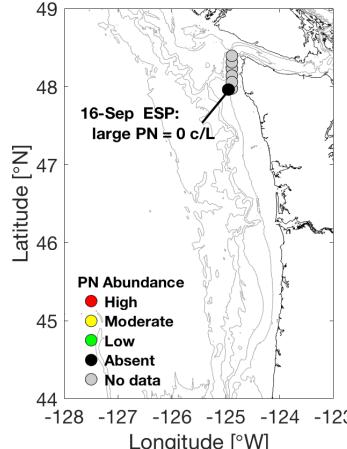


(particulate domoic acid)

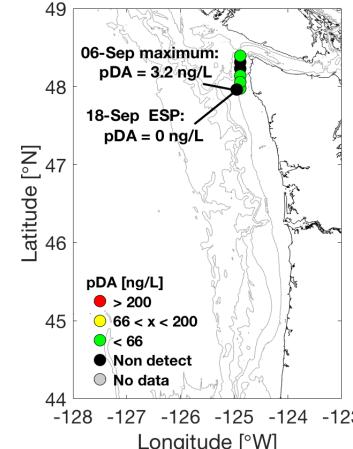


Offshore Sampling

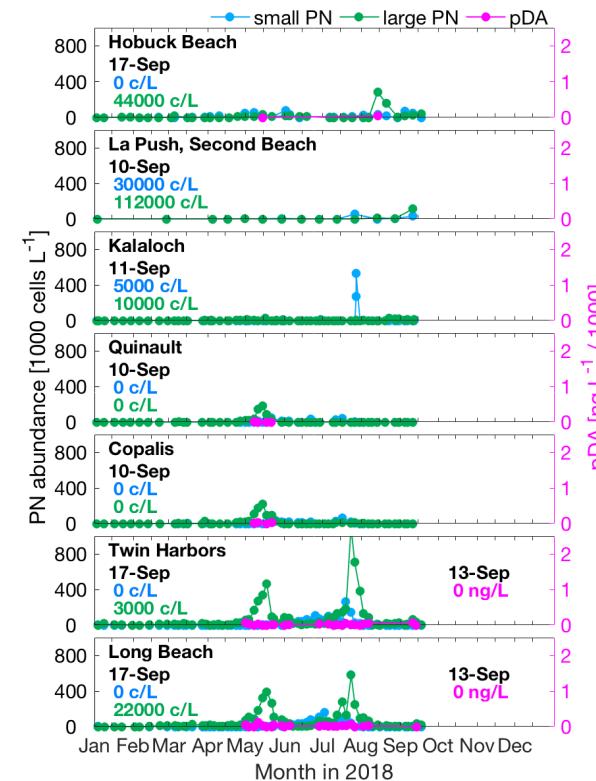
(*Pseudo-nitzschia*)



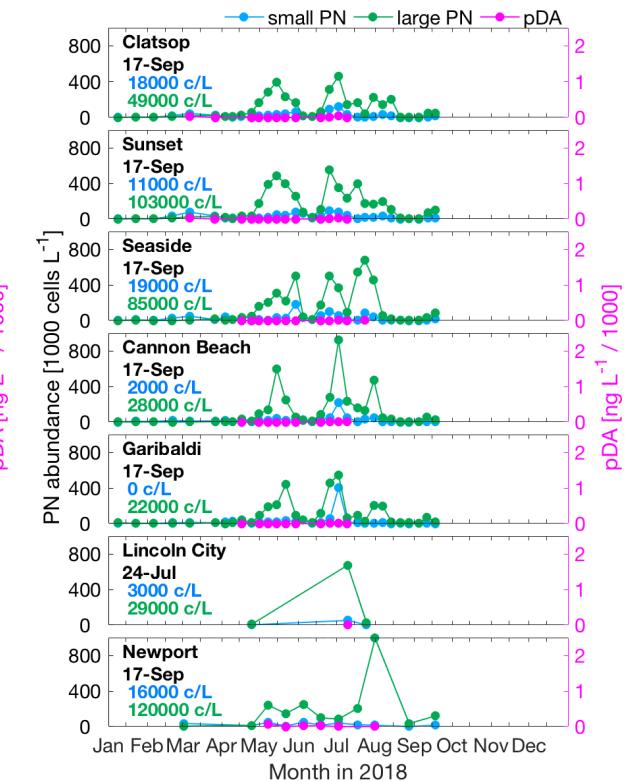
(particulate domoic acid)



WA *Pseudo-nitzschia* & domoic acid



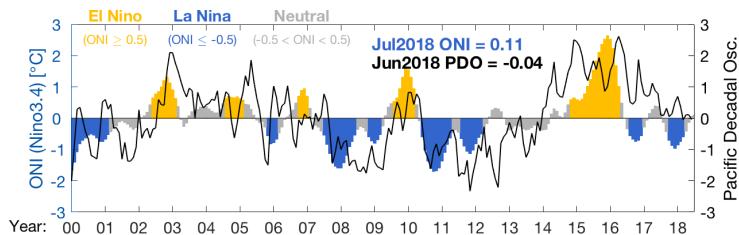
OR *Pseudo-nitzschia* & domoic acid



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.

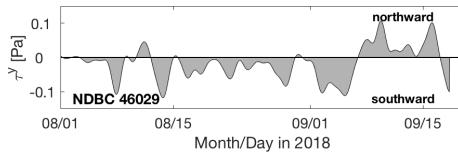
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



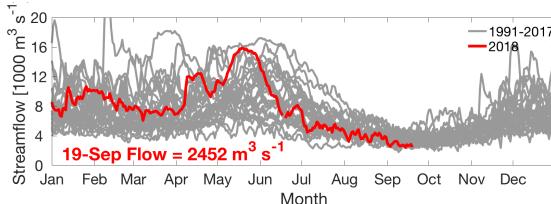
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

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 cumulative upwelling index (i.e. during years with fluctuating winds) rather than in years with sustained upwelling or downwelling winds.

Columbia River Discharge



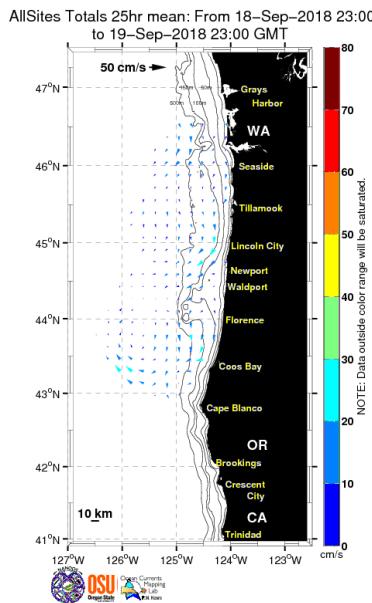
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Fri	Sat	Sun	Mon	Fri - S wind, 15 kt	Sat - SW wind, 10 kt	Sun - NW wind, 15 kt	Mon - N wind, 15 kt

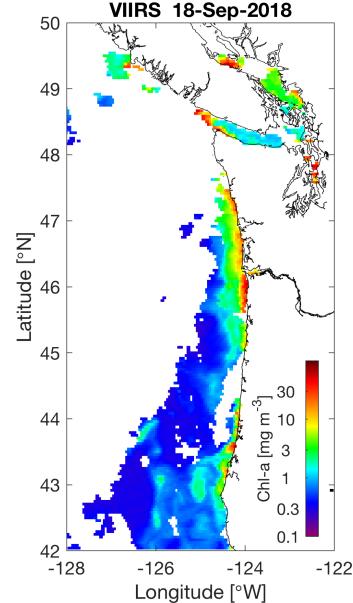
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

Ocean Surface Currents



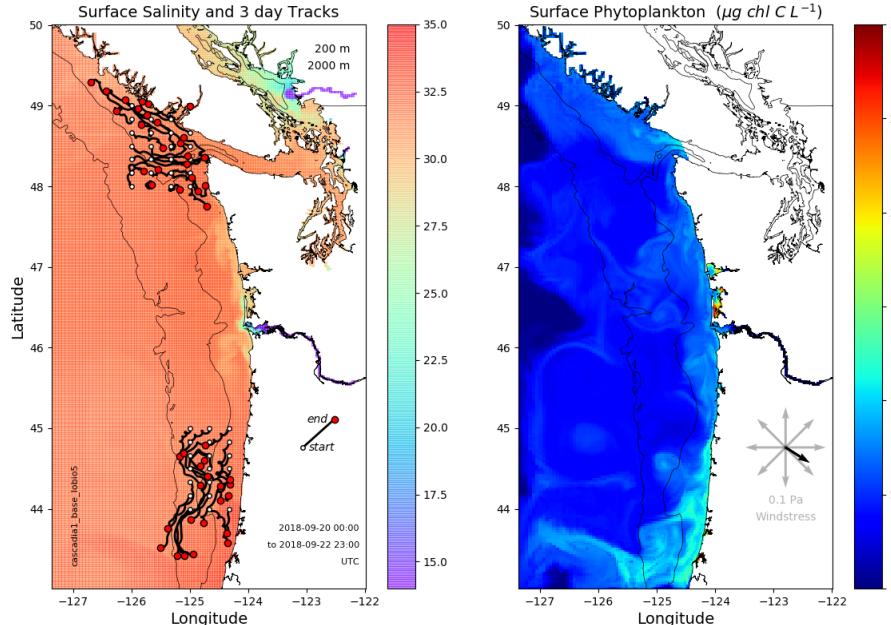
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

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 and phytoplankton with particles released near the Juan de Fuca eddy and Heceta Bank and tracked 3 days into the future.

Summary - Generally northward winds have forced surface water and plankton shoreward over the last week or so, and have led to increases in *Pseudo-nitzschia* (PN) abundances at many beach sites. Satellite imagery also shows elevated chlorophyll-a concentrations very near shore. The highest recent PN abundances were in southern OR (Brookings: 808,000 cells/L large morphology PN on 17-Sep) and northern WA (La Push, Second Beach: 112,000 cells/L large morphology PN on 10-Sep). Despite the recent northward winds, coastal ocean currents remain generally southward. Few particulate domoic acid (pDA) samples have been analyzed recently. Samples collected on 13-Sep at Twin Harbors and Long Beach, WA, indicated no detectable pDA; at Brookings, OR, pDA was 933 ng/L on 17-Sep. At the ESP site off northern WA, seawater pDA as high as 27.1 ng/L was observed on 11-Sep; however, pDA has remained undetectable there since 13-Sep. As of 12-Sep, WA razor clam DA remains low (≤ 2 ppm) at all sites. Razor clam samples from OR were also below regulatory limits on 14-Sep except at Coos Bay (23 ppm) and Gold Beach (180 ppm) in southern OR. Mussels collected near Humboldt, CA, on 10-Sep had DA levels well over the regulatory limit, suggesting the possibility of an ongoing larger event related to the DA outbreak in southern OR. The southern OR shellfish harvest closure recently expanded north; harvests are now closed from the CA border to the Umpqua River (north of Coos Bay, OR).

Forecast - ENSO neutral and PDO neutral conditions currently continue. A weak El Niño is expected by winter. The short-term weather forecast suggests that a low-pressure system, with northward winds, will move through the region Friday and Saturday. High pressure is expected to build off the coast as early as Sunday with the possibility of fair weather lingering through next week. The LiveOcean forecast suggests continued southward transport of surface water and plankton until Friday when northward winds will force surface water shoreward. Given the increased PN abundances overall and the expanded DA outbreak in southern OR, we recommend continued caution during upcoming shellfish harvests. Diligent sampling, including pDA if possible, is recommended. Testing shellfish samples collected after 23-Sep will help ensure public safety. If shellfish DA concentrations remain low, the expected improvement in next week's weather should help keep future harvests safe.