Pacific Northwest Harmful Algal Blooms Bulletin

Nov 18, 2019 HAB risk =

HAB risk key:

- = *low*
- = *medium*
- = *high*

JISAO Joint Institute for the Study of the Atmosphere and Ocean

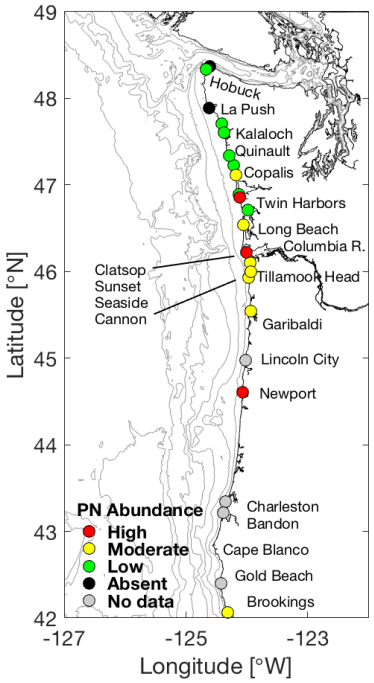
School of Oceanography, University of Washington

ORHAB Partnership

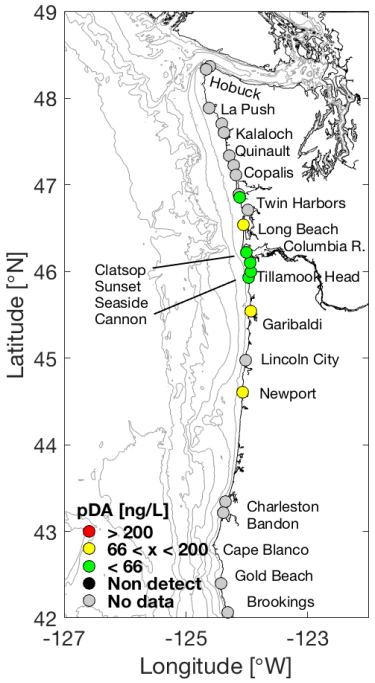
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

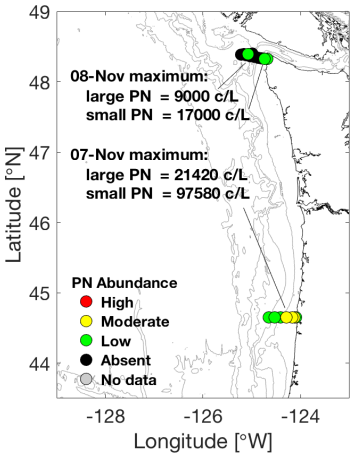


(particulate domoic acid)

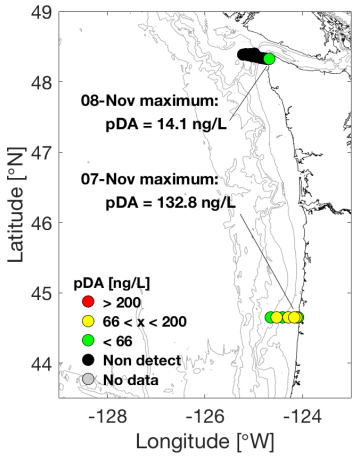


Offshore Sampling

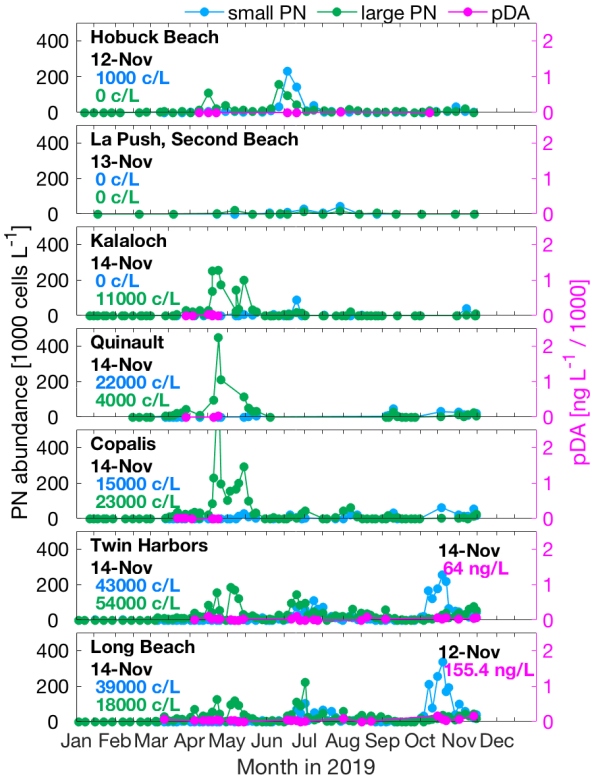
(*Pseudo-nitzschia*)



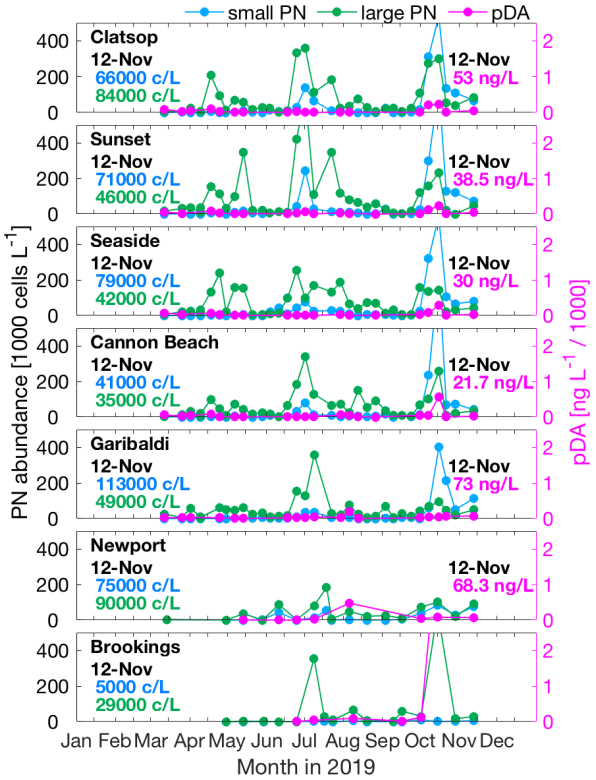
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



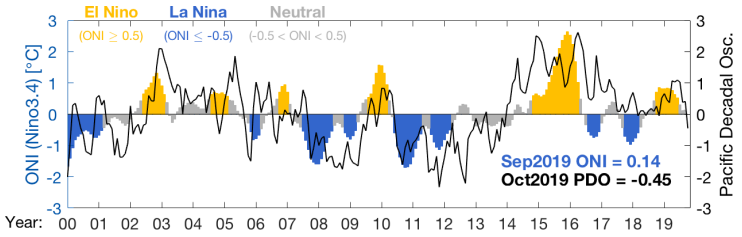
OR *Pseudo-nitzschia* & Domoic Acid



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.

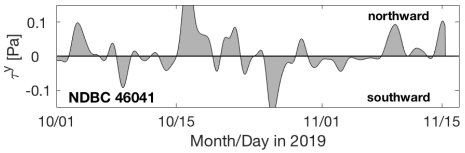
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



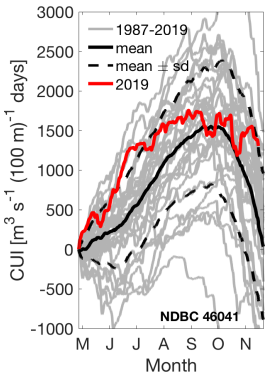
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

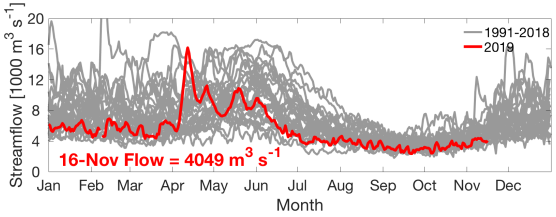


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress



Columbia River Discharge



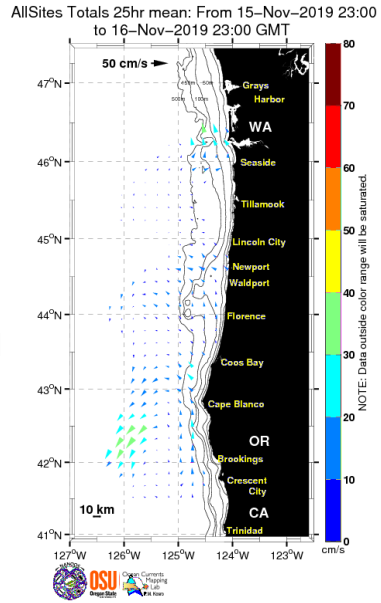
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Mon - SW wind, 20 kt
Tues - NW wind, 20 kt
Wed - NE wind, 10 kt
Thur - E wind, 10 kt

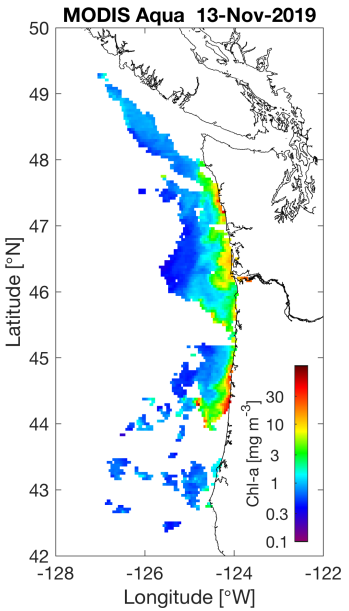
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

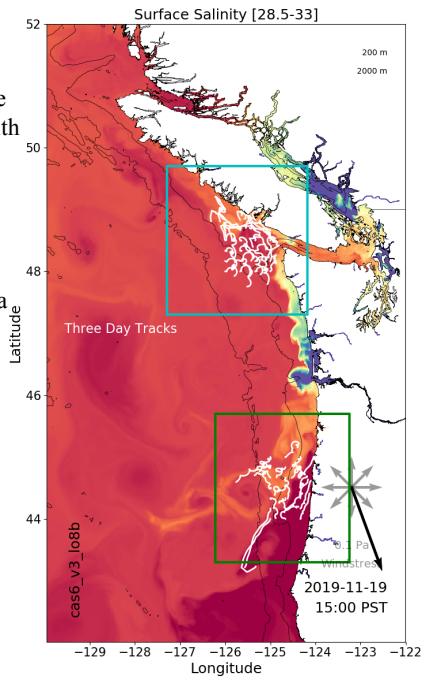
Satellite Chlorophyll-*a*

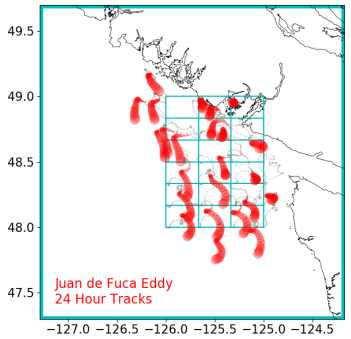


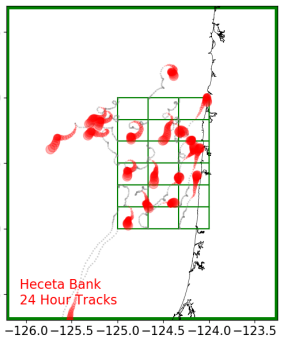
Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

LiveOcean Forecast Model

Model predicted sea surface salinity with particles released near the Juan de Fuca eddy and Heceta Bank and tracked three days into the future.







Summary - Fluctuating winds continue in November. So far this season, upwelling-favorable conditions have tended to resume after storms have passed through the region. Recent hydrographic transects off Newport, OR, suggest that deeper density surfaces remain upwelled, consistent with weak but generally southward surface currents. Satellite imagery has been sparse, but data from 13-Nov show elevated chlorophyll off both WA and OR with slightly higher values off central OR. *Pseudo-nitzschia* (*PN*) cell counts have diminished overall. Highest recent values were in southern WA on 14-Nov (Twin Harbors: 54,000 cells/L large *PN*; 43,000 cells/L small *PN*) and throughout northern (Garibaldi: 113,000 cells/L small *PN*) and central OR (Newport: 90,000 cells/L large *PN*) on 12-Nov. Where measured, seawater particulate domoic acid (pDA) has been low to moderate: highest values on 12-Nov were at Long Beach, WA (155 ng/L), and Garibaldi, OR (73 ng/L). Samples collected offshore of northern WA on 8-Nov contained very few *PN* cells (17,000 cells/L small *PN* nearshore; 9,000 cells/L large *PN* offshore). Only the nearshore site had detectable pDA (14.1 ng/L). Samples collected offshore of Newport, OR, on 7-Nov contained both large and small *PN* (up to 98,000 cells/L small *PN*; 21,000 cells/L large *PN*) with pDA as high as 133 ng/L near shore. Scanning electron microscopy of samples collected offshore of Newport on 11-Oct and 24-Oct confirmed that *P. pseudodelicatissima* dominated with *P. multiseries* present. Razor clams from WA beaches have low DA values (≤7 ppm) as of 1-Nov. In OR, razor clams from north of Coos Bay had the highest DA levels (40 ppm on 15-Nov); Clatsop South Jetty razor clams decreased to 16 ppm on 15-Nov.

Forecast - ENSO neutral conditions are favored through winter and into next spring. The PDO index is now weakly negative. Northward winds are expected to continue through Monday as a front impacts the region. This will continue forcing plankton and toxins north and onshore (see the LiveOcean forecast). By Tuesday, upwelling-favorable winds will resume as high pressure rebuilds. Given the recent moderate seawater pDA values and *PN* abundances, razor clam toxin concentrations could have increased during the recent storms. Additionally, the expected return to strong upwelling could fuel additional *PN* blooms. New samples will be necessary to determine toxin levels after that event. Managers should be particularly wary of northward wind reversals following the period of upwelling forecast for this week.