Pacific Northwest Harmful Algal Blooms Bulletin

Mar 18, 2019 HAB risk = ⚠

HAB risk key:

- ✓ = *low*
- ⚠ = *medium*
- ✗ = *high*

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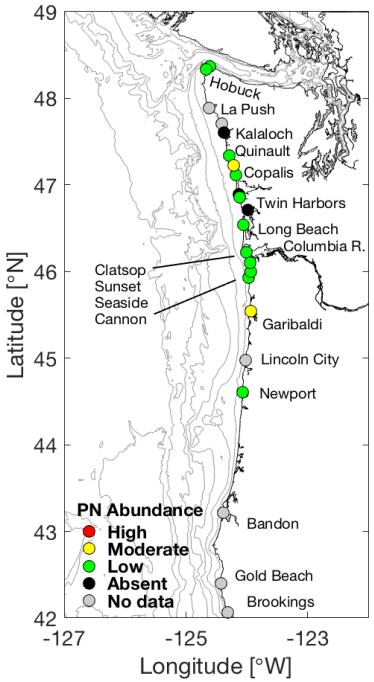
ORHAB Partnership — Olympic Region Harmful Algal Bloom

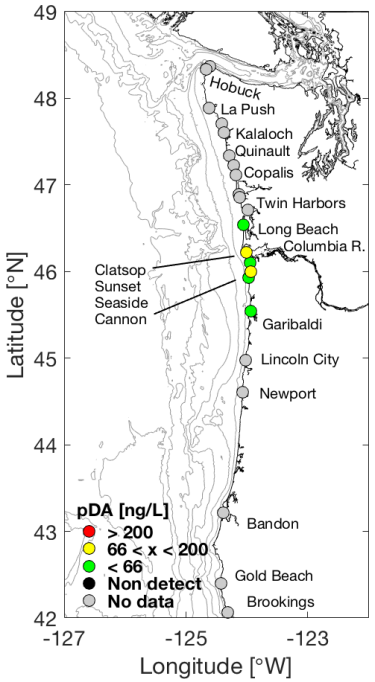
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

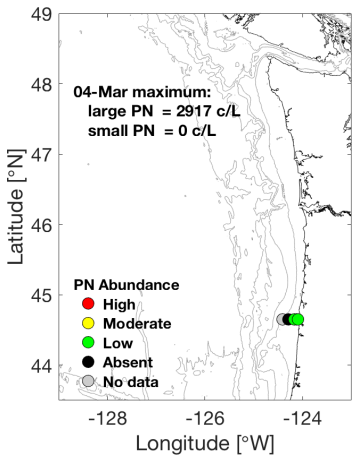


(particulate domoic acid)

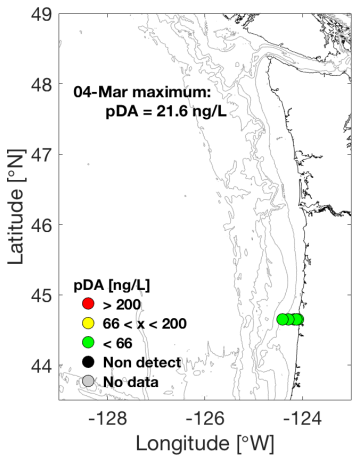


Offshore Sampling

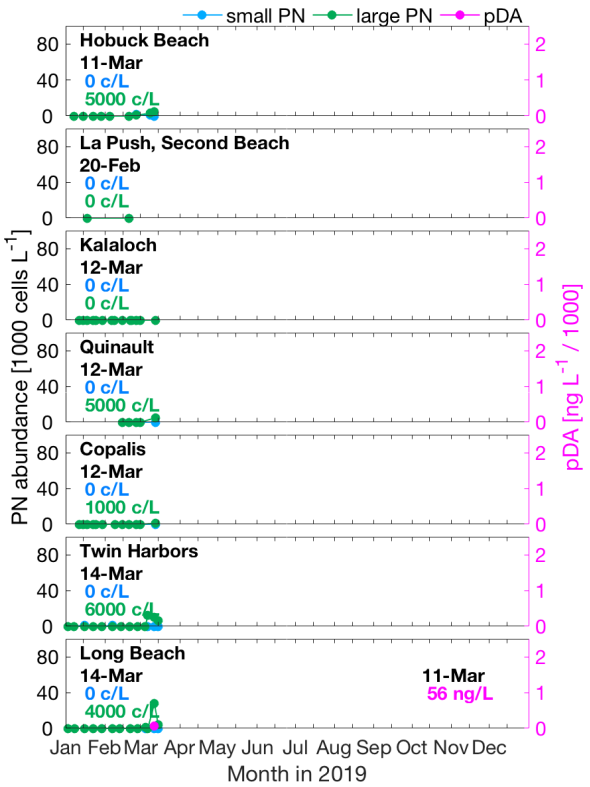
(*Pseudo-nitzschia*)



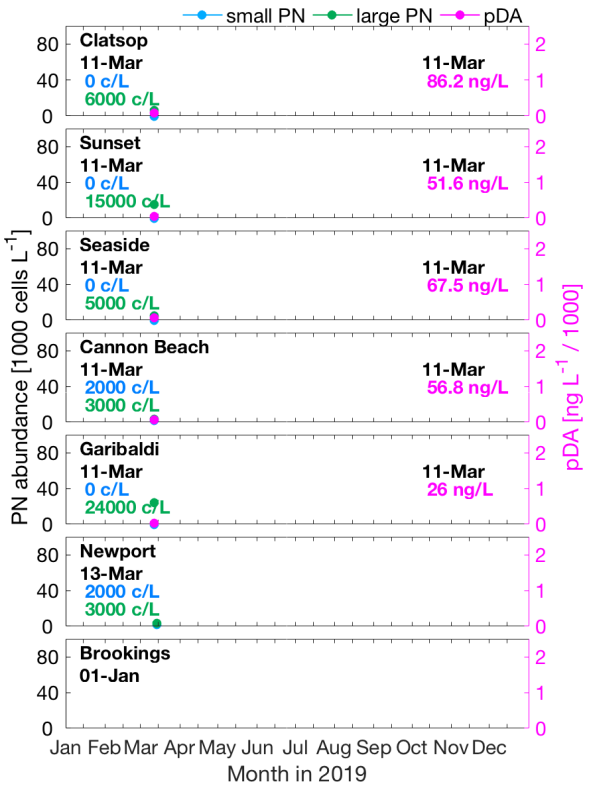
(particulate domoic acid)



WA *Pseudo-nitzschia* & domoic acid



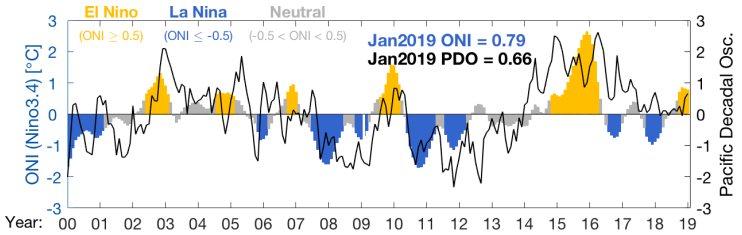
OR *Pseudo-nitzschia* & domoic acid



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.

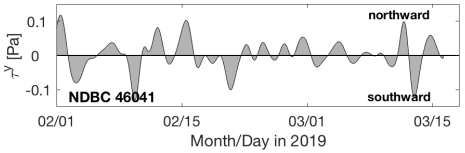
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



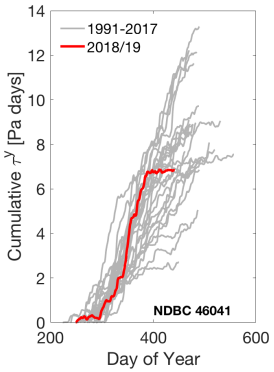
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south wind stress

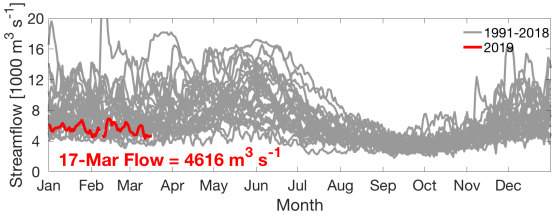


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress

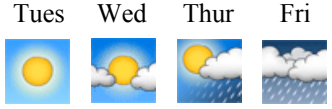


Columbia River Discharge



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.

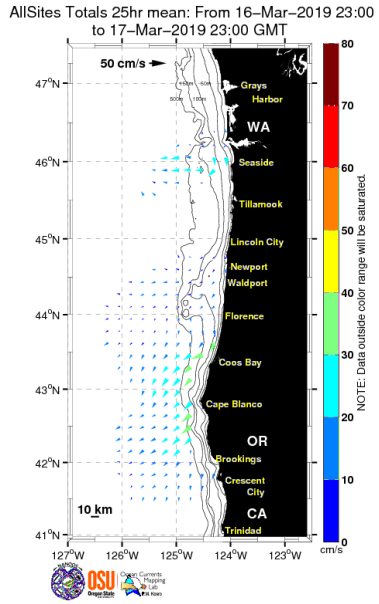
Marine Weather Forecast



Tues - E wind, 10 kt
Wed - SE wind, 10 kt
Thur - S wind, 10 kt
Fri - S wind, 20 kt

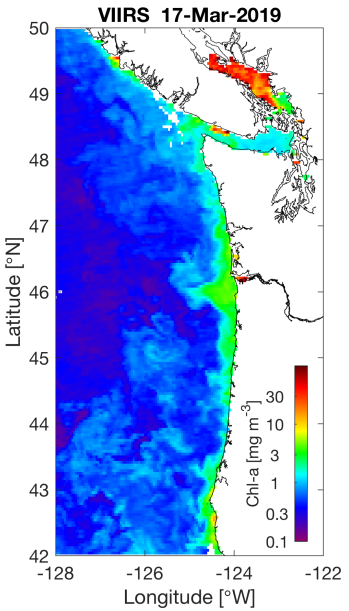
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

Ocean Surface Currents



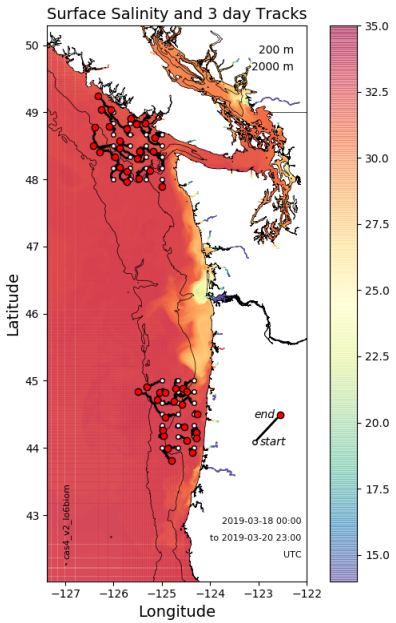
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

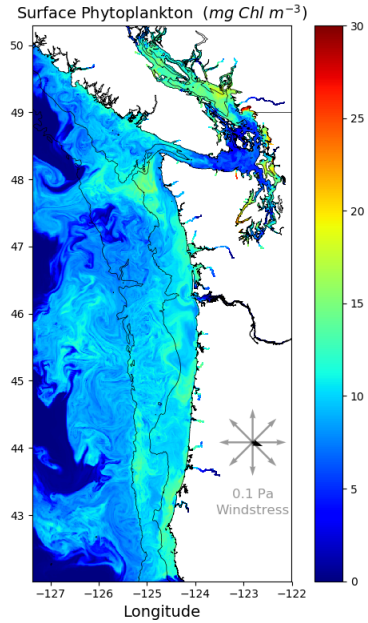
Satellite Chlorophyll-*a*



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 - Weak, fluctuating winds have persisted since mid Feb giving rise to relatively stagnant coastal ocean flows. Recent satellite images indicate that phytoplankton have started blooming throughout the region. *Pseudo-nitzschia* (*PN*) abundances at beaches in both WA and northern OR have also started increasing. At present, *PN* cells are primarily large morphology. Highest cell counts have been at Long Beach, WA (28,000 cells/L on 11-Mar), Mocrocks, WA (24,000 cells/L on 12-Mar), and Cape Meares, OR (24,000 cells/L on 11-Mar). Samples collected offshore of Newport, OR, on 4-Mar contained low abundances of large-cell *PN* (<3,000 cells/L), and had particulate domoic acid (pDA) concentrations up to ~22 ng/L. Scanning electron microscope (SEM) analysis revealed both *P. pungens* and *P. australis* present in those offshore samples. More recently, relatively low pDA concentrations (26–86 ng/L) were also detected at beach sites from Garibaldi, OR, to Long Beach, WA. SEM analysis of 11-Mar samples from Twin Harbors and Long Beach, WA, also confirmed the presence of *P. pungens* and *P. australis*. Razor clam DA samples from WA were all <7 ppm as of 8-Mar. In OR, a razor clam sample from Sunset Beach had 22 ppm DA on 8-Mar, and a sample from Port Orford contained 62 ppm DA on 22-Feb. Some crab viscera samples collected south of Cape Blanco, OR, since 4-Mar also had elevated DA (34-100 ppm). OR beaches north of Tillamook Head and south of Cape Blanco are currently closed to shellfish harvest.

Forecast - Mild El Niño conditions are ongoing and are expected to persist for the next several months. The PDO index recently increased and remains positive. Weak fluctuating winds will continue in the short-term and will be directed offshore through Tues. Relatively sluggish ocean flows will also continue in the short-term, as indicated by the LiveOcean forecast. Nevertheless, phytoplankton will likely continue to bloom. The extended weather forecast suggests that after Tues winds will turn northward and a storm could impact the region on Fri, forcing phytoplankton shoreward. The forecast trend shows the storm weakening. Because pDA is already present from Newport, OR, to at least Long Beach, WA, and *P. australis* has also been confirmed throughout the region, extreme caution is recommended. Given the current relatively low pDA concentrations and the forecasts, the perceived risk is moderate over the next few days. By Fri risk increases with the forecasted change to stronger northward winds.