



Pacific Northwest Harmful Algal Blooms Bulletin

Mar 28, 2019 HAB risk =

HAB risk key:

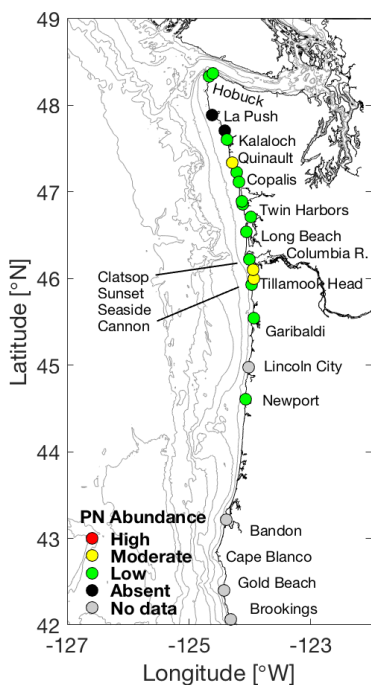
- = low
- = medium
- = high



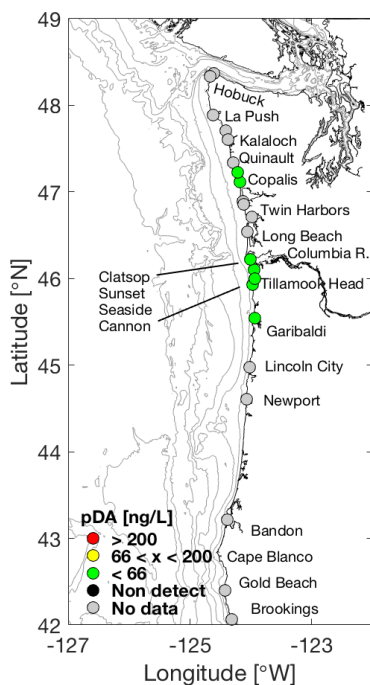
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

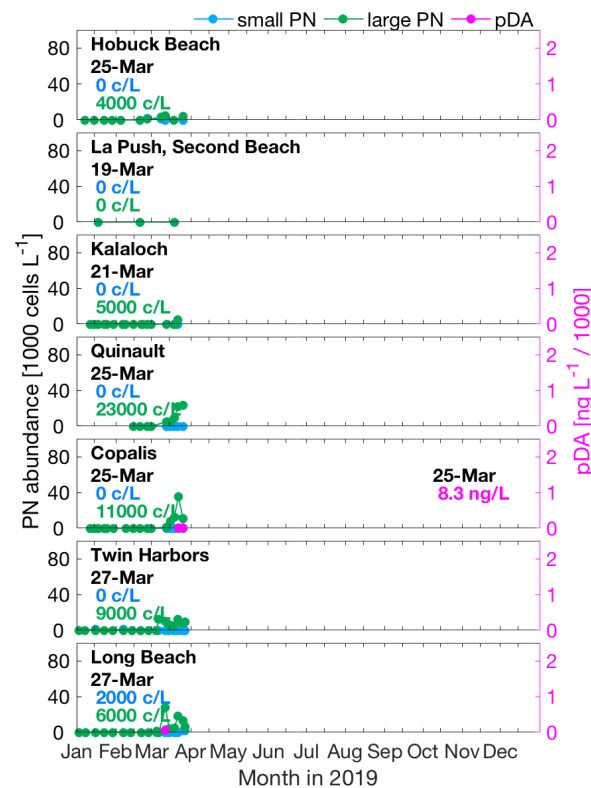
(*Pseudo-nitzschia*)



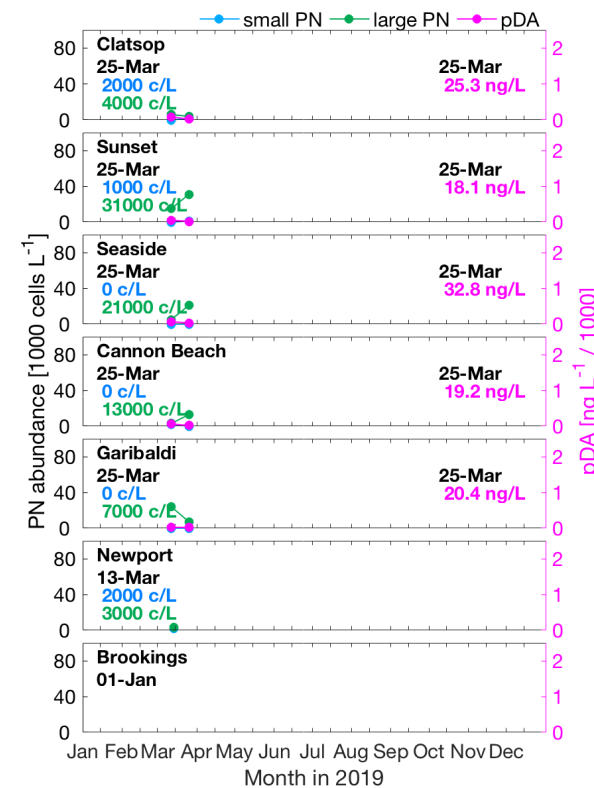
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid

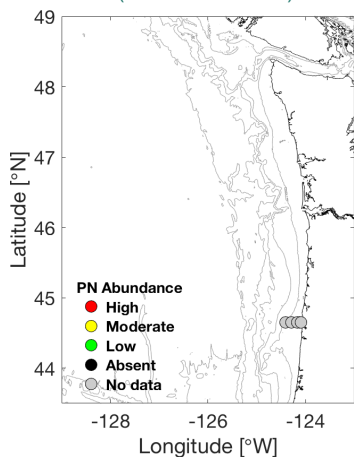


OR *Pseudo-nitzschia* & Domoic Acid

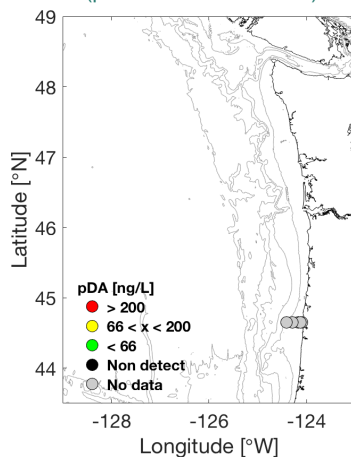


Offshore Sampling

(*Pseudo-nitzschia*)



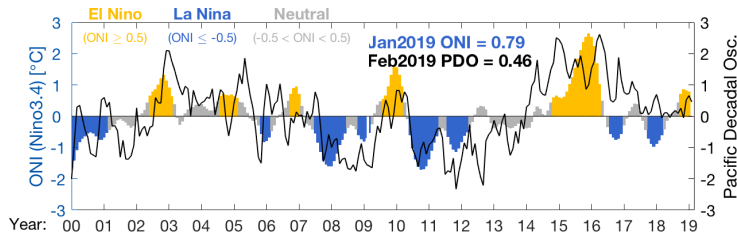
(particulate domoic acid)



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; < 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.

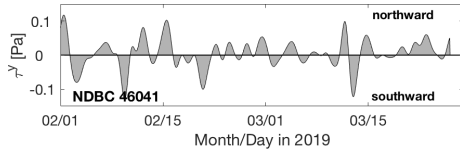
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information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



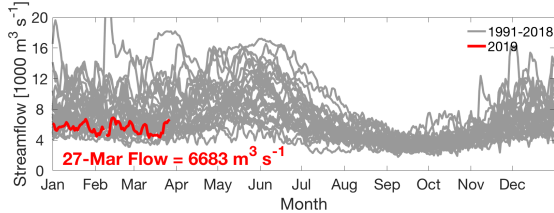
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress



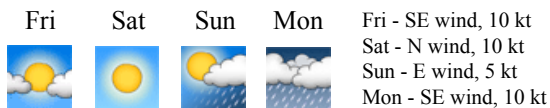
Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cumulative upwelling index (i.e. during years with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

Columbia River Discharge



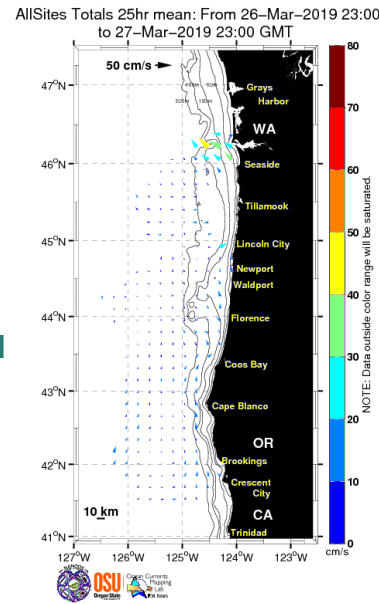
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast



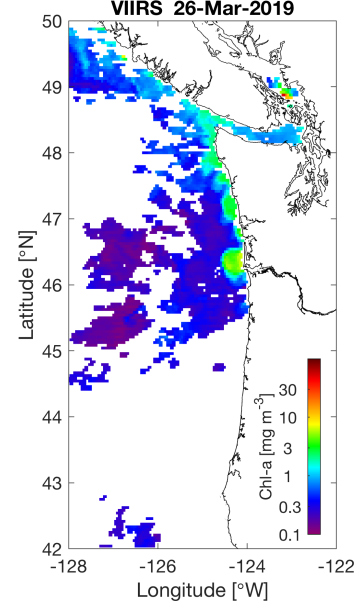
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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

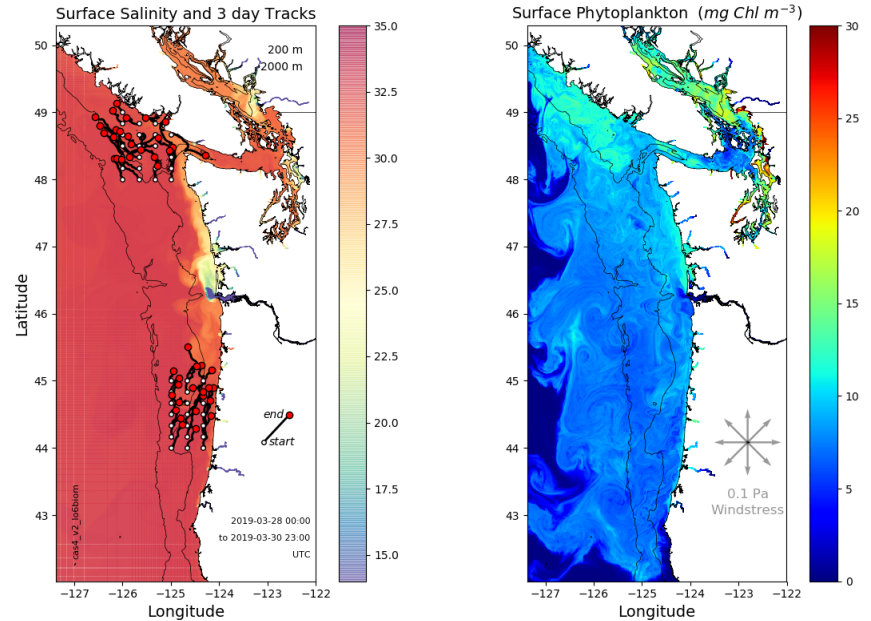


Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

Summary - Over the last week and a half, winds have remained weak but have largely been northward, forcing surface ocean currents shoreward and northward. These conditions forced phytoplankton toward shore and led to increases in *Pseudo-nitzschia* (*PN*) abundances at some beaches. Recent satellite images suggest low amounts of chlorophyll-*a* are present south of Bandon, OR, and in river plume water along much of the WA coast. *PN* cells are primarily large morphologies, with highest abundances at central WA locations (Copolis: 35,000 cells/L; Mocrocks: 24,000 cells/L; Quinalt: 23,000 cells/L; from 21–25 Mar), and near Sunset Beach, OR (31,000 cell/L on 25-Mar). Particulate domoic acid (pDA) levels at central WA sites have also been relatively low (< 13 ng/L) since 21-Mar. On 25-Mar, northern OR beaches had 18–33 ng/L of pDA. No additional offshore samples have been analyzed since those collected on 4-Mar. Razor clam DA samples from WA were all <7 ppm as of 20-Mar. A razor clam sample from Clatsop South Jetty, OR, had 14 ppm DA on 22-Mar, and samples from near Cape Blanco, OR, had fallen to 30 ppm DA on 22-Mar. 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 expected to persist for the next several months. The PDO index remains positive. Northward winds will continue in the short-term. The recent shoreward and northward ocean flows will therefore also continue as indicated by the LiveOcean forecast. Weak southward winds may occur briefly on Saturday. The long-term weather forecast is much less certain, but suggests that a series of weak fronts, with northward winds, may continue to impact the region through at least next Wednesday. Because of this we do not anticipate large-scale upwelling (that would fuel significant phytoplankton blooms) to occur within the next week. Thus, in the short-term, the perceived risk of a large toxic bloom is relatively low to moderate. However, conditions can change quickly. Since pDA remains detectable and it is likely that *P. australis* cells are still present throughout the region, we must recommend continued caution, especially given the extremely uncertain long-term weather forecast. With any significant upwelling of nutrients, conditions could easily give rise to a toxic *PN* bloom. At present, managers should be wary of any upcoming periods of sustained southward winds followed by northward reversals.

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.