Pacific Northwest Harmful Algal Blooms Bulletin

May 24, 2018 HAB risk =

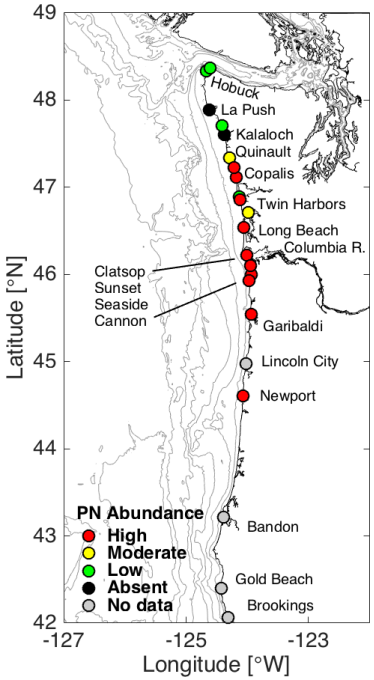
HAB risk key:

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

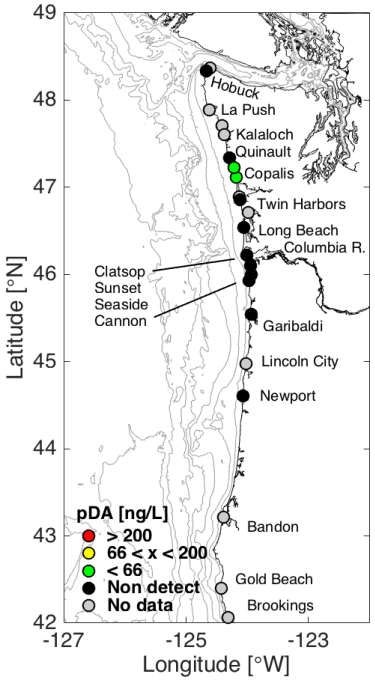
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

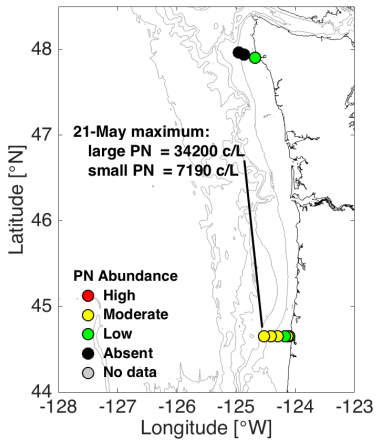


(particulate domoic acid)

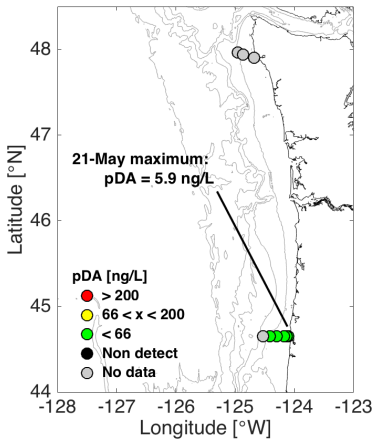


Offshore Sampling

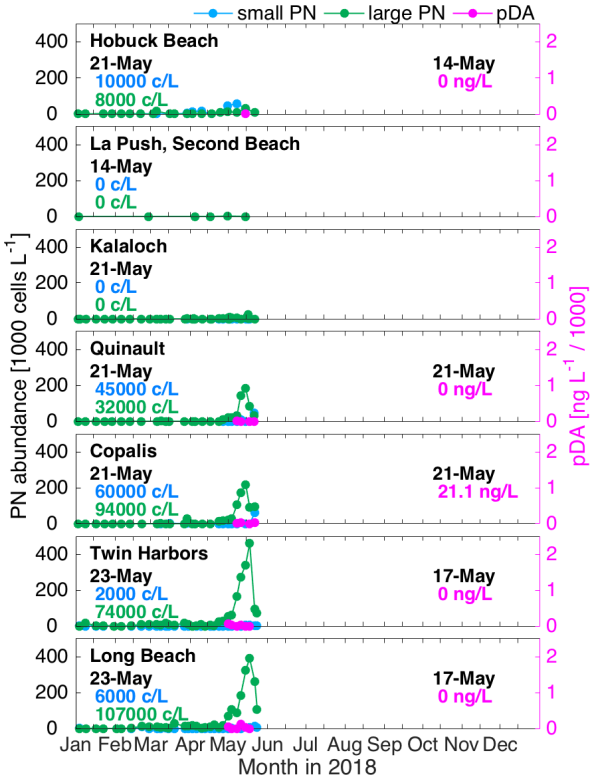
(*Pseudo-nitzschia*)



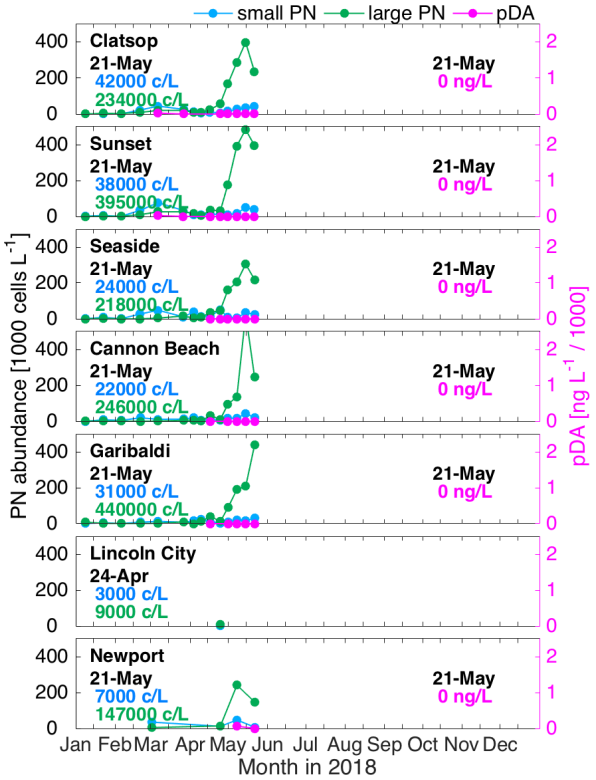
(particulate domoic acid)



WA *Pseudo-nitzschia* & domoic acid



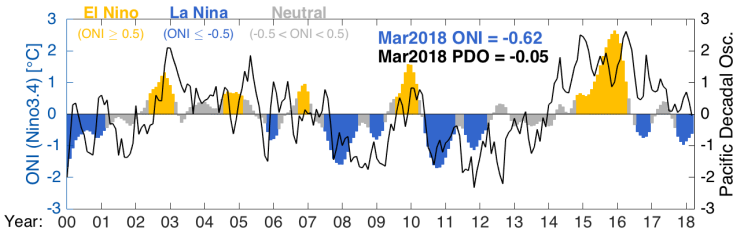
OR *Pseudo-nitzschia* & domoic acid



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.

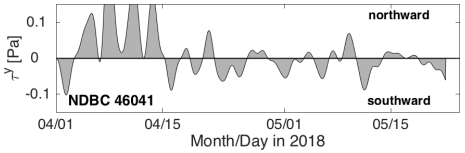
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health and the Oregon Department of Agriculture after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented here. However, the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



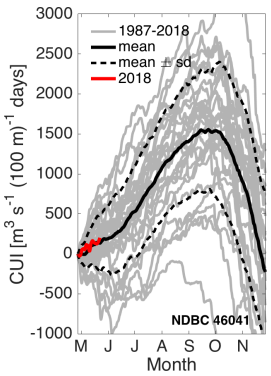
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south wind stress

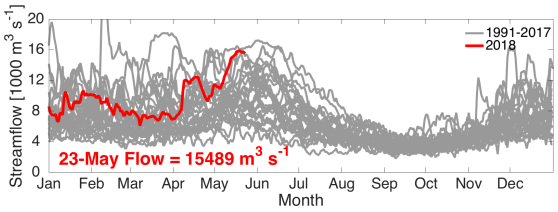


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress

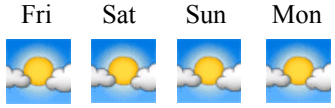


Columbia River Discharge



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.

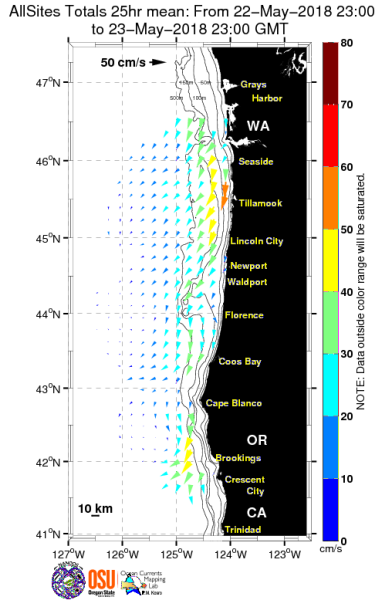
Marine Weather Forecast



Fri - NW wind, 15 kt
Sat - NW wind, 10 kt
Sun - NW wind, 10 kt
Mon - NW wind, 15 kt

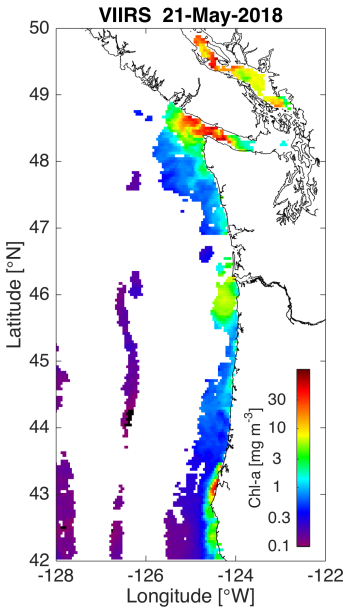
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

Ocean Surface Currents



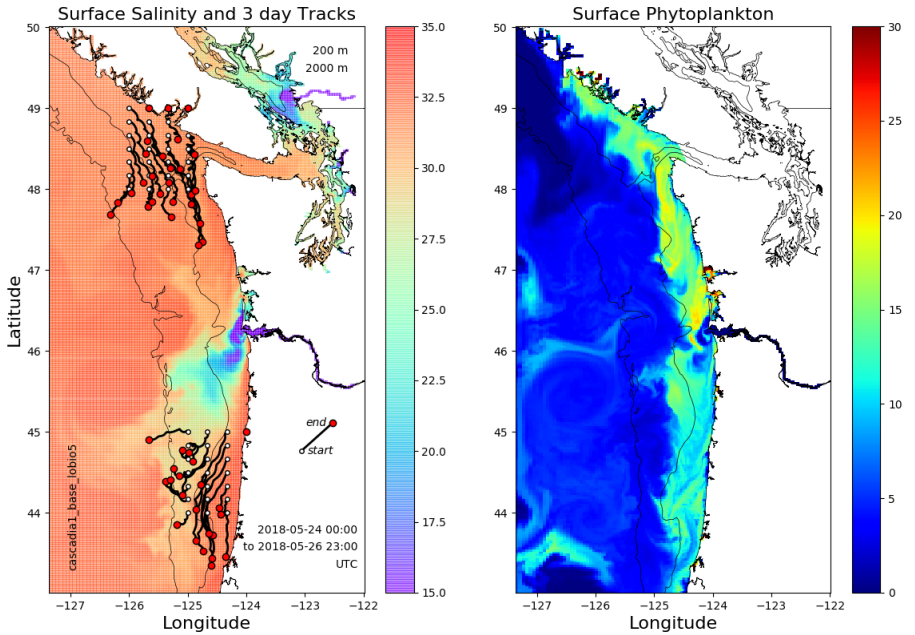
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

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 - Fluctuating winds typical of spring continue to force upwelling pulses and phytoplankton blooms along the coast. Highest concentrations of chlorophyll-*a* in satellite images are near the mouths of Juan de Fuca Strait and the Columbia River, with elevated chlorophyll-*a* also near Cape Blanco, OR. Beach samples from 21-23 May contain high abundances of large morphology *Pseudo-nitzschia* (*PN*; ~100,000 cells/L at southern/central WA beaches, and up to ~400,000 cells/L at northern OR beaches). Small morphology *PN* cells increased in abundance at OR (42,000 cells/L, Columbia River South Jetty) and central WA beaches (79,000 cells/L, Mocrocks, WA). Most beaches had undetectable seawater particulate domoic acid (pDA) on 21-May except in central WA (31.9 ng/L at Mocrocks, WA). Offshore samples collected near La Push, WA, on 22-May had low *PN* abundances (3,000 cells/L large; 2,000 cells/L small cells) only at the site nearest shore. Samples collected 21-May off Newport, OR, had moderate *PN* abundances (~35,000 cells/L large *PN*) and low pDA near shore (< 6 ng/L). Scanning electron microscope analysis indicated these 21-May OR samples were primarily composed of *P. pungens* and *P. cuspidata*, with *P. fraudulenta* also present. Mussels off Humboldt, CA, had low DA (<1 ppm; 14-May). WA razor clam DA remains low (≤ 4 ppm) at all sites recently sampled. Shellfish DA concentrations in OR have continued decreasing. OR razor clam harvest is currently open north of Cape Arago (near Coos Bay).

Forecast - ENSO neutral conditions are expected this summer, possibly transitioning to El Niño by winter. Indications are that an updated PDO value will show continued large-scale cooling. The short-term weather forecast suggests that southward winds will continue through Monday. The LiveOcean forecast suggests continued upwelling with southward offshore transport of surface water and plankton for the next few days. An upper-level atmospheric trough could impact the region by mid next week, suggesting the possibility of additional northward wind reversals at that time. Since seawater pDA concentrations remain low or undetectable there appears to be relatively low risk for a toxin outbreak over the next few days. However, phytoplankton communities can transition rapidly, so managers should continue exercising additional caution during such northward wind reversals and relaxations, especially given the recent increases in small morphology toxigenic *PN* cells.