Pacific Northwest Harmful Algal Blooms Bulletin

Apr 13, 2018 HAB risk = ✔

HAB risk key:

- ✔ = *low*
- ⚠ = *medium*
- ✖ = *high*

JISAO Joint Institute for the Study of the Atmosphere and Ocean

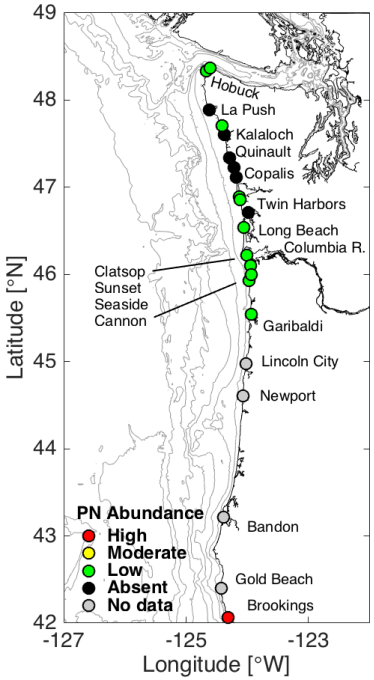
School of Oceanography, University of Washington

ORHAB Partnership

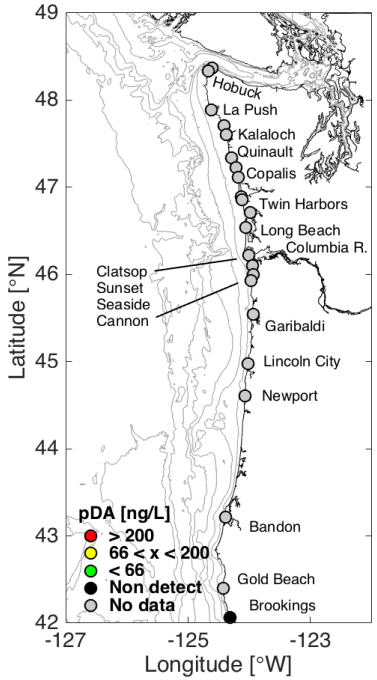
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

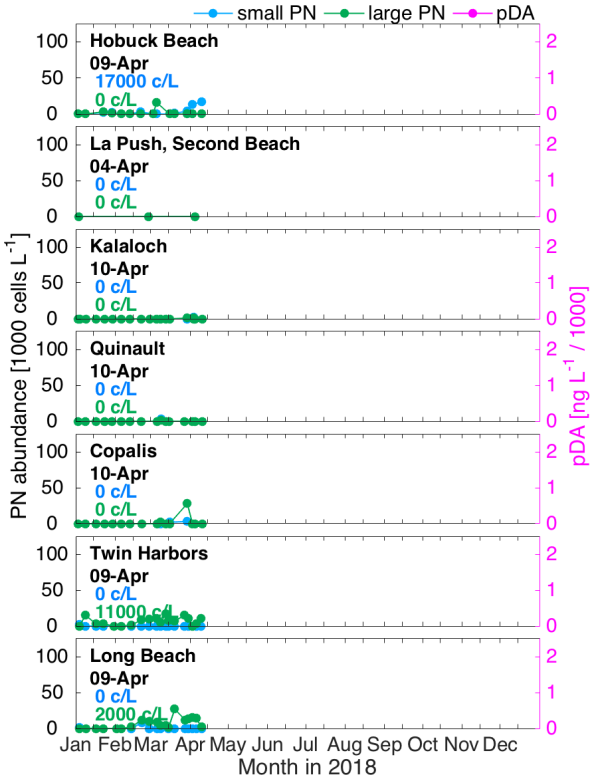
(*Pseudo-nitzschia*)



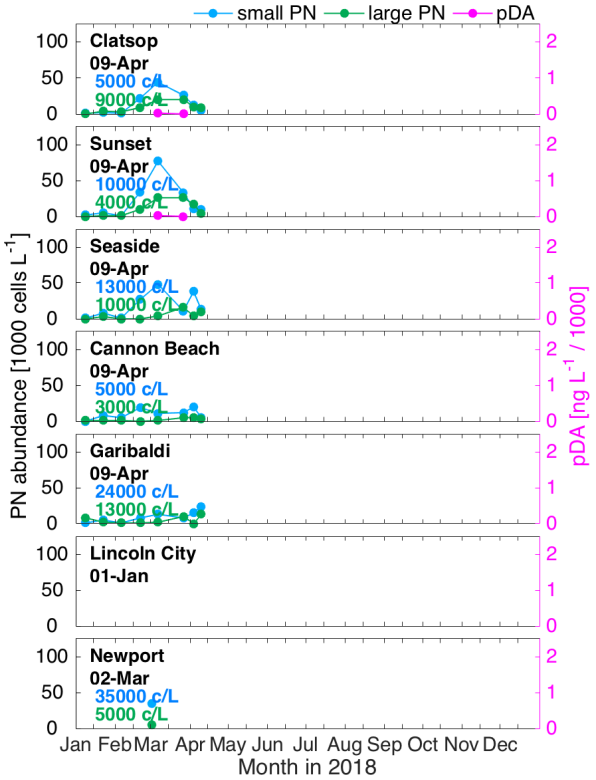
(particulate domoic acid)



WA *Pseudo-nitzschia* & domoic acid

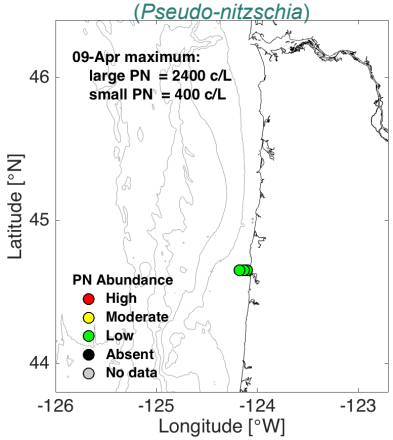


OR *Pseudo-nitzschia* & domoic acid

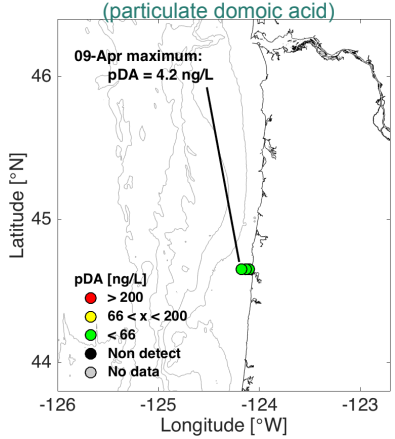


Offshore Sampling

(*Pseudo-nitzschia*)



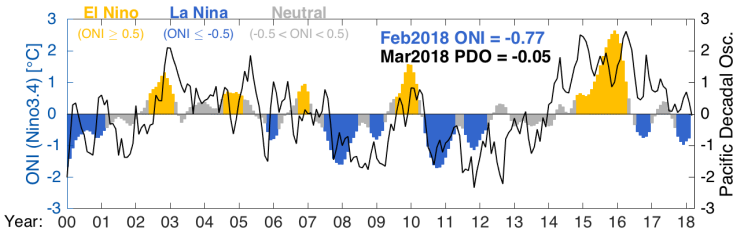
(particulate domoic acid)



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; *low:* < 1/3 theshold) 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.

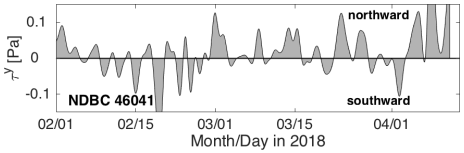
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health and the Oregon Department of Agriculture after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented here. However, the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



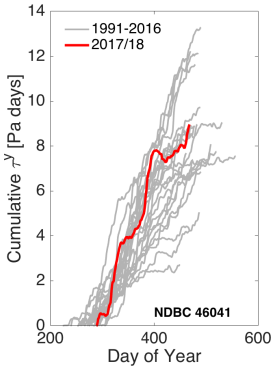
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south wind stress

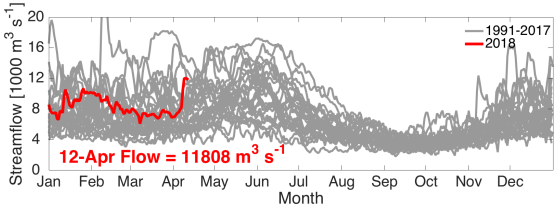


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress

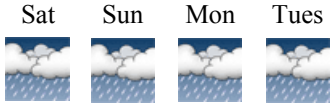


Columbia River Discharge



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.

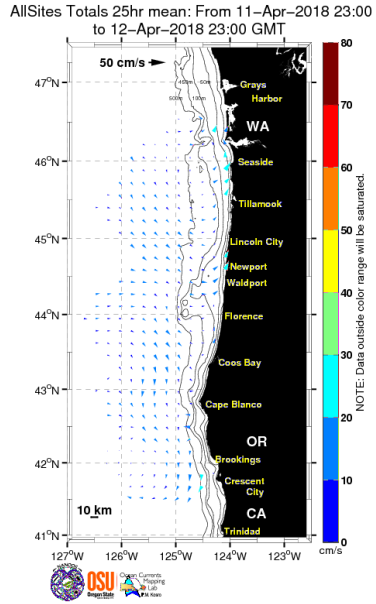
Marine Weather Forecast



Sat - SW wind, 15 kt
Sun - N wind, 10 kt
Mon - W wind, 15 kt
Tues - SW wind, 10 kt

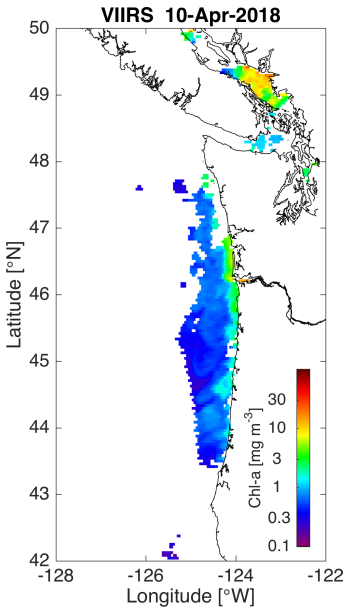
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

Ocean Surface Currents



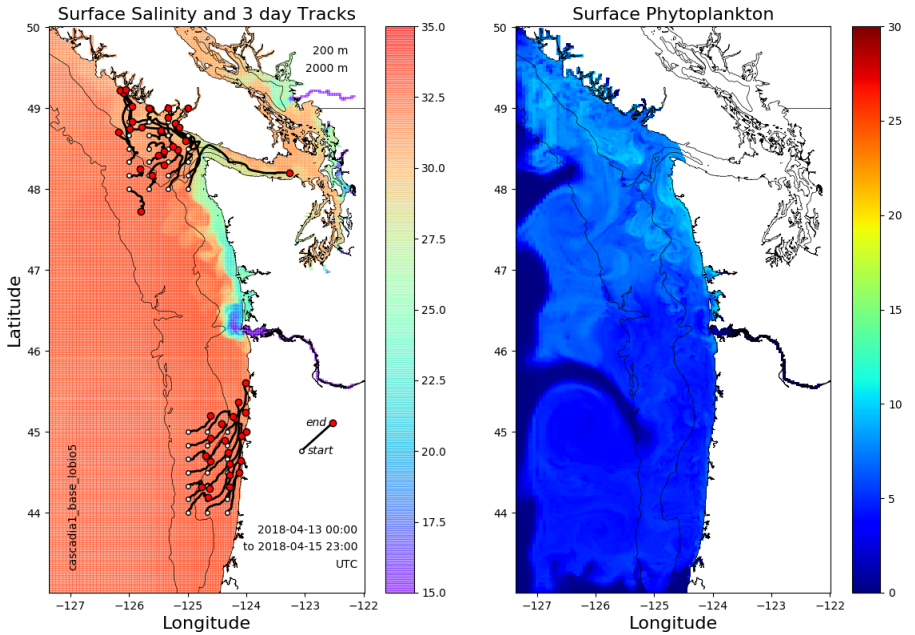
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

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

Summary - Conditions remain similar to those in mid March. In particular, predominantly northward flow continues over the shelf. *Pseudo-nitzschia* (*PN*) remain present off both WA and OR in relatively low abundance (< 25,000 cells/L for both large and small cell types) at most sites sampled. Exceptions were a 9-Apr Neah Bay, WA, sample containing 299,000 cells/L of small morphology *PN*; and a 9-Apr Brookings, OR, sample with 269,000 and 173,000 cells/L of large and small *PN*, respectively. Seawater particulate domoic acid (pDA) was undetectable in the Brookings, OR, sample and has not been quantified at other beach sites. Three stations off Newport, OR, were also sampled on 9-Apr. Large and small *PN* cells were present, with highest abundances nearest shore (2400 cells/L large *PN*; 400 cells/L small *PN*). Particulate DA was low (≤ 4.2 ng/L) at all three sites and dissolved DA was not detected; two species were identified by scanning electron microscope: *P. heimii* (a weakly toxic large cell) and *P. cuspidata* (a toxigenic small cell). Recent razor clam samples in southern and central WA had DA concentrations ≤ 7 ppm. A sample from Kalaloch Beach was at 21 ppm on 20-Mar, likely a carry-over from the Nov 2017 event at that site. As of 6-Apr the highest razor clam DA values in OR were at the Coos Bay North Jetty (16 ppm) and Newport South Jetty (13 ppm) sites. Razor clam digs are ongoing in both WA and northern OR. Oregon beaches south of Cascade Head (near Lincoln City) remain closed to razor clam harvest.

Forecast - Weak La Niña conditions persist but ENSO neutral conditions are expected this spring and summer. The PDO is presently -0.05 indicating that sea surface temperatures are near average. However, as of 9-Apr relatively warm (+1.3 °C anomaly) and fresh (-1.16 salinity anomaly) water remains over the shelf off Newport, OR. The weather forecast suggests variable winds changing to drier conditions (potentially upwelling) by mid next week. The short-term LiveOcean forecast indicates that surface currents will continue to push plankton north and onshore. Since pDA was very low off Newport, OR, and undetected off Brookings, OR, and because *PN* abundances are generally low, there is little perceived risk of a toxin outbreak over the next few days. However, managers should exercise continued longer-term caution as we near the spring transition to upwelling conditions that can lead to rapidly multiplying phytoplankton blooms.