



# Pacific Northwest Harmful Algal Blooms Bulletin

May 10, 2018 HAB risk =

HAB risk key:

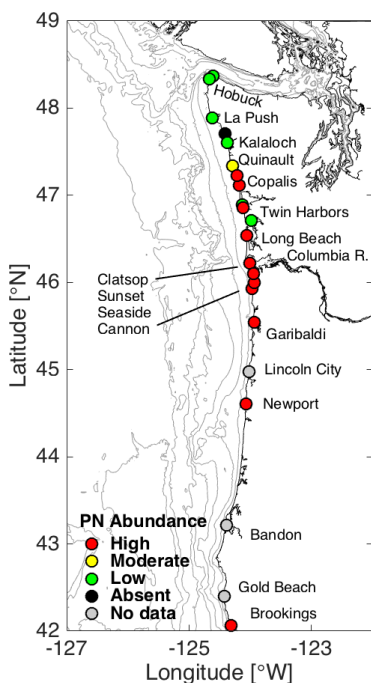
- = low
- = medium
- = high



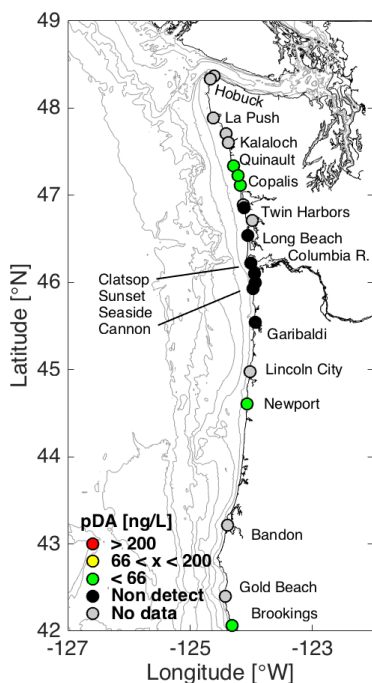
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

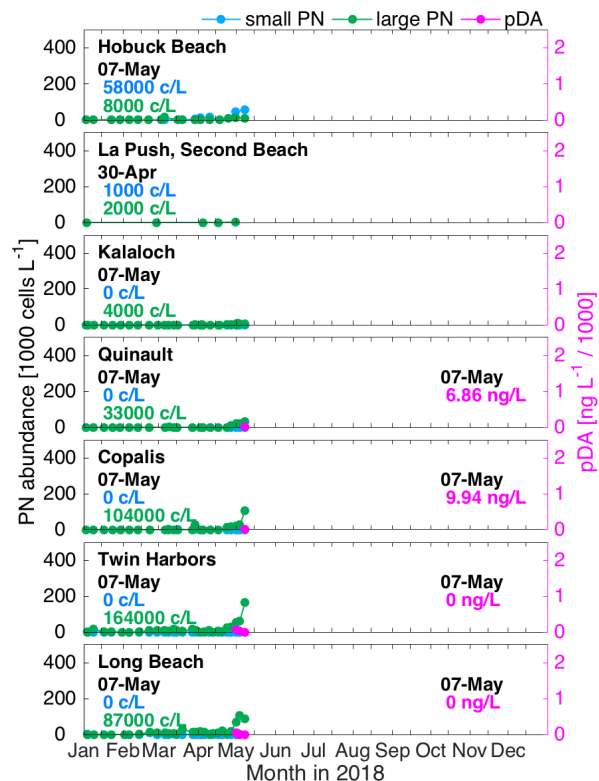
(*Pseudo-nitzschia*)



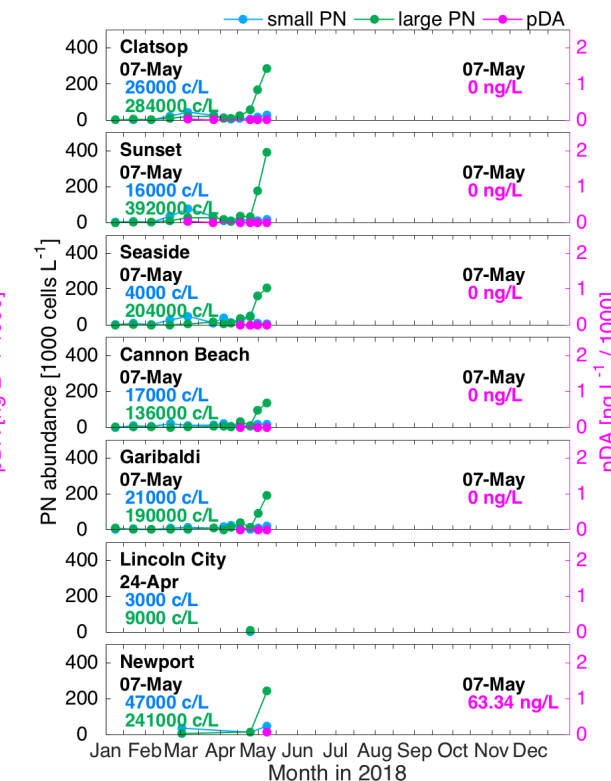
(particulate domoic acid)



## WA *Pseudo-nitzschia* & domoic acid

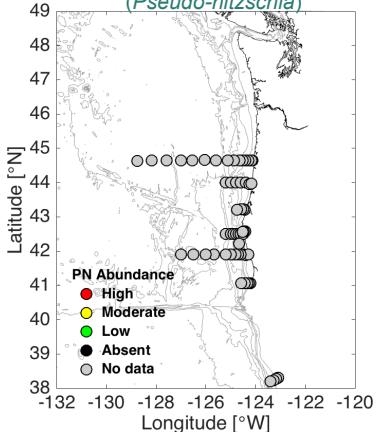


## OR *Pseudo-nitzschia* & domoic acid

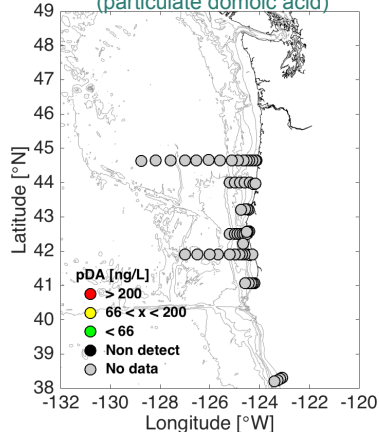


## Offshore Sampling

(*Pseudo-nitzschia*)



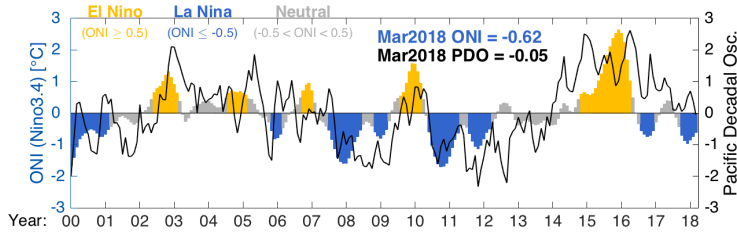
(particulate domoic acid)



*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 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.

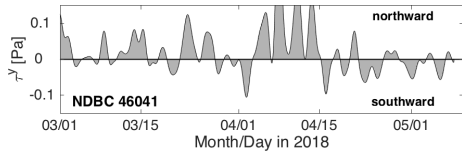
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health and the Oregon Department of Agriculture after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information presented here.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



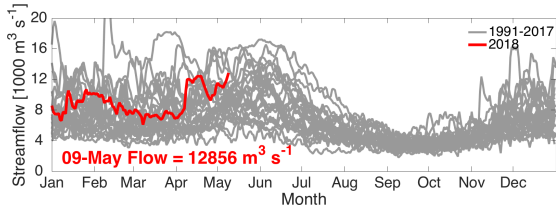
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## North-south wind stress



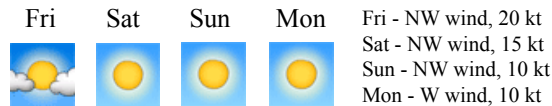
Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cumulative upwelling index (i.e. during years with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

## Columbia River Discharge



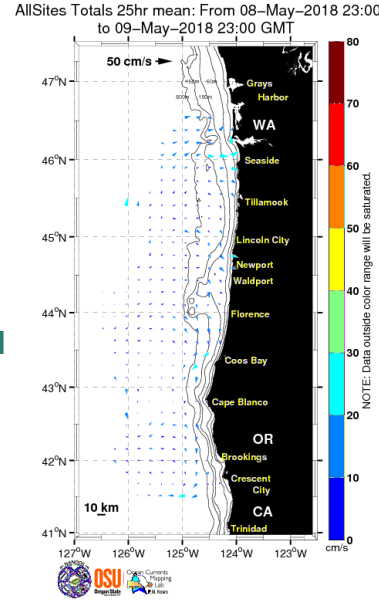
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

## Marine Weather Forecast



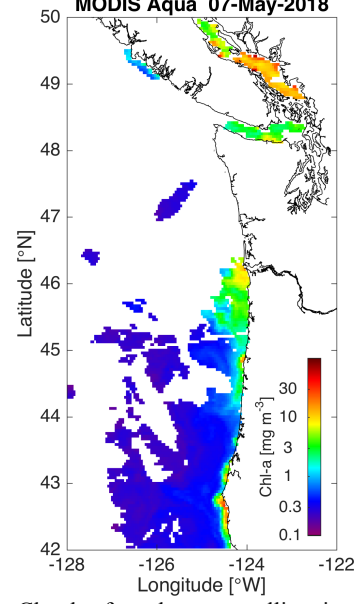
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

## Ocean Surface Currents



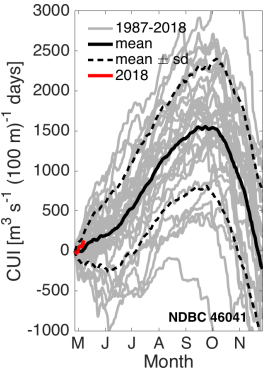
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

## Satellite Chlorophyll-a

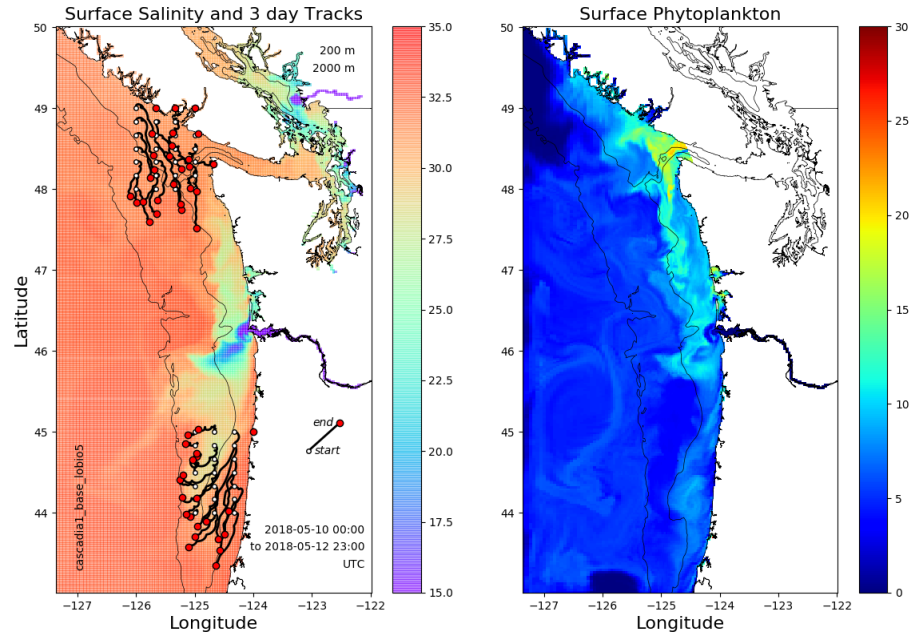


Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

## Cumulative Wind Stress



## 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** - Spring has arrived; winds and surface ocean currents have switched to predominantly southward over the shelf but with occasional northward reversals. Recent satellite images confirm relatively high concentrations of chlorophyll-*a*, particularly near the mouths of Juan de Fuca Strait and the Columbia River. Small morphology *Pseudo-nitzschia* (*PN*) are dominant at beaches near Juan de Fuca Strait (23,000 cells/L Neah Bay; 58,000 cells/L Hobuck Beach) whereas large morphology cells are dominant at most other sites in WA and OR (164,000 cells/L Twin Harbors, WA; 392,000 cells/L Sunset Beach, OR). Species information and offshore samples are not yet available. Seawater particulate domoic acid (pDA) was undetectable at beaches nearest the Columbia River on 7-May but quantifiable values were recorded at central WA beaches (< 10 ng/L) and near Newport (~63 ng/L) and Brookings, OR (~37 ng/L). Farther south, seawater pDA was undetectable off Trinidad, CA, on 25-Apr. Razor clam DA in WA was ≤ 5 ppm at all sites sampled; as of 4-May, the highest razor clam DA values in OR were at Gold Beach (90 ppm), and Agate Beach near Newport (19 ppm). Oregon razor clam harvest is currently open north of Cascade Head (near Lincoln City) and from the south jetty of the Umpqua River to Cape Arago (near Coos Bay).

**Forecast** - ENSO neutral conditions are expected this summer, possibly transitioning to El Niño by winter. Last month's PDO value was -0.05 and indications are that an updated value will show continued large-scale cooling. Moderate upwelling conditions were recorded from northern CA to central OR and some "cold water" copepods were collected off OR this past week. The weather forecast suggests that conditions will be consistently upwelling-favorable for the foreseeable future; the LiveOcean forecast confirms that plankton and toxins are likely to move offshore over the next few days. However, *PN* abundances are relatively high and recent pDA samples, while low, remain detectable at some sites. New razor clam samples could show DA increases after the most recent northward wind reversal, particularly in OR where current pDA values are highest. Nevertheless, there is little perceived short-term risk if new shellfish DA samples are below safety threshold values. Significant phytoplankton blooms will persist into next week with the forecasted upwelling, so managers should beware of any potential wind relaxations or northward reversals.