



# Pacific Northwest Harmful Algal Blooms Bulletin

Mar 14, 2018 HAB risk =

HAB risk key:

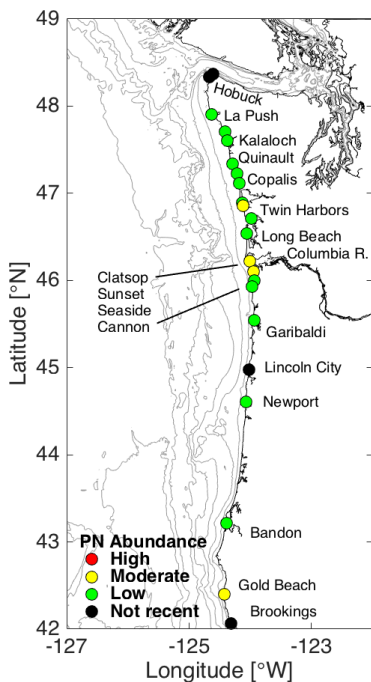
- = low
- = medium
- = high



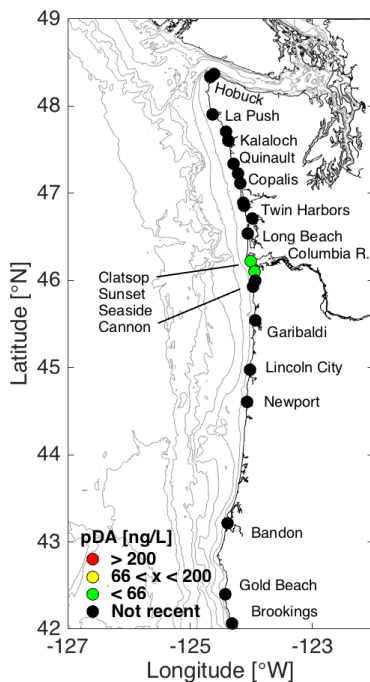
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

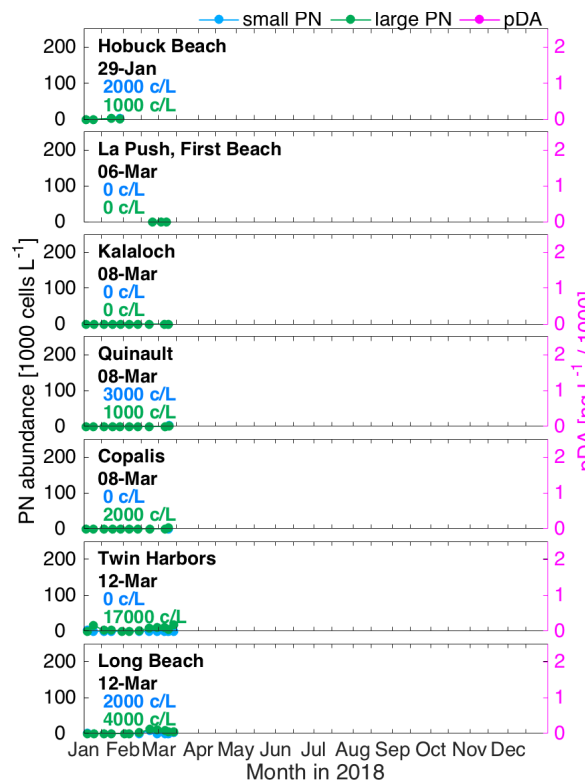
(*Pseudo-nitzschia*)



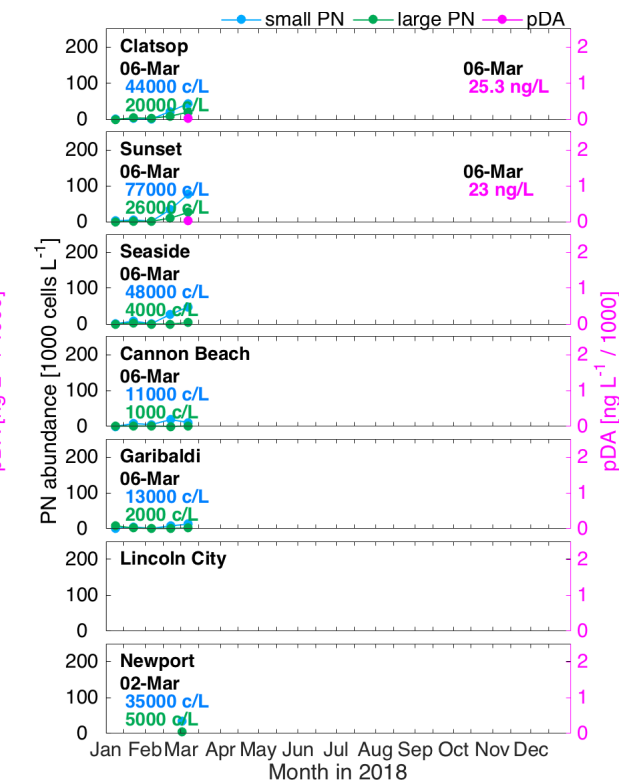
(particulate domoic acid)



## WA *Pseudo-nitzschia* & domoic acid

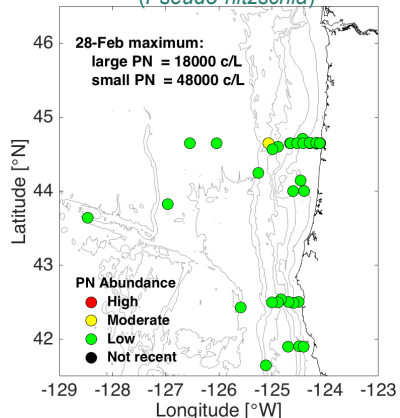


## OR *Pseudo-nitzschia* & domoic acid

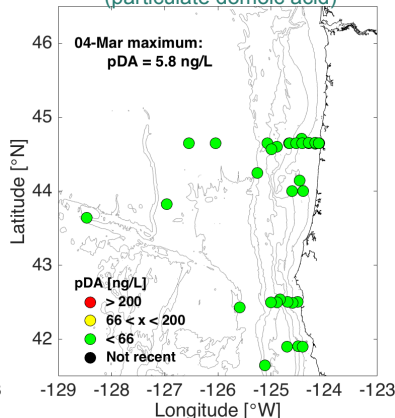


## Offshore Sampling

(*Pseudo-nitzschia*)



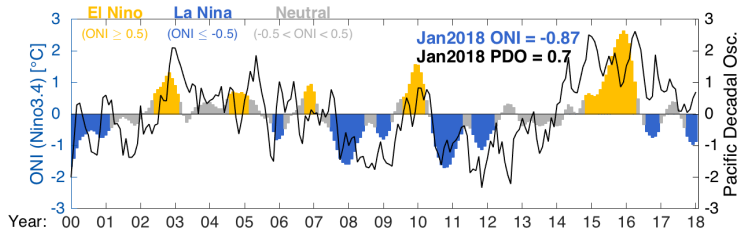
(particulate domoic acid)



*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 water column particulate domoic acid (pDA). Water column 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. "Not recent" 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.

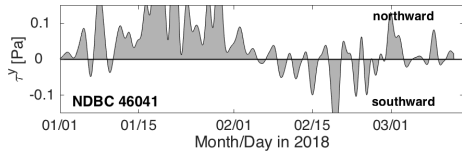
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health and the Oregon Department of Agriculture after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information presented here.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



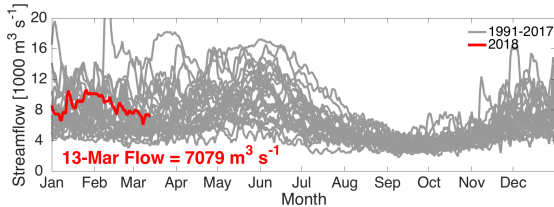
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## 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



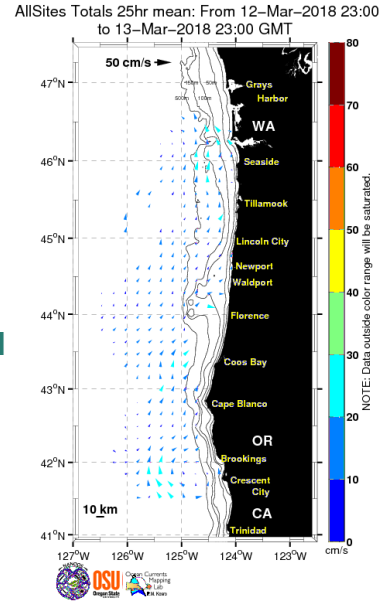
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

## Marine Weather Forecast



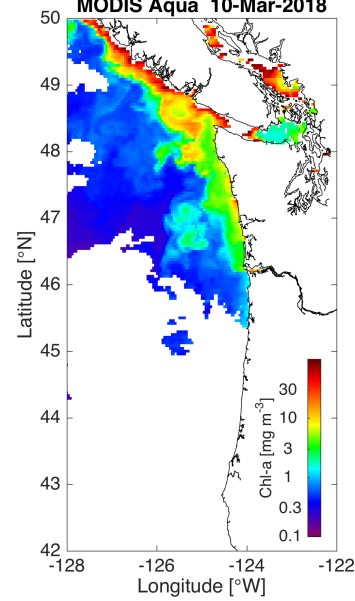
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

## Ocean Surface Currents



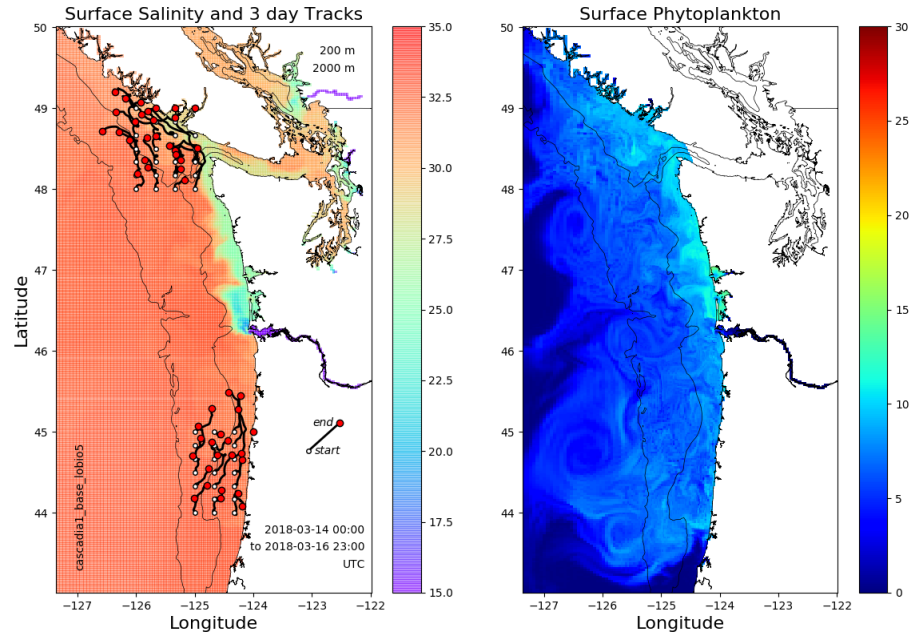
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

## 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.

## 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** - Throughout most of February, winds and surface ocean currents were upwelling-favorable. Phytoplankton blooms were evident off WA and OR in satellite imagery available at that time. More recently, coastal winds and currents have returned to the downwelling-favorable conditions typical of late winter. The spring transition to large-scale coastal upwelling has not yet occurred. Nevertheless, *Pseudo-nitzschia* (*PN*) are present off both WA and OR. Highest *PN* abundances were recently recorded at northern and southern OR beaches (Sunset Beach: 26,000 and 77,000 cells/L; Gold Beach: 18,000 and 42,000 cells/L; for large and small morphologies, respectively). *PN* cells are also present off southern and central WA beaches, albeit at lower concentrations (< 20,000 cells/L at all sites). Water column particulate domoic acid (pDA) was ~24 ng/L off northern OR beaches near the Columbia River on 6-Mar. The NOAA Ship *Bell M. Shimada* sampled *PN* and pDA off OR and northern CA from 27-Feb to 5-Mar. Particulate DA was low (< 6 ng/L) at all sites; both large- and small-cell *PN* were omnipresent but low in abundance; species composition is currently unknown. Recent razor clam samples in WA had DA concentrations ≤ 6 ppm. Razor clams collected from Sunset Beach, OR, had DA concentrations of 13 ppm on 2-Mar. Washington and northern OR razor clam digs are ongoing. Oregon beaches south of Cascade Head (near Lincoln City) remain closed to razor clam harvest due to elevated DA.

**Forecast** - ENSO conditions are currently weakening (warming) from a moderate La Niña state; neutral ENSO conditions are expected for this spring and summer. The PDO increased significantly (warmed) to a value of 0.7 following average conditions during prior months. The short-term weather forecast suggests generally northward but relatively weak and variable winds for the next few days that could retain plankton and toxins near the coast. The LiveOcean forecast indicates that northward ocean flows will continue through the week's end. We do not anticipate the spring transition to occur this week; *PN* will likely remain present nearshore. Since pDA is present at moderate levels off northern OR we do recommend caution during upcoming digs. The relatively early presence of *PN* cells and, in particular, pDA is concerning. We recommend that managers exercise continued caution as we approach the seasonal change to upwelling conditions and the resulting large scale spring phytoplankton blooms.