



# Pacific Northwest Harmful Algal Blooms Bulletin

May 12, 2019 HAB risk =

HAB risk key:

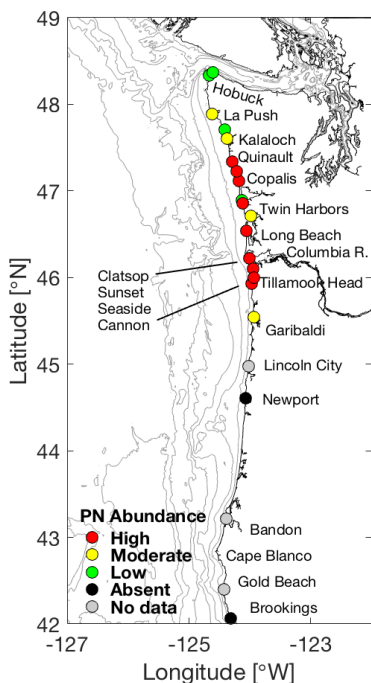
- = low
- = medium
- = high



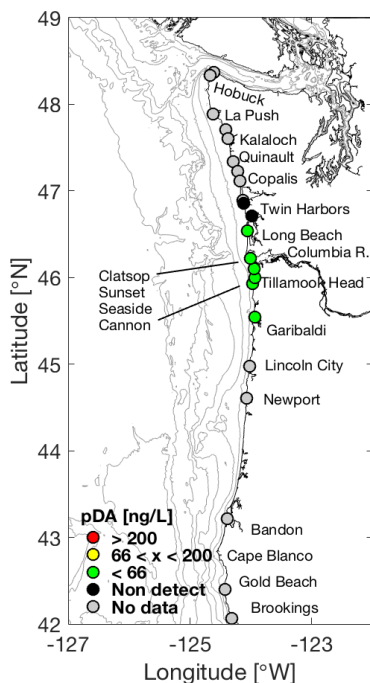
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

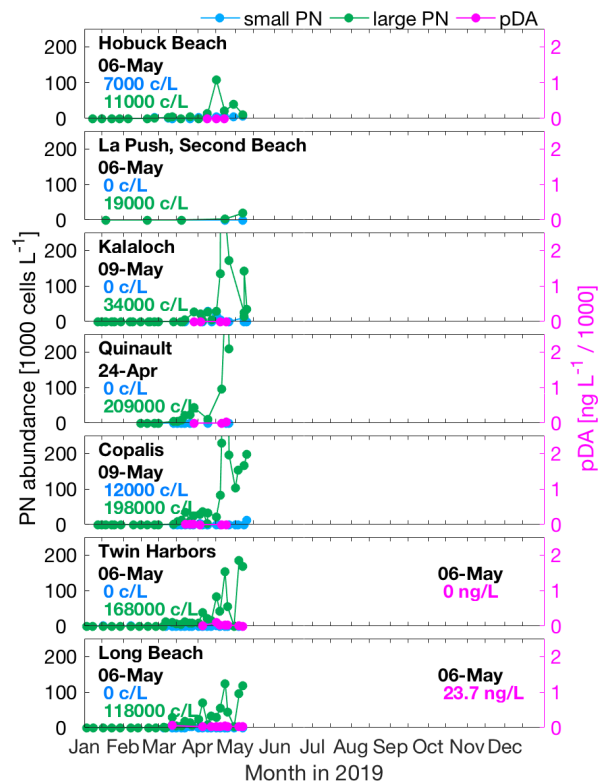
(*Pseudo-nitzschia*)



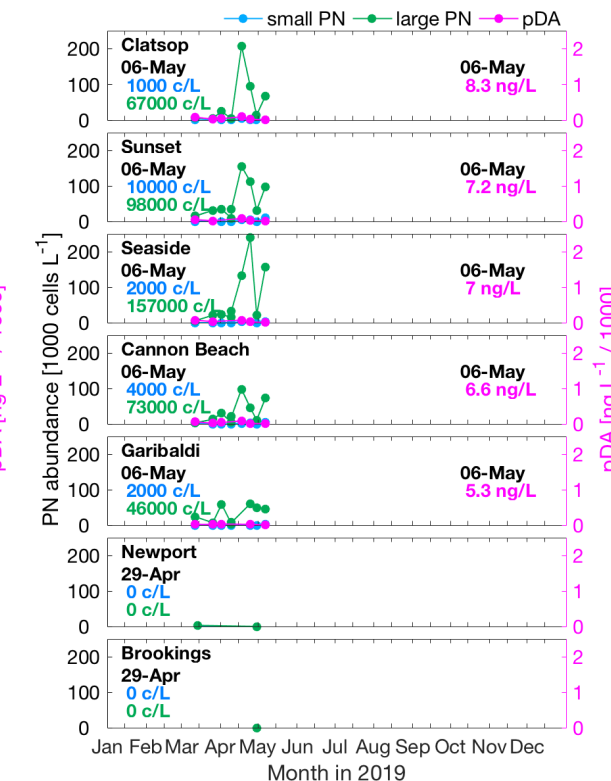
(particulate domoic acid)



## WA *Pseudo-nitzschia* & Domoic Acid

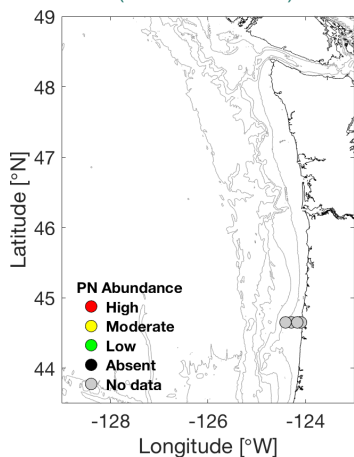


## OR *Pseudo-nitzschia* & Domoic Acid

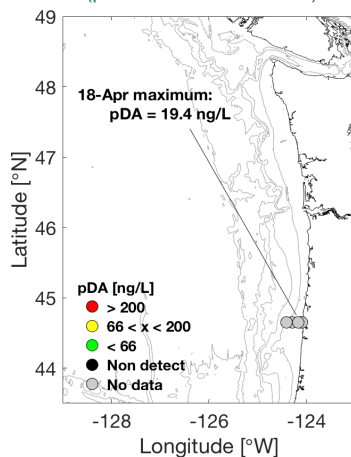


## Offshore Sampling

(*Pseudo-nitzschia*)



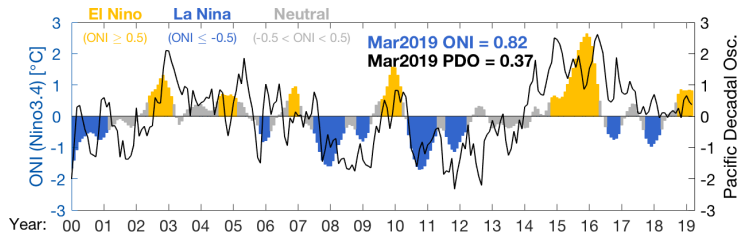
(particulate domoic acid)



*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; *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.

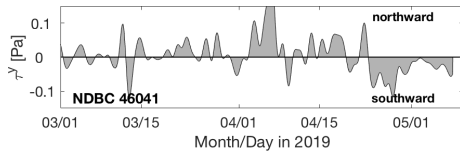
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information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



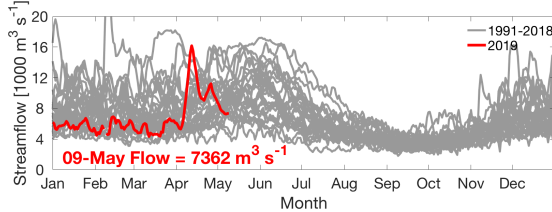
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## North-south Wind Stress



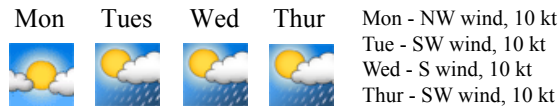
Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cumulative upwelling index (i.e. during years with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

## Columbia River Discharge



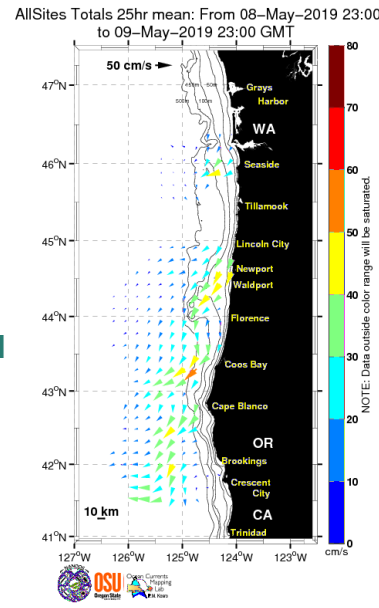
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

## Marine Weather Forecast



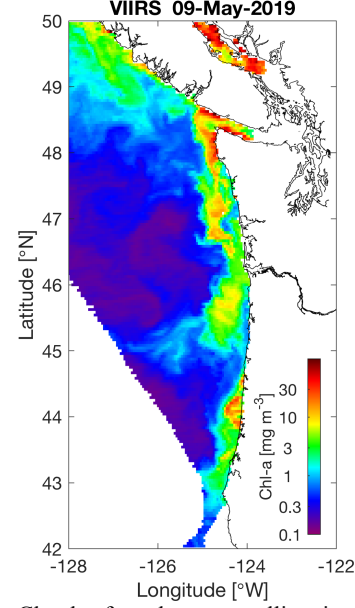
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

## Ocean Surface Currents



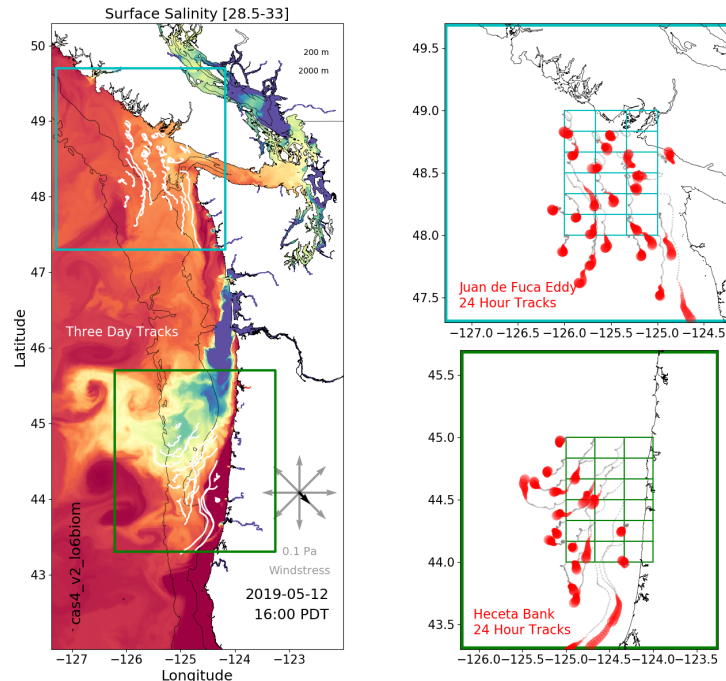
Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

## 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.

## LiveOcean Forecast Model



Model predicted sea surface salinity with particles released near the Juan de Fuca eddy and Heceta Bank and tracked three days into the future.

**Summary** - In late April winds and surface ocean currents switched to strongly southward, and large scale upwelling commenced. Coastal phytoplankton blooms are evident in recent satellite images. Beach samples have documented increasing abundances of large morphology *Pseudo-nitzschia* (*PN*). Recent *PN* cell counts were highest at Copalis, WA (198,000 cells/L on 9-May), and Seaside, OR (157,000 cells/L on 6-May). Small morphology *PN* cells have also started appearing, in low abundance (12,000 cells/L at Copalis, WA, on 9-May). Seawater particulate domoic acid (pDA) has remained relatively low (max 24 ng/L at Long Beach on 6-May). Samples from the five northern OR beaches were all <9 ng/L pDA on 6-May. Scanning electron microscopy (SEM) of samples collected off Newport, OR, on 18-Apr, prior to the transition to upwelling, contained a mix of *P. australis* and *P. pungens* cells and low pDA (<20 ng/L). Since then, a NOAA research vessel has been sampling off both OR and WA, but *PN* abundances and toxin results are not yet available. SEM analysis of beach samples collected on 24-Apr (after the change to upwelling) from Twin Harbors, WA, and Seaside and Sunset Beaches, OR, indicated primarily *P. pungens* cells with toxigenic *P. cuspidata* also present. Razor clam DA samples from WA beaches and Clatsop Beach, OR were ≤5 ppm and <7 ppm, respectively, as of 8-May. Gold Beach, OR, razor clams increased from 39 ppm on 26-Apr to 140 ppm on 9-May; a crab viscera sample from that same region was at 40 ppm DA, suggesting an ongoing toxic event. OR beaches south of Cape Blanco are closed to shellfish and recreational crab harvest.

**Forecast** - Mild El Niño conditions are ongoing and expected to persist throughout summer and into fall. The PDO index remains positive. Southward winds will continue through Monday. By Tuesday winds will turn northward as a storm arrives, and are anticipated to remain northward through Wednesday. Another storm, with northward winds, is expected to impact the region on Friday. *PN* cells and toxins will likely get pushed shoreward during this period. However, since current shellfish DA levels and seawater pDA levels are relatively low, the likelihood of a large toxic event appears relatively low north of southern OR. Because the coastal phytoplankton community can transition rapidly and seawater toxin concentrations remain detectable, we recommend continued caution, particularly in southern OR.