



# Pacific Northwest Harmful Algal Blooms Bulletin

May 19, 2020 HAB risk =

HAB risk key:

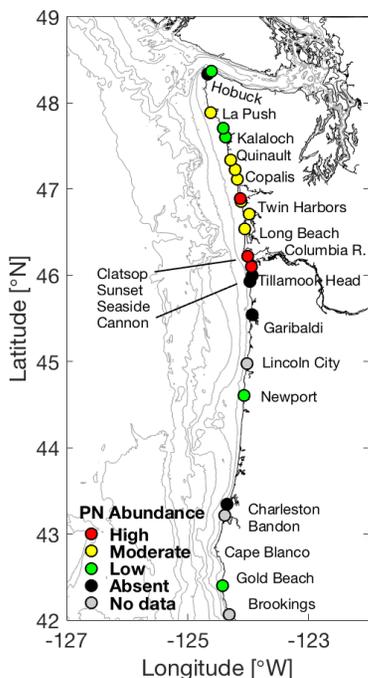
- = low
- = medium
- = high



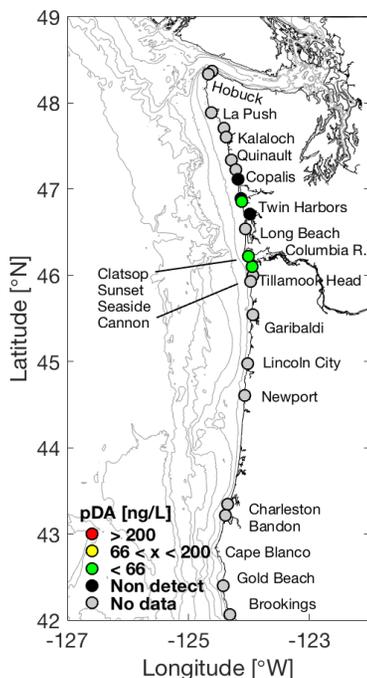
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

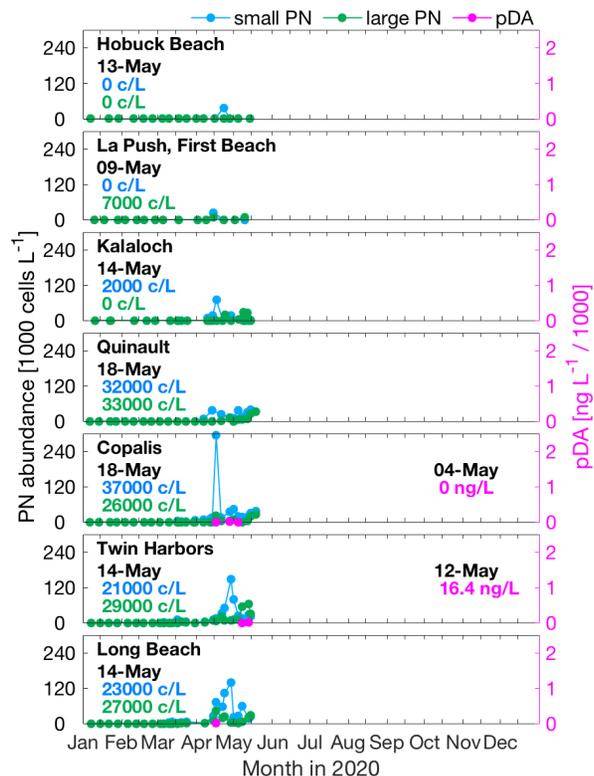
(*Pseudo-nitzschia*)



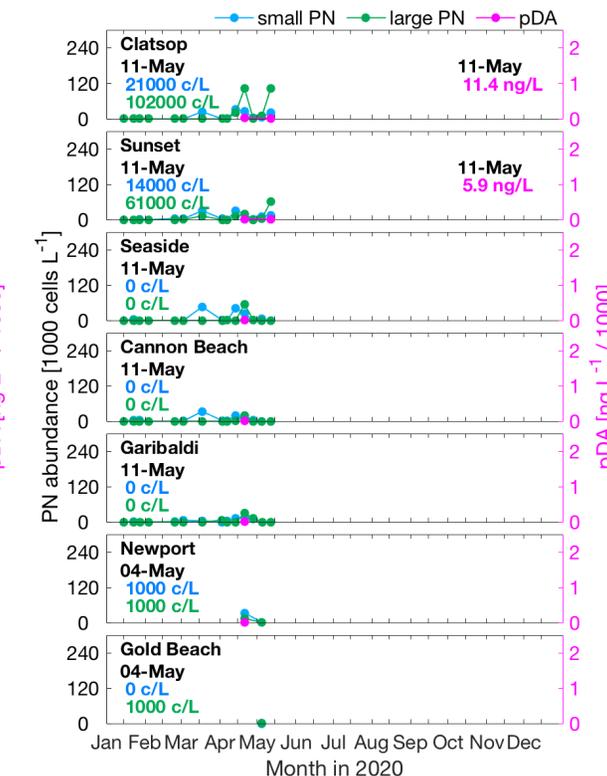
(particulate domoic acid)



## WA *Pseudo-nitzschia* & Domoic Acid

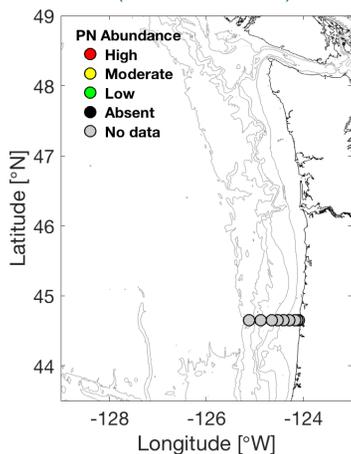


## OR *Pseudo-nitzschia* & Domoic Acid

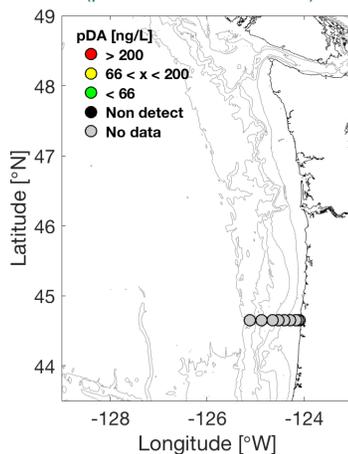


## Offshore Sampling

(*Pseudo-nitzschia*)



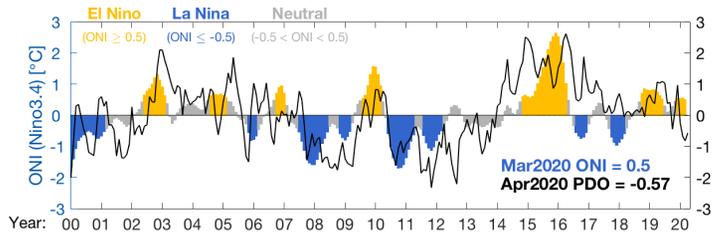
(particulate domoic acid)



*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.

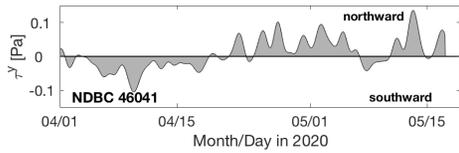
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information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



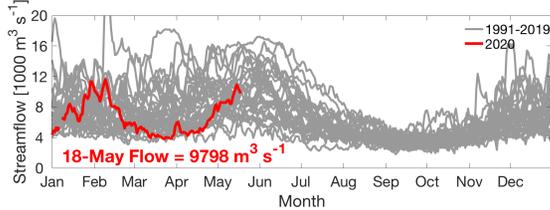
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## 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



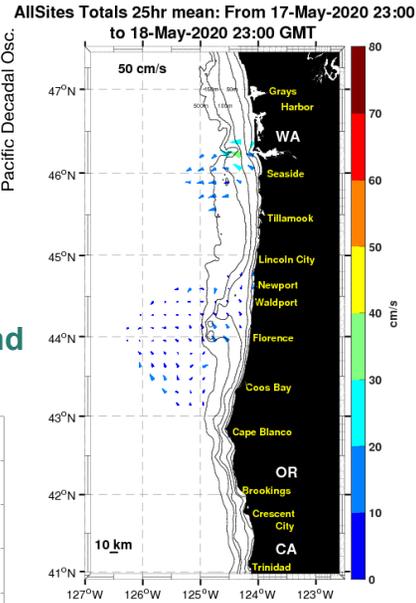
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

## Marine Weather Forecast



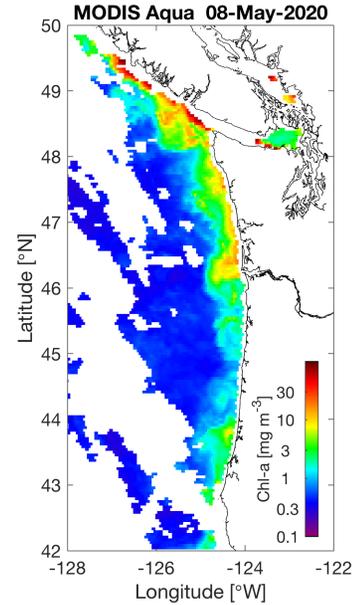
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

## 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.

**Summary** - During the first half of May winds fluctuated, but remained primarily downwelling-favorable. This, coupled with the spring freshet, led to a large quantity of Columbia River water along the WA coast. Satellite imagery suggests higher chlorophyll-a concentrations there, consistent with recent beach monitoring results. Beach samples confirm a mix of both large and small morphology *Pseudo-nitzschia* (*PN*). In WA, the highest recent *PN* concentrations were at Westport (large: 55,000 cells/L; small: 20,000 cells/L) on 14-May and Copalis (large: 26,000 cells/L; small: 37,000 cells/L) on 18-May. In OR, *PN* concentrations were highest at Clatsop South Jetty (large: 102,000 cells/L; small: 21,000 cells/L) on 11-May, but were much lower or undetected south of Sunset Beach. Despite the elevated concentrations of large morphology *PN*, recent seawater particulate domoic acid (pDA) concentrations were low where sampled (Twin Harbors: 16.4 ng/L on 12-May; Clatsop: 11.4 ng/L on 11-May). No recent offshore samples have been collected and the *PN* species have not been identified. As of 13-May, WA razor clam DA concentrations remain low ( $\leq 2$  ppm). PSP levels in razor clams remain greater than regulatory limits at La Push and were elevated at Kalaloch as of 8-May. In OR, results from 14-May indicated that razor clam DA was 6.4 ppm at Clatsop South Jetty, 12 ppm at both Newport Agate Beach and Coos Bay North Jetty sites, and 24 ppm at Gold Beach. Near Humboldt, CA, recent reports indicate that seawater DA has been increasing, consistent with an ongoing *PN* bloom; razor clams there continue to contain dangerous levels of DA.

**Forecast** - ENSO neutral conditions continue, and are expected to persist through summer and fall. The recent PDO value remains negative. High pressure offshore will lead to generally southeastward winds this week. The LiveOcean forecast suggests some upwelling, with nearshore currents turning southward. Northward winds are forecast for the weekend, but high pressure is expected to build next week which should drive additional upwelling. Given this, we do not anticipate rapid changes in the state of the coastal ocean. The current low pDA concentrations are encouraging. The short-term perceived risk of a large DA outbreak remains low, but managers should reassess with updated *PN* and pDA results as the weather changes, particularly during any extended duration harvests. Given the elevated seawater DA levels in northern CA, managers should continue diligent monitoring in southern OR.

## LiveOcean Forecast Model

