



# Pacific Northwest Harmful Algal Blooms Bulletin

Apr 2, 2024 HAB risk =

HAB risk key:

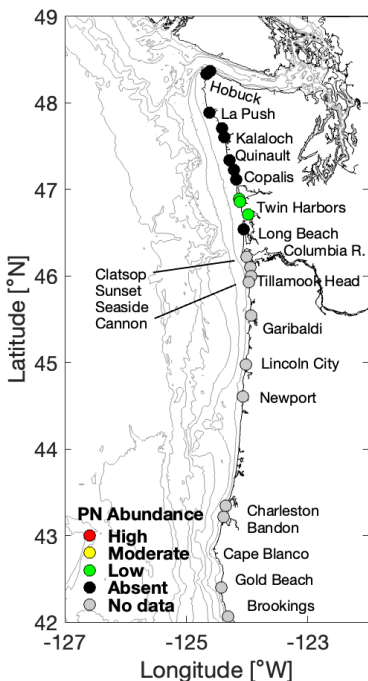
- = low
- = medium
- = high



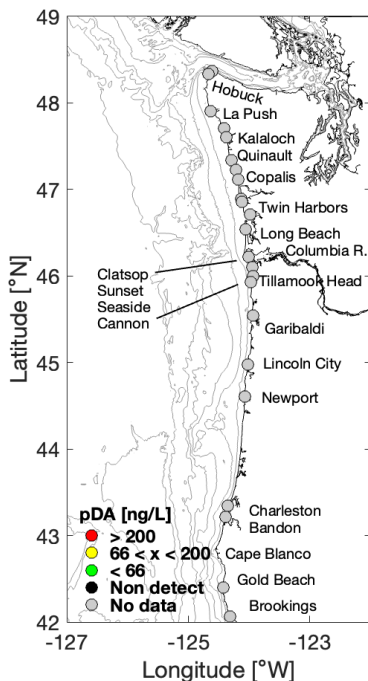
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

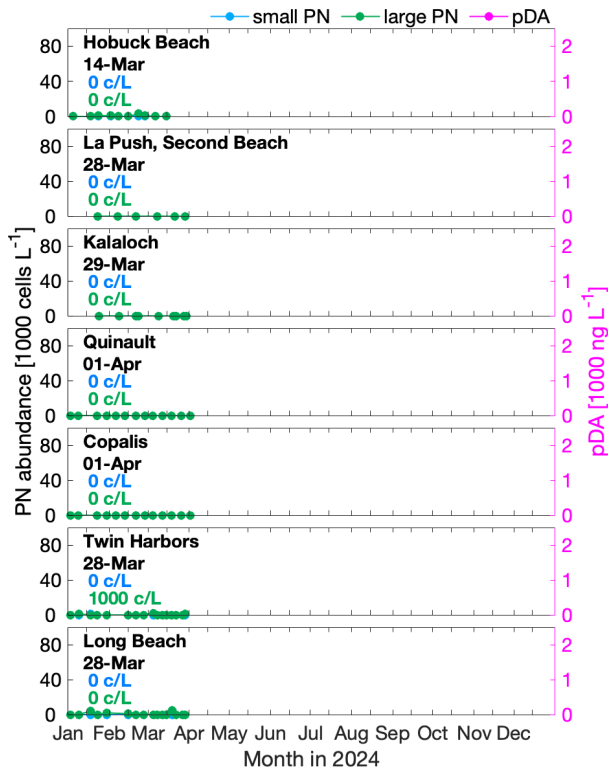
(*Pseudo-nitzschia*)



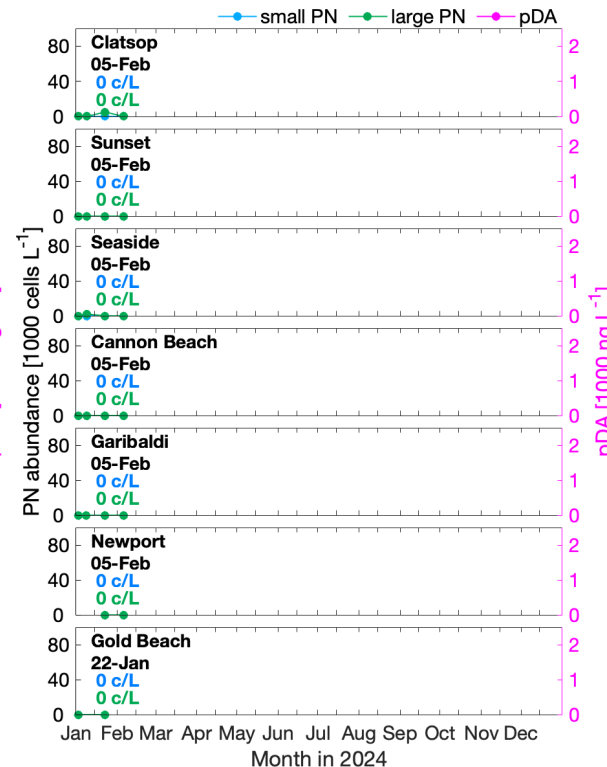
(particulate domoic acid)



## WA *Pseudo-nitzschia* & Domoic Acid

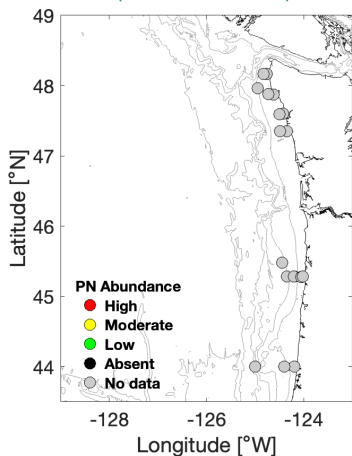


## OR *Pseudo-nitzschia* & Domoic Acid

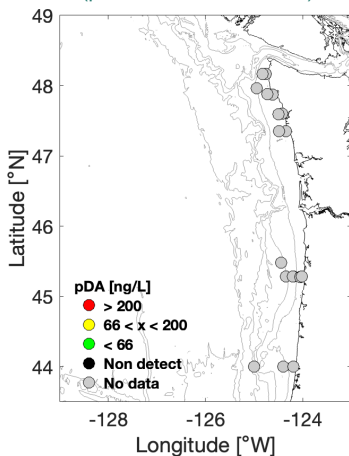


## Offshore Sampling

(*Pseudo-nitzschia*)



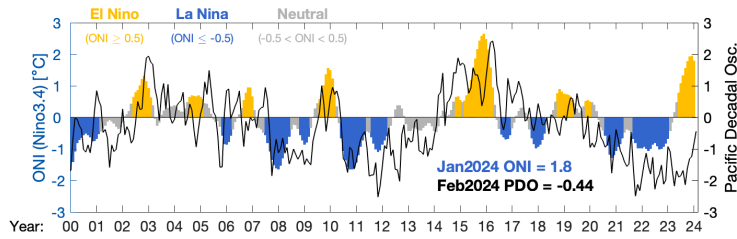
(particulate domoic acid)



*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.

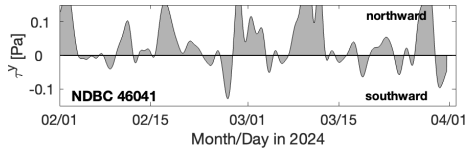
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information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



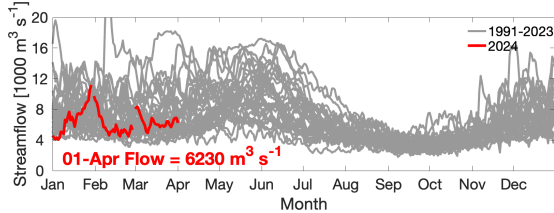
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## 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



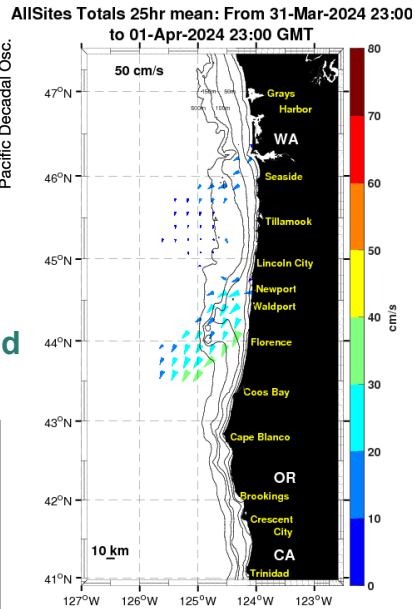
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

## Marine Weather Forecast



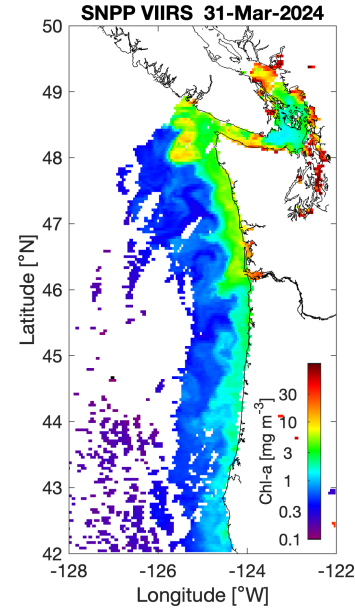
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

## 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

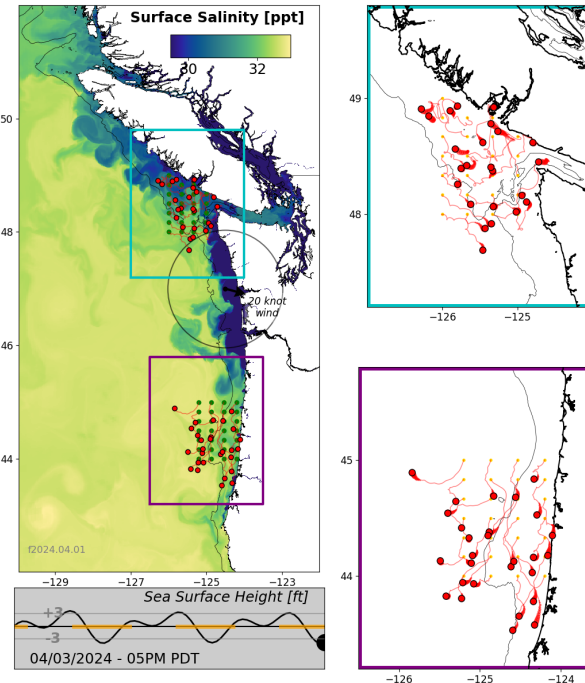


Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

**Summary** - A number of storms have impacted the region over the last couple of months, resulting in continued predominantly downwelling conditions. According to the LiveOcean model, the Columbia River plume remains northward along the WA coast. Satellite chlorophyll-*a* estimates are moderate nearshore, a signal that is likely impacted by sediment and freshwater runoff. Middle shelf bottom temperature is still warm (~9 °C). All signs indicate that the spring transition to seasonal upwelling has not yet occurred. Coastal winds turned south late Friday, but that pattern was interrupted today by a passing front. *Pseudo-nitzschia* (*PN*) cells appeared intermittently at some WA beaches throughout the winter months. Highest recent concentrations were 5,000 cells/L of large size *PN* at Long Beach on 18-Mar. More recent observations documented ≤2,000 cells/L large *PN* in southern WA as of 28-Mar. No *PN* have been detected at central WA beaches. Surprisingly, *PN* cells were detected 200 nm offshore of Newport, OR, in early March. No recent cell observations are available from OR beaches. Given the low *PN* concentrations, seawater particulate domoic acid (pDA) has not yet been quantified. Razor clam DA values are also generally low. The highest recent concentration in WA was 6 ppm DA at Mocrocks on 18-Mar. In OR, recent high values were 6 ppm at Sunset Beach and 7 ppm at Newport on 15-Mar. Interestingly, crab viscera DA concentrations from the Gold Beach, OR, area had increased as of 21-Mar, with values as high as 16 ppm, suggesting a potential DA source nearby.

**Forecast** - El Niño conditions currently exist, but are rapidly dissipating. Neutral conditions are expected by May, and La Niña conditions are favored to develop by July. The PDO index remains negative but has decreased in magnitude over the last few months, indicative of warming. Coastal winds are forecast to be upwelling-favorable through the end of the week. They will shift to shoreward Saturday as another front passes over the region. A follow-up storm system appears in the forecast for Monday, but considerable uncertainty currently exists regarding its strength and position. *PN* cell concentrations should generally begin their seasonal increase soon, but large-scale upwelling appears unlikely to occur within the next few days. Near-term conditions appear consistent with overall low risk. An exception could exist in southern OR given the crab viscera values, so some caution is advised there.

## 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. Red dots indicate particle endpoints.