



# Pacific Northwest Harmful Algal Blooms Bulletin

May 31, 2023 HAB risk =

HAB risk key:

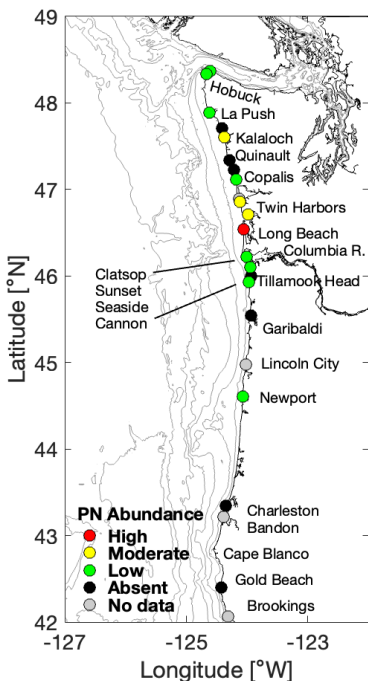
- = low
- = medium
- = high



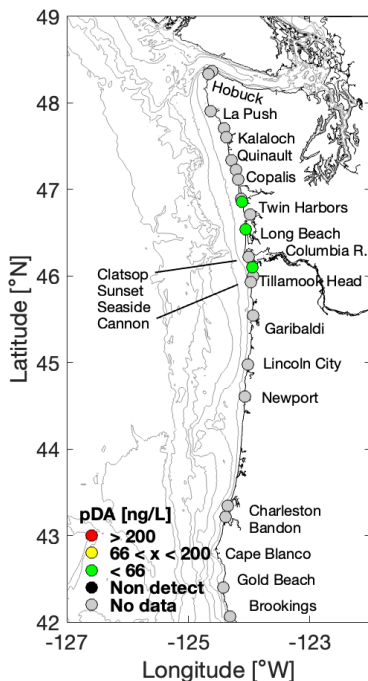
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

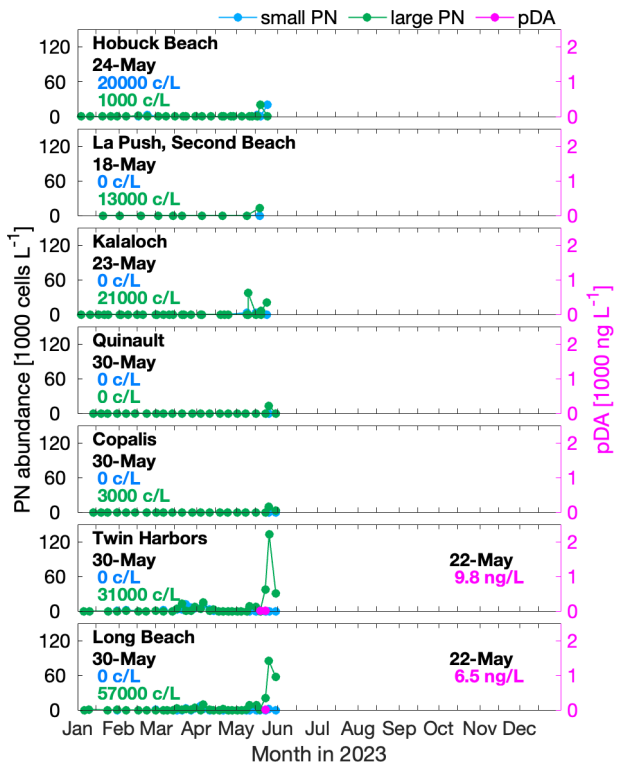
(*Pseudo-nitzschia*)



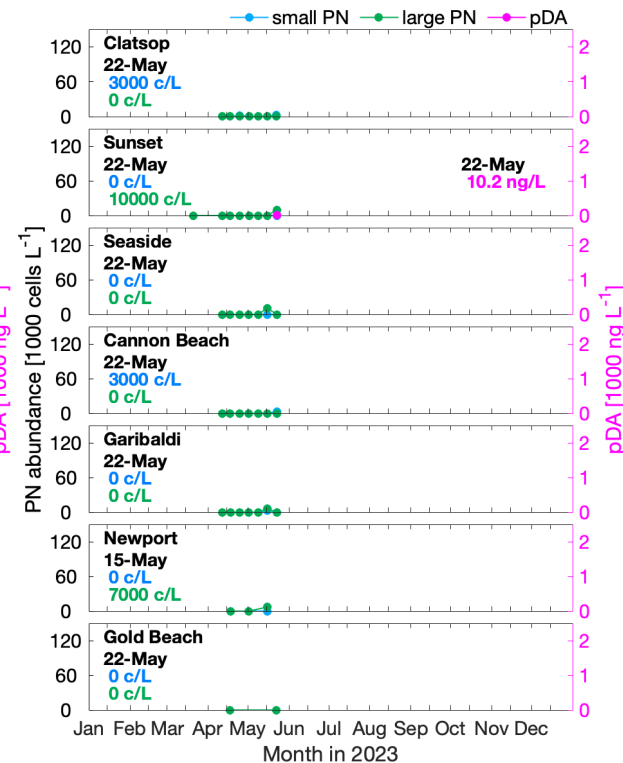
(particulate domoic acid)



## WA *Pseudo-nitzschia* & Domoic Acid

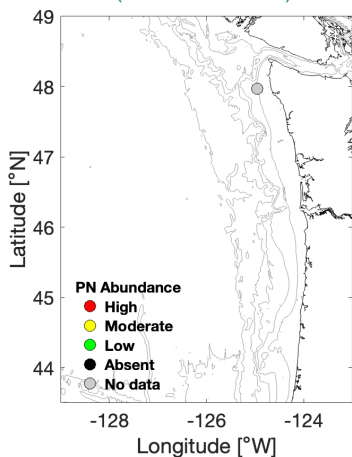


## OR *Pseudo-nitzschia* & Domoic Acid

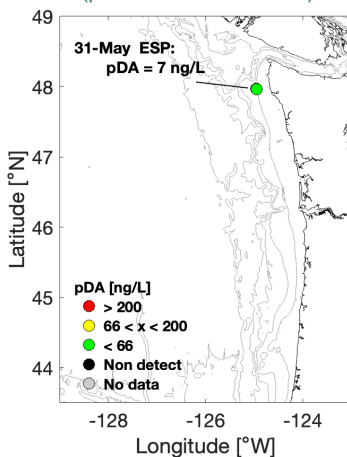


## Offshore Sampling

(*Pseudo-nitzschia*)



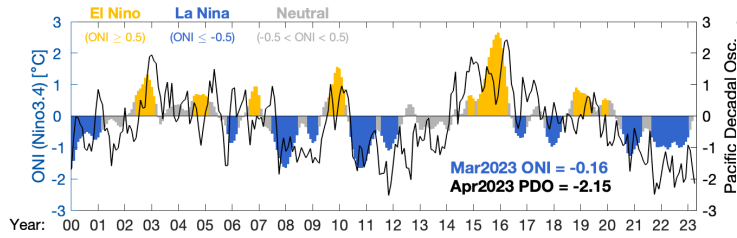
(particulate domoic acid)



*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.

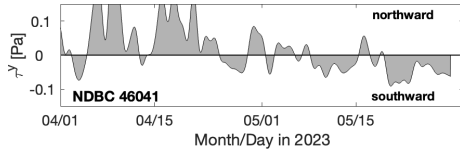
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information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



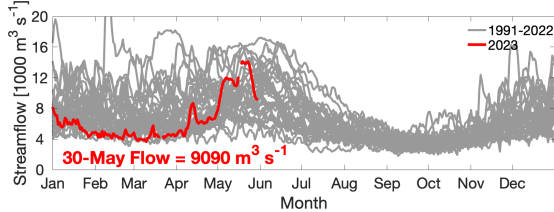
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## 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.

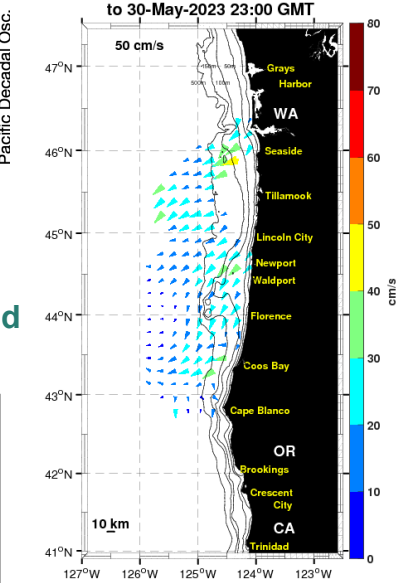
## Marine Weather Forecast



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

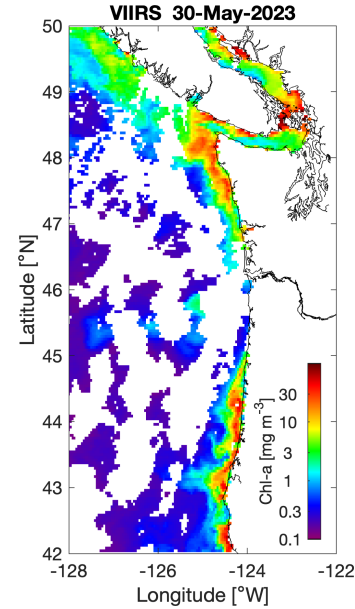
## Ocean Surface Currents

AllSites Totals 25hr mean: From 29-May-2023 23:00 to 30-May-2023 23:00 GMT



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

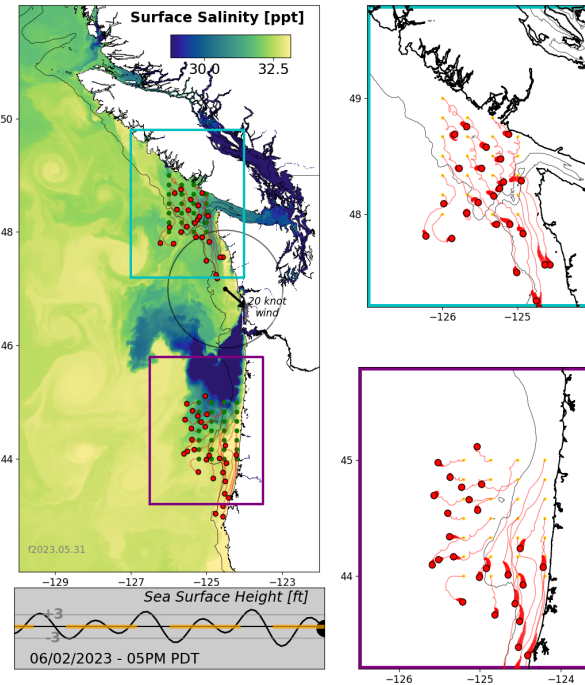


Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

**Summary** - In the last couple of weeks, coastal winds became stronger and were sustained southward. Ocean currents also now flow south, consistent with the occurrence of the spring transition to upwelling. The LiveOcean model indicates that Columbia River water is oriented southwest off OR. On 30-May, researchers aboard an ongoing NOAA Ecosystem cruise reported 7.7 °C shelf bottom water 5 nm off Newport, OR, confirming active upwelling. Recent low-level clouds have obscured satellite images, but available snapshots indicate elevated chlorophyll-a values along the coast including off northwest WA. Both large and small morphology *Pseudo-nitzschia* (*PN*) cells have appeared at beaches throughout the region as far south as Newport, OR. The highest cell abundances have been at WA beaches, with a recent maximum of 133,000 cells/L of large *PN* at Twin Harbors, WA, on 25-May. *P. australis*-like cells were noted at southern WA beaches 22-30 May. Seawater particulate domoic acid (pDA) concentrations at southern WA and northern OR beaches were low (<11 ng/L) on 22-May. Samples collected from the NOAA Ecosystem cruise indicated that *PN* were common off Crescent City, CA (just south of Brookings, OR). The ESP mooring off northwest WA has intermittently detected pDA, with a recent value of 7 ng/L on 31-May. Razor clam DA concentrations continue to decrease. In WA, highest recent values (8 ppm) were at Willapa Spits on 23-May. In OR, Clatsop area razor clams remained at 15 ppm as of 26-May.

**Forecast** - An ENSO neutral state continues and is expected to transition to El Niño this summer. The PDO remains negative. Weather forecasts suggest that winds should generally remain upwelling-favorable. Winds will weaken Friday but that relaxation should not last; southward winds will strengthen again by Saturday. Stronger, persistent upwelling-favorable winds currently dominate longer-term forecasts, though uncertainty increases next week. *PN* cell concentrations should continue to increase. Despite this, the near-term risk appears low. Recent beach observations indicate that *PN* are producing only low concentrations of DA. The expected persistent upwelling conditions are unlikely to lead to the development and transport of toxic blooms to the coast. Nevertheless, caution is advised beyond the weekend since the phytoplankton community can change rapidly and long-term uncertainty exists. Diligent *PN* and pDA monitoring at beaches will ensure safe harvests.

## 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 end points.