Pacific Northwest Harmful Algal Blooms Bulletin

Apr 2, 2023 HAB risk = 

HAB risk key:

- = *low*
- = *medium*
- = *high*

School of Oceanography, University of Washington

Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES

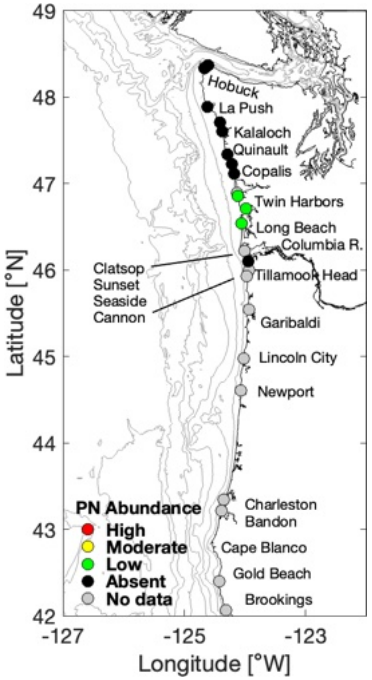
ORHAB PARTNERSHIP

NANOOS

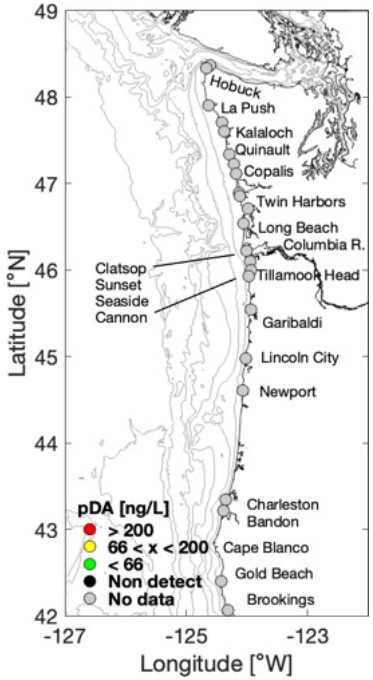
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

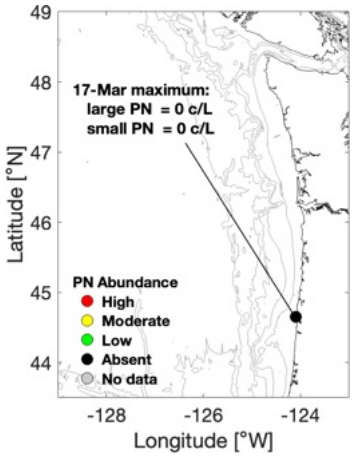


(particulate domoic acid)

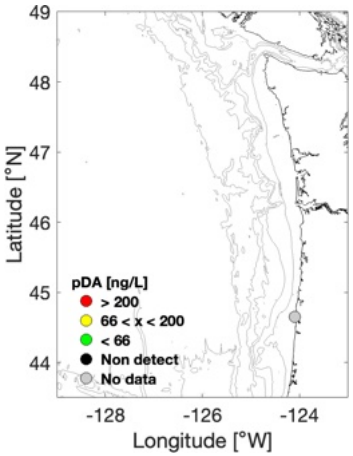


Offshore Sampling

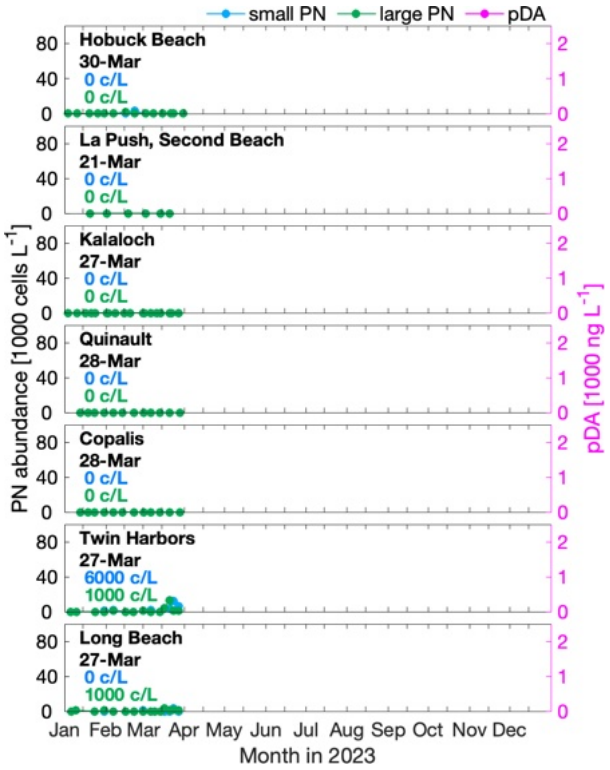
(*Pseudo-nitzschia*)



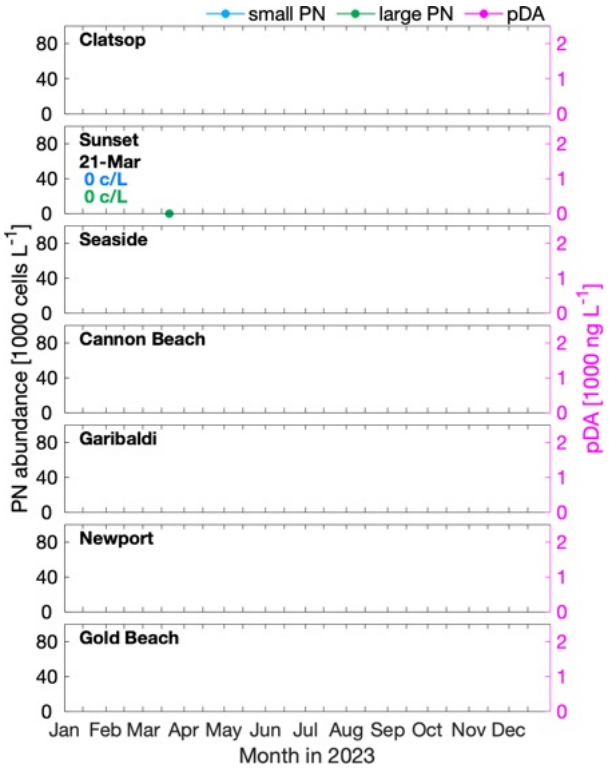
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



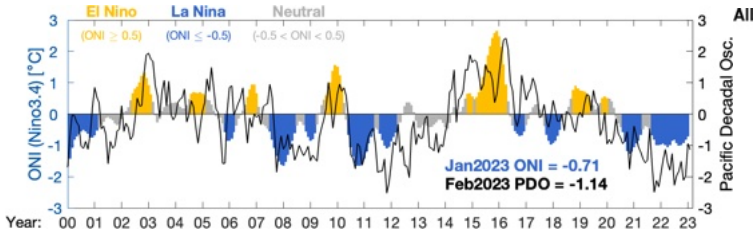
OR *Pseudo-nitzschia* & Domoic Acid



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.

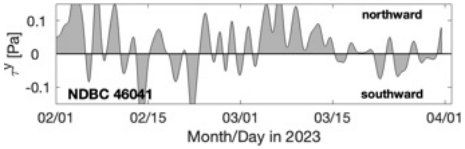
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



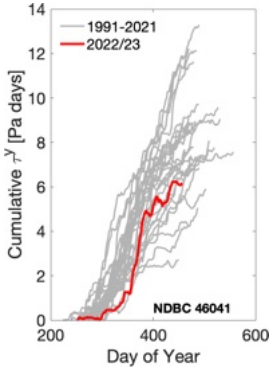
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

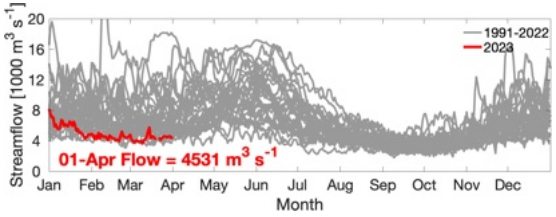


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress



Columbia River Discharge



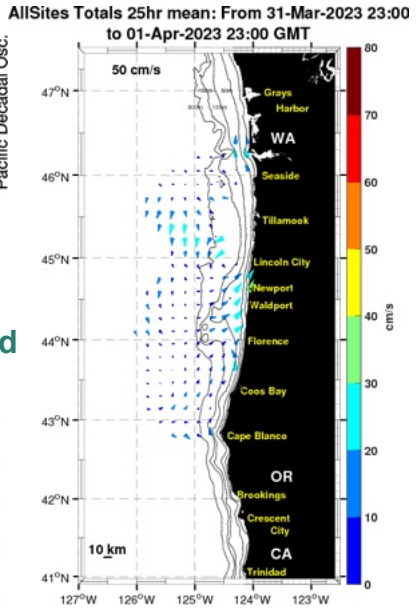
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

Marine Weather Forecast

Mon - NW wind, 15 kt
Tues - N wind, 10 kt
Wed - SE wind, 15 kt
Thur - S wind, 20 kt

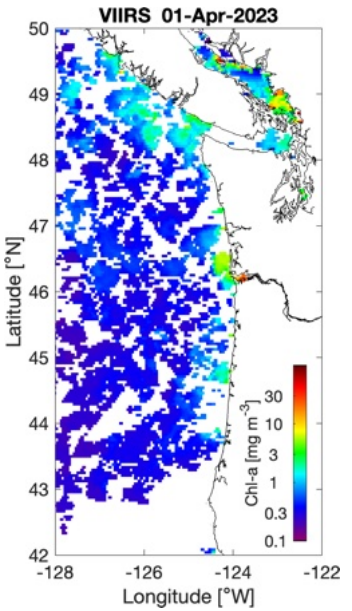
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

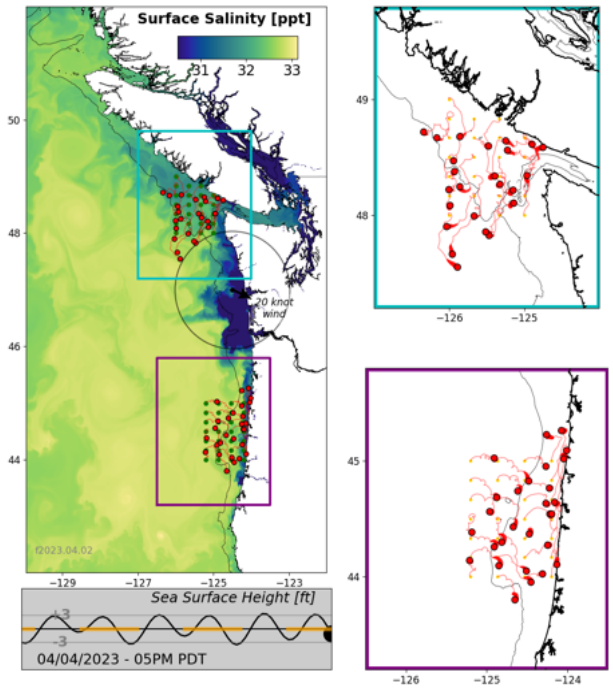
Satellite Chlorophyll-*a*



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. Red dots indicate particle end points.



Summary - Winter was somewhat atypical with a number of larger storms occurring south of Oregon. Stronger northward winds occurred in early March, but southward wind pulses have been more frequent since then. The oceanic transition to the regional upwelling that delivers nutrients for phytoplankton blooms has not yet occurred. A front with strong northward winds arrived on Friday, 31-Mar. However, winds quickly transitioned to primarily shoreward behind the front. Satellite images show moderate chlorophyll-*a* concentrations along the coast with highest values scattered near central OR, the Columbia River, and northwest WA. Columbia River flow has not yet begun to increase, but a fair amount of plume water currently occupies the nearshore regions of northern OR and the southern half of the WA coast according to the LiveOcean model. *Pseudo-nitzschia* (*PN*) cells have remained relatively sparse at WA beaches. The highest recent concentrations were <15,000 cells/L of both small and large morphology cells at Twin Harbors, WA, as of 27-Mar. A sample collected on 21-Mar at Sunset Beach, OR, had no detectable *PN* cells. A sample collected 5 nm offshore of Newport, OR, on 17-Mar also contained no *PN* cells. Given the low *PN* concentrations, seawater particulate domoic acid (pDA) has not yet been quantified at beaches. Razor clam DA concentrations continue to decrease from their elevated levels in fall 2022. Razor clam samples from WA beaches were all below the 20 ppm DA closure limit, with highest values (16 ppm) at Long Beach as of 21-Mar. Razor clams remain well over the closure limit at OR beaches (e.g., 43 ppm at Sunset Beach).

Forecast - La Niña conditions have ended and ENSO neutral conditions are expected into summer. There is a possibility of El Niño developing at that time. Warmer conditions are developing in the Pacific and so we expect the PDO index to decrease in magnitude soon. Winds this week will again turn briefly southward before returning to the northward direction on Wednesday, 5-Apr. Forecasts suggest those northward winds will persist through Saturday. Beyond next weekend, the longer-term forecasts currently disagree regarding whether another storm will approach the coast. No increases in shellfish DA concentrations have occurred recently. Since large concentrations of *PN* are not yet apparent, and because conditions appear to continue to reflect a winter-like state, we believe the risk of a large toxic *PN* event to be low.