



# Pacific Northwest Harmful Algal Blooms Bulletin

Apr 7, 2022 HAB risk =

HAB risk key:

- = low
- = medium
- = high

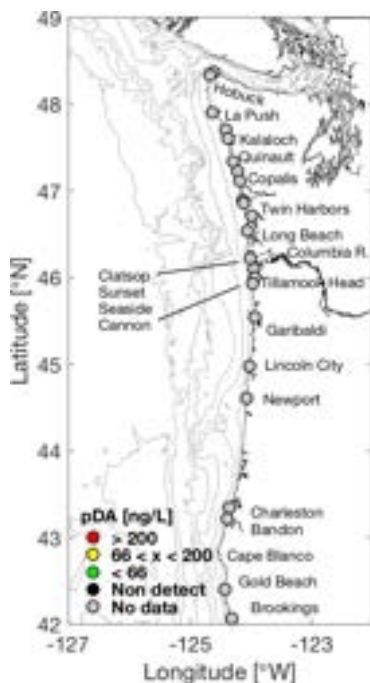
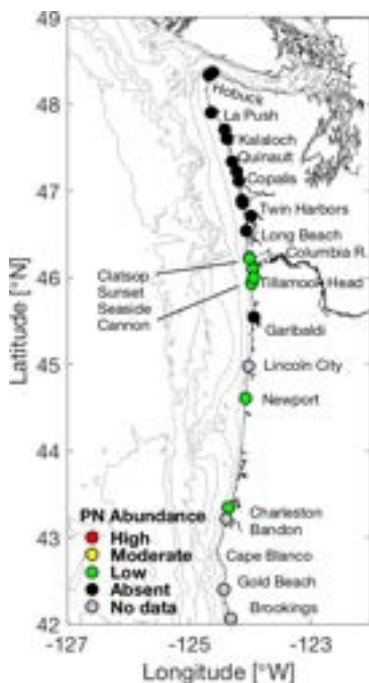


The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

## Beach Sampling

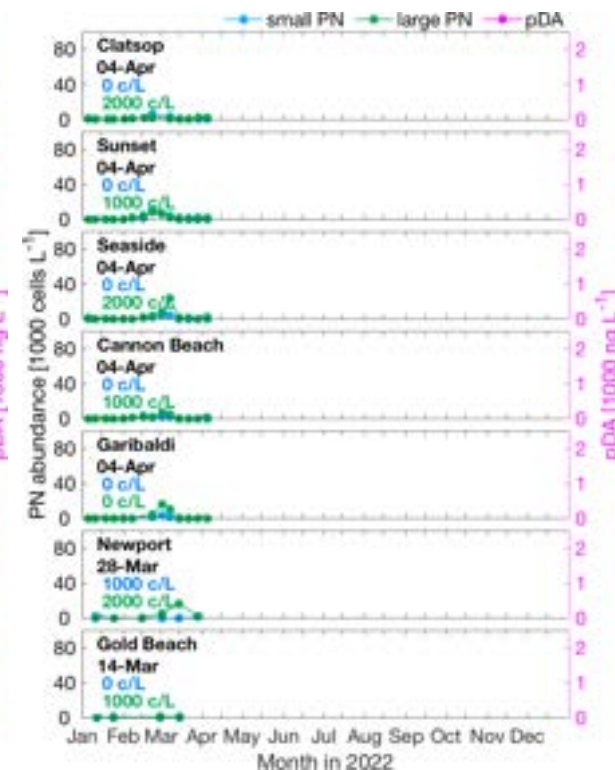
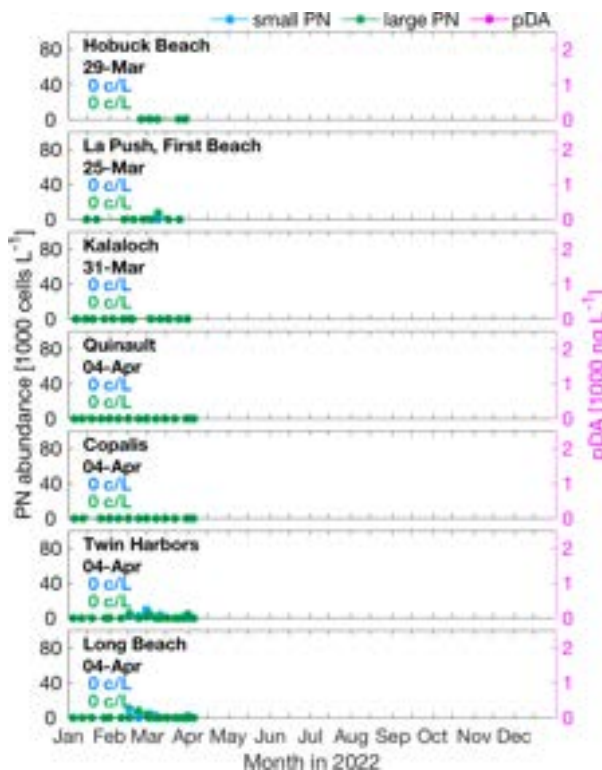
(*Pseudo-nitzschia*)

(particulate domoic acid)



## WA *Pseudo-nitzschia* & Domoic Acid

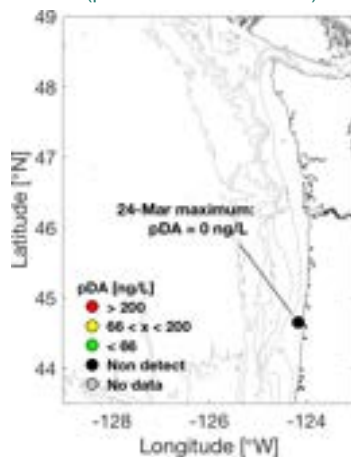
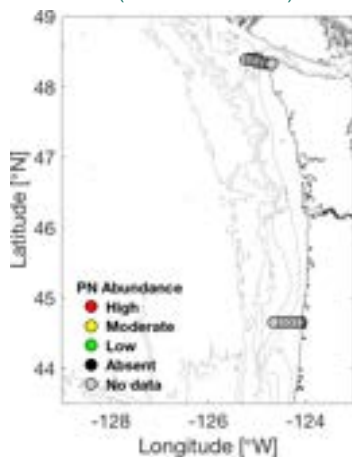
## OR *Pseudo-nitzschia* & Domoic Acid



## Offshore Sampling

(*Pseudo-nitzschia*)

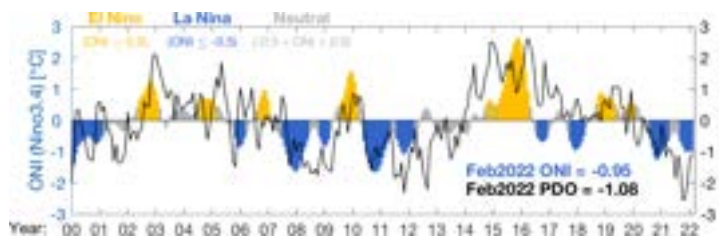
(particulate domoic acid)



*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. 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.

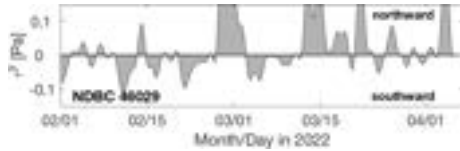
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA [link](#); OR [link](#)), and not from the information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



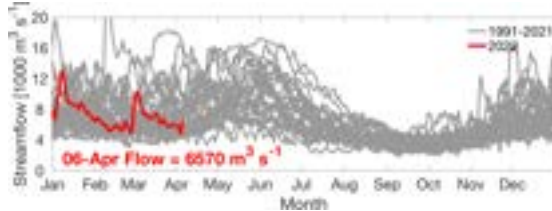
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

## 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



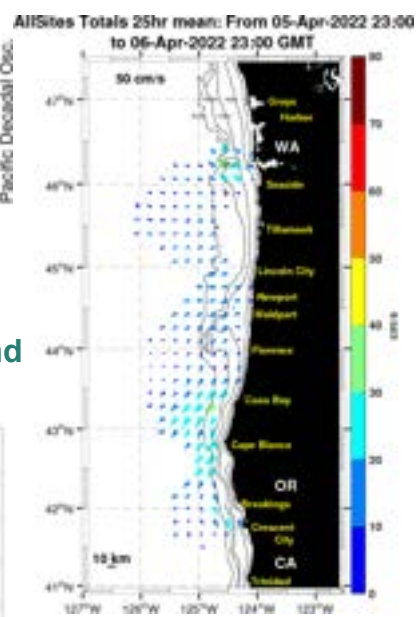
The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

## Marine Weather Forecast



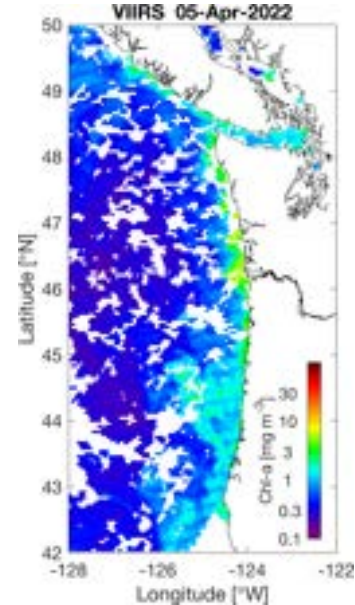
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

## 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

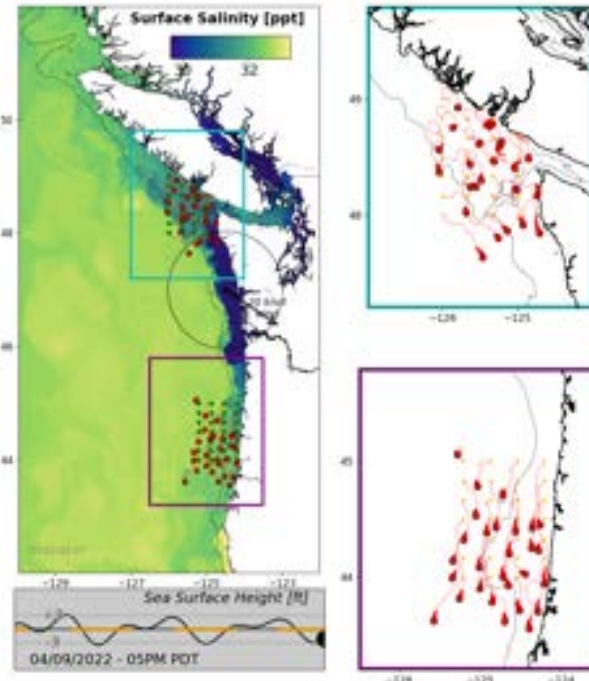


Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

**Summary** - Northward winter winds relaxed in February and even gave way to a few upwelling-favorable periods. Since then, spring storms have arrived and winds have been fluctuating between short-lived upwelling-favorable periods and the stronger northward storms. Ocean currents appear relatively weak and according to the LiveOcean model a large amount of Columbia River water remains all along the WA coast and at northern OR beaches. Satellite chlorophyll-a concentrations are moderate near the coast with highest values off WA. *Pseudo-nitzschia* (PN) cells have remained relatively sparse at both WA and OR beaches with the highest values <10,000 cells/L of small and large morphology cells (14-Mar to present); though more PN have generally been observed at OR beaches to date. Given the low PN concentrations, seawater particulate domoic acid (pDA) has not yet been quantified at beaches. A sample collected 5 nm offshore of Newport, OR, on 24-Mar, however, contained no detectable DA. WA and OR razor clam DA concentrations continue to decrease. Samples collected at WA beaches were generally ≤ 2 ppm as recently as 4-Apr. The exceptions were samples from Shoalwater Bay on 21-Mar (4 ppm) and Willapa Spits on 27-Mar (6 ppm). In OR, a razor clam sample from Sunset Beach on 4-Mar contained 8.5 ppm DA, but two subsequent samples contained no detectable DA. The only other razor clam sample with elevated DA came from Gold Beach on 4-Feb (52 ppm).

**Forecast** - The current La Niña conditions may transition to an ENSO neutral state by summer, but substantial uncertainty reportedly exists in that forecast. The recent PDO value remains negative. Warm sunny weather is expected to deteriorate Friday. However, stronger upwelling-favorable winds are likely Saturday and should remain until a small storm arrives on Sunday. After that storm passes, longer-term forecasts indicate generally upwelling-favorable conditions that could support PN blooms. Those longer-term forecasts are also rather uncertain at this stage. It would take some time for upwelling-favorable winds to flush Columbia River water away from the WA coast. Given this, risk appears generally low over the next few days at WA beaches, and possibly slightly higher off Oregon. Risk increases mid to late next week given the present uncertainty in weather. If the longer-term upwelling conditions do manifest in a more substantial PN bloom, pDA monitoring will help to 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.