Pacific Northwest Harmful Algal Blooms Bulletin

Sep 11, 2020 HAB risk = ⚠

HAB risk key:

- ✓ = *low*
- ⚠ = *medium*
- ✗ = *high*

School of Oceanography, University of Washington

Cooperative Institute for CLIMATE, OCEAN & ECOSYSTEM STUDIES

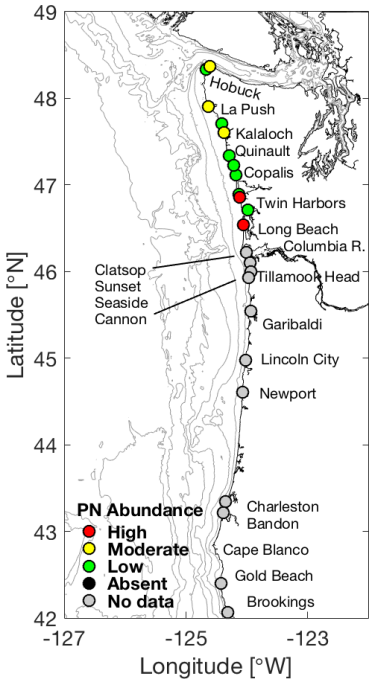
ORHAB PARTNERSHIP

NANOOS

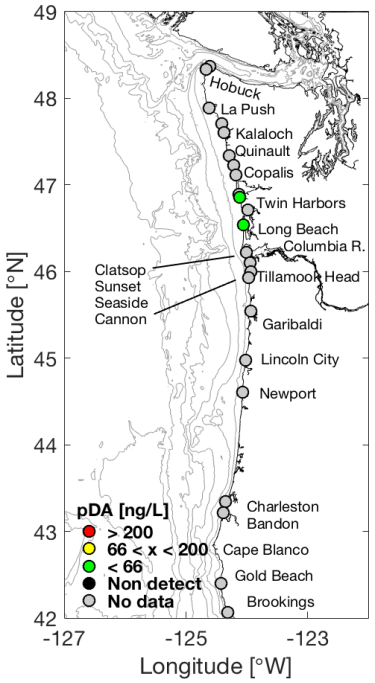
The statements, findings, conclusions, and recommendations do not necessarily reflect the views of NOAA or the Department of Commerce.

Beach Sampling

(*Pseudo-nitzschia*)

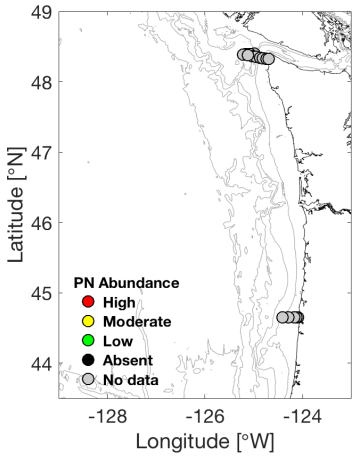


(particulate domoic acid)

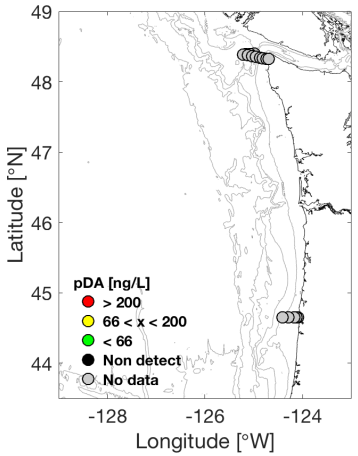


Offshore Sampling

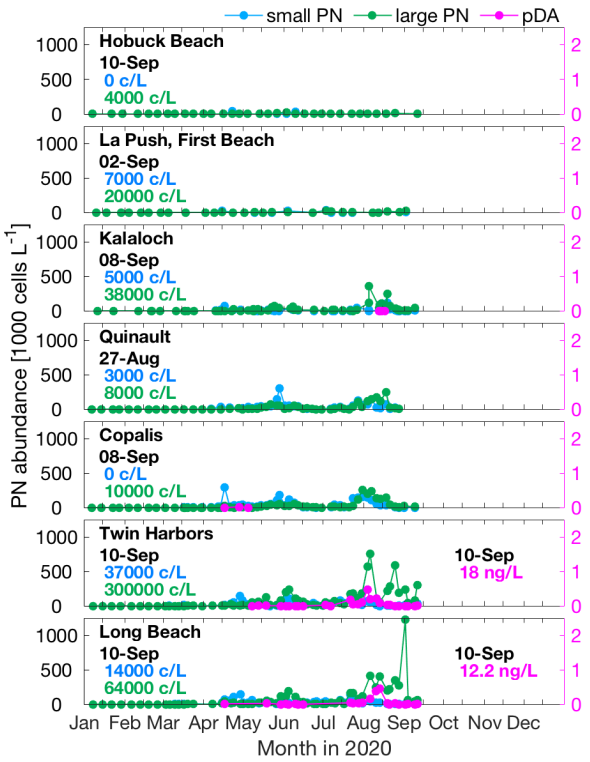
(*Pseudo-nitzschia*)



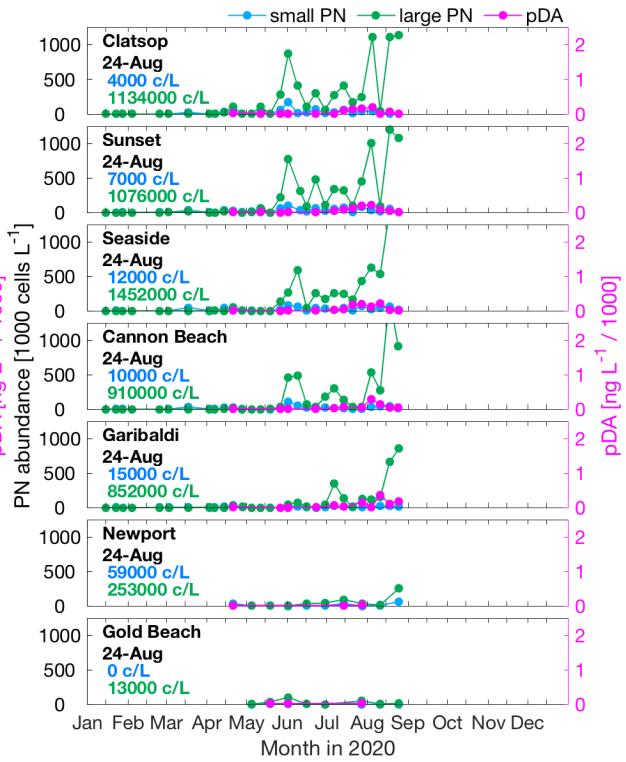
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid



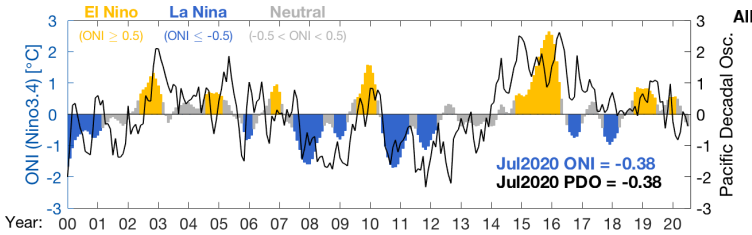
OR *Pseudo-nitzschia* & Domoic Acid



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.

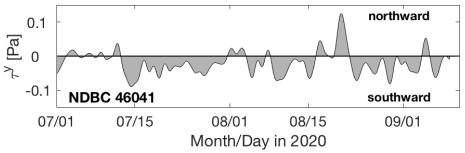
Decisions regarding shellfish harvest closures at individual beaches are made by the Washington Department of Health, the Oregon Department of Agriculture, and Coastal Treaty Tribes after measuring toxin levels in shellfish collected from each beach (WA link; OR link), and not from the information presented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



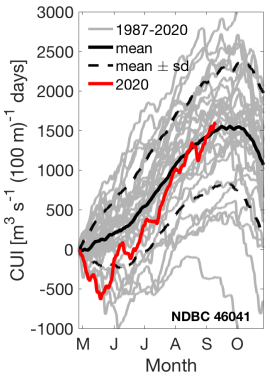
Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

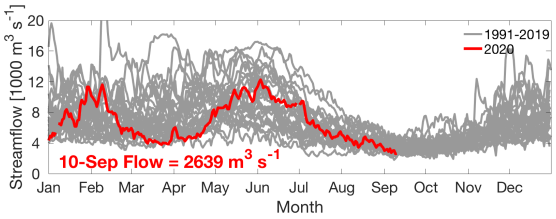


Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with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

Cumulative Wind Stress

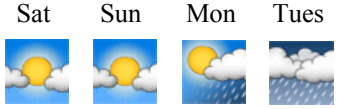


Columbia River Discharge



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.

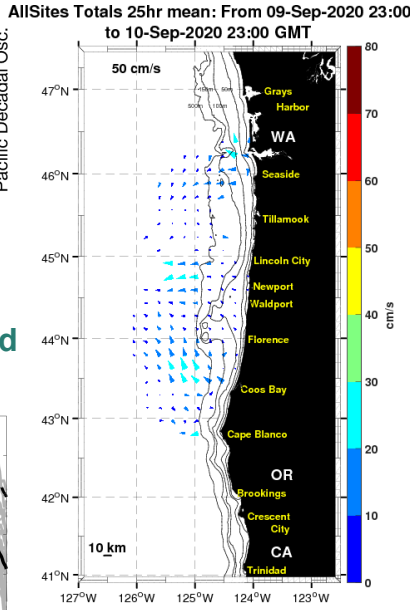
Marine Weather Forecast



Sat - S wind, 5 kt
Sun - S wind, 5 kt
Mon - S wind, 10 kt
Tues - S wind, 10 kt

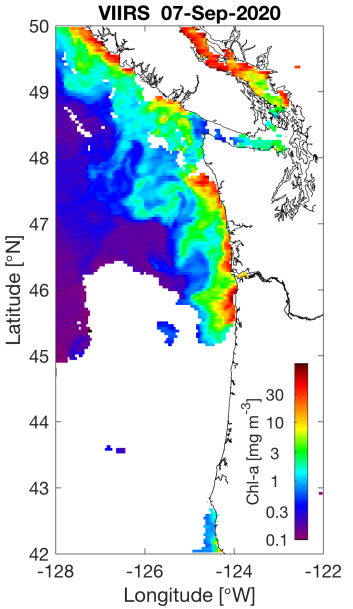
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

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.

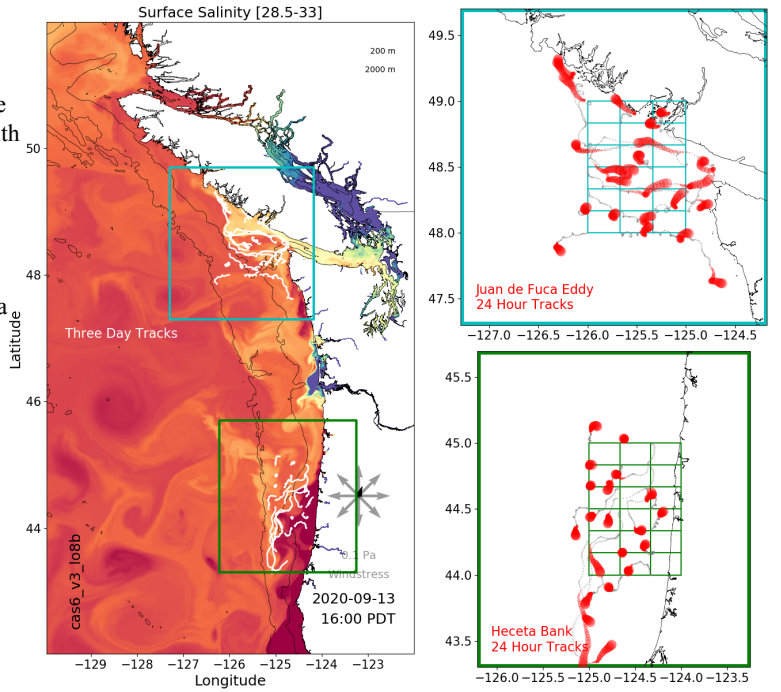
Satellite Chlorophyll-*a*



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.



Summary - Winds have remained primarily upwelling-favorable for the past three weeks fueling continued phytoplankton blooms. Available satellite imagery suggest the highest chlorophyll-*a* concentrations continue to be north of central OR. Primarily large morphology *Pseudo-nitzschia* (*PN*) cells have remained in high abundance in recent beach samples. When downwelling-favorable winds have occurred, recent seawater particulate domoic acid (pDA) concentrations have remained low. The highest recent *PN* abundances in southern WA were >1,200,000 cells/L of large *PN* on 1-Sep at Long Beach, but abundances at that site had decreased to 64,000 cells/L large *PN* on 10-Sep. Samples collected 10-Sep from Twin Harbors, WA, contained 300,000 cells/L large *PN*. Small morphology cells are generally present, but in much lower abundance. At both Long Beach and Twin Harbors, WA, pDA was ≤18 ng/L on 10-Sep. At northern OR beaches, large *PN* were near 1,000,000 cells/L on 24-Aug with pDA ≤50 ng/L, except for Garibaldi where pDA was 182 ng/L. Samples from Newport, OR, contained 253,000 cells/L large *PN* on 24-Aug. Southern OR beaches had low abundances (≤13,000 cells/L) of large *PN* in samples from 24-Aug. Recent offshore samples are not available and the *PN* species remains unidentified. WA razor clam DA remains low, with highest values at Long Beach and Twin Harbors (5 ppm) and Copalis Beach (4 ppm) as of 10-Sep. In OR, Clatsop razor clam samples were at 12 ppm as of 4-Sep; Newport and Gold Beach, OR, razor clams were <9 ppm DA as of 21-Aug.

Forecast - La Niña conditions developed in August and are expected to remain through winter. The recent PDO value is weakly negative. Coastal winds switched to downwelling-favorable on 10-Sep, and the extended forecast suggests they will remain northward, though modest in strength, for five or more days. These northward winds will again force plankton and any toxins northward and toward shore, as indicated in the LiveOcean forecast. Risk assessment is difficult given the lack of recent offshore data. However, due to strong upwelling over the last few weeks and the currently low pDA levels, the chance of a siginificant toxic event does not appear to be high. The immediate risk is likely low, until coastal winds shift southward again; following that shift, more caution is required due to the potential onshore movement of toxic cells from offshore HAB initiation sites. Still, we recommend diligent monitoring during the upcoming extended duration harvest.