

# NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS (NANOOS)

*The eye on the Pacific Northwest's ocean and coast*

“NANOOS provides critical life safety information to the public, aiding coastal communities to reduce risk.”

— Jonathan Allan, Coastal Geomorphologist  
Oregon Department of Geology and Mineral Industries



NANOOS is the Regional Association of the national Integrated Ocean Observing System (IOOS) in the Pacific Northwest, primarily Washington and Oregon. Investments in NANOOS have resulted in high-technology jobs, better-informed decisions, and new innovation.

## We help improve:

HEALTH

Decision-making to protect human health

SAFETY

Enabling preparedness and security

ECONOMY

Preserving economic benefits of the ocean



## NANOOS Increases Efficiency

The NANOOS Visualization System (NVS) integrates data from a wide variety of sources, and makes that data available in one online data portal, saving substantial time and money. Real-time observations and forecasts from a range of assets including buoys, shore and tidal stations, high-frequency radar, wave and current forecasts, and satellites are available in user-friendly data displays. NVS provides sophisticated yet accessible capabilities such as comparisons of forecasts with real-time observations, and customized presentations based on community feedback.



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IOOS in the Pacific Northwest



**IOOS**  
Integrated Ocean  
Observing System

# Benefits for People and Businesses in the Pacific Northwest

## Innovative Technology for Safe & Profitable Resource Use



NANOOS detects toxins from harmful algal blooms (HABs) from an undersea robot at La Push.

*"Having the NANOOS automated HAB sampler, with toxin assessment capability, offshore between our harvest beaches and the HAB generation sites will give tribes the forewarning they need to adjust sampling protocols and better protect the health of coastal residents, tribal and non-tribal."*

– Joe Schumacker, Department of Fisheries, Quinault Indian Nation

NANOOS partners with industry to develop a lower cost sensor for effective shellfish growing.

*"This current generation of shellfish farmer is reliant upon data and services from NANOOS. Checking the NANOOS app before seeding a beach or filling a settling tank has become standard practice."*

– Margaret Pilaro, Director, Pacific Coast Shellfish Growers Association

## Support for Maritime Operations, Safety & Fishing Commerce

*"Ships crossing the Columbia River Bar face one of the most dangerous harbor entrances in the world. The Columbia River Bar Pilots rely on weather forecasts, real time buoy data along with wave and current models when determining safe times for ships to cross the bar. NANOOS provides an excellent location for us to see and compare all the available data sources."*

– Captain Dan Jordan, Columbia River Bar Pilots

*"NANOOS addresses a critical gap in recreational boater safety. Too many safety incidents on Pacific Northwest waters happen to pleasure boaters who make poorly informed decisions about if, when, how, and where weather may impact their safety. Sadly, many don't know how to access marine weather information freely available to them. NANOOS provides easy access weather information and routing tools to support better decision making by recreational boaters. I'm confident it will help save lives."*

– Captain Margaret Pommert, National Association of Safe Boating Law Administration



## Information for Coastal Hazard Risk Reduction



NANOOS data are used by the Oregon Department of Geology and Mineral Industries (DOGAMI) for coastal flood hazard maps; together NANOOS and DOGAMI provide tsunami hazard evacuation information to coastal populations. Both products aid risk reduction and increase coastal preparedness.

*"NANOOS support has "...provided us with invaluable information concerning our ongoing erosion problems. Without such assistance, we are operating blind."*

– Mayor Crystal Dingler, City of Ocean Shores

*"The Oregon Office of Emergency Management (OEM) appreciates the tools that NANOOS provides. The online tsunami evacuation route viewer is especially useful in helping coastal residents and visitors understand and respond to the tsunami hazards."*

– Althea Rizzo, Coordinator, Oregon OEM Geologic Hazards Program



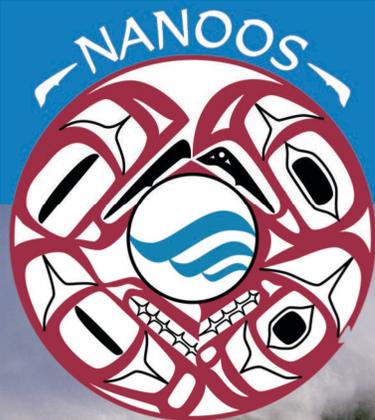
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## For More Information

Contact us if you have any questions, or to learn more about our program:

Jan Newton, NANOOS Executive Director

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NANOOS enhances health, safety and economic prosperity in the Pacific Northwest

## Fisheries Science and Commerce

*"I start my work day every day by visiting the NVS data explorer for the latest real time data and modelling forecasts. NANOOS and the NVS data explorer have become a routine resource and are an incredible benefit to the management and mitigation of harmful algal blooms along Washington's outer coast for ORHAB. One stop shopping to open-access mooring data, satellite imagery, and UW's LiveOcean model have been instrumental in advancing ORHAB's understanding of ocean processes and harmful algal bloom development along Washington's outer coast."*

**– Anthony Odell, Research Analyst Lead, Olympic Region Harmful Algal Bloom (ORHAB) Monitoring Partnership-University of Washington/Olympic Natural Resources Center**

*"The NANOOS Visualization System is an essential tool for the shellfish industry and provides critical real time data to aid in decisions surrounding harvests, food safety and hatchery operations. Having immediate access to this information throughout the summer allows us to ensure the highest degree of confidence that our forecasting and harvest schedules are in accordance with the best practices and State vibrio control plans. As an industry, we'd greatly benefit from an expansion of the program and increase in monitoring sites to help us utilize this technology for safe and profitable resource use."*

**– Justin Stang, Wholesale Manager, Hama Hama Company**

*"I just wanted to let everyone know that the real time data from the various buoys are incredibly helpful for those of us in the Marine Fish Science Unit at WDFW. We use this information to assist us with planning our field sampling on a daily and weekly basis; wind speeds and directions, as well as temperatures, help us determine the feasibility of our sampling routine. We hope this network stays funded to provide long-term data that we can use to help understand the dynamics of forage fish and their trophic interactions in the southern Salish Sea and beyond!"*

**– Todd Sandell, Senior Forage Fish Specialist, Washington Department of Fish and Wildlife**

*"Your team has made this a very solid and valuable tool for our tuna fishing business. Some of my favorite features are trip planning and creating routes; identifying sea surface temperatures — current and forecasted; combining chlorophyll locations with warm water currents; understanding current flow so I can estimate the direction and distance we will drift at night; and wave and wind forecasting. This application is helping us enjoy safer trips, find the fish easier and save on fuel usage. Thank you for the great job you're doing, we appreciate it very much."*

**– Gary and Julie Palmer, Fishing Oregon Podcast**

*"As an ocean sport fisherman, I want to give a huge shout out to the team at NANOOS. The NVS Tuna Fisher application has given myself and other sport boats the ability to narrow our search area for the fish we seek. As a sport halibut fisherman, wave height, wind and current direction are very important in how far we travel offshore as well as setup for fishing. Your tools provide us the ability to glimpse hours out into the day before I leave the dock to ensure I have the best knowledge possible on where to go, but more importantly, whether or not to go. As a new albacore fisherman, I read the information provided on your site discussing chlorophyll and what it meant for tuna. I was then able to use your chlorophyll and sea surface temperature maps to target an area I thought may be productive. The education I have received from your tools has paid off greatly, saving us time and money. Lower fuel consumption is good for all of us. We love your toolset. Keep up the great work."*

**– Wallace Coon, F/V Kimberlie Marie, Oregon Resident**

*"The Swinomish Indian Tribal Community is very concerned about the impacts climate change is expected to have on our shellfish resources. We are a coastal tribe and shellfish not only provide an important economic resource for our people, but are also culturally significant being used for ceremonial purposes and subsistence harvest since time immemorial. NANOOS is one of the tools that tribes are interested in learning from, and can help improve our understanding of ocean acidification and enable adaptation by shellfish growers and co-managers."*

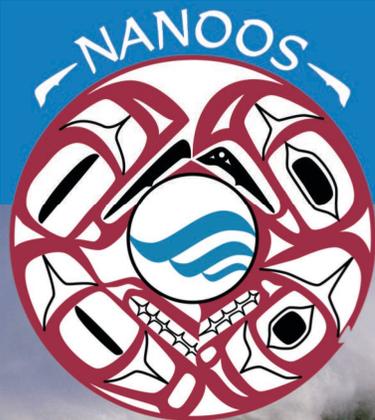
**– Lorraine Loomis, Fisheries Manager, Swinomish Indian Tribal Community**

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## Coastal Hazard Risk Reduction

"As a coastal community deeply committed to emergency preparedness, we find the new tsunami application to be a critical tool. It is easy and flexible to use and allows access to and clear designation of evacuation zones, allowing you to understand your risk and how to get to safety quickly after an earthquake. Access to accurate information is so important to our citizens and, as a destination location, to our visitors as well. We are proud to market our region as the most prepared on the Oregon coast and the tsunami software has become an important and useful tool!"

– Linda Kozlowski, President, Emergency Volunteer Corp of Nehalem Bay

"This app is great for homeowners on the coast as well as visitors who are planning trips. Knowing where you are in the tsunami zone means you will be better prepared should a tsunami occur. You can bookmark places and save or print a unique evacuation map centered on your home, workplace, hotel or even campsite. Users can then determine their nearest point of high ground outside the evacuation zone and develop a plan for how to get there."

– Jon Allan, Coastal Geomorphologist, Oregon Department of Geology and Mineral Industries

"The beach and shoreline monitoring data supported by NANOOS has been instrumental in helping to support [Oregon state] requirements, such as completing new FEMA regulatory maps, updating the science for foredune management planning purposes, developing coastal hazard zone maps to guide development, and monitoring dynamic revetments used for mitigating the effects of coastal erosion "

– Patty Snow, Coastal Program Manager, Oregon Department of Land Conservation and Development

## Recreation Safety

"For Pacific Northwest boaters crossing the Strait of Juan de Fuca or the Strait of Georgia, real time data on wave heights, wind speeds, and other meteorological information can be invaluable. To time such passages optimally and safely requires a knowledge of the sea conditions actually present at the time of the decision to set sail. A VHF weather broadcast, which is hours old can be inadequate when compared to the immediacy of the data available through the NANOOS NVS system."

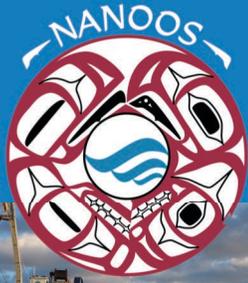
– Captain Lincoln Rutter, S/V *Sajal*

"The NANOOS surfer application provides the most comprehensive assemblage of ocean and coastal data on water quality, swell direction/height, winds, tides, and beach cameras that is currently available for the Pacific Northwest. Having access to these current conditions and forecasting models is crucial for decision making on where and when to recreate, which aids in trip planning and safe ocean enjoyment."

– Gus Gates, Washington Policy Manager, Surfrider Foundation

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# NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS

NANOOS assets provide up-to-date 24/7 data on the Pacific Northwest



## Strengthening Regional Science

*"Without NANOOS assets, our ability to effectively monitor the development and effects of ocean acidification in Pacific Northwest coastal waters would be significantly curtailed... we cannot overstate the importance of maintaining NANOOS's infrastructural, data management, and outreach assets for the successful development of NOAA's West Coast and national ocean acidification monitoring networks and information products."*

**– Richard Feely, Senior Fellow, NOAA Pacific Marine Environmental Laboratory**



*"The treaty Indian tribes in western Washington are resource managers and acknowledge the positive partnerships that the NANOOS program has worked to build and maintain with tribal governments and programs, and the benefits that this is providing. The tools and products provided by NANOOS, especially the NVS Data Explorer and climatology apps, are an essential tool in my work to support the Tribes. The ease of access to data and data products from a range of different platforms and sources greatly simplifies the process of assessing the current state of the marine environment, while tools such as J-SCOPE provide a valuable resource for planning ahead."*

**– Tommy Moore, Oceanographer, Northwest Indian Fisheries Commission**



*"As Superintendent of Olympic Coast National Marine Sanctuary (OCNMS), I enthusiastically endorse the valuable data and services provided by the Northwest Association of Networked Ocean Observing Systems (NANOOS), many of which greatly enhance our understanding of ocean ecosystem dynamics influencing conditions within OCNMS. Thank you for your continued dedication to serving the community of resource managers and users in our region so effectively and collaboratively."*

**– Carol Bernthal, Superintendent, Olympic Coast National Marine Sanctuary**



*"The West Coast Ocean Data Portal (WCODP) seeks to increase access to and discovery of critical ocean and coastal data for resource managers and policymakers on the West Coast. The ocean observing information provided by NANOOS are important resources for us to highlight in our data catalog, so that our users (namely the state, tribal and federal agencies represented in the West Coast Ocean Alliance, or WCOA) can access the most up-to-date data and models to inform their decision-making at local and regional levels."*

**– Andy Lanier and Stephen B. Weisberg, Co-Chairs, West Coast Ocean Data Portal**

*"I anticipate my group will continue to use NANOOS' LiveOcean model in collaboration with several colleagues, as we seek to expand seafloor pressure geodesy studies in Cascadia to search for shallow slow slip earthquakes. The availability of a good long-lived regional oceanographic circulation model is essential for supporting these studies, which are likely to require at least a decade of observations. The geodetic work is critical for improving our understanding the fault mechanics of the Cascadia megathrust and its tsunamigenic potential."*

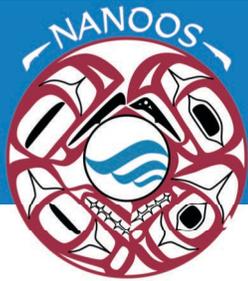
**– William S.D. Wilcock, Jerome M. Paros Endowed Chair in Sensor Networks, University of Washington**

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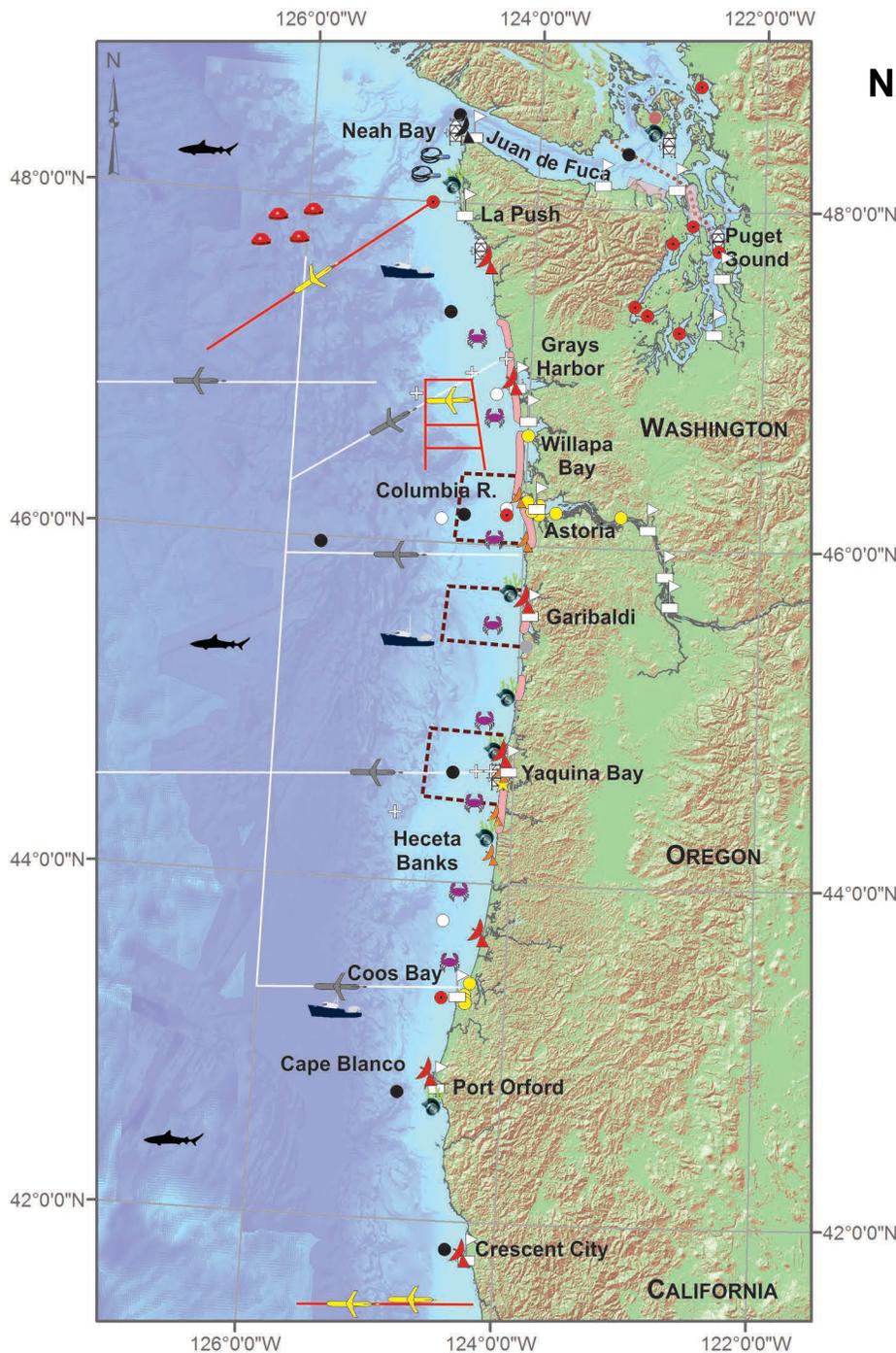


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# NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS

NANOOS assets provide up-to-date 24/7 data on the Pacific Northwest



## NANOOS Assets and Vision

### Existing assets to be sustained in partnership:

- Existing *coastal* and *estuarine* buoys
- Existing fixed mooring *estuarine* buoys
- ↔ Existing glider tracks
- ▲ Existing long-range (180 km range) HF radar site
- ▲ Existing standard-range (50 km range) HF radar site
- ★ Port X-band wave radar
- ▭ Beach and shoreline assessment. Includes multiple sites where nearshore bathymetry is being collected
- ⋯ Puget Sound ferry box
- ↔ Existing glider tracks (OOI)
- + OOI moorings

### Federal assets:

- NDBC buoys
- CDIP buoys
- NOS Tide gauges
- ⊠ CMAN station

### Proposed for new support to be sustained in partnership:

- ▲ Proposed long and short-range radar site
- 🌿 Proposed new marine reserve OA sites
- 🐟 Proposed west coast acoustic tracking
- 🚢 Proposed fishing vessels of opportunity
- Proposed new Friday Harbor mooring
- 📡 Proposed new drifter program
- 🔊 Proposed new ocean sound network
- ⊠ Proposed new nearshore/port wave modeling
- 🦀 Proposed new crab pot moorings

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