

Interactive Tsunami Evacuation Maps Now Available for the Pacific Northwest

Tsunamis are an infrequent but potentially deadly visitor to the Pacific Northwest (PNW) coast. Tsunamis are created by an underwater earthquake, and the PNW is at risk of being hit by tsunamis created by a **local** earthquake such as might occur off the coast of Oregon and Washington or by a distant earthquake like the one that hit Japan in 2011.



To safeguard the PNW coast, staff from the Oregon Department of Geology and Mineral Industries (DOGAMI) and the Washington Department of Natural Resources (WADNR) built computer models to map the tsunami inundation, or flood, zones. NANOOS collaborated with DOGAMI and WADNR to provide these maps online and as a smartphone app (*TsunamiEvac-NW*).

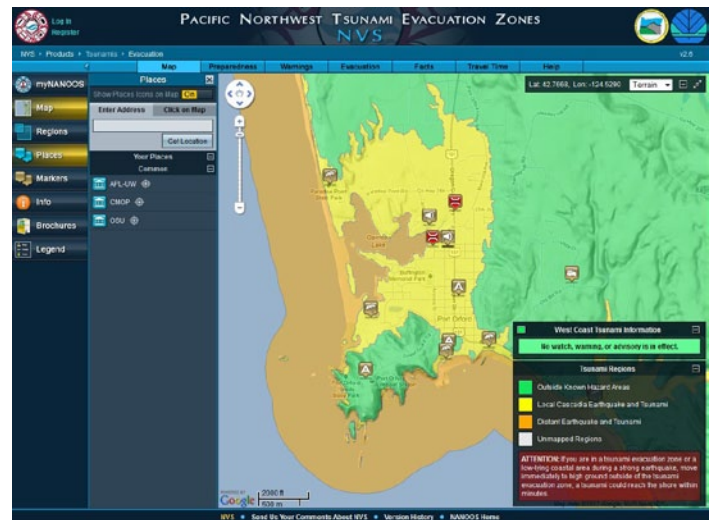
The NANOOS Pacific Northwest Tsunami Evacuation Zones online portal and smartphone app provide an at-a-glance view of tsunami hazard zones along the coasts of Oregon and Washington. To help users develop and plan their own evacuation routes, the *Places* feature of this tool allows users to pin-point a location by either entering an address or clicking on the map to see if that location is in a danger zone. Users can create multiple places, and if they log in with their *myNANOOS* account, their places will be saved automatically.

In addition to the maps, the portal provides information and resources that are of critical importance prior to, during, and following a tsunami event. The portal provides the current tsunami warning status, as provided by the NOAA West Coast and Alaska Tsunami Warning Center (WCTWC), and brochures of evacuation routes for many communities.

Preparation for a **local** earthquake and tsunami is necessary. Based on sediment deposits, Japanese harbor records and Pacific Northwest tribal oral histories, scientists have identified that the last mega-thrust earthquake (magnitude 8–9+) happened in 1700. Scientists estimate that there is a 10% probability that the next earthquake will occur in the next 30 years.

Tsunamis that result from distant earthquakes, like the 1964 magnitude-9.2 Alaska or 2011 magnitude-9.0 Japan earthquakes, incur damage in the Pacific Northwest as well. When the tsunamis from both of these events reached the shores of Washington, Oregon, and Northern California, lives were lost and tens of millions of dollars' worth of damage was created in several harbors and bays.

You can find the portal online at <http://nvs.nanoos.org/tsunami> and for smartphones through iTunes and the Android Market.



NANOOS's Pacific Northwest Tsunami Evacuation Zone online portal allows communities such as Port Orford, OR (pictured above) to see the predicted maximum extent of a tsunami and to plan accordingly.

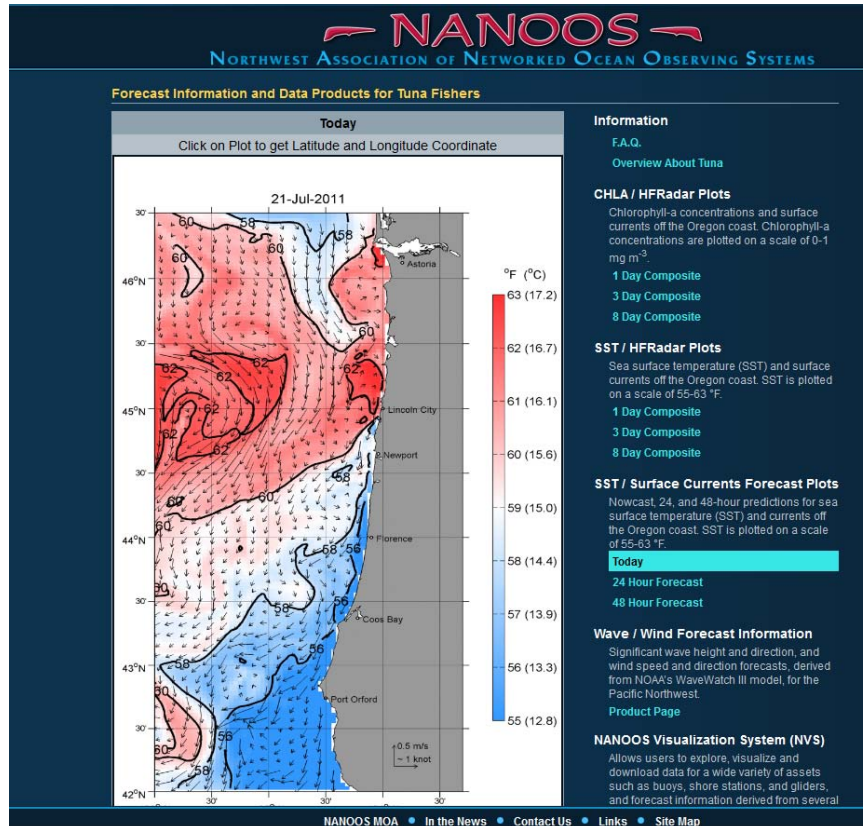
Products/Tools

Tuna Fisher Page

Albacore tuna (*Thunnus alalunga*) undertake massive migrations to find food. On the move between Japan, where they spend winters, and off of Oregon and Washington, where they spend summers, tuna search for enough sardines, anchovies, and squid to maintain their high-energy lifestyle. Ocean conditions strongly influence Albacore migration and geographical extent. Tuna are mostly likely to be found in water that is between 60 to 66 °F and has low amounts of phytoplankton, or single-celled algae, in the water. Being able to identify potential tuna habitat based on ocean conditions is extremely useful for fishers when they are planning their trips allowing them to better predict where and when to fish, saving time and money on gas.

In 2009 and 2010, NANOOS staff attended the Saltwater Sportsmen's Conference, an annual meeting of mostly recreational tuna and salmon fishers from Oregon. The fishers identified temperature and chlorophyll as the most important ocean conditions for finding tuna, but knowing wind and wave conditions are just as important for safety reasons. Armed with this information, NANOOS staff developed a webpage that provides easy access to data and forecast plots of these ocean conditions.

In 2011, the following year, NANOOS staff once again attended the conference to demonstrate the



new webpage and gather feedback to improve the page. The plots were positively received on the whole and with some fisher-requested additions, the plots were ready to go for the 2011 tuna fishing season.

The response from the fishers throughout the season is a very promising start for this product page: fishers mentioned the utility of the NANOOS plots on ifish.net, a fishing discussion board several times;

Amigo, a charter fishing boat out of Depoe Bay, OR created a video on YouTube about how to use the NVS data portal; and the tuna fisher product page was the most visited page on the NANOOS site from June 1–Oct 1, 2011 with over 19,500 visits. NANOOS is currently reaching out to fishers to get feedback over the winter to make improvements in time for the 2012 fishing season.

You can find the NANOOS Forecast Information and Data Products for Tuna Fishers Page at http://www.nanoos.org/data/products/tuna_fishers/tuna_fishers.php.

The “how-to” video from Amigo Charters is found at http://amigocharters.com/?page_id=58.

Many thanks to the Salty Dogs that have provided input to the product page, especially Mark McCulloch.

New Capabilities Field/Lab

Nearshore Wave Forecasts Along the Oregon Coast

Imagine you have the task of making two mosaics of a person's face. You have two sizes of square tiles to use—one set 3 inches on each side and the other 1/8th of an inch a side. Which size tiles would you use for each mosaic?

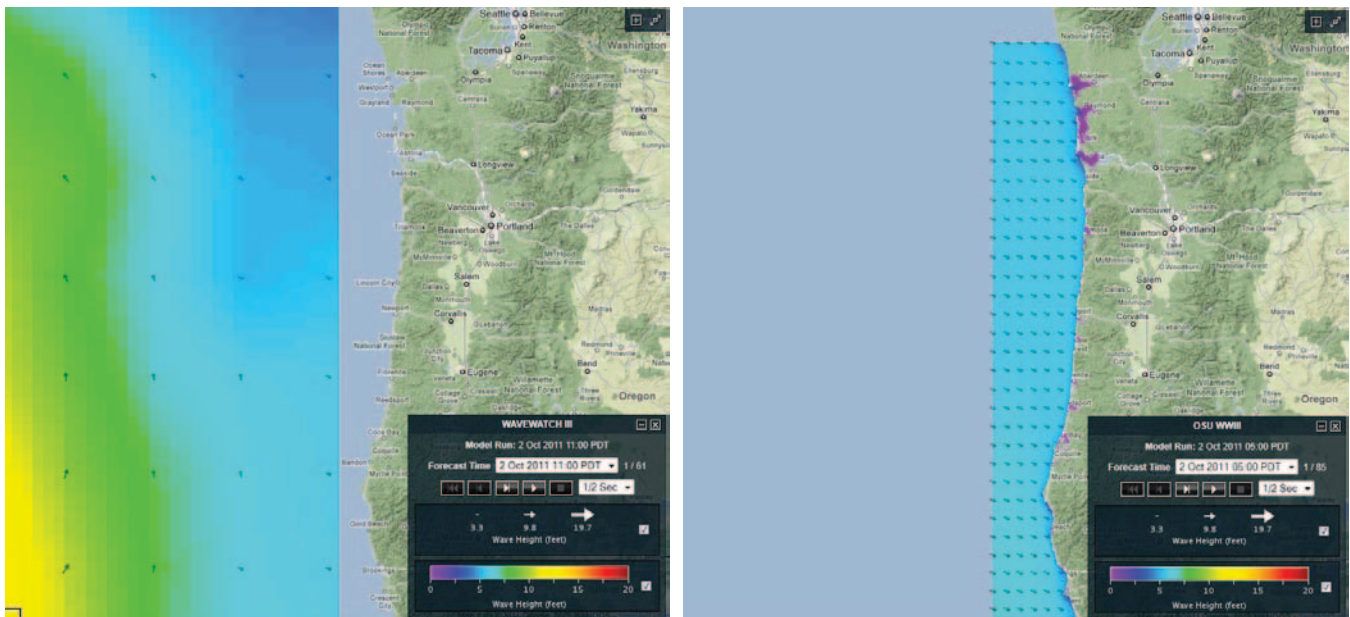
Just like creating a mosaic, scientists building forecast models of ocean conditions must decide on the size of tiles to use, balancing the amount of detail with the time it takes to create the forecast. Creating a model representing the entire surface of the Pacific Ocean requires much larger tiles than a model of the surface coastal waters of the Pacific Northwest from northern CA to mid-WA coast.

Smaller tiles may provide the most detail of the Pacific Ocean, but would take too much time and energy to put together, so larger tiles would suffice. However, the larger tiles would show hardly any detail in a mosaic representing the coastal waters of the Pacific Northwest. Up until a few months ago, the NANOOS portal only provided wave height and direction forecast models similar to a mosaic with larger tiles. This only allowed a rough view of the ocean surface and did not extend to

the coastline, making it unusable for fishers, researchers, and others that stay mostly near the coast.

NANOOS partners at Oregon State University just released a new forecast model with much smaller tiles. The new high-resolution forecasts of the wave conditions along the Oregon Coast extend from just offshore to the coastline and into the major bays and estuaries, incorporating how underwater hills or canyons near the shore affect wave behavior. Because these new forecasts are filling in a gap left by the larger model, this can be used by mariners and surfers alike as a more accurate decision-support tool when they are planning trips. Since the model is relatively new, scientists labeled it “experimental,” which means, as with all forecasts, use it with caution. Ongoing work on the model includes improving its performance by creating a way to monitor the accuracy of the forecasts.

For more information, the forecast is located at nvs.nanoos.org under the *Overlay* button in the menu on the left. *Many thanks to the model contributor: Tuba Ozkan-Haller (Oregon State University).*



The new model from OSU (right) extends wave forecasts to the coastline, allowing better predictions of wave conditions in the nearshore by filling in the forecast gap from NOAA's WaveWatch III model (left).

Happenings

Pacific Northwest Waters:

NANOOS Workshop **Gateway to our Future**

NANOOS in partnership with U.S. IOOS® is hosting a workshop to bring together users and providers of marine information to explore how monitoring and forecasting the ocean, coast and estuaries can best deliver safety, economic and environmental benefits to industries, government and citizens of the Pacific Northwest. The workshop is being held on February 2, 2012 in Redmond, WA and is free and open to anyone who is interested in attending. We encourage anyone interested in learning more about ocean observing to join us. For more information, please visit: <http://www.iooc.us/stakeholder-outreach/pacific-northwest-workshop/>.

NANOOS Annual Meetings

Spring and summer are always exciting times for NANOOS because of the annual meetings we hold with three different groups: the Tri-committee meeting with members of the Data Management and Communications, User Products, and Education & Outreach committees; the Governing Council meeting; and the Principal Investigators meeting.

This year, the Tri-committee meeting was held May 12th–13th in Beaverton, OR at the Oregon Health and

Science University's campus where NANOOS-partner Center of Margin Observation and Prediction (CMOP) is based. This meeting allows all the committee members to go over what they have accomplished in the past year, and identify activities and goals for the upcoming year.

The Governing Council meeting was held June 15th this year in Vancouver, WA at the Washington State University's Vancouver campus. The Governing Council is comprised of representatives from NANOOS's 46 member organizations. The Council comes together every year to receive updates of NANOOS's progress during the past year, identify future directions and needed data products, and participate in NANOOS's annual business meeting.

On August 23rd, the NANOOS Principal Investigators (PIs), or scientists, gathered at the WSU Vancouver campus. Each PI provided a 5 minute presentation of his/her science and findings from the past year. The PIs discussed future funding and design plans for NANOOS to aid development of a 10-year build-out plan for the Regional Coastal Ocean Observing System (RCOOS) here in the PNW. These build-out plans are required by every Regional Association (RA) in the county by NOAA to fulfill a Congressional mandate through the Integrated Coastal and Ocean Observation System (ICOOS) Act passed in 2009.

Member Spotlight / New Member

Welcome Port Townsend Marine Science Center!



Our newest NANOOS member is the Port Townsend Marine Science Center (PTMSC). PTMSC is located at Fort Worden State Park on the northeastern corner of the Olympic Peninsula where the Strait of Juan de Fuca meets Puget Sound. Founded in 1982, PTMSC works to promote stewardship of the environment by providing exhibits, professional development for teachers, educational programs for the community and

citizen science opportunities. The center is comprised of two exhibit buildings, the Natural History Exhibit which features a full orca skeleton and a sand collection from around the world and is open year-round and the Marine Science Exhibit which features aquariums and touch-tanks of animals collected nearby, open during the summer only. Citizen science projects which PTMSC oversees include water quality and harmful algal bloom monitoring, marine mammal monitoring through the Salish Sea Hydrophone Network, and The Plastics Project, which measures the amount of plastic in the sand and water around PTMSC. NANOOS and PTMSC are working together to design, build and test exhibits. **Welcome to the NANOOS family, Port Townsend Marine Science Center!**

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