OREGON OCEAN SCIENCE TRUST

Recent Projects

The Oregon Ocean Science Trust (OOST) secures resources to support and fund ocean and coastal science and monitoring specific to the needs of Oregon. In recent years, we've funded research to address Oregon's changing ocean conditions, conduct science and monitoring in the nearshore, and support an assessment of Oregon's marine reserves and protected areas. The research has been conducted by teams consisting of universities, nonprofits, community organizations, and local residents.

Ocean Acidification and Hypoxia (OAH)

WHAT: With funding from Oregon Legislature, the OOST received and disbursed $1,000,000 to grant recipients to conduct research and monitoring to address the effects of changing ocean conditions and improve how we communicate the importance of this issue and its effects to Oregonians.

WHY THIS MATTERS: Oregon's ocean is changing, and many species have already shown signs of distress. Just as humans need calcium to build their bones, sea creatures need calcium carbonate to build strong skeletons and shells. The ocean absorbs a lot of carbon dioxide, which is changing the ocean's chemistry and prevents the development of calcium carbonate. This is called **ocean acidification**.

As a result of the changing chemistry, we are seeing sea creatures' skeletons and shells becoming thinner or more brittle. Climate change is also the cause of **hypoxia**, as warmer waters hold less oxygen. As the Pacific Ocean warms, its ability to hold a lot of oxygen declines. The term "hypoxia" refers to low or depleted oxygen in a body of water. Because most organisms need oxygen to live, few organisms can survive in hypoxic conditions. Local actions will lead to a brighter future, for the oceans, its species, and the communities that depend on them.

SPOTLIGHT ON: Develop best practices for sustainable shellfish cultivation in Oregon

San Diego State University, Cascadia Visualizations LLC, and Oregon State University developed recommendations to:

- Maximize the abundance of wild shellfish, cultured shellfish, and aquatic vegetation in Oregon's estuaries.
- Develop best management practices for conducting shellfish cultivation in a way that protects or promotes health of our estuaries.

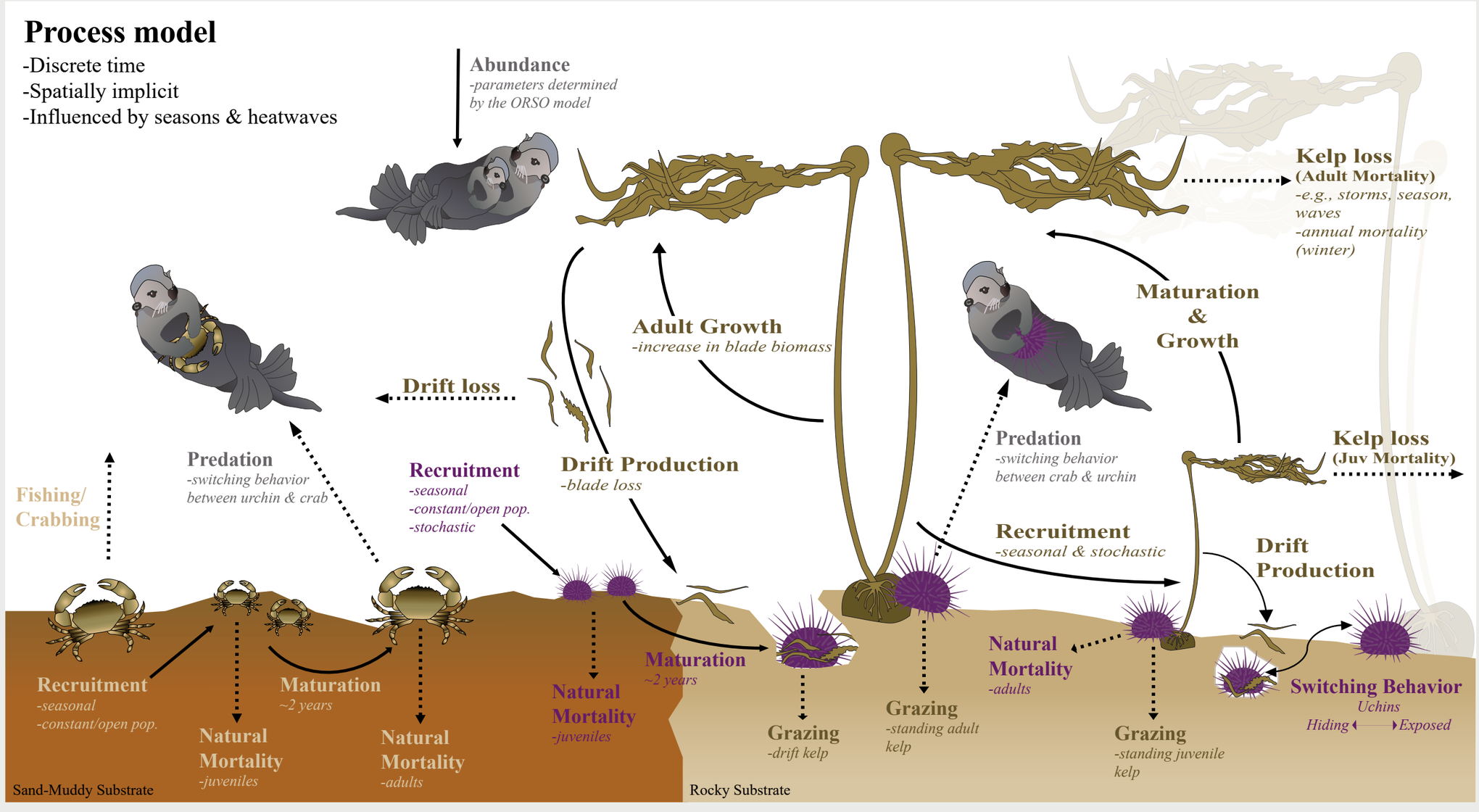
This work synthesizes difficult-to-find information on policies and data associated with shellfish and aquatic vegetation in Oregon and will be a key resource for community members, policymakers, and managers. Similarly, the team developed a mapping tool that can be used to visualize where shellfish and aquatic vegetation habitats overlap across the state.

Learn more about ocean acidification and hypoxia projects.

SPOTLIGHT ON: Kelp habitat

Kelp forests are an important part of Oregon's coastal ecosystem, but they face threats from marine heatwaves and grazing by sea urchins. A variety of management options could address these threats, from kelp restoration to urchin removal to the introduction of sea otters, an urchin predator. However, these ecosystems are complex. Two project teams seek to understand our rocky reef habitats and the kelp connection.

- **Trophic modeling of Oregon's nearshore reefs:** Oregon State University is developing a mathematical model of predator-prey relationships in Oregon kelp forests using simulations to predict the results of different management actions. This work will provide information to resource managers on the expected outcomes of different management and restoration actions. Preliminary results indicate that a combination of urchin removal and kelp restoration may help reduce kelp forest losses during a marine heatwave.



- **Kelp communities in transition:** The Oregon Department of Fish and Wildlife is exploring how rocky reef habitats differ in places that have lost kelp versus areas where kelp beds persist. Commercial sea divers and trained science divers are conducting underwater surveys to document presence of sea urchins, sea stars, and abalone across reefs with kelp beds and places where kelp has declined.

As our ecosystems experience this critical period of transition along the Oregon coast, understanding habitat conditions is urgent to understand the rate of change and establish baselines for managers.

Original illustration attribution: Urchin by Jess K. Hopf; Crab by Kim Kraeer & Lucy Van Essen-Fishman; Sea Otter by Tracey Saxby; Kelp by Jane Thomas; Sourced from ian.umces.edu/media-library.
Species: Sea otter (*Enhydra lutris*), Bull Kelp (*Nereocystis luetkeana*), Dungeness crab (*Metacarcinus magister*), Urchins (*Strongylocentrotus purpuratus* & *Mesocentrotus franciscanus*). Illustrations modified by Andrés Pinos-Sánchez.

SPOTLIGHT ON:
Climate monitoring at Yaquina Bay

The Hatfield Marine Science Center and Oregon State University maintain a suite of scientific instruments called the Climate Monitoring Station (CMS) that monitors OAH in real time in the Yaquina Bay Estuary. The station builds on data sets established more than 40 years ago to monitor trends in coastal Oregon waters.

In those 40 years, sea level has risen more than 4 inches, the ocean has become more acidic, and hypoxia (low oxygen) zones have grown to the size of the Willamette Valley during some summer months, all hastened by human carbon emissions. The CMS long-term monitoring will continue to track these changes and will inform our understanding of their impacts.

The CMS team recently tested an innovative sensor to capture high quality images of phytoplankton – these samples will be used to train an artificial intelligence (AI) system to detect potential harmful algal blooms in Yaquina Bay!

Nearshore Ocean and Coastal Research

WHAT: During the last two years, OOST received $1,000,000 from the Oregon Legislature to advance science and monitoring for nearshore ecosystems and keystone species, including sea otters and eelgrass. To date, we have disbursed these funds to six grant recipients to inform status and changes in Oregon's nearshore ecosystems.

WHY THIS MATTERS: Oregon's nearshore includes coastal and marine areas that extend from the shore to three nautical miles offshore and include habitats such as rocky and sandy shores and estuaries. Nearshore ecosystems are among the most diverse and productive systems on Earth. The nearshore provides many benefits, from producing nurseries for commercial and recreational fish and shellfish, to providing opportunities for recreation and sightseeing.

There are growing pressures on Oregon's nearshore resources as human populations grow and climate change stressors affect species and habitats. Understanding how the nearshore functions, the abundance and distribution of species and habitats, and how these resources are responding to climate change, can inform strategies that lessen the effects of human activities on nearshore habitats and species.

Learn more about nearshore ocean and coastal research projects.

SPOTLIGHT ON:
Ocean acidification and hypoxia monitoring network for Oregon's marine reserve system.

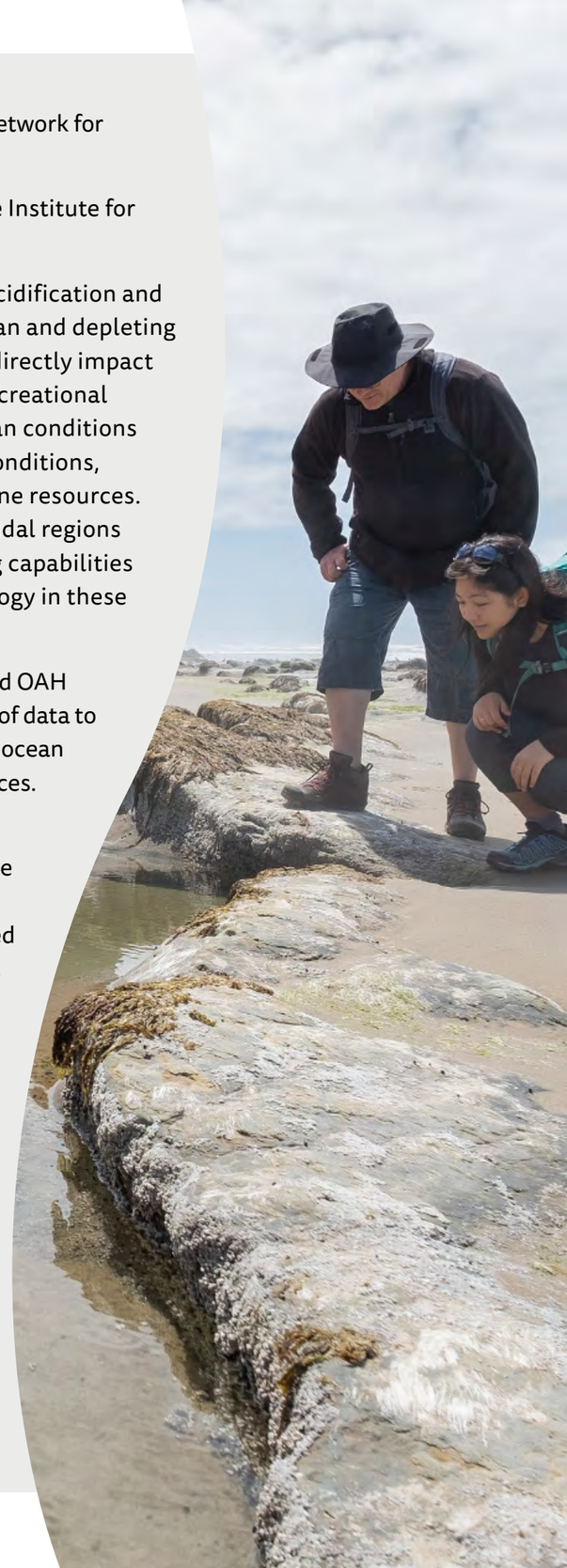
WHO: Oregon State University, CIMERS (Cooperative Institute for Marine Ecosystem and Resources Studies)

Oregon is at the epicenter of the impacts of ocean acidification and hypoxia, which is changing the chemistry of the ocean and depleting oxygen levels. Ocean acidification and hypoxia can directly impact our marine habitats and species, commercial and recreational fisheries, and coastal communities. Monitoring ocean conditions allows resource managers to respond to changing conditions, mitigate risks, plan effectively, and protect our marine resources. Two Trust-funded projects in the intertidal and subtidal regions of Oregon's marine reserves build robust monitoring capabilities by using Oregon's world class scientists and technology in these living laboratories.

LONG-TERM MONITORING: These projects extended OAH monitoring that began in 2009 and provide a baseline of data to enable coastal managers to document and respond to ocean acidification and hypoxia to protect our natural resources.

OUTREACH AND ENGAGEMENT: Stories discussing this research were featured in the Washington Post, the Seattle Times, magazines, and federal websites. The articles highlighted the cutting-edge science conducted on the coast, expanding awareness of Oregon's coastal threats, and providing a blueprint for OAH monitoring around the world. Early research results from the monitoring network resulted in more than $5 million in federal funding to continue OAH research across the West Coast.

Collaborative ocean observing partners: Members of the fishing industry and coastal communities volunteered to deploy and monitor ocean sensors to collect ocean data across the marine reserves. The value of this research is recognized by many Oregonians, as they are pitching in to help understand our changing ocean conditions to better protect marine ecosystems and their associated industries and livelihoods.



Assessing Oregon's Marine Reserves

WHAT: In 2021, the OOST coordinated an award to conduct an assessment of the social, economic, and environmental factors of Oregon's marine reserves and marine protected areas. The assessment set out to determine:

1) if Oregon's marine reserves were effectively designed and implemented to achieve the goals identified in Oregon Ocean Policy Advisory Council's (OPAC) 2008 Oregon Marine Reserve Policy Recommendations. Read the recommendations at https://tinyurl.com/OMRPolicyRec

2) if the Oregon Department of Fish and Wildlife successfully executed the legislative mandates for marine reserve implementation. Read the final 2022 assessment at https://tinyurl.com/2022ODFWAssessment.

WHO: Oregon State University

WHY THIS MATTERS: The assessment, required by the Oregon Legislature, revealed:

- Oregon's marine reserves are effectively designed and implemented to achieve the goals and objectives set forth in legislation and OPAC recommendations.
- Ongoing monitoring and research are needed to better evaluate localized socioeconomic impacts and whether some ecological goals will be met.

Learn more about assessing marine reserves.

FOR MORE INFORMATION

To learn more about the OOST and sign up to receive updates on funding opportunities:

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