



# DEEPER UNDERSTANDING

## Student Collaborations

Student research, from lingcod life histories and juvenile Dungeness crab genetics, to coralline algae signaling and sea star wasting disease –provides invaluable contributions to nearshore ocean and marine reserves science. The ODFW Marine Reserves Program supports student projects through funding, fieldwork, or data sharing, and they in turn help us meet one of the goals of the ODFW Marine Reserves Program – advancing our knowledge about the nearshore environment. ODFW marine reserves researchers work with graduate students in numerous ways to advance what we know about the creatures in Oregon’s nearshore ocean.

### Table of Contents

Oregon State University .....	2
Linus Stoltz: Oregon State University .....	2
Ross Whippo: Oregon State University .....	2
Shea Steingass: Oregon State University .....	2
Sarah Hamilton: Oregon State University .....	2
Megan Wilson: Oregon State University .....	2
Will Fennie: Oregon State University .....	3
Heather Fulton Bennet: Oregon State University .....	3
Jackie Dixon: Oregon State University .....	3
Jenna Sullivan: Oregon State University .....	3
OIMB Students: Oregon State University .....	3
Alec Youngblood: Oregon State University .....	3
Liz Lee: Oregon State University .....	4
Moss Landing Marine Laboratory .....	4
Rachel Brooks: Moss Landing Marine Laboratory .....	4
Bonnie Brown: Moss Landing Marine Laboratories .....	4
Laurel Lam: Moss Landing Marine Laboratories .....	4
Other Universities .....	5
Madison Bristol: University of Washington .....	5
Jen Fields: California State University Northridge .....	5
Bobby San Miguel: University of Wisconsin - Milwaukee .....	5
Micheal Thomas: University of Oregon .....	5

## Oregon State University

### Tom Calvanese: Oregon State University

Tom Calvanese conducted a 17- month acoustic telemetry study to document the movement patterns of 20 individuals (6-7 each) of China Rockfish (*Sebastes nebulosus*), Quillback Rockfish (*S. maliger*), and Copper Rockfish (*S. caurinus*) at Redfish Rocks, Oregon. Objectives were to (1) estimate residence times for individuals of each species, (2) evaluate spatial and temporal movement patterns, and (3) analyze the relationship between habitat attributes and movement patterns. His results demonstrated that this small (6.78 km<sup>2</sup>) no-take marine reserve provides refuge for a substantial portion of the local population of these demersal residential fishes, due to those species' high site fidelity to this patch of high relief rocky reef habitat located within the Redfish Rocks Marine Reserve.

[\[Link to Thesis\]](#)

### Linus Stoltz: Oregon State University

Linus was a masters student at OSU under Francis Chan. He collaborated with local crab fishers using a novel approach that deployed oceanographic sensors in active crab fishing gear. ODFW marine reserves oceanography time series were also utilized to better characterize the spatial and temporal variability of coastal oxygen levels. He successfully defended his thesis and reported on numerous interesting new oceanographic insights including a seemingly distinct break in oxygen levels around Cape Blanco. Our data from Cape Falcon and Cascade Head provided additional support for the findings of temporal and spatial variability of oxygen along the coastline.

### Ross Whippo: Oregon State University

Ross collaborated with the ODFW marine reserves team to use SCUBA algal data as part of exploration for Ph.D. project ideas. He dove to conduct SCUBA surveys as part of ongoing ODFW research. While Ross's Ph.D evolved away from investigating Oregon kelp beds, Ross assisted the 2022 Synthesis Report process by analyzing SCUBA data and providing a summarized report of algal analysis results.

### Shea Steingass: Oregon State University

Sheanna Steingass completed her PhD Student at Oregon State University studying the ecology of Pacific harbor seals on the Oregon coast. She is utilizing tracking data to understand habitat utilization, and also conducting studies of dietary composition for harbor seals using stable isotopes. Her research aims to understand the ecological roles of seals inside of and outside of marine reserves in Oregon.

### Sarah Hamilton: Oregon State University

Sara investigated sea urchins diet by looking at the chemical composition of their reproductive organs. This work will help us better understand what role urchins play in Oregon's nearshore foodwebs. Urchins were collected while participating in ODFW SCUBA surveys.

### Megan Wilson: Oregon State University

Megan Wilson is a graduate student at Oregon State University in the [Plankton Ecology Lab](#). She is studying Cabezon, a commercially and recreationally harvested nearshore groundfish that lives right off the Oregon Coast. Her research focuses on all stages of Cabezon life cycle to understand drivers of survival in Oregon's nearshore environment. With this information, she aims to improve our understanding of the environmental conditions that are most important to the survival of young Cabezon and thus in sustaining a healthy adult population. Juvenile fish are caught in SMURFs –

collection devices resembling good habitat for young Cabezon – which are monitored by ODFW’s Marine Reserves team and OSU students.

### [Will Fennie: Oregon State University](#)

Will Fennie completed his Ph.D under Dr. Su Sponaugle in the [Plankton Ecology Lab](#) at OSU. He teamed up with ODFW’s Marine Reserves team to study the fascinating lives of young rockfish. Rockfish (genus *Sebastes* – which means magnificent) give birth to live young that are only 0.2 inches long. These tiny fish drift along with ocean currents for 2-6 months before they are big enough to swim back to coastal habitats. During this drifting phase, young rockfish must find enough food to grow and avoid the many predators looking to eat them. His studies investigated how changes in ocean conditions can affect the growth and survival of these young rockfish. Rockfish, like all bony fishes, have ear stones (otoliths) that can be read in the same way as tree rings to determine age and growth rates. Using otoliths from young rockfish collected in 2011-2018 Will analyzed the link between changing ocean conditions and rockfish growth and whether this leads to changes in survival. This information will improve our ability to predict how future ocean conditions will affect these magnificent fishes.

### [Heather Fulton Bennet: Oregon State University](#)

Heather is studying interactions between seaweeds and invertebrates along the Oregon coast. Her research focuses on crustose coralline algae, which are the bubble gum pink rocky crusts that you can find in the low intertidal. These algae play an important role in signaling animals such as abalone, chitons, and urchins to transform from free-floating planktonic juveniles to the colorful adults that we find on the rocks. The lives of these invertebrates and algae are known to be affected by ocean acidification, but we don’t yet know how the relationships between these species will change. She was able to pursue this research at Hatfield Marine Science Center thanks to ODFW’s Marine Reserve Program Scholarship.

### [Jackie Dixon: Oregon State University](#)

Jackie studied Natural Resources, GIS and Fisheries Management at Oregon State University. She collaborated with the Oregon Marine Reserves Program to assess the use of longline fishing data as a method to understand fish, habitat associations. With the help of spatially derived habitat data, we can model what natural features and weather conditions influence where fish species live. This will be useful for learning more about the species we fish, and also help focus research efforts on a species-by-species basis!

### [Jenna Sullivan: Oregon State University](#)

Jenna Sullivan from Oregon State University studied the impacts of seastar wasting disease on communities of animals that live in the intertidal zone in Oregon. Specifically, she investigated changes in the communities of seastar prey, such as barnacles and mussels. One change she observed was an increase in baby seastars between 0 and 2 years old. Figuring out the drivers of strong seastar recruitment will help us understand how populations can rebound after a disease.

### [OIMB Students: Oregon State University](#)

Dr. Craig Young and Dr. Cynthia Trowbridge taught an intensive hands-on course in subtidal and deep-sea biology with 17 undergraduate marine biology majors at the University of Oregon. They had an opportunity to collect deep-sea animals from an oceanographic ship, snorkel in nearshore kelp beds, dredge animals from the Oregon Continental shelf, and drive a remotely operated undersea vehicle. Their main assignment was a collaboration with the ODFW Marine Reserves team in which we evaluated underwater video footage and used statistical techniques to characterize the diversity of invertebrate life in the marine reserves. We hope our work will help to establish baselines for future monitoring efforts in the marine reserves.

### [Alec Youngblood: Oregon State University](#)

CERN student who worked with Tommy Swearingen to create a timeline of Oregon fisheries management activities.

## [Liz Lee: Oregon State University](#)

Liz was a fisheries genetics student at HMSC studying the genetic diversity of Dungeness crab in Oregon. Her research used genomic approaches to gain a better understanding of how ocean conditions influence larval dispersal and, ultimately, the genetic connectivity of this species along our coasts.

## Moss Landing Marine Laboratory

### [Rachel Brooks: Moss Landing Marine Laboratory](#)

Rachel's thesis research explored Canary Rockfish growth and reproduction along the U.S West Coast. She worked collaboratively with captains, deckhands and volunteer anglers to collect Canary Rockfish from various locations along the coast between Washington, Oregon, and Southern California. Through understanding the spatial variability in how Canary Rockfish grow and mature, this project can help resource managers better manage fisheries that catch this species. Her thesis can be accessed here:

[\[Link to Thesis\]](#)

### [Bonnie Brown: Moss Landing Marine Laboratories](#)

Studied the diet of lingcod along the west coast. This collaborative project took place in Alaska, Washington, Oregon, and California. She had help across multiple resource agencies and academic institutions, captains and deckhands, and many volunteer anglers. ODFW collaborated with Bonnie in the retention of Lingcod from several Oregon ports. Her thesis is available online at:

[\[Link to Thesis\]](#)

[\[Link to Lingcod Genome Paper\]](#)

[\[Link to Lingcod Coloration Paper\]](#)

### [Laurel Lam: Moss Landing Marine Laboratories](#)

In conjunction with Bonnie Brown, Laurel used collected Lingcod to study life history traits of Lingcod along the west coast including age, growth, and reproduction. This collaborative project took place in Alaska, Washington, Oregon, and California. She had help across multiple resource agencies and academic institutions, captains and deckhands, and many volunteer anglers. ODFW collaborated with Bonnie in the retention of Lingcod from several Oregon ports. Results of this study have been published in MEPS:

[\[Link to Published Results\]](#)

## Other Universities

### Madison Bristol: University of Washington

Madison Bristol, majored in Environmental Science (BS) and Dance (BA) at the University of Washington. As an Oregon Sea Grant Summer Scholar with the ODFW's Marine Reserves Program she worked in the Human Dimensions Project and interviewed fishers about their perspectives on Oregon's marine reserves. Commercial and charter fishers are potentially affected by the reserves on an economic and social level. Madison traveled a thousand miles during her summer program to capture their individual stories. This valuable knowledge about how marine resources should be managed can help inform future underwater video footage and used statistical techniques to characterize the diversity of invertebrate life in the marine reserves. This effort will help establish baselines for future monitoring efforts in the reserves marine policy and management decisions.

### Jen Fields: California State University Northridge

With the support of ODFW marine reserves team, Jen Fields completed her M.S. degree studying the role of mussels (*Mytilus californianus*) and surfgrass (*Phylospadix spp.*) in the nearshore intertidal environment. Specifically, she used *in situ* tide pool manipulations at 32 tide pools within the Otter Rock Marine Reserve to investigate how intertidal foundation species removal affects ecosystem function via changes in community structure and resource fluxes one month after foundation species removal. She examined the direct and indirect effects of mussel and surfgrass foundation species removal from tide pools on (1) community composition of sessile and mobile species, (2) thermal and light environments, (3) local biogeochemistry, and (4) ecosystem metabolism (NEC and NEP) using general linear models and a structural equation model (SEM) one month after foundation species removal. Her thesis can be accessed here:

[\[Link to Thesis\]](#)

### Bobby San Miguel: University of Wisconsin - Milwaukee

ODFW assisted Bobby San Miguel in collecting *Nereocystis leutkeana* (Bull Kelp) samples for a coastwide Ph.D genetics project through the University of Wisconsin. Kelp forests along the pacific coast of North America are dominated by one or a combination of three canopy-forming kelp species: *Macrocystis pyrifera*, *Eualaria fistulosa*, and *Nereocystis leutkeana*. Of these three the bull kelp, *Nereocystis leutkeana*, has the largest geographic range in North America forming beds from Point Conception in California to Unimak Island in Alaska. The bias towards studying *Macrocystis* over *Nereocystis* has led to several gaps in our knowledge of *Nereocystis*. For example, the frequency and scale of dispersal in *Nereocystis* is unknown, but it is known that it can occur during one of three points in its life history: as spores, as intact sporophytes, or as detached sori. There are also absolutely no published studies of the population genetic structure in *Nereocystis*. This project stalled as Bobby did not complete his Ph.D program.

### Micheal Thomas: University of Oregon

Micheal Thomas was a master student under Aaron Galloway interested in studying survival of Dungeness crab. He partnered with ODFW marine reserves team to collect larval Dungeness crab during multiple years of ongoing SMURF sampling. These collections were ultimately not used in his final thesis project.