2019 State of the Coast

Gleneden Beach, Oregon

November 9, 2019

Student poster abstracts

2019 STATE OF THE COAST STUDENT RESEARCHERS

1. **Britta Baechler** (Portland State University)--Microplastic Concentrations in Two Oregon Bivalve Species: Spatial, Temporal, and Species Variability
2. **Anna Bolm** (Oregon State University)--Microplastic contaminants in pelagic zone zooplankton and seawater of the Northern California Current
3. **Hailey Bond** (Oregon State University)--Observations of Water Content and Fluid Pressure within the Interior of an Eroding Beach Dune
4. **Marco Corrales-Ugalde** (University of Oregon)--Are small hydromedusan jellyfish "stealing" from larval fishes in the Northern California Current?
5. **Beau Courteau** (Oregon State University)--Hormone mimics found in tidepools near Port Orford, Oregon
6. **Amy Ehrhart** (Portland State University)--Addressing coastal pharmaceutical pollution with drug take-back boxes in Oregon: customer behavior and pharmacist recommendations regarding leftover drug disposal
7. **Haley Evans** (Oregon State University-Cascades)--Preliminary Research in Plastic Contamination of Vertebrates and Invertebrates
8. **John Fitzgerald** (Oregon State University - Cascades)--Detection of Endocrine Disruption in Three-Spined Stickleback
9. **Henry Fleener** (Oregon State University)--Evaluation of Complex Particle Feeding by Sablefish (*Anoplopoma fimbria)* and Steelhead Trout (*Oncorhynchus mykiss*).
10. **Lisa Hildebrand** (Oregon State University)--Investigating potential gray whale individual foraging specializations within the Pacific Coast Feeding Group
11. **Dorothy Horn** (Portland State University)--The Presence of Microplastics in Dungeness Crab (Cancer magister) digestion
12. **Rebecca Howard** (Oregon State University)--Four decades of change in the Oregon nearshore flatfish fishery through the eyes of science and industry
13. **Maria Johnson** (Oregon State University)--Seafood Processing Workers' Sense of Place in Coos County, Oregon
14. **Erin Kanzig** (Oregon State University)--Aging Tidegates in Oregon: The Problem and Possible Solutions
15. **M Kelsey Lane** (Oregon State University)--The return of the marine heatwave & the impacts on the plankton community off the Oregon coast
16. **Joanna Lyle** (University of Oregon)--Vertical Distribution of the Pyrosome Pyrosoma atlanticum off the Oregon Coast from Camera Profiles and Depth-Stratified Net Tows

17. **Chantelle MacAdams** (Oregon State University)--Can small predators prevent a mussel takeover after Sea Star Wasting Syndrome?
18. **Steven Manos** (Portland Community College)--Juvenile Dungeness crab try to avoid low pH seawater, but when forced into such unfavorable conditions, they may take longer to find their prey.
19. **Hannah Nolan** (Oregon State University)--Culturally Responsive Data Literacy Curriculum in an Afterschool Program for Latino Youth
20. **Keala Pelekai** (Oregon State University)--Evaluation of Pacific Lamprey statoliths and eye lenses as records of age, natal origin, and trophic history patterns
21. **Stephanie Porter** (Oregon State University)--Development of a diagnostic tool for Vibriosis
22. **Victoria Quennessen** (Oregon State University)--Accounting for population dynamics improves the use of no-take marine reserves for fishery management
23. **Vanessa Robertson-Rojas** (Portland State University)--Do Fungal Symbionts of Salt Marsh Plants Impact Plant Competition?
24. **Kaegan Scully-Engelmeyer** (Portland State University)--Understanding Oregonians' Coastal Values and Priorities Through Participatory GIS Mapping
25. **Andrew Teahan** (Oregon State University)--Anomalous warm ocean conditions impact the depth and distribution of Chinook Salmon (Oncorhynchus tshawytscha) off the Oregon Coast
26. **Anna Ward** (Oregon Institute of Marine Biology, University of Oregon)--Resolving pyrosome prey consumption through gut content analysis
27. **Victoria Williams** (Oregon State University)--An Analysis of Oceanographic, Social, and Ecological Vulnerabilities Associated with Ocean Acidification on the West Coast
28. **Reyn Yoshioka** (Oregon Institute of Marine Biology, University of Oregon)--Taking Inventory of our Invertebrates: Oregon Institute of Marine Biology's BioBlitz

Abstract Number: 1

Name: Britta Baechler

Title: Microplastic Concentrations in Two Oregon Bivalve Species: Spatial, Temporal, and Species Variability

Institution: Portland State University
Degree (Expected Graduation Year): PhD (2020)

Co-Author(s): Elise Granek, Matthew Hunter, Kathleen Conn

Abstract: Microplastics are an ecological stressor with implications for ecosystem and human health when found in seafood. We quantified microplastic types, concentrations, anatomical loadings, geographic distribution, and temporal differences in Pacific oysters (Crassostrea gigas) and Pacific razor clams (Siliqua patula) collected from 15 Oregon coast sites. Organisms were chemically digested and visually analyzed for microplastics, and material type was determined in a subset of particles using Fourier Transform Infrared Spectroscopy (FTIR). Microplastics were present in organisms from all sites sampled. On average, whole Pacific oysters and Pacific razor clams contained 10.95 ± 0.77 and 8.84 ± 0.45 microplastics per individual, respectively. Contamination was quantified but not subtracted from averages. Over 99% of identified particles were microfibers. Spring samples contained more anthropogenic debris than summer samples in oysters but not razor clams. This study provides a baseline of microplastics in Oregon bivalves and is the first to determine Pacific razor clam concentrations.

Abstract Number: 2

Name: Anna Bolm

Title: Microplastic contaminants in pelagic zone zooplankton and seawater of the Northern California Current

Institution: Oregon State University
Degree (Expected Graduation Year): Masters in Fisheries Science (2021)

Co-Author(s): Jennifer Fisher, Dr. Elise Granek, Dr. Jessica Miller, Dr. Susanne Brander

Abstract: Microplastics are ubiquitous in marine habitats globally yet knowledge of their spatial distribution and prevalence in the marine food web is limited. When present, microplastics are mistaken as food and ingested by marine animals causing physical or chemical damage to the organisms and potentially accumulating along trophic pathways. This study aims to quantify microplastic presence in the base of the Northern California Current food web by investigating zooplankton and their environment. We collected 77 plankton tows and 436 water samples from a 534 kilometer stretch between Trinidad Head, California and Cape Meares, Oregon, from three to 200 nautical miles offshore. Early investigations of water samples showed presence of potential microplastics in 84% of the filters analyzed with a trend toward near shore, surface waters. Further analysis will provide more temporal and oceanographic context, presence in zooplankton groups, and plastic composition. Microplastics present in zooplankton and seawater can have detrimental effects on marine food webs, impacting fisheries, local economies, and possibly even consumers of higher trophic level marine species.

Abstract Number: 3

Name: Hailey Bond

Title: Observations of Water Content and Fluid Pressure within the Interior of an Eroding Beach Dune

Institution: Oregon State University
Degree (Expected Graduation Year): Coastal Engineering (2020)

Co-Author(s): Meagan Wengrove, Jack Puleo, Rusty Feagin

Abstract: Existing parameterizations for predicting dune morphology do not include the mechanics of water movement within dune interiors during erosion events. Sediment moisture content influences sediment behavior and consequently influences the behavior of dunes as they erode, but field data is scarce due to the challenges of collecting data during erosion events. We used sand from Newport, OR, to construct a vegetated dune representative of a restoration project, a biocemented dune with several new storm protection strategies, and a bare dune as a control in the OH Hinsdale Wave Research Laboratory Large Wave Flume. The dunes were each instrumented with 30 moisture sensors and 15 pressure sensors, and a line-scan LiDAR was used to capture runup heights and erosion along a single transect throughout the duration of the experiment. The 1:2 scale dunes were subject to hurricane waves and water levels scaled from Hurricane Sandy. Using this combination of sensors, we quantified the movement of water in the dune throughout the storm, pressure gradients and infiltration caused by runup events, and the influence of pressure and moisture content on the mechanics of dune erosion. Erosion volumes are correlated with individual runup events and their associated sediment moisture content for each dune archetype. Preliminary results indicate that moisture sensor data can identify shifts in erosion mechanism and that water moves differently through each dune. Results have implications for more informed decision-making on the effectiveness of vegetation restoration and the potential for biocementation as a rapidly deployable dune protection strategy.

Abstract Number: 4

Name: Marco Corrales-Ugalde

Title: Are small hydromedusan jellyfish "stealing" from larval fishes in the Northern California Current?

Institution: University of Oregon
Degree (Expected Graduation Year): Doctoral (2021)

Co-Author(s): Jessica Masterman, Kelsey Swieca, Moritz S Schmid, Su Sponaugle, Robert K. Cowen and Kelly Sutherland (Advisor)

Abstract: Larval fishes generally experience up to 99% mortality due to starvation and predation, hence finding prey is of high importance to their survival. The presence of other abundant predators such as hydromedusan jellyfish, might mean that these larval fishes must compete for food. Competition could lead to lower larval fish survival rates, but these interactions between hydromedusae and larval fishes have not been explored in the Northern California Current System (NCCS). During the winter and summer of 2018-2019, we collected mesozooplankton from five stations along two cross-shelf transects located in the NCCS: the Newport Hydrographic line, OR and the Trinidad Head line, CA. We analyzed the gut contents of the hydromedusa Clytia gregaria to 1) determine their spatial and temporal patterns of prey resource use, and 2) whether diets of hydromedusae overlap with the diets of commercially important larval fishes. Preliminary results show that C. gregaria shift their prey resource use over the year. During winter, the jellyfish feeds mostly on microcrustacean eggs and adults, while during summer it feeds mostly on appendicularians (gelatinous grazers) and arrow worms (gelatinous predators). These results suggest a high degree of predation overlap with the larval stages of fish species that eat both crustacean prey (e.g., pollock, sand lace, and herring), and with fish species that prefer gelatinous prey (e.g., English sole). Further analysis of the food preferences of hydromedusae will increase our understanding of energy transfer through the food web and how this affects the survival and recruitment of commercially important fish species.

Abstract Number: 5

Name: Beau Courteau

Title: Hormone mimics found in tidepools near Port Orford, Oregon

Institution: Oregon State University
Degree (Expected Graduation Year): Biology (2020)

Co-Author(s): Ann M. Petersen, Ph.D.

Abstract: Contaminants to the environment - including endocrine disruptors – are becoming more common due to increased use of chemicals in terrestrial agriculture, farming and timber industries. Endocrine disrupting chemicals found in herbicides, pesticides, plastics, and numerous other chemicals are sometimes called hormone mimics because when ingested by animals, their effect is to stimulate steroid pathways. Some chemicals mimic female hormones like estrogen, and some chemicals mimic male hormones such as testosterone. Others suppress steroid pathways in the body. Therefore, endocrine disruptors have the potential to harm fish health and reproduction in aquatic environments. This poses the question, when industry takes place near the coast, are endocrine disruptors reaching the tidepools and nearshore marine environment due to runoff? To address this question, we performed a preliminary assessment of water quality in tidepools near the Redfish Rocks Marine Reserve. Ocean water samples were taken from four separate locations and analyzed for endocrine activity. The assay used relies on transgenic yeast that glow in the presence of hormone mimicking chemicals. We grew the yeast in the water samples from the four locations, and measured how much light they emitted. The assay found the ocean water samples obtained were endocrine active in some cases, and showed signs of contamination from different types of hormone-mimics at each location. This suggests that contaminants from runoff are finding their way into tidepools. This is an alarming finding because fish health and reproduction would be impacted by these contaminants.

Abstract Number: 6

Name: Amy Ehrhart

Title: Addressing coastal pharmaceutical pollution with drug take-back boxes in Oregon: customer behavior and pharmacist recommendations regarding leftover drug disposal

Institution: Portland State University
Degree (Expected Graduation Year): PhD (2020)

Co-Author(s): Dr. Elise Granek, Dr. Max Nielsen-Pincus, Dorothy Horn

Abstract: Production and use of pharmaceuticals in the United States is high and continues to grow. The combination of production and use, poor removal rates for drugs in excreted waste, and improper pharmaceutical disposal leads to the presence of pharmaceuticals in freshwater and marine environments. In prior work, we found traces of pharmaceuticals in Pacific oysters in Oregon (Ehrhart and Granek in prep), a commercially important species in the Pacific Northwest. To address the issue of the contribution of improper disposal to marine environmental contamination, we investigated the impacts of drug take-back boxes (dropboxes) in pharmacies on consumer behavior and pharmacist recommendations for drug disposal in Oregon. We found that customer awareness of dropboxes as well as knowledge about risks of improper disposal are low, however awareness was greater at pharmacies with dropboxes. Additionally, pharmacists at dropbox locations were more consistent in their messaging to customers, more likely to recommend proper disposal methods, and more supportive of drug take-back programs. These results demonstrate the importance of pharmacy dropboxes in improving proper drug disposal practices which could in turn reduce pollution in the marine environment. This provides support for state legislation mandating dropbox establishment at a majority of pharmacies in Oregon, including along the Oregon coast where wastewater treatment plants often discharge directly to coastal and estuarine waters.

Abstract Number: 7

Name: Haley Evans

Title: Preliminary Research in Plastic Contamination of Vertebrates and Invertebrates

Institution: Oregon State University-Cascades
Degree (Expected Graduation Year): Biology (2021)

Co-Author(s): Dr. Ann Petersen, Tom Calvenese, and Risa Christie

Abstract: The abundance of plastic debris found in aquatic environments has become a rising cause for concern. As a result of ubiquitous environmental contamination, microplastics have been accumulating in fish guts and in bivalves along the coast. It is unknown however if microplastics accumulate more in larger fish that move around a lot versus in sessile invertebrates such as bivalves or anemones that stay in one place. The driving question of my research is whether or not microplastics detectable in vertebrates and invertebrates? During a week-long field course at Port Orford, we performed a preliminary investigation into microplastic accumulation in rockfish guts and green anemone gastrovascular cavity. We collected eight rockfish samples and four giant green sea anemone samples, dissected out the guts, and digested the material in proteinase K, a strong enzyme that dissolves animal proteins but not plastics. Microplastics were identified via the use of a published guide for identifying microplastic types and a light microscope with an 100x objective. Through this technique, microplastic fibers were identified in rockfish and anemone samples at each location we studied. We identified Styrofoam, plastic threads and fibers, and unidentified plastic chunks in the samples. Our preliminary data suggest that a larger study looking at geographic distribution and taxonomic distribution of microplastic contamination is warranted. The pressing and important question our data raise is whether invertebrate and vertebrate life within protected areas such as Redfish Rocks are adequately protected from microplastics.

Abstract Number: 8

Name: John Fitzgerald

Title: Detection of Endocrine Disruption in Three-Spined Stickleback

Institution: Oregon State University - Cascades
Degree (Expected Graduation Year): Bachelor of Science - Biology (2020)

Co-Author(s): Nick Maithonis, Sara Palmer- Antoniou, Ann Petersen, Ph.D

Abstract: Contaminant runoff from inland human activity and industry creates an invisible influence that can negatively impact the health of aquatic environments and fisheries. By selecting an ideal model species in a region, it may be possible to detect the presence of such contaminants. Three-spined stickleback (Gasterosteus aculeatus) may provide such an example of a model species thanks to the observable phenotypic traits that they exhibit in the presence of endocrine-disrupting agents, particularly androgens and antiandrogens. Exposure to these classes of contaminants causes increased fat cells (adipocytes) in the liver and enlarged kidney cells. Fifty-three three-spined stickleback were retrieved from six near-shore or lake environments adjacent to Oregon's Marine Reserve system. The fish were analyzed for pathohistological changes to the liver and kidney. NIH ImageJ software was used to quantitatively measure adipocyte content of the livers and cell height in kidneys. Adipocyte levels were significantly higher in both males and females taken from Devil's Lake near Otter Rock Marine Reserve, and the kidney cell heights of males taken from Garrison Lake near Redfish Rocks Marine Reserve during the breeding season were significantly lower than males taken from other regions during the season. These findings suggest that endocrine-disruptors are present in these systems in concentrations sufficient to impact the health of fish populations. This study provides important preliminary data on a method for detection of harmful chemical agents in seemingly healthy environments. Detection of contaminants of emerging concern is crucial to managing fisheries along the Oregon Coast.

Abstract Number: 9

Name: Henry Fleener

Title: EVALUATION OF COMPLEX PARTICLE FEEDING BY SABLEFISH Anoplopoma fimbria AND STEELHEAD TROUT Oncorhynchus mykiss.

Institution: Oregon State University

Degree (Expected Graduation Year): Fisheries and Wildlife (2020)

Co-Author(s): Matt Hawkyard

Abstract: Disease continues to be a problem in the finfish aquaculture industry across the PNW and in Oregon conservation hatcheries. Current vaccination methods often involve immersion and injection delivery methods. Injections are effective but often costly and stressful on fish whereas immersions are generally less effective. Current options for an oral vaccine delivery route are limited. Vaccines cannot be added to commercial type feeds as the high temperature of production destroys bacterial-based vaccines. In this study, we investigate novel complex particles which utilize the entire particle volume for vaccine delivery and are produced with a cold production method. However, for these particles to be effective, the particles must be ingested and partially digested (once in the hindgut). We investigated the rate of ingestion and level of digestion of complex particles fed to sablefish (Anoplopoma fimbria) and steelhead trout (Oncorhynchus mykiss).

We investigated the uptake and digestion of complex particles. For our experimental treatments, the complex particles contained liposomes encapsulating an amino acid mix added to a solution of 2% alginate, we also added gelatin to an experimental treatment to promote digestion. A significantly higher portion of sablefish and steelhead fed on the amino acid mix particles when compared to a saline control treatment. Sablefish that were offered the amino acid mix treatment had significantly more particles in their gut when compared to the saline treatment, while the steelhead did not have a statistically significant difference. Particles containing no gelatin faced minimal digestion while particles comprised of 6% gelatin were highly digested. gelatin were highly digested.

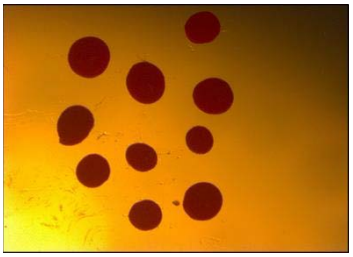

Image 1. Pigmented complex particles containing 2% alginate and liposomes encapsulating an amino acid mix. Particles were dissected from hind-gut of sablefish after 8 hours

Image 2. Pigmented complex particles containing .5% alginate, 6% gelatin, and liposomes encapsulatingan amino acid mix. Particles were dissected from hind-gut of sablefish after 8 hours

Abstract Number: 10

Name: Lisa Hildebrand

Title: Investigating potential gray whale individual foraging specializations within the Pacific Coast Feeding Group

Institution: Oregon State University
Degree (Expected Graduation Year): MS Wildlife Science (2020)

Co-Author(s): Florence Sullivan, Robyn Norman, Sarah Henkel, Leigh Torres

Abstract: Although individual niche specialization within populations has been widely documented, populations are typically managed based on the assumption that all individuals are ecologically equivalent. This approach can be problematic when a single management strategy is not effective at protecting all individuals within a population equally due to distinct ecological patterns. We examine the presence and degree of individual foraging specialization within the Pacific Coast Feeding Group (PCFG) of gray whales feeding near Port Orford, Oregon, USA. The 264 PCFG gray whales already display a hierarchical form of foraging specialization: At a species level they are the only baleen whale to feed benthically; at a population level PCFG whales do not migrate to the Bering Sea with the other 26,000 Eastern North Pacific gray whales; at a sub-group level there is evidence of temporally and spatially restricted resource exploitation (e.g., ghost shrimp foraging in WA, USA). We tracked 96 gray whales in the nearshore habitat using a theodolite (405 hours) during the same 4 week summer period in four consecutive years (2016-2019). Simultaneous to data collection on whale movements, we collected zooplankton prey samples using a research kayak. We link whale movement and prey data in space and time to assess individual foraging specializations of PCFG whales. With the potential resumption of the Makah tribal gray whale hunt and increased anthropogenic coastal use, increased understanding of the PCFG foraging ecology is needed to inform management decisions of this small, culturally distinct population unit.

Abstract Number: 11

Name: Dorothy Horn

Title: The Presence of Microplastics in Dungeness Crab (Cancer magister) digestion

Institution: Portland State University
Degree (Expected Graduation Year): PhD (2022)

Co-Author(s): Steve Rumrill, Elizabeth Perotti, Mitch Vance, Elise Granek, Catherine de Rivera

Abstract: Microplastics are present throughout coastal marine ecosystems globally as well as the Oregon coast. These tiny plastics (<1mm) are highly abundant within the near shore environment as well as in surface waters offshore. The presence of these microplastics poses a threat to the marine organisms within this ecosystem. Numerous laboratory studies have shown ingestion of these plastics by a wide array of organisms, from zooplankton to marine mammals, as well as their deleterious effects. Here we investigated the prevalence of microplastic in an economically important species, Dungeness crab (Cancer magister). We analyzed megalope, first post-larval instars, juvenile and adult crabs (male and female) from Yaquina Bay, Alsea Bay as well as pelagic traps along the Oregon coast. We analyzed the leg and body tissue, cardiac stomach, gills, and fecal matter for the presence of microplastics.

Abstract Number: 12

Name: Rebecca Howard

Title: Four decades of change in the Oregon nearshore flatfish fishery through the eyes of science and industry

Institution: Oregon State University
Degree (Expected Graduation Year): Marine Resource Management (2020)

Co-Author(s): Lorenzo Ciannelli*, Waldo Wakefield, Melanie Fewings

Abstract: Commercial fishing and scientific research have historically been conducted simultaneously off the Oregon Coast. The target species for the non-whiting groundfish fishery are primarily flatfishes, sablefish, lingcod, and rockfishes, though landings of each have fluctuated dramatically over time. Recent work has shown that in the past two decades fishing efforts have shifted offshore, likely caused by new regulations, market demand changes, or fish distribution shifts. Although federal fisheries-independent surveys have been conducted across most of the depth range, the data is limited by years and seasons surveyed as well as absence of data in the very shallowest waters (<50m). Fishery-dependent data covers those shallow waters and broader temporal range but at coarse scale. Limitations in data coverage combined with an abundance of research on deeper water groundfishes has led to a gap in understanding dynamics of the nearshore fishery, particularly regarding the influence of environmental factors on abundance and distribution. This project assesses changes in the spatiotemporal dynamics of the Oregon nearshore non-whiting groundfish trawl fishery over the past four decades. Both univariate and multivariate statistical analyses are used to assess distribution shifts in species and temporal changes in community composition. Visualization of fishery-independent and -dependent data allows for a qualitative comparison in sampling coverage as well as an assessment of differences in distribution when mapped from each dataset. These analyses will illuminate where knowledge gaps lie in both data types, how they complement each other, and how they can be filled by recently collected learned ecological knowledge (LEK) information.

Abstract Number: 13

Name: Maria Johnson

Title: Seafood Processing Workers' Sense of Place in Coos County, Oregon

Institution: Oregon State University
Degree (Expected Graduation Year): Marine Resource Management (2020)

Co-Author(s): Jamie Doyle, Marta Maldonado, Flaxen Conway

Abstract: Seafood processing is an important industry along the Oregon coast, providing employment and locally-caught seafood to coastal communities. The industry has been an integral part of Coos County since the establishment of salmon canneries in the late 1800's and has shifted over time due to changes in management, markets, the environment, and the companies in operation. Through qualitative semi-structured interviews and mental mapping with workers in several plants in Coos County, this research seeks to understand seafood processing workers' sense of place as mediated by their work in the industry. The findings will highlight a plurality of meanings and experiences among workers' sense of place based primarily on race/ethnicity, gender, and length of time in the region and industry. Understanding sense of place can reveal larger social structures and values in a given locale, highlight how individuals or groups of people experience space and form identity, and can inform policy as well as coastal resource management in a more inclusive manner. Further, sense of place significantly influences both the social and physical space. Because the seafood processing industry sits at a juncture of human and ecological systems, understanding the worker's sense of place in this context can be particularly informative.

Abstract Number: 14
Name: Erin Kanzig

Title: Aging Tidegates in Oregon: The Problem and Possible Solutions

Institution: Oregon State University
Degree (Expected Graduation Year): Master of Public Policy (2020)

Co-Author(s): None. Research conducted on behalf of the Oregon Watershed Enhancement Board (OWEB) in summer 2019.

Abstract: It is estimated that over 1,000 tidegates exist along the Oregon Coast and Lower Columbia River that provide vital flood control measures for farms and residential areas. Growing recognition that this infrastructure is aging and posing risks to coastal residents, as well as blocking salmonid fish passage, has led to interagency efforts to address the issue. A main factor in effectively addressing tidegate upgrades and/or removals is the complex permitting process. Whether upgrading and maintaining tidegates to continue farming or removing them to provide vital wetland and salt marsh restoration, the permitting process poses significant hurdles for private landowners in terms of time, finances, and expertise. Through interviews with county, state, and federal agencies and departments, my research seeks to understand the regulatory framework that tidegate projects reside in and offers potential steps for streamlining and simplifying the permitting process. This poster will use engaging, easy-to-understand visuals to outline current and suggested permitting processes.

Abstract Number: 15
Name: M Kelsey Lane

Title: The return of the marine heatwave & the impacts on the plankton community off the Oregon coast

Institution: Oregon State University
Degree (Expected Graduation Year): M.S., Marine Resource Management (2020)

Co-Author(s): Jennifer Fehrenbacher, Jennifer Fisher

Abstract: This study describes the planktic foraminifera community found in a cross-shelf transect off the Oregon coast (44.6°N) during an extended warm water event in 2014 – 2016, and compares these results with the new marine heatwave emerging in the fall of 2019. In 2013, an anomalously warm water mass formed in the Gulf of Alaska that was coined the 'Warm Blob.' It reached the Oregon Coast in fall 2014, persisting for nearly 34 months. The 'Warm Blob' had significant impacts on the pelagic communities off the Oregon Coast. These impacts on phytoplankton, gelatinous organisms, copepods, and krill have been published (Peterson et al., 2017), but foraminifera were not included. Foraminifera, or forams, are shelled marine protists, a ubiquitous plankton found globally. Because different species of planktic forams have affinities to different sea surface temperatures and water masses, changes in their community assemblage can help track the dispersion and spread of warm water anomalies off the Oregon coast.
For this study, samples were collected during annual fall research cruises from plankton tows along the Newport Hydrographic Line, a long-term monitoring transect off the coast of Oregon. Preliminary results showed that during the Warm Blob years, subtropical species were found in high abundance and closer to nearshore, compared to a historical foraminifera species assemblage from this region. A similar pattern has been observed in 2019. Preliminary data

Abstract Number: 16

Name: Joanna Lyle

Title: Vertical Distribution of the Pyrosome Pyrosoma atlanticum off the Oregon Coast from Camera Profiles and Depth-Stratified Net Tows

Institution: University of Oregon
Degree (Expected Graduation Year): Masters of Science in Marine Biology (2021)

Co-Author(s): Robert K. Cowen, Su Sponaugle, Kelly R. Sutherland

Abstract: Immense blooms of the colonial pelagic tunicate Pyrosoma atlanticum in Oregon waters during 2016-2018 followed an unusual marine heatwave encompassing the western coast of the US. Typically found in tropical or subtropical waters, pyrosomes are among the most efficient zooplankton grazers capable of rapid reproduction and, when numbers are high, consuming much of the local phytoplankton biomass. In this study, we used vertical camera tows and MOCNESS sampling to estimate the vertical distribution of P. atlanticum along transects off
Newport, Oregon (45 N, 124 W) and Trinidad Head, California (41 N, 124 W) during July 2018. Pyrosomes underwent diel vertical migration and were distributed non-uniformly in the water column with peak numbers associated with the base of the surface mixed layer. Considerably more pyrosomes were observed offshore of Oregon than northern California. Large blooms of P. atlanticum similar to those seen in 2018 could dramatically affect pelagic food webs of the NE Pacific due to high clearance rates and carbon export from fecal pellet production and mortality events. Understanding the distribution of these gelatinous grazers may give insight to their ecological role in the Northern California Current as conditions become more favorable for recurring blooms.

Abstract Number: 17

Name: Chantelle MacAdams

Title: Can small predators prevent a mussel takeover after Sea Star Wasting Syndrome?

Institution: Oregon State University
Degree (Expected Graduation Year): B.S. in Zoology (2020)

Co-Author(s): Silke Bachhuber, Sarah Gravem, Bruce Menge

Abstract: After Sea Star Wasting Syndrome (SSWS) decimated populations of the intertidal sea star Pisaster ochraceus along the West Coast, many hypothesized that the loss of this keystone predator could lead to an overwhelming takeover by its mussel prey, Mytilus californianus. While this occurred at some sites, others showed no takeover by mussels. One possibility is that other predators may have filled the keystone role of Pisaster and kept mussel populations under control. We conducted a field experiment, to investigate whether the predatory snail Nucella ostrina and predatory small sea star Leptasterias hexactis were able to control populations of settling mussels and barnacles by enclosing both, neither, or each species separately in cages attached to the rocks for >1 year. Using photo analysis, we found that both Nucella and Leptasterias controlled mussel cover, and that mussels were more abundant when no predators were present. This suggests that these predators can compensate for the loss of the keystone predator, and may have contributed to the stability of communities at some sites after SSWD. Understanding mechanisms of resistance to community-level change after mortality events and the role of compensatory predators may help mitigate the effects of future disease events that are predicted to increase in frequency due to climate change. This research may inform work in other ecosystems where the top predator is at risk of decline or extinction.

Abstract Number: 18

Name: Steven Manos

Title: Juvenile Dungeness crab try to avoid low pH seawater, but when forced into such unfavorable conditions, they may take longer to find their prey.

Institution: Portland Commuinty College
Degree (Expected Graduation Year): Enviormental studies (2021-2022)

Co-Author(s): Hannah G Hayes, Julie B. Schram, Aaron W.E. Galloway

Abstract: Recent studies have shown that the large increase of anthropogenic carbon is contributing to low pH in the ocean, referred to as ocean acidification, which in turn affects the calcification of crustaceans. Ocean acidification is also known to affect behavior and sensory systems of organisms. Metacarcinus magister (Dungeness crab) are a major contributor to the Oregon fishing communities, and coastal culture of the region. There has been relatively little research on the effects of ocean acidification on post-settlement juvenile life history stage in Dungeness crab. Here, we tested how exposing juvenile Dungeness crab to an ambient pH and a more acidic pH alters their foraging behavior and if they are able to sense and move away from a reduced pH. We captured megalopae using a light trap and settled juvenile crab into ambient lab conditions. We measured crab prey discovery time and handling time in the controlled pH and more acidic pH. We hypothesized that the juveniles in the low pH water would take a longer amount of time to find their food or would not be able to find it. We used a two-current choice flume with an ambient pH and a reduced pH, providing a choice between to the two, and measured the amount of time individuals spent in each pH in 300 second trials. We found that while behavior is highly variable, juvenile Dungeness try to avoid low pH water, and when they are forced into such unfavorable conditions, they may take longer to find their prey.

Abstract Number: 19

Name: Hannah Nolan

Title: Culturally Responsive Data Literacy Curriculum in an Afterschool Program for Latino Youth

Institution: Oregon State University
Degree (Expected Graduation Year): Marine Resource Management (2020)

Co-Author(s): Tracy Crews

Abstract: In 2013 the National Science Foundation selected Oregon State University to lead the construction of three new regional class research vessels (RCRV). One innovative feature of these new research vessels are their data-presence systems which will allow researchers at sea to transmit data to shore in real time via a web portal. In theory, this web portal will also allow K-12 students to interact and explore oceanographic science alongside researchers. However, past research has indicated data portal websites are relatively meaningless to students if students have low data literacy. Data literacy is defined as the ability to collect, organize, and analyze data. In order to support students' data literacy skills and thus the use of the web portal, the RCRV outreach team is developing curriculum for the new vessels. A component of this project is making sure curriculum is culturally relevant for minority youth in the state of Oregon. Research is being conducted through a small exploratory study with an afterschool program for Latina/o high school students to determine best practices for applying culturally responsive education theory to data literacy curriculum. The researcher will utilize a qualitative case study approach and work with students in order to elucidate their perspectives for tailoring curriculum to their interests. The curriculum will apply the education strategy of creative data literacy which states students respond more positively to data learning experiences that are hands-on and utilize local, actionable data.

Abstract Number: 20

Name: Keala Pelekai

Title: Evaluation of Pacific Lamprey statoliths and eye lenses as records of age, natal origin, and trophic history patterns

Institution: Oregon State University
Degree (Expected Graduation Year): Fisheries Science (2021)

Co-Author(s): Jessica Miller

Abstract: The Pacific Lamprey (Entosphenus tridentatus) is an anadromous species native to the North Pacific Ocean and its adjacent freshwater tributaries. Pacific Lamprey are both ecologically and culturally important to the Pacific Northwest of the United States. In that last 50 years, Pacific Lamprey have experienced declines in abundance throughout the Columbia River Basin, USA. More information on the biology and ecology of this species is needed for conservation and management. Anatomical structures have been widely used in fisheries science for biological inference. The Pacific Lamprey is a cartilaginous fish that lacks the common hard structures used in teleosts to elucidate age and life history patterns. Statoliths, analogous to otoliths in function, are calcium-fluorapatite concretions found in the auditory capsules of lampreys. Statoliths have potential for aging and microchemical analysis but require further validation that bands represent annual deposition and are chemically reflective of the individual's environment. Eye lenses are another structure with potential for trace element and stable isotope analysis but remain relatively unexplored for lamprey. The goal of this project is to broaden our understanding of lamprey by evaluating the efficacy of different structures for determining age, natal origin, and trophic history patterns. These objectives will be achieved by evaluating lamprey statoliths and eye lenses taken from known age and origin specimens.

Abstract Number: 21

Name: Stephanie Porter

Title: Development of a diagnostic tool for Vibriosis

Institution: Oregon State University
Degree (Expected Graduation Year): Masters of Science (2021)

Co-Author(s): Elizabeth Carroll and Dr. Claudia Hase

Abstract: Global climate change is increasing the temperature of the ocean which subsequently increases the prevalence of marine pathogens. Vibrio parahaemolyticus (Vp) is the etiological agent for gastroenteritis (or Vibriosis) associated with eating raw shellfish. It is commonly found throughout temperate marine and estuarine waters all over the world. Vp bacteria emerge during summer months when water temperatures are warmer than usual. Oysters are filter feeders and typically have a robust microflora of marine bacteria colonizing the gut. Through normal feeding, oysters can ingest Vp and it proliferates in the digestive tract of the animal. Recreational and commercial shellfish harvesting is very common along the Oregon coast and with each passing year, more vibriosis infections are reported. At the State of the Coast conference, we would like to present preliminary data for the development of a diagnostic tool for the presence of Vp in shellfish. The goal of developing this tool is to ensure safety for shellfish consumers, while providing a cheap and effective quality control tool for shellfish producers.

Abstract Number: 22

Name: Victoria Quennessen

Title: Accounting for population dynamics improves the use of no-take marine reserves for fishery management

Institution: Oregon State University
Degree (Expected Graduation Year): MS in Fisheries Science (2020)

Co-Author(s): J. Wilson White

Abstract: Today, fisheries are managed using information obtained through stock assessments. These provide reference points, such as how depleted the fishery is compared to when it is unfished, to determine optimal catch. However, these stock assessments typically need decades of catch and abundance data to accurately estimate depletion. These data may be difficult to obtain for smaller, or mostly recreational, fisheries. Populations in no-take marine reserves, that are not fished, may therefore serve as a reference point to determine depletion. One method developed in 2011 uses the ratio of fish density, or numbers of individuals per unit area, outside to inside the reserve, as a proxy for depletion. We can then explore how best to use this ratio to determine optimal catch using control rules, which dictate whether fishing effort should decrease, remain the same, or can increase based on the density ratio. The density ratio is especially useful because it does not require as many years of data, and can be applied at a local scale that is relevant to annual recruitment. One limitation to the original method is that it did not model strong, periodic recruitment pulses that we see in many fish species off the coast of Oregon. It also did not account for differences between the short-term and the long-term, unfished population dynamics after a marine reserve has been implemented. Using age-structured spatial population modeling of Black Rockfish (Sebastes melanops) populations, I show how these factors can be accounted for to help determine consistent, sustainable catches.

Abstract Number: 23

Name: Vanessa Robertson-Rojas

Title: Do Fungal Symbionts of Salt Marsh Plants Impact Plant Competition?

Institution: Portland State Univesity
Degree (Expected Graduation Year): Master of Environmental Science (2020)

Co-Author(s): Dr. Catherine de Rivera, Dr. Sarah Eppley, Dr. Jennifer Morse

Abstract: Study in salt marshes have revealed unique symbiotic relationships between plants and soil fungus despite brackish and anoxic conditions. These fungi, called arbuscular mycorrhizal fungi (AMF), grow in the roots of plants and can enhance various plant functions when exchanging nutrients for glucose. This exchange may increase the productivity of a plant host, and allow the fungus to proliferate as well. Increased productivity may ultimately affect competition success and expression of competition strategy. The growth of plants colonized in their roots by arbuscular mycorrhizal fungus was investigated to determine how AMF affects plant competition. AMF effects on competition between species when grown together in a greenhouse was measured by biomass allocation, photosynthetic stress, canopy cover, and plant height. When grown in the stressful marsh conditions of high soil saturation with salinity presence, AMF inoculation will increase the growth of the competitive dominants Deschampsia cespitosa and Phalaris arundinacea more than growth of the morem ruderal and stress tolerant species, Juncus balticus. The difference between AMF inoculation and non-inoculation will be even stronger when in polyculture than monoculture.

Abstract Number: 24

Name: Kaegan Scully-Engelmeyer

Title: Understanding Oregonians' Coastal Values and Priorities Through Participatory GIS Mapping

Institution: Portland State University
Degree (Expected Graduation Year): PhD, Earth Environment and Society (2020)

Co-Author(s): Dr. Elise Granek, Dr. Max Nielsen-Pincus, Paul Manson

Abstract: The Marine Reserves Program and Territorial Sea Plan update for ocean renewable energy both triggered extensive social science research along the Oregon coast. This research effort in coastal communities has provided new insights on the social dimensions of ocean and coastal management decisions, but there has been little examination statewide of Oregonians' priorities and perceptions of marine resources and management more broadly. In order to fill this data gap of perceptions, priorities and values of Oregon residents statewide, we implemented and analyzed a public participation geographic information system (PPGIS) mapping survey designed to capture Oregonians' uses and perceived values of coastal and marine areas. These data were used to measure the values Oregonians hold for Oregon's coastal and marine ecosystems, assemble spatially explicit baseline data on coastal benefits and values along the Oregon coast, and identify the suite of coastal and marine ecosystem services that Oregonians prioritize from the marine reserve network. Spatial point data were explored through the creation of heat maps summarizing the density of value and management priority pins captured in the survey. We found values and management priorities varied based on participants' home region in Oregon, with regions of the state demonstrating distinct value orientations.

Abstract Number: 25

Name: Andrew Teahan

Title: Anomalous warm ocean conditions impact the depth and distribution of Chinook Salmon (Oncorhynchus tshawytscha) off the Oregon Coast

Institution: Oregon State University
Degree (Expected Graduation Year): Marine Resource Management (2020)

Co-Author(s): Michael Banks, Renee Bellinger, Stacey Miller

Abstract: With the effects of climate change becoming more apparent, assessing the impact on populations important to wildlife conservation and fishery sustainability has become an increasingly important topic to explore. Among those fish which express diverse life history strategies, we are learning that Chinook salmon ocean residence strategies are sensitive to ocean temperatures at depths. Thus, warming ocean conditions could present a challenge to maintaining vitality of the species and fisheries for which the Pacific Northwest has become globally renowned. Through study of precise location and oceanographic parameters among Chinook encounters observed in fisheries off of Oregon in years 2012- 2015 we will examine the effects of the 2014-2015 marine heat-wave ('Warm blob') on the depth and location distributions of Chinook Salmon. Specifically, we will focus on stocks which are economically valuable as well as indicator stocks which are crucial for making management decisions. We then outline how these findings may have relevance to management and policy decisions.

Abstract Number: 26

Name: Anna Ward

Institution: Oregon Institute of Marine Biology, University of Oregon
Degree (Expected Graduation Year): Ph.D. Biology (2024)

Co-Author(s): Anne Thompson; Kelly Sutherland

Title: Resolving pyrosome prey consumption through gut content analysis

Abstract: Pyrosomes are colonial, columnar-shaped pelagic tunicates that filter feed on small planktonic organisms and marine microbes. These tunicates provide a unique pathway for energy transfer in marine food webs, lowering the number of trophic steps required to transfer energy from microbial organisms to mesozooplankton. Yet, little research has investigated the prey preferences and selectivity of pyrosome grazing. Given the recent occurrence of pyrosome blooms off the Oregon coast, there is renewed interest in their prey consumption and the implications for plankton community composition. In this study, we coupled light and electron microscopy techniques to better understand prey consumption by Pyrosoma atlanticum. We analyzed 32 pyrosome guts during the winter and summer of 2018 in the Northern California Current. Preliminary results show the consumption of picocyanobacteria, centric and pennate diatoms, and some thecate dinoflagellates by the pyrosomes. Prey size ranged from 1µm-50µm in diameter. These results corroborate and expand on complementary findings using flow cytometry and sequencing techniques. Feeding on diverse prey items may allow pyrosomes to succeed under a range of environmental conditions and, once present, they may facilitate new linkages between marine organisms. Minimizing energy lost through trophic transfer may ultimately increase carbon availability to predators and deep-sea communities during sinking events.

Abstract Number: 27

Name: Victoria Williams

Institution: Oregon State University
Degree (Expected Graduation Year): Masters in Public Policy (2021)

Co-Author(s): Ana K. Spalding, Tessa Hill, Kristy J. Kroeker, Liz Whiteman, Eric Sanford, Brian Gaylord, Aurora M Ricart, Sarah Close, Emily Knight, Jessica Kauzer

Title: An Analysis of Oceanographic, Social, and Ecological Vulnerabilities Associated with Ocean Acidification on the West Coast

Abstract: Ocean acidification (OA) disrupts the carbonate chemistry of marine ecosystems and threatens calcifying organisms, harming coastal communities that depend on them. Given the range of effects on ecological, economic, and cultural systems, we are spearheading OA research in Washington, Oregon, and California to better understand where to act and how to engage with future policy and management.

Our two complementary projects, funded by the Lenfest Ocean Program and the California Ocean Protection Council (OPC), are analyzing the various vulnerabilities associated with OA on the West Coast. Through the Lenfest project, we aim to map the geospatial patterns of OA and other environmental stressors, and various marine and nearshore organisms along the West Coast that are vulnerable to such stressors. Through the OPC project, we aim to understand the combined social-ecological vulnerabilities in California to the effects of OA and related stressors, with a focus on estuaries and other coastal waters; and including a rapid assessment of the factors that affect adaptive capacity of human communities.

We aim to use the results from both projects to directly inform OA policy. Investigating OA along the West Coast will provide a platform for future mitigation efforts and increase community involvement and integration of their needs in policymaking. In the future, we hope to expand our work to explore the adaptive capacity of communities in Oregon, in alignment with the recently released Oregon OAH Action plan.

Abstract Number: 28
Name: Reyn Yoshioka

Title: Taking Inventory of our Invertebrates: Oregon Institute of Marine Biology's BioBlitz

Institution: Oregon Institute of Marine Biology, University of Oregon
Degree (Expected Graduation Year): PhD (2021)

Co-Author(s): Jan Hodder, Gustav Paulay, Christopher Meyer, Richard Emlet, Maya Watts, Svetlana Maslakova, Aaron Galloway (advisor)

Abstract: The Oregon Coast has a remarkable biodiversity and a long history of study. However, as with much the world, there is still much to be learned about the fauna of this region. Because finding and documenting species is time and resource consuming, 'BioBlitzes' have emerged as a tool to concentrate effort to describe local biodiversity. BioBlitzes are short, intensive events to catalogue biodiversity in a small area, often relying on taxonomic experts to identify the material. On the local scale, BioBlitzes help us determine what species we have and where they live. On a broader scale, data from BioBlitzes can be combined and compared with those from events around the world, giving us a better idea of earth's biodiversity and its distribution. In June 2019, we conducted a BioBlitz of marine invertebrates at the Oregon Institute of Marine Biology (University of Oregon) in an effort to understand the biodiversity around Coos Bay. This event, with dozens of participants including undergraduate students and taxonomic experts from near and far, documented over 800 morphospecies of 18 phyla using a three-part gold standard of taxonomic vouchering: high-quality photographs, DNA barcodes, and morphological vouchers. Additionally, ahead of the BioBlitz, we held a workshop for OIMB students on publication-ready photography appropriate for photo-vouchers. All data from the event, including images and sequences, will be available to researchers and the public. We hope the findings of the effort will help us better recognize and manage our local biodiversity.