

## Undergraduate Research Symposium May 19, 2017 Mary Gates Hall

### Online Proceedings

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#### POSTER SESSION 2

Commons West, Easel 36

1:00 PM to 2:30 PM

##### **A Study on the Morphological Variability of *Nucella lamellosa* in the Salish Sea**

Joycelyn Chui, Senior, Aquatic & Fishery Sciences

Mentor: Gary Winans, SAFS

Mentor: Jacqueline Padilla-Gamino, School of Aquatic and Fishery Sciences

*Nucella lamellosa* is a common low-intertidal snail in the Pacific Northwest. Unlike its Atlantic Congener *N. lapillus*, there are no recent thorough studies or data available on the morphology of *N. lamellosa* in the Salish Sea. *Nucella* plays an important structuring role in the intertidal ecosystem by preying on barnacles, algae and other bivalves. Moreover, *Nucella* does not have planktonic larva, the young hatch directly into juveniles instead. This unique life history characteristic contributes to a greater likelihood of reproductive isolation between populations. Understanding the morphological variations and environmental influences between populations is crucial for conservation management. *Nucella lamellosa* from up to six locations in the Salish Sea will be individually photographed on the front and back side and the images analyzed as part of the research done with the NOAA Northwest Fisheries Science Center. In Spring 2017, further analyses will be conducted on morphological variations among potential populations. Morphological shape differences will be assessed using three contemporary multivariate approaches as well as color pattern differences. The three multivariate approaches will be Principle Component Analysis, Thin Plate Spline, and Momocs. Shell features such as color, banding, shell thickness will be categorized according to locations to evaluate this source of variability in Salish Sea. Results from the three analyses will be compared and distinguishable populations will be displayed on a map as an outcome

#### POSTER SESSION 2

Commons West, Easel 38

1:00 PM to 2:30 PM

##### **Historical Ecology of *Philometra* spp. “Blood Worms” in English Sole (*Parophrys vetulus*) of Puget Sound**

Ingrid Tong Tong (Ingrid) Howard, Senior, Aquatic & Fishery Sciences

Mentor: Chelsea Wood, Aquatic and Fishery Sciences

Parasites can be very influential in various aspects of aquatic health, conservation, industry, and environmental management. They can affect the size and marketability of fish, compromise wildlife conservation, and pose risks to public health. However, despite their ubiquity and significance, how human impacts on the environment affect their distribution is largely unknown. This study investigated this by creating a historical timeline for the abundance of *Philometra* spp. blood worms in Puget Sound, WA. In this study, I used preserved specimens of English sole from the Burke Museum Ichthyology Collection to document the presence of the parasite and make comparisons of fish caught in different regions and oceanographic regimes within the Sound. I used this data to investigate how *Philometra* spp. abundance tracks with implementation of restrictions on English sole exploitation. I also obtained live samples of English sole in order to compare the historical timeline with contemporary data. This timeline ultimately provides insight into the mechanisms of how oceanographic features, fishing, and fishing cessation affected the distribution and abundance of *Philometra* spp. in English sole. Change in parasite abundance through time is relevant to the conservation of fish species, as well as determining fishing regulations and policies that in turn affect the economy and public health, making this area of study one of great value and worthy of further pursuit.

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#### SESSION 2F

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##### **POLITICS AND CULTURE**

Session Moderator: John Wilkerson, Political Science

MGH 242

3:30 PM to 5:15 PM

\* Note: Titles in order of presentation.

### **The Longitudinal Effect of Defined Contribution Pension Plans on Employees in Public Sectors**

*Judy Zhuang, Senior, Economics, Mathematics*

*UW Honors Program*

*Mentor: Christopher Anderson, Aquatic and Fishery Sciences*

*Mentor: Rachel Heath, Economics*

Many scholars have constantly claimed that a shift from defined benefit plans to defined contribution plans has been the wrong course of action in policy and it has brought dire effect to the economy. Economists have argued that defined contribution plans are generating inefficiency pension income for employees in the private sectors, creating further cost burden for taxpayers and discouraging employees to stay at a job. While most observers are accepting the current situation by sticking to the traditional defined benefit plans, there are significant indicators in which the shift to defined contribution plans is inevitable. Economic shocks such as financial crisis, new health policy like Affordable Care Act and Congress abolishment of the Aid to Families with Dependent Children federal assistance program have changed the tides. They have brought a great deal of attention on how defined contribution pension plans can shape agents' behavior in the labor market. Using datasets from the Survey of Income and Program Participation (SIPP) Synthetic Beta file and the National Quarterly Workforce Indicators, this paper examines the proposition that defined contribution plans motivate newly hired workers to stay at a job for a much longer period and gain higher weeks at pay without federal assistance programs taken place. This occurs particularly for male employees in public sectors. Regression analysis (OLS and logistic) demonstrates that workers enrolled in defined contribution pension plans have increasing personal level annual earnings taxed under FICA, higher probability in having employer-based health insurance and a larger family size in their individual households. Furthermore, this paper attempts to explain whether defined contribution plans have transitory or permanent effect on workers' wellbeing during economic shocks using unit root test to determine whether there exists a stochastic trend. Keywords: defined contribution pension plans, labor market, individual households, workers

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## **SESSION 20**

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### **USING MODERN GENETIC APPROACHES TO INVESTIGATE DEVELOPMENT AND DISEASE**

*Session Moderator: Celeste Berg, Genome Sciences*

**MGH 389**

*3:30 PM to 5:15 PM*

\* Note: Titles in order of presentation.

### **Genetic Differentiation in Reproductive Gene of Pacific Cod Along Species' Geographical Range**

*Theodore Shumway (Teddy) Hartinger, Senior, Aquatic & Fishery Sciences*

*Mentor: Daniel Drinan, School of Aquatic & Fishery Sciences*

*Mentor: Lorenz Hauser, School of Aquatic and Fishery Sciences*

Pacific cod (*Gadus macrocephalus*) is the target species of a large fishery in North America that ranges from Alaska to California. In a recent genetic sequencing study, very high divergence among Pacific cod from different geographic areas was observed in what appears to be the Zona pellucida sperm-binding protein 3 (ZP3) gene. In many other vertebrates, the ZP3 gene codes for proteins that are significant to reproduction, and this gene may be an important factor in the context of the species' life history and management. To increase resolution of how ZP3 varies across the Pacific cod range, this project investigates the entire coding sequence in Pacific cod from four geographic areas: Kodiak Island, Prince Williams Sound, Hecate Strait, and the Washington Coast using PCR and Sanger sequencing. Differences in amino acids and protein structure were identified. It appears that there are significant differences in the ZP3 gene between southern and northern populations of Pacific cod. Understanding these patterns is important for future studies of how differences in the ZP3 gene may affect reproduction and population connectivity.

## **POSTER SESSION 3**

**Balcony, Easel 91**

*2:30 PM to 4:00 PM*

### **Chemical Control of Burrowing Shrimp on Shellfish Beds in Washington: Is Emamectin Benzoate a Viable Alternative to Imidacloprid?**

*Shannon Heather (Shannon) O'Brien, Junior, Environmental Science & Resource Management*

*Mentor: Christian Grue, Aquatic & Fishery Sciences*

*Mentor: Lisa Crosson*

Imidacloprid (IMI), a neonicotinoid, is being sought as an alternative to the carbamate pesticide, carbaryl, to control burrowing shrimp (ghost shrimp, *Neotropea californiensis*) in Willapa Bay and Grays Harbor. The shrimp destabilize sediments resulting in poor survival and low yields of the commercially harvested Pacific oyster. Previous laboratory tests indicate ghost shrimp are overtly affected (immobilized) when exposed to IMI at concentrations up to 1 million ppb in artificial seawater (SW), but not killed and subsequently recover. Our objective was to determine if emamectin benzoate (EB) is a better alternative to IMI. EB, the active ingredient (a.i.) in Slice(R), is currently registered for use in marine waters for the control of sea lice on farmed salmon. We

simulated a 6-hour tidal exposure of adult non-gravid female ghost shrimp to concentrations of EB (as the insecticide Proclaim(R)) ranging from 0.01 to 100 ppb a.i. within artificial seawater alone or sediment + seawater. No treatment-related mortality was observed within the 96-hour test, but overt effects were observed, particularly at 100 ppb in both seawater (abnormal body position) and sediment (lethargy, inability to burrow). Results suggest that the 6-hour exposure was not sufficient to cause mortality. In a subsequent 96-hour test, we will expose the shrimp to EB mixed directly into the sediment simulated tidal cycle. As the shrimp re-establish their burrows, we anticipate increased exposure to the chemical and mortality. EB is more effective as a pesticide when ingested and, in comparison to IMI, targets the primary neurophysiology of crustaceans including sea lice and burrowing shrimp.

## **POSTER SESSION 4**

**Commons East, Easel 76**

*4:00 PM to 6:00 PM*

### **Assessing Temporal Changes in Coral Reef Communities of the Caribbean Sea**

*Hannah Morgan (Hannah Waterman) Waterman, Senior, Aquatic & Fishery Sciences*  
*Mentor: Lorenz Hauser, School of Aquatic and Fishery Sciences*

In recent decades, coral reef ecosystems have experienced mass mortality events related to increased sea surface temperatures and coral bleaching. Although numerous studies have documented the loss of coral diversity and abundance after bleaching, less is known about the potential of these communities to recover over longer time periods. We investigated whether reef communities in Bocas del Toro, Panama, were able to recover from two bleaching events: a moderate event in 2005 and a severe event in 2010. Ten reefs were randomly sampled using underwater photography before bleaching occurred (2004) and four years post-bleaching (2013). We identified marine organisms (corals, sea urchins, sponges, algae, etc.) and substrate type for 3,500 random points across a depth gradient on each reef. Subsequently, we investigated trends in reef community composition across the two different sampling periods. We hypothesize that coral recovery will be influenced by different life history strategies such as reproductive behavior and tolerance to environmental perturbation. Preliminary data suggest that sea urchins have increased in abundance since 2004, while algal cover has declined. We hope that this study will provide more information on the contribution of invertebrate herbivores to reef recovery and resilience.