**DETAILS**

**SPRING 2012**

**CAPSTONE SUMMARY**

**STUDENT**

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**SITE**

Friday Harbor Labs

*University of Washington*

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# “Science at Sea!” Summary:

The primary goal of this research project was to investigate the San Juan Archipelago’s pelagic ecosystem to under- stand how physical oceanography shapes the patterns of biotic communities in the open ocean. The apprenticeship team and I used university research vessels to explore the complex physical and biological relationships of the San Juan Channel. This research built upon the findings of previous apprentices and contributed to a unique data set that allowed us to examine long-term ecological changes in the region. My research focuses primarily on how local environmental conditions influence the behavioral patterns and population dynamics of zooplankton, which are an essential component of marine food webs.

# Why I did it:

This research is important for understanding this oceano- graphically complex and highly productive ecosystem. The San Juan Archipelago is located at the nexus of the Pacific Ocean and the Fraser River, which allows us to compare freshwater and marine influences on locally abundant populations of plankton, fish, seabirds, and marine mam- mals. The San Juan Archipelago is particularly sensitive to climate change, compared to other areas along the Pacific coast, due to idiosyncrasies in its physical oceanography. Other research strongly suggests that, as the world’s oceans absorb atmospheric carbon dioxide, the Puget Sound may have a unique status with respect to ocean acidification and its effects on marine ecosystems. Under- standing the relationships between the physical and biological components of this complex ecosystem is essential to our ability to make predictions of how the region will respond to changes in the biosphere.

# How I did it:

The apprenticeship team and I collected data from six sampling stations throughout the San Juan Channel during weekly cruises abroad the Friday Harbor Laborato-

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**The Big Picture**

The results of this study may enhance our understanding of tidal mixing as an influence on the juvenile development and reproduction of copepods in the San Juan Channel. Investigating how environmental conditions influence the life history stages of copepods is critical to understanding this essential component of marine food webs.

ries Research Vessel, R/V Centennial. The apprenticeship team and I worked collectively to collect and analyze data on the major aspects of the pelagic ecosystem. During each cruise, we utilized water column-sampling devices to collect physical and chemical oceanographic data, acoustic-sampling devices to calculate fish populations, phytoplankton and zooplankton nets to collect specimens, and standardized observation techniques to count seabirds and marine mammals. In the laboratory, I analyzed zooplankton samples with a dissecting micro- scope and contributed my observations to an existing database. I investigated the abundance and distribution of juvenile and adult copepods (a ubiquitous crustaceous zooplankton taxon) in the San Juan Channel with respect to the environmental conditions present at each sampling station.

# What I discovered:

Copepod development and recruitment is influenced considerably by environmental conditions. The abundance and distribution of juvenile and adult copepods in the San Juan Channel is influenced considerably by the degree of tidal mixing at each sampling station. Tidal mixing causes marine turbulence that acts as a stressor and influences the behavior of copepods at various stages of develop- ment. Juvenile copepods were more common in turbulent waters, suggesting that tidal mixing at the nexus of the Strait of Georgia and the Fraser River creates stress that inhibits copepods from entering diapause (i.e., a critical stage of development as a means to survive predictable, unfavorable environmental conditions) before reproduc- ing. In contrast, adult copepods were more common in unmixed waters, suggesting that stratified waters at the nexus of the Strait of Juan de Fuca and the San Juan Chan- nel create a stable environment that facilitates copepod diapause and recruitment.

# What I learned:

* To utilize standardized methods for oceanography abroad a scientific research vessel;
* To collect and analyze physical oceanographic data;
* To collect and identify zooplankton specimen;
* To analyze relationships between physical and biological components of a complex marine ecosystem;
* To engage with the terminology related to curriculum/education development; and
* To work and engage students in an activity.