



**University
of Victoria**

Graduate Studies

Notice of the Final Oral Examination
for the Degree of Master of Science

of

SARA WICKHAM

BSc (University of Victoria, 2014)

**“The ecology of sea wrack accumulations across space and time
on islands along British Columbia’s Central Coast”**

School of Environmental Studies

Thursday, December 14, 2017
2:00 P.M.
Clearihue Building
Room B007

Supervisory Committee:

Dr. Brian Starzomski, School of Environmental Studies, University of Victoria (Supervisor)
Dr. Natalie Ban, School of Environmental Studies, UVic (Member)
Dr. Christopher Darimont, Department of Geography, UVic (Outside Member)

External Examiner:

Dr. Katy Hind, Department of Biology, UVic

Chair of Oral Examination:

Dr. Jon Willis, Department of Physics and Astronomy, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

The equilibrium theory of island biogeography provides a useful model for understanding patterns of species richness on island systems and analogous fragmented terrestrial habitats. However, like all models, it is limited in its ability to explain island species richness patterns when nutrients may move across ecosystem boundaries. Recently, enhancements to the theory have been proposed, including the subsidized island biogeography hypothesis. This hypothesis suggests that nutrient subsidies from the marine environment may impact the productivity and diversity of small islands. Sea wrack (dead, shore-cast seaweed) is a recognized vector of marine-nutrient subsidies to islands in regions of low in situ productivity, but little is known about the mechanisms surrounding sea wrack accumulation in productive, temperate environments.

In this research I explore the spatial and temporal distribution of sea wrack on islands along British Columbia's temperate Central Coast. Through an observational study I investigate three broad factors that could affect sea wrack deposition: climatic patterns, physical characteristics of shorelines, and the amount of nearby donor habitat. I surveyed sea wrack biomass and species composition, as well as the biogeographical characteristics of shorelines across 455 sites on 101 islands. I returned to a subset of sites on a bi-monthly basis to document temporal changes in wrack biomass and species composition. My results demonstrate that sea wrack accumulations were present at sites that were not composed of rock substrate, and that had wide, wave protected shorelines and high amounts of nearby donor ecosystem habitat. Additionally, sea wrack biomass and species composition was ubiquitous throughout all seasons. These results suggest that sea wrack can be considered a press subsidy as it is a consistent vector of nutrients to beaches along the Central Coast.

Ecological research on macrophytes, macroalgae and sea wrack often requires the conversion of wet biomass to dry, to create consistency across investigations. This is a laborious process. Here, I present the results of wet-dry calibrations for 12 common macrophyte and macroalgae species collected from the Northeast Pacific Ocean. Future investigators can use the correction factors derived from these results for estimating dry biomass, reducing the need to conduct wet-dry calibrations for each new macrophyte, macroalgae, or sea wrack study.