



University  
of Victoria

Graduate Studies

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

of

**JESSICA HOLDEN**

BSc (University of Victoria, 2014)

“Beach-Cast Deposition, Food Provision, and Commercial Harvesting  
of a Non-Indigenous Seaweed, *Mazzaella japonica*, in Baynes Sound,  
British Columbia”

Department of Biology

Thursday, August 25, 2016

1:00 P.M.

Hickman Building

Room 120

Supervisory Committee:

Dr. Francis Juanes, Department of Biology, University of Victoria (Supervisor)

Dr. Sarah Dudas, Department of Biology, UVic (Member)

Dr. Rana El-Sabaawi, Department of Biology, UVic (Member)

External Examiner:

Dr. Thomas Therriault, Marine Ecosystems and Aquaculture Division, Fisheries and Oceans Canada

Chair of Oral Examination:

Dr. Carolyn Crippen, Department of Education Psychology & Leadership Studies, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

## **Abstract**

This thesis examines the contribution of a non-indigenous red alga, *Mazzaella japonica*, to wrack subsidies in Baynes Sound, British Columbia, and the effects of its removal by a commercial beach-cast harvest. Field and laboratory work was conducted to determine: 1) How large wrack inputs are in terms of biomass and spatial extent within the harvest region, and what proportion of this is comprised of *M. japonica*; 2) how wrack characteristics influence associated macrofauna communities; 3) if there is any detectable effect of beach-cast harvesting on either the wrack characteristics or macrofauna communities; and 4) if *M. japonica* provides a food source for native invertebrate consumers within the subtidal and supralittoral zones.

Field surveys conducted from November 2014 through March 2015 found that wrack biomass within the harvest region could reach as much as 853 kg ( $\pm 172.9$  SD) per meter of shoreline, and cover up to 34.7 m<sup>2</sup> ( $\pm 3.4$  SD) of beach surface within this area. The macrophyte composition of the wrack was dominated by *M. japonica*, which accounted for 90% of the identifiable macrophyte biomass on average. Wrack in the later stages of decomposition hosted the most speciose and diverse assemblages of macrofauna, though community composition also differed among collection sites and with depth of the wrack.

Though we were limited in our ability to disentangle the effects of beach-cast harvesting due to a concentration of effort at one site, we failed to detect any large influence on wrack biomass or macrofauna communities. Harvesting did, however, appear to be associated with a greater area of wrack cover and decreased mean depth.

Stable isotope mixing models estimated that *M. japonica* contributed no more than 22% and 17% on average to the diets of supralittoral and subtidal consumers respectively, despite its overwhelming dominance in both environments. These results suggest that the non-indigenous red alga may experience a reprieve from herbivory within the subtidal environment. A lack of consumption within the supralittoral zone could influence nutrient cycling on recipient beaches and increase propagule pressure in the surrounding regions. Results from these studies are intended to help inform the management of *M. japonica* and its commercial harvesting.