University of Victoria | Graduate Studies

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

of

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BA (University of Victoria, 2012)

"Springtime in the Delta: The sociocultural role of muskrats and drivers of their distribution in a changing Arctic delta"

School of Environmental Studies

Wednesday, April 25, 2018
10:00 A.M.
Clearihue Building
Room B007

Supervisory Committee:
Dr. Trevor Lantz, School of Environmental Studies, University of Victoria (Supervisor)
Dr. Jason Fisher, School of Environmental Studies, UVic (Member)

External Examiner:
Dr. Murray Humphries, Department of Natural Resource Sciences, McGill University

Chair of Oral Examination:
Dr. Louise Page, Department of Biology, UVic

Dr. Stephen Evans, Acting Dean, Faculty of Graduate Studies

Abstract

Climate change is altering numerous conditions in Canada's western arctic, including hydrology and lake habitat conditions in the heterogeneous landscape of the Mackenzie Delta. The delta is an expansive alluvial plain dominated by thousands of lakes and interconnected channels that provide habitat for fish, birds, and mammals. Muskrats (Ondatra zibethicus) are a culturally important ecological indicator species found in the Delta. Throughout the 1900s, Gwich'in and Inuvialuit residents in the Delta relied heavily on the muskrat for food, fur, and culture, but as in other regions around the world, changing socioeconomic and ecological conditions are altering the land and Indigenous Peoples' access to it. This can strongly impact communities by affecting food security, physical health, and overall wellbeing. In the first part of this thesis, I investigated the role of muskrats in the cultural traditions and land-based livelihoods of the Gwich'in and Inuvialuit residents of the Mackenzie Delta by conducting interviews and meetings with over 70 community members. Although the role of muskrats has changed over the last 100 years, muskrat harvesting continues to offer Delta residents a meaningful way to remain engaged in, perpetuate, and strengthen their cultural identity and land-based traditions among generations, and ultimately, to foster individual and community wellbeing.

In the second part of this thesis, I investigated the importance of landscape connectivity and patch quality – two properties affected by climate change – as drivers of muskrat presence and distribution in the Mackenzie Delta, using remote sensing and field-based surveys of lakes with and without muskrats present in the winter. I tested multiple hypotheses about predictors of muskrat presence and biomass using a model-selection, information theoretic approach. My results show that patch quality related to specific habitat requirements is a more important driver of muskrat distribution than landscape connectivity in the Mackenzie Delta. Muskrats were more likely to occur in lakes with longer perimeters, higher amounts of edible submerged macrophyte biomass, and sediment characteristics that supported macrophyte growth. The latter two conditions are related to spring flooding regimes, which are likely to be altered by climate change. This may result in a decrease in the quality and quantity of preferred muskrat habitat in the Mackenzie Delta. My research indicates that patch quality and landscape-level processes are important for understanding species distributions in heterogeneous landscapes.