



**University
of Victoria**

Graduate Studies

Notice of the Final Oral Examination
for the Degree of Doctor of Philosophy

of

JEANNETTE BEDARD

MSc (University of Victoria, 2011)
BSc (Royal Roads Military College, 1994)

**“The Role of Variable Oceanographic and Environmental Conditions
on Passive Acoustic Tracking Proficiency”**

School of Earth and Ocean Sciences

Thursday, October 24, 2019
10:00 A.M.
Bob Wright Centre
Room A319

Supervisory Committee:

Dr. Svein Vagle, School of Earth and Ocean Sciences, University of Victoria (Co-Supervisor)
Dr. Stan Dosso, School of Earth and Ocean Sciences, UVic (Co-Supervisor)
Dr. Richard Dewey, School of Earth and Ocean Sciences, UVic (Member)
Dr. David Atkinson, Department of Geography, UVic (Outside Member)

External Examiner:

Dr. Alexander Hay, Department of Oceanography, Dalhousie University

Chair of Oral Examination:

Dr. David Goodenough, Department of Computer Science, UVic

Abstract

Examining fish behaviour through passive acoustic tracking is a technique being employed more and more. Typically, research using this method focuses on detections without fully considering the influence of both the physical and acoustic environment. Here we link the aquatic environment of Cumberland Sound with factors influencing the detection proficiency of fish tracking equipment and found multi-path signal interference to be a major issue. Cumberland Sound is a remote Arctic embayment where three species of deep-water fish are currently tracked, that can be considered as two separate layers. Above the 300 m deep sill, the cold Baffin Island Current follows a geostrophic pattern, bending into the sound along the north shore, circulating before leaving along the south shore. The warm deep water is replenished from the recirculated arm of West Greenland Current occasionally flowing over the sill and down to a stable depth. This influx of water prevents deep water hypoxia, allowing the deep-dwelling fish populations in the sound to thrive. To complement the work done in Cumberland Sound, a year-long study of the underwater soundscape of another Arctic coastal site, Cambridge Bay, Nunavut, was conducted over 2015. Unlike other Arctic locations considered to date, this site was louder when covered in ice with the loudest times occurring in April. Sounds of anthropogenic origin were found to dominate the soundscape with about ten times more snowmobile traffic on ice than open water boat traffic.