University of Victoria | Graduate Studies

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

of

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BSc (University of Victoria, 2008)

## "Comparison of underwater visual methods for assessing temperate rocky reef fish communities and the effectiveness of spatial marine conservation areas"

School of Environmental Studies

Friday, July 27th, 2018
11:30 a.m.
David Turpin Building
Room 255

Supervisory Committee:
Dr. John Volpe, School of Environmental Studies, University of Victoria (Supervisor)
Dr. Jason Fisher, School of Environmental Studies, UVic (Member)
Dr. Natalie Ban, School of Environmental Studies, UVic (Member)

External Examiner:
Dr. Dana Haggarty, Inshore Rockfish and Lingcod Program, Fisheries and Oceans Canada

Chair of Oral Examination:
Dr. Francis Choy, Department of Biology, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

## Abstract

Precise and accurate species abundance and distribution data are important for making effective ecological conservation and management decisions. These data are often challenging to obtain, especially in marine environments where the logistical and technical difficulties of working underwater can both limit and bias the precision and accuracy of detection. The chosen approach will also determine the extent to which species' spatial or temporal variability may be investigated. Different observational methods may yield different results. We explore how the methodology used to collect sample measurements of fish in marine environments can influence your understanding of the focal population and the effectiveness of spatial marine conservation areas.

We compared rockfish abundance and fish diversity estimates between paired towed video and baited video surveys and between dive and baited video surveys conducted on temperate rocky-reefs in the nearshore Northeast Pacific on the central and south coasts of British Columbia, Canada. Surveys on the South Coast took place inside and outside of spatial marine conservation areas designated for inshore rockfish called Rockfish Conservation Areas We test whether the baited video data generate the same conclusions about Rockfish Conservation Area effectiveness as data derived from the dive surveys, and whether the Rockfish Conservation Areas have greater rockfish abundance and fish diversity than paired locations outside of the conservation areas.

Our results indicate that the towed video and baited video surveys were about equally reliable at estimating rockfish abundance, but baited video better estimated fish diversity. The dive surveys outperformed the baited video surveys for both rockfish abundance and fish diversity metrics. Even though the dive surveys produced higher rockfish abundance and fish diversity estimates, baited video data yielded equivalent insight on Rockfish Conservation Area effectiveness to data derived from the dive surveys. We found no indication rockfish recovery is influenced by Rockfish Conservation Area protection. After 12 to 15 years of protection, Rockfish Conservation Areas did not produce more rockfish, bigger rockfish, or greater fish diversity than similar areas outside of Rockfish Conservation Areas, whether we used a dive survey or a baited video survey.

The differences we observed in rockfish abundance and fish diversity between paired surveys reveals the methodology used matters. Our results suggest that a baited video survey can be used as a low cost and effort methodology for examining rockfish abundance and fish diversity over rocky reefs from nearshore waters down to depths greater than 20 m. The results highlight the need to test the performance of the survey methodology as it is important to employ a methodology with known biases, especially when evaluating management actions. Accounting for detection probability of the survey species in the underwater method used will allow for more accurate estimates of population abundance.