



In Partial Fulfillment of the Requirements for the Degree of

Master of Science
Micah V. Cameron-Harp

Will defend his scientific paper

**Achieving Sustainability in Harvested Predator-Prey Systems:
Modeling Opportunity Cost Management Strategies**

Abstract

Recent estimates suggest that over ninety percent of fisheries are currently collapsed, over-exploited, or fully exploited. In addition to the ecosystem consequences associated with removal of prey species, fishery collapse has broad implications for the communities reliant upon these resources. Ecosystem based management emerged as an approach to tackle this social-ecological problem in a coordinated and scientific manner. Yet, fishery management efforts continue to rely on a classic set of management tools: fisheries closures, gear restrictions, and marine protected areas. In this study, we examine the consequences of opportunity cost management as a strategy to operationalize ecosystem-based fishery management. To do so we develop a harvested predator-prey model of a regulated open-access fishery that targets the prey species and an eco-tourism industry that uses the predator species in a non-extractive manner. Rather than determining an optimal control rule that includes culling of the predator species to maximize prey harvest, we examine the effect of introducing time-specific subsidies for the non-extractive use of the predator population. We demonstrate that this strategy can achieve improvements in the fishery's objectives without direct management of the predator population. Such policies will prove necessary in ecosystem based fishery management because of the diverse, and sometimes conflicting, value sets that must be navigated.

Monday, October 24th, 2016
9:30 AM
Wrigley Hall, room 401

Faculty, students, and the general public are invited.

Supervisory Committee:
Dr. Leah Gerber, chair
Dr. Joshua Abbott, member
Dr. Marty Anderies, member