

Understanding Resource Conflicts by Modeling Participation in the Dungeness Crab Fishery

A Proposal in Progress

Alice Smoker
SELMR fellow

School of Fisheries & Ocean Sciences
University of Alaska Fairbanks

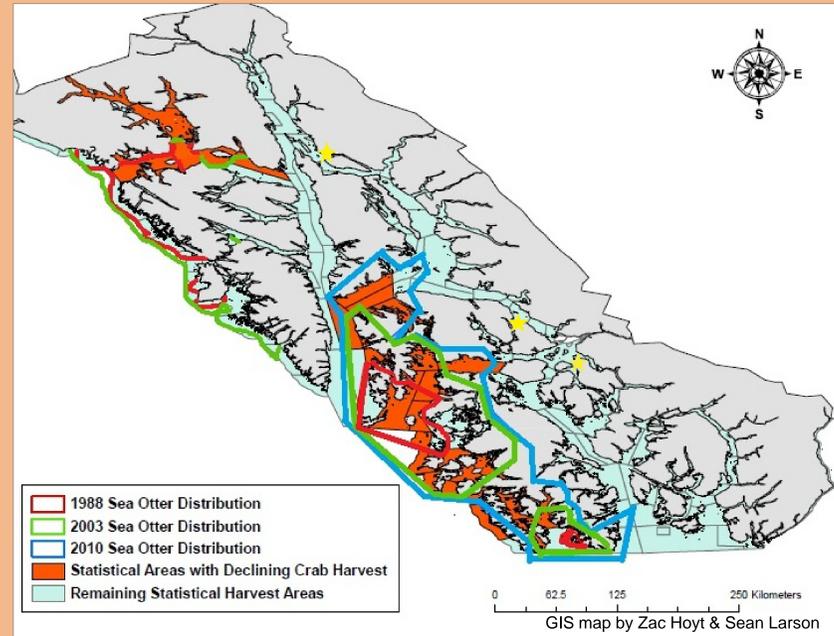


Background

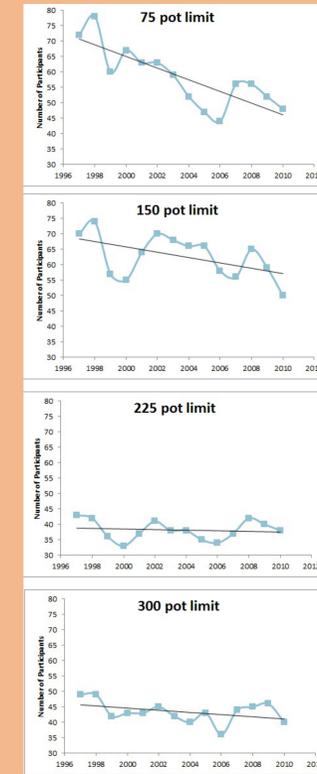
Dungeness crab (*Metarcarcinus magister*) supports a valuable fishery in Southeast Alaska.

Averaged over the last decade, 195 permit holders participated in the fishery each year and generated an ex-vessel value of \$7 million dollars (1).

The Dungeness crab fishery has social value as an entry-level fishery because it is relatively cheap to enter and easy to execute. Permits may be purchased with 75, 150, 225, or 300 pot limits, and participants use vessels ranging in size from 15 feet to over 60 feet in length.



The contemporary range of sea otters in southeast Alaska as it has expanded from the points of their reintroduction. Management areas where Dungeness crab harvests are thought to be declining due to sea otter presence are colored orange. Statistical areas cover a greater area than may actually be affected.



Overall, participation in the Dungeness fishery has been declining over the last decade. These graphs illustrate how permit holders with 75, 150, 225, and 300 pot limits are differently affected by this change⁵.

Permit holders differ in their residency, the home port from which they travel, their history in the fishery, and the extent of their other fishing activity. Therefore, they face different constraints regarding the distance they can travel to go crabbing, the time period in which they can do it, the economic tradeoffs they face, and the relative success they may have.

They will likely only participate in the fishery if they expect to break-even, i.e., they expect the benefits of their effort to at least offset the costs.



Vessels employed in the Dungeness fishery come in a variety of shapes and sizes. Capabilities and amenities vary accordingly.

Problem

Stakeholders in the Dungeness crab fishery are concerned that it is threatened by the rapid population growth of sea otters.

Since being locally exterminated a century ago, sea otters reintroduced in the late 1960s have successfully re-colonized much of their historic habitat.

Declining commercial harvests of Dungeness crab in these places have been attributed to the sea otters' presence, and fishermen attest that they are subsequently crowded together into fewer and fewer otter-free areas (2,3).

It is difficult to quantify the sea otters' economic impact or predict how that will change human communities without a more complete understanding of other factors influencing participation in the fishery.



Sea otters dramatically impact the abundance of their prey species.

Permit holders with very different levels of fishing experience and capital can participate in the Dungeness crab fishery (4).

Research Objective & Benefits

The objective of my thesis is to explore the interplay between ecological and economic variables and participation in the Dungeness crab fishery.

Ecological changes related to sea otters in Southeast Alaska have spurred political debate as well as scientific inquiry. The complicated and emotionally charged discussion of whether and how to mitigate resource conflicts between marine mammals and fishermen will benefit from a nuanced understanding of the economic and social impacts of such ecological changes.

Methods

I will survey a representative sample of permit holders as to their likelihood of making a crabbing trip given specific values of catch per unit effort, ex-vessel crab price, distance from port to fishing grounds, fuel prices, and bait costs.

These survey data will populate a multiple regression model, which will determine how each of these factors affects participation among different permit holders

The model will be tested using historical data to verify whether or not likelihood of participation is indicative of a permit holder's break-even point.

Factors with statistically significant relationships will be used in stochastic stimulations, which will characterize fishery participation under varying ecological and economic circumstances.

References: 1) Commercial Fisheries Entrance Commission. State of Alaska Fisheries Statistics: Crab participation and earnings 2011. www.cfec.state.ak.us/bit/MNUCRAB.htm. 2) Bishop GH, "Dungeness crab and scallop fisheries of southeast Alaska," Fisheries Management Rep. No. 06-03, Alaska Department of Fish and Game. 3) M. Worhatch, E. Larson, R. Lantiegne, personal communication. 4) J. Curry, personal communication. 5) S. Hutter, personal communication.

Acknowledgements I am grateful to the following people for their assistance and patience: Keith Criddle, Ginny Eckert, Julianne Curry, Randy Lantiegne, Joe Stratman, Sunny Rice, Jan Carlile, Nancy Free-Sloan, Shellene Hutter, Eric Larson, Zac Hoyt, Sean Larson & Stena Troyer