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MPA-Based Collaborative Techniques to Improve Management of Nearshore Fisheries

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MPA-Based Collaborative Techniques to Improve Management of Nearshore
Fisheries

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Project Hypothesis

We hypothesized that information from marine reserves can be used to parameterize length based, data-poor fisheries management models to evaluate the status of grass rockfish and spiny lobster.

Project Goals and Objectives

Our goals were to organize collaborative fisheries research data, perform growth rate modeling, perform mortality modeling, analyze these data using data poor fisheries management models, and submit these results to peer reviewed journal articles.

Briefly describe project methodology

We performed statistical analyses and simulation modeling to estimate growth, and reproductive maturity of spiny lobster and grass rockfish. We used these life history characteristics to parameterize mortality models that estimate natural and fishing mortality. We then calculated the probability of overfishing for grass rockfish using simulation techniques in two different management zones. For spiny lobster we examined movement rates, spillover from marine reserves, growth, maturity, and mortality. These results were submitted for publication in four separate peer reviewed papers.

Describe progress and accomplishments toward meeting goals and objectives.

We completed all proposed tasks and submitted all results for publication.

PROJECT MODIFICATIONS:

None given.

PROJECT OUTCOMES:

We generated current growth rate data, and reproductive maturity functions for spiny lobster and grass rockfish.

We developed a methodology to estimate natural and fishing mortality using information from no-take marine reserves. This method was evaluated using monte carlo simulation techniques.

We performed basic assessments of grass rockfish and spiny lobster using a cohort based approach.

We estimated fishing mortality rates across the northern Channel Islands for spiny lobster and grass rockfish.

We estimated the probability of overfishing using a data-poor technique for grass rockfish.

IMPACTS OF PROJECT:

We contributed much needed life history information for two data poor stocks in southern California. We have offered these data to the stock assessment team at DFG for use in the spiny lobster assessment.

We developed a novel method for estimating fishing mortality using information from marine reserves. This method is in review at ICES *Journal of Marine Science* and will hopefully contribute to the effective management of data poor fisheries throughout the world.

We have submitted three additional papers that describe the benefit of collaborative fisheries research, the contribution of MPAs to understanding the status of data poor stocks and the contribution of MPAs to increasing the egg production of data poor stocks.

Our work provides impetus for the implementation of marine reserves throughout the world and provides methodology to utilize reserves as fisheries management assessment tools.

BENEFITS, COMMERCIALIZATION, AND APPLICATION OF PROJECT RESULTS:

All results will be published in peer reviewed journals and made available to the general public. Furthermore, we anticipate these results will be used in the future management of these important fishery resources.

ECONOMIC BENEFITS generated by discovery

We identified that MPAs can contribute to the management of data poor fisheries, thus providing an economically efficient way to manage these fisheries without the need for a conventional "big science" approach to stock assessment that costs the state millions of dollars.

Issue-based forecast capabilities

We forecast that our models and results will be used in fisheries management for years to come.

Tools, technologies and information services developed

As described above, we have developed several tools to assess and manage data poor fisheries.

Publications

Peer-reviewed journal articles or book chapters

Kay, Lenihan, Guenther, Wilson, Shroud, Miller. Collaborative assessment of California spiny lobster (*Panulirus interruptus*) population and fishery responses to a marine reserve network. *Ecological Applications*. In Press.

Hamilton, Wilson, Ben-Horin, Caselle. 2011. Utilizing spatial variation in demography and life histories to improve the management of a temperate sex-changing reef fish. *PLoS ONE*. 6(9): e24580.

Kay, Wilson. Spatially explicit mortality of California spiny lobster (*Panulirus interruptus*) across a marine reserve network. *Environmental Conservation*. In revision.

Wilson, Colgate, Qi, Kay, Lenihan. Identifying spatial management options for grass rockfish (*Sebastes rastrelliger*) through collaborative fisheries research. *Marine Ecology Progress Series*. In review.

Wilson, Valencia. Bounded catch curves to estimate natural and fishing mortality using information from marine reserves. *ICES Journal of Marine Science*. In review.

Maps, Charts, Atlases

Marine reserves and the management of small scale fisheries. Jono Wilson, June 2011, UCSB.

MEDIA COVERAGE:

none

DISSEMINATION OF RESULTS:

Results were disseminated through presentations (previous page) and peer reviewed publications (previous page)

COOPERATING ORGANIZATIONS:

Federal

NOAA Fisheries
Channel Islands National Marine Sanctuary

State

California Department of Fish and Game

Nongovernment

Sustainable Fisheries Group
CALobster
Environmental Defense Fund

Industry

Commercial Fishermen of Santa Barbara
California Abalone Association

Academic

UCSB

INTERNATIONAL IMPLICATIONS:

We have presented the results of this work to the Caribbean Fisheries Management Council, and the Indonesia Ministry of Marine Affairs and Fisheries.

We are working with both of these groups to develop capacity to implement our techniques in the sustainable management of data-poor fisheries

FOR ALL STUDENTS SUPPORTED BY THIS GRANT, PLEASE LIST:

Volunteer Count 2

Graduate Student Info—N/A