JIMAR, PFRP ANNUAL PROGRESS REPORT FY 2004

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Project Proposal Title:

Regulatory Impact Analysis Framework for Hawaii Pelagic Fishery Management: A Multilevel and Multiobjective Programming Model

Funding Agency: Pelagic Fisheries Research Program/NOAA

Purpose of the Project and Indicative Results:

The objective of this project is to enhance the multi-level multi-objective programming model for the Hawaii fisheries that was developed under PFRP Project #2066/2113. This will involve making the basic model structure more tractable for regulatory analysis. It should allow more flexible time-area specification and facilitate updating the underlying data. The update focuses on the Hawaii-based longline fishery (HILLF).

Project Activities and Progress During FY 2004:

The updated non-linear programming model, implemented by General Algebraic Modeling System (GAMS), was validated by comparing the simulation results with the actual data from 1993 and 1998. By using the 1998 results as a baseline (i.e., assuming that prices and abundance levels of the major species for the HILLF in 1998 are given), the impacts of two recent policies to conserve sea turtles were assessed. A technical report has been drafted and is undergoing review by two industrial economists from NMFS (Dr. Dale Squires and Dr. Samuel Herrick).

In details, the North Pacific Ocean was divided into five areas: the main Hawaiian Island (MHI) area and four adjacent areas. Two of these four areas correspond to the areas that were actually closed. Under the first turtle conservation policy, an area of $28^{\circ} - 44^{\circ}$ N and $145^{\circ} - 168^{\circ}$ W, was closed from December 1999 – March 2001. Under the second policy (where all shallow sets were prohibited year around), an area south of 15° N above the equator was closed during April-May. Likewise, each year is divided into five periods to simulate the above seasonal closure and capture seasonal variation of fish price and CPUE. Using a couple of data processors developed in the previous fiscal year, all necessary parameters were generated under the above time and area definition.

The time series data of auction prices of nine major pelagic species were analyzed to estimate fishermen's expected price for each species. Results from this price analysis indicate that fishermen generally expect (i) higher price (\$/lb) for bigger fish, although

¹ During FY 2004, Dr. Pan replaced Dr. Pooley as a co-PI since Dr. Pooley is currently acting as the director of the Pacific Island Region, NMFS.

the effect of size is negligible for big pelagic species, such as swordfish and blue marlin; (ii) there was statistical evidence that more landing of each species by the HILLF would decrease its auction price, although a measure, "price flexibility", was inelastic (7 –39%), in particular, more inelastic (less than 10%) for swordfish and yellowfin and bigeye tunas, which are regularly shipped to outside of Hawaii markets. However, the results suggest that the model should incorporate a decline of fish price responding to an increase in the total supply from the HILLF because fishermen's decision regarding whether or not to go fishing and where to fish is very sensitive to profitability (i.e., fish price, CPUE, and costs).

Originally we had a hypothesis that the price of each species may be different by set type or trip type, there was no statistical evidence to support this hypothesis. More intensive data and statistical work are needed to investigate the impact of other factors, such as (a) SST where fish were caught, (b) days passed from caught to landing, and (c) handling and other procedure of fish from caught to store fish on vessel.

Planned Project Activities for the Next Fiscal Year

We plan to conduct another policy simulation to analyze the recent policy for reopening the Hawaii swordfish fishery and update longline vessel's operating and annual fixed costs if time allows. Then we will complete the manuscript and publish to referee journals. At present, I'm considering *Marin Policy, Marine Resource Economics*, or *Fisheries Research* as the venue for publication.

The remaining activities and further applications/extension of the models will be inherited to a new PFRP project ("Spatial Modeling of the Tradeoff between Sea Turtle Take Reduction and Economic Returns to the Hawaii Longline Fishery," co-PI with Michael Parke), which is an extension of the current project. Please refer to the proposal for the new PFRP project for its detailed activities.

Papers Published in Refereed Journals during FY 2004: None

Other Papers, Technical Reports, Meeting Presentations, during FY 2004:

I (*KN*) presented "Regulatory Impact Analysis Framework for Hawaii Pelagic Fishery Management: Progress and Future Plan" at the PFRP Principal Investigators Workshop, Univ. of Hawaii at Manoa, Honolulu, Hawaii, December 2003. I also participated a poster session held on 03/04/2004, at the East-West Center, Univ. of Hawaii at Manoa. Another additional presentation of updated results is planned for 06/10/2004 at the Council's Scientific and Statistical Committee (SSC) meeting.

Names of students graduating with MS or Ph.D. degrees during FY 2004: None.

Budget: This project has completed. No additional funds are requested.