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INTRODUCTION OF THE AGENT BASED FISHERY MANAGEMENT MODEL OF HAWAII'S LONGLINE FISHERIES

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ABSTRACT

Fishery Management Model of Hawaii's Longline Fisheries (FMMHLF) is an agent-based simulation model designed for assessing the potential impacts of alternative fisheries regulatory policies on Hawaii's longline fisheries (HLF). By HLF we refer to Hawaii's fleet of longline fishing vessels and their owners and operators; and the regulatory agencies and markets the fleet interacts with. The model is specifically designed to represent the state's largest fleet, which uses Honolulu as its home port.

The primary regulatory policies of interest in FMMHLF are those to protect sea turtles. Sea turtles can be disturbed or harmed when they become entangled or hooked on fishing lines, an event termed a "turtle interaction". Currently, turtles are protected by an annual quota (or "cap") on turtle interactions: under this policy, if the number of turtle interactions in the current calendar year reaches the cap, then longline swordfish fishing is prohibited until the end of the year.

FMMHLF intends to capture the key elements that influence fishing decisions of individual vessels that make up HLF and thus predict and assess the possible responses of HLF to regulatory policies. Policy assessment focuses on four aspects of HLF: the allocation of fishing effort between tuna and swordfish fisheries, the spatiotemporal distribution of fishing effort, total catch of the two fisheries, and interaction with protected sea turtles. Additionally, FMMHLF was designed to test how alternative decision rules(e.g., profit-maximizing versus revenue-targeting by vessel operators) and social networks affect the performance of HLF.

The poster reported the enhancements that have been made to the prototype FMMHLF (Yu et al., 2009). It introduces how the pattern-oriented modeling (POM) strategy is successfully adopted in refining and validating the prototype model. The refined model emphasizes the model's capability of reproducing spatiotemporal patterns that characterized Hawaii's longline fisheries. Specifically, this version of the model is designed to predict how changes in kinds of regulation affect: 1) allocation of fishing efforts between Tuna fisheries and Swordfish fisheries, 2) the spatiotemporal distribution of fishing efforts (sets).

As for policy assessment, the new version of the model focuses on four aspects of the HLF, including the allocation of fishing efforts between Tuna fisheries and Swordfish fisheries, the spatiotemporal distribution of fishing efforts (sets), total fish catch (of 4 fish species groups, including bigeye tuna, yellowfin

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tuna, swordfish and others), and interaction with protected sea turtles (2 sea turtle species - loggerhead turtle and leatherback turtle).

We believe that the experience we learned from employing POM in developing the refined model is invaluable for advancing ABM and POM in studying socioeconomic systems such as fishery.