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MODIFYING LONGLINE FISHING OPERATIONS TO REDUCE STRIPED MARLIN CATCH WHILE MAINTAINING BIGEYE TUNA CATCH[1]

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Paper submitted by the USA

A recent review of N. Pacific striped marlin stock status resulted in a recommendation by the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) that “the fishing mortality rate of striped marlin (which can be converted into effort or catch in management) should be reduced from the current level (2003 or before), taking into consideration various factors associated with this species and its fishery.” (http://isc.ac.affrc.go.jp/isc7/ISC7_Plenary_Report-FINAL4.pdf). However, fishing effort or catch restrictions may not be the only means of reducing striped marlin fishing mortality. This paper briefly reviews a method that could serve to reduce longline catch of striped marlin while maintaining bigeye tuna catch.

Boggs (1992) reviewed earlier work on swimming depths of target tunas and other incidental catches in tuna longline fisheries and presented results of a study using time-depth recorders (TDRs) and hook timers on longline gear to estimate fish capture time and depth. The results indicated clearly that striped marlin tend to be caught on hooks set less than 120 m deep, whereas bigeye tuna tend to be caught on deeper hooks (Figure 1). Based on these results, a model of reconfigured longline gear with all shallow hooks eliminated indicated that striped marlin catch-per-unit effort (CPUE) would be greatly reduced and bigeye tuna CPUE would be increased. The study also found that marlin were frequently caught as hooks were being hauled in through the

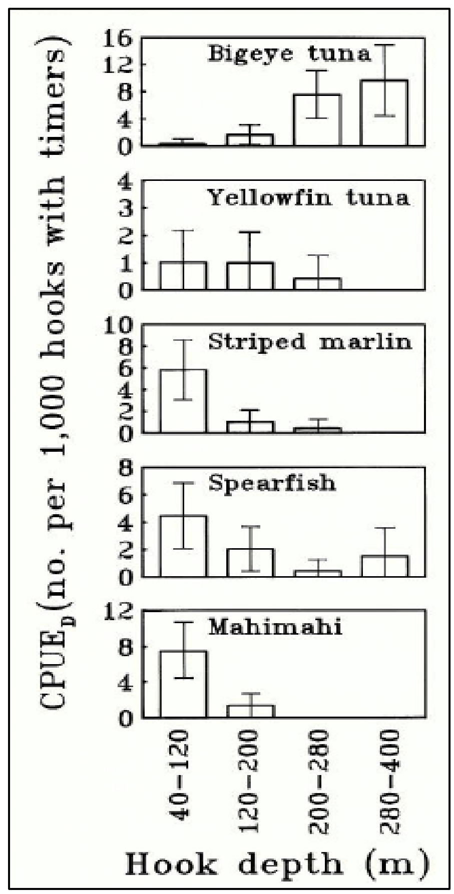

Figure 1. Differences in longline capture depth for species caught in experimental fishing operations targeting bigeye tuna (from Boggs, 1992)

surface layer and that these fish tended to be in good condition for live release.

A simulation of the ecological and economic impacts of modifying longline gear to eliminate all hooks shallower than 120 m (Kitchell et al., 2004) found that if applied to all longline effort, this gear alteration would result in a substantial increase in biomass in the near term, with biomass equilibrating to levels 80% higher for striped marlin and 180% higher for blue marlin over 30 years. The simulation used an ecosystem model, which also predicted that there would be a reduction in tuna biomass due to increased predation by marlins, with negative economic consequences to the commercial longline fishery. The study also predicted economic benefits for sports fishing due to increase marlin abundance.

Field trials of longline gear that eliminates the shallowest hooks were recently conducted in the Australian fishery for tuna and the Hawaii seamount fishery for bigeye tuna and pomfrets (Beverly and Chapman, 2007; see http://www.wcpfc.int/sc3/pdf/SC3_EB_IP1.pdf). Trials in the Hawaii longline fishery for bigeye tuna were recently completed using a commercial fishing vessel that compared equal fishing effort (total numbers of hooks) using traditional gear (45 sets) versus gear with no shallow hooks (45 sets) on alternate days. The deeper gear was configured and deployed as described in Beverly (2006, see

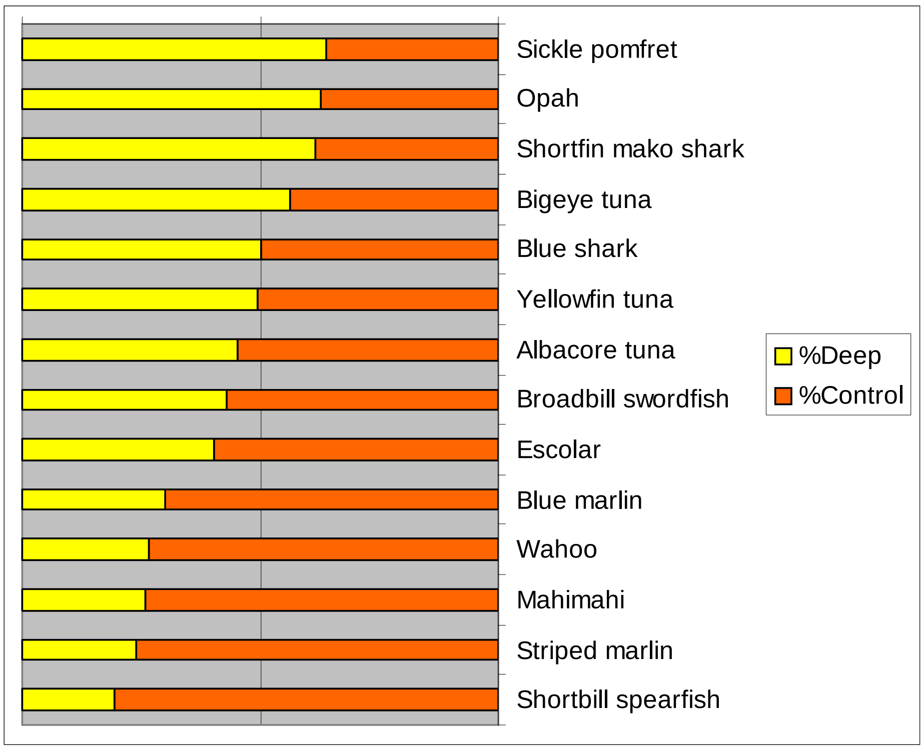

Figure 2. Percentage catch (% total no. of fish caught) from 45 sets of deeper gear and 45 sets of traditional gear (total = 90 sets) in the Hawaii longline fishery for bigeye tuna (Unpublished data. Do not cite without permission of authors).

HTTP://www.spc.int/coastfish/news/Fish_News/119/Fish_News_119.PDF) with extra lengths of main line set, with weights deployed before branch lines were attached to achieve an average increase of about 50 m for the shallowest hooks and 40 m for the deepest hooks as compared with the traditional (control) method. All hooks in the deeper sets were below 100 m as verified with TDRs. Based on unpublished data from the experiments (*do not cite without permission of the authors*), striped marlin catch on the deeper gear was reduced by about 70%, and bigeye tuna catch increased (Figure 2). Although the deeper gear required a little more time to set each day, it generated 6% more revenue from fish sales, despite reduced catches of incidental species.

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