JIMAR, PFRP ANNUAL PROGRESS REPORT
FY 2004

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Project Proposal Title: Incorporating Oceanographic Data in Stock Assessments of Blue Sharks and Other Species Incidentally Caught in the Hawai‘i-based Longline Fishery

Funding Agency: Pelagic Fisheries Research Program

1. Purpose of the project and indicative results.
   Improve habitat based standardization of longline effort by accounting for the affects of current shear and other oceanographic features on the depth distribution of longline hooks and the degree to which that distribution overlaps the depth distribution of particular fish species.

   During FY 2004 this PFRP developed a longline shoaling model for the Hawaii-based longline fishery. An estimate of longline shoaling was based on extensive analysis of 599 temperature-depth recorders (TDRs) deployed by fishery observers from 1996 to 1999 within the tuna (n=266 sets) and swordfish (n=333 sets) sectors. Longline shoaling for each set was estimated by the actual observed depth from the TDRs and the predicted depth based on gear configuration and catenary geometry.
   Shallow swordfish sets shoaled a mean of 51% (median=56%) with mean observed and predicted depths of 62 and 138 m, respectively. Deeper tuna sets shoaled a mean of 14% (median=30%) with mean observed and predicted depths of 248 and 342 m, respectively. About 17% of the sets had predicted depths that were shallower than actual depths. This results from a potentially biased longline sag rate and corresponding catenary angle estimated from gear configuration.

   The project interacted with the NOAA Coastwatch central Pacific node and the PFRP Ocean Atlas project to develop indices to explain longline shoaling. Explanatory oceanographic and meteorological variables included: wind stress, surface ocean currents from various products (NCEP, AVISO, OSCARS) and horizontal current shear from the NCEP OGCM. GLM and GAM longline shoaling models were developed to explain longline shoaling as a function of predicted depth, and oceanographic effects. Preliminary modelling efforts explained 40% of the shoaling for swordfish sets and 65% for tuna sets. The most important explanatory variable was predicted catenary depth. Oceanographic variables were of little explanatory value, possible due to a mismatch in spatio-temporal scale between longline sets and oceanographic data.

   The computer specialist continued to work with a data base system for assembling of catch, effort, and sample data into data files suitable for input to MULTIFAN-CL, the stock assessment program used in
this project. He is in process of developing a system to facilitate examination and editing of the complex parameter files incident to MULTIFAN-CL analyses.

3. Plans for the next fiscal year.
   The longline shoaling manuscript will be submitted to a refereed journal.

   The 599 observed sets with TDR monitors have recorded >20,000 fishes by hook number. There are 11 Pelagic Management Unit Species of the WPRFMC that are represented by at least 100 individuals. The observer catch database and TDR data will be linked to generate histograms of CPUE by depth and temperature strata for these 11 species.

   Continue to participate in a non-PFRP project (K. Bigelow of NOAA Fisheries and J. Hampton of the Secretariat of the Pacific Community) to estimate habitat-based longline effective effort. The habitat-based model is based upon two submodels: a longline gear model and a species vertical distribution model. The completed research on longline shoaling will assist in refining the longline gear model and future work on catch-at-depth information will assist in validating or refining assumptions used in the species vertical distribution model.

   none

5. Other papers, technical reports, meeting presentations, etc.
   none

   Include title of thesis or dissertation.
   none

7. For multi-year projects, provide budget for the next year on a separate page.