JIMAR, PFRP ANNUAL PROGRESS REPORT
FY 2003

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Project Proposal Title: DIRECT TESTS OF THE EFFICACY OF BAIT AND GEAR MODIFICATIONS FOR REDUCING INTERACTIONS OF SEA TURTLES WITH LONGLINE FISHING GEAR IN COSTA RICA.

Funding Agency: PFRP/NMFS

1. Purpose of the project and indicative results.

The objective of the proposed research is to determine the efficacy of a bait or gear modification that could significantly reduce the incidental capture of marine turtles in longline fishing gear. In addition, with the use of pop-up satellite archival tags, the research will also refine estimates of sea turtle survivorship post-capture and release from longline fishing gear.

2. Progress during FY 2003. Provide a thorough discussion of accomplishments and problems.

Permitting Problems:

This project has been delayed due to the lengthy process of acquiring necessary permits required for U.S. and Costa Rican scientists to pursue this research that may impact threatened species. C. Boggs is leading the process to obtain U.S.-based permits with NMFS headquarters in Silver Spring, MD. A summary of the current issues are mentioned below:

This grant has been set up such that the project's PI (John Sibert) has issued a subcontract from JIMAR PFRP to TIRN to conduct the research. This subcontract is funded by Cooperative Agreement Number NA67RJ0154 from the National Oceanic and Atmospheric Administration. TIRN is a California incorporated non-profit (501 c 3). One potential option that would enable us to progress with the proposed research might be to cancel the subcontract with TIRN and instead issue a subcontract to Randal Arauz's Costa Rican non-governmental organization (PRETOMA).

The argument has been made that turtles taken in the planned research would be those that are caught incidental to this fishery, and thus this research would incur no directed take of turtles. If this were an issue for a Section 10 Permit, however, the work could all be done inside the EEZ. All of the work will be conducted on board Costa Rica-flag fishing vessels. All the at-sea work could be conducted by citizens of Costa Rica, although TIRN would like to let U.S. students help with the work if that wouldn't affect the status with regard to needing a Section 10 permit.

All of the appropriate permissions for the work are being obtained from the Government of Costa Rica by R. Arauz. None of the sea-going participants will be officials or employees of the Costa Rican government. Collaborating scientists on the research project include R. Brill and Y. Swimmer. These collaborators are named in the permissions being provided by the Costa Rican government. These NMFS employees will not be directly involved in capturing turtles and do not need to go to sea on the vessels that conduct the work.

At this point, NMFS headquarters will review our requests and discuss possibilities with Endangered Species Act officials. Because the source of these funds are Federal, and due to participation by Federal employees in the research, it has been suggested that a Section 7 consultation and a Section 10 permit would be required. However, due to a precedent set by Alan Bolten to conduct similar studies in the Azores without any such permits, this research may be exempt from these requirements. Another potential obstacle, however, is the potential NEPA requirements. We await to hear from NMFS headquarters on all these matters.

Study Design Progress:

In spite of this delay, we have pursued planning for this research and are fully prepared to conduct studies once we have the necessary permits. Accomplishments to date include a study design that will allow for the greatest statistical power. Specifically, Marti McCracken has taken the lead in identifying critical factors necessary to ensure successful analysis of our data.

1. Assignment of Bait. For the experiment comparing blue dyed and untreated squid, Marti suggests that the same treatment (blue dyed or untreated bait) be used throughout the set and that treatments be randomly assigned to the set. For other treatments, such as different types of hooks, this would not be the case, as in these situations, we may want to have a set contain the different treatments as there are advantages (e.g., to control for some of the environmental variables). Additionally, the study design would not in include the same treatment to all sets within a trip (or vessels), as this would prevent an estimation of the variation between trips (vessels).

2. Controlling variables that may influence the catch rate. If possible the number of hooks between sets and any other variable that may influence the catch rate of turtles or the target species will be held constant. For example, all sets should have the same number of hooks with approximately the same distance between hooks, and they should be approximately at the same depth. If it is not possible to control these variables, they should be recorded.

3. Number of vessels. If we have vessels doing multiple trips the factors in our anova will be (1) vessel, (2) trip within vessel, (3) and treatment (there may be covariates as well). The set within a trip is our replication. If each vessel does only one trip, the factors in our anova will be (1) vessel and trip (these two factors are confounded) and (2) treatment.Hence, if vessels are going to do multiple trips and there is more than one vessel, then all vessels should do the same number of trips. If there is only one vessel,

we do not have the problem of variation between vessels, but the experiment would be drawn out over a longer period. If each vessel only does one trip, then the vessel and trip effect are confounded, but this is not too concerning since the objective is to test the effect of the treatment.

To obtain a balance design, each trip needs to do the same number of sets and each treatment needs to be equally represented within a trip. This may not be practical, but if each vessel agrees to do a minimal number of sets during a trip, say eight, then we would just use the first eight sets. Before the trip departed, we could randomly assign the treated bait to four or the first eight sets.

4. Determining the number of sets needed. Because the treatment is being randomly assigned to the set and not the hook, the set is our experimental unit. If at all possible, the number of hooks on a set should be held constant throughout the experiment. If this is not possible, then the number of hooks in a set will be a covariate in the anova and estimating the number of sets needed for a desired result becomes more complicated. We will not assume that turtle catch has a linear relationship with the number of hooks as the number of turtles that encounter the longline is not a factor in our control. Although the bycatch rate is high in the Costa Rica fishery, the fact that the rate is one turtle for 180 hooks suggest that a limited number of turtles may encounter the longline.

To calculate the sample size we need to formalize how we are going to quantify the success of the treated bait. This will likely be an estimate (including a confidence interval) of the difference between the two treatments. If there is a reduction of turtle bycatch with the treated bait, then this reduction is estimated. In order to calculate sample size, we will need an estimate of the variation in bycatch between sets.

Furthermore, in order to determine the impact of treated baits on catch rates mahi mahi, we will either do a one-way (reduction in catch) or a two-way test (reduction or increase in catch). Once again, a measure of the variation in the mahi mahi catch between sets is needed in order to determine sample size.

3. Plans for the next fiscal year.
Uncertain at this time.

4. List of papers published in refereed journals during FY 2003.
n/a

5. Other papers, technical reports, meeting presentations, etc.
n/a

6. Names of students graduating with MS or Ph.D. degrees during FY 2003. Include title of thesis or dissertation.
n./a

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