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DESCRIPTION OF SEA TURTLE BYCATCH MITIGATION PROGRAM FOR THE COASTAL LONGLINE FLEETS AND PRELIMINARY RESULTS OF CIRCLE HOOK EXPERIMENTS

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This paper provides a brief description of the Regional Program to reduce incidental mortality of sea turtles in the eastern Pacific. The participants in the program are listed in the Appendix.

1. DESCRIPTION OF THE PROBLEM:

All leatherback and most loggerhead turtle nesting populations have been declining for many years in their nesting areas of the Pacific, and incidental mortality in fisheries is believed to be one of the leading causes. The main exception are some Japanese loggerhead nesting beaches that have seen several years of increases, but other beaches in Japan, and the Australian ones, have been steadily declining.

A program was started in Ecuador in 2003, and expanded to many other Pacific coast countries in 2004 and 2005. Currently the program is (1) active in Peru, Ecuador, Colombia, Panama, Costa Rica, El Salvador and Guatemala; (2) in development en Nicaragua and in Mexico.

2. PROGRAM ACTIVITIES

2.1. Hook exchanges

One of the main goals of the program is to allow the fishers to test the fishing characteristics of circle hooks, an alternative technology tested by US NOAA researchers in other regions. To achieve this goal a program to exchange the traditional J-type hooks or tuna hooks with circle hooks was started in the two major longline fisheries in the region, which target dorado (*Coryphaena hippurus*) and tunas, billfishes, and sharks (TBS), respectively. Most of the data obtained come from the TBS fishery. During the first year of the program, the fishers tested circle hook sizes 16/0 and 18/0, but the larger hook was not accepted by the fishers because it requires larger bait, and because of lower catch rates. So the main comparison in Peru and Ecuador became J hooks *vs.* 16/0 circle hooks, and the replacements became only of J hooks by C16/0 hooks in 2005. In the Central American countries, some of their fisheries were already using circle hooks sizes 14/0 and 15/0, but some of the boat owners expressed interest in testing C16/0 hooks. As we had no information on the hooking rates of turtles in this region, and a larger hook should have a lower hooking rate than a smaller one, we placed observers, and exchanged circle hooks with larger circle hooks if the fishers were willing. Not all the data have yet been included in a database, and the results here only pertain to those that have. Participants are in the process of completing the data entry process.

2.2. Distribution of de-hookers

The distribution of these tools, and training in techniques to de-hook and release turtles, has continued throughout the region. Workshops are taking place regularly in all countries involved.

2.3. Observer trips and sampling effort

Initially, and based in the experience from Peru and Ecuador, we separated the fisheries into a dorado fishery, and another fishery that targets primarily tunas, sharks, and billfishes. Based on this, the observer trips were assigned to one of those classes. However, the fisheries from Central America show other characteristics. There are mixed trips, targeting for instance tunas in some sets, and dorado in others, with exactly the same gear. A total of 391 fishing trips, yielding data for 916,191 hooks, have been observed since the beginning of the program for all participating countries.

3. HOOKING RATES OF TURTLES IN THE TBS FISHERIES

The figure below shows the observed hooking rates in the preliminary database. These data have not been subject to strict quality controls yet, and should be treated as provisional. The most important feature is the consistency of the results across countries and fleets. For most fleets there are data for only one season, but in few cases there are data for two seasons. The case with most data points is the Ecuadorian TBS fishery . As this was the first observation of inter-annual variability it was especially interesting. Figure 1 shows a very large inter-annual variability for the Ecuadorian fisheries: the rates in the second season were several times higher than in the first one. It is extremely unlikely that this reflects a change in turtle abundance, so the increase is probably a reflection of changes in fishing grounds or in other variables that we are investigating. It is evident that we need a significant series of annual estimates to produce a solid idea of the average levels of mortality. The rates increased for both J and circle hooks, but the difference between hooking rates is even larger in 2005 than in 2004. While in 2004 (Y1) the 16/0 circle hooks caught around 40% fewer turtles than the J hooks, in 2005 (Y2) the reduction was around 60%, with a sample size that was almost three times greater than in 2004.

Also for the first time we could compare rates along the South American coast. The rates are lower in southern Peru. The northern Peru rates are very close to the Ecuadorian ones in 2004.
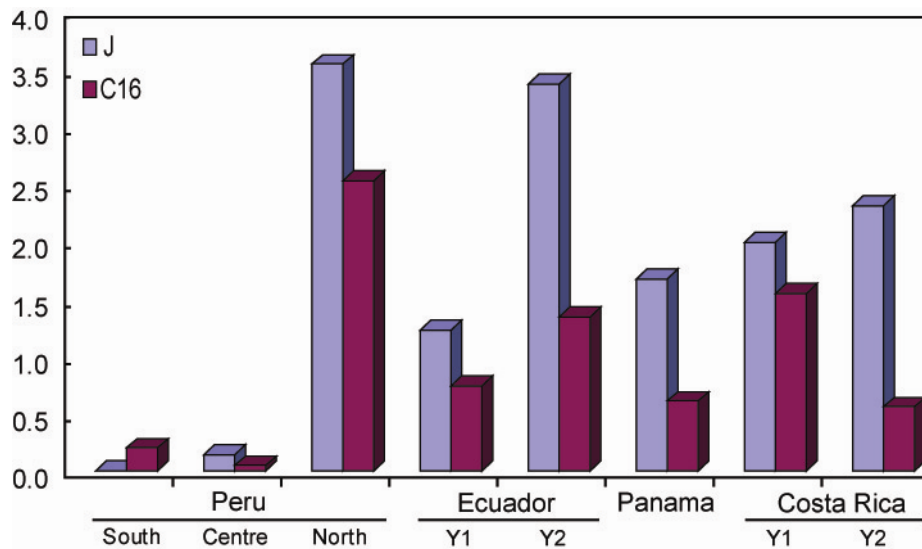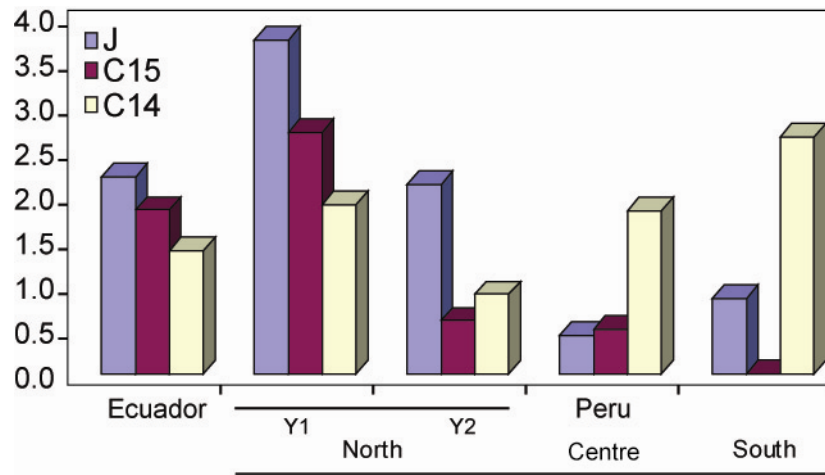

Sea turtles per 1000 hooks – TBS fisheries

Except for southern Peru, there are consistent reductions in sea turtle hooking rates comparing the control J hooks with the 16/0 circle hooks. Confidence intervals and statistical tests will be calculated after the full revision of the databases.

4. HOOKING RATES IN THE DORADO FISHERIES

In this case, the comparison is between control J hooks (smaller than the J hooks from the TBS fisheries) and circle hooks sizes 15/0, 14/0, and smaller. In central and southern Peru the C14 hooks did not perform

as well as J hooks, and in central Peru J hooks performed slightly better than C15 hooks. For the others the reductions in the hooking rate by circle hooks is promising.



Sea turtles per 1000 hooks – Dorado fisheries

5. HOOKING LOCATIONS

In all fisheries there are considerable reductions in the proportion of hookings which are considered "bad" (hooks lodging in the esophagus or other areas detrimental to the turtles). Turtles with "bad" hookings have lower probability of post-hooking survival. The percentages of such "bad hookings", pooled across fisheries, are:

	J hooks	C14	C15	C16
Tuna fishery	59%			41%
Dorado fishery	53%	15%	14%	

6. TARGET SPECIES HOOKING RATES IN THE TBS FISHERIES

The target species hooking rates have been quite similar to the control hooks:
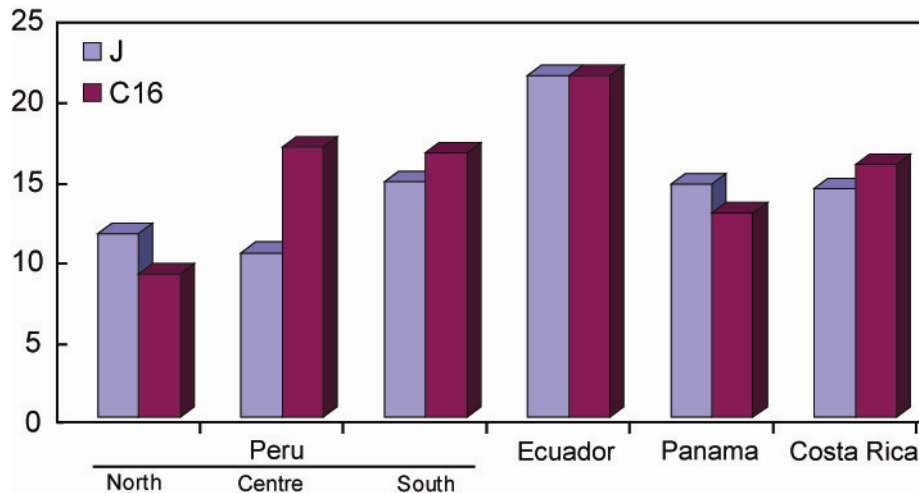
Target species per 1000 hooks – TBS fisheries

7. DATABASE AND DATA QUALITY CONTROL

After the efforts to jumpstart the observer programs, the next task was to begin to enter, organize, and standardize the databases from all the participating countries. A database program on MS Access 2003

was prepared including all observer forms, entry data programs, queries, etc. The programs were sent to all countries and a week-long training session was held in Manta for all participants. During the training an overall review of the data collection system took place, and improvements were made in many sections. The programs were also sent to the other countries, and the training was done remotely. After the training, the programs started entering the data in a common format database.

Following the training, time was dedicated to the data editing process, and the quality controls needed to ensure the statistical quality of the results. Summaries of data were prepared, and the results were interpreted with the participants in each country. Especially important was the understanding of the similarities and differences between fisheries with respect to gear, mode of operation, etc. The final results will be presented when all databases are finalized.

8. FUTURE WORK

In June 2006, a meeting of all participants in the program will take place in Costa Rica. The objectives of the meeting are to: (1) standardize data collection and handling of databases across the region; (2) improve data quality controls, and increase consistency; (3) compare results from the different countries and fleets on the revised databases; (4) organize research groups to further process and publish the results obtained; (5) identify factors leading to sea turtle mortality, and develop approaches to mitigate the impact of those factors; (6) develop a regional protocol for the handling, de-hooking, and release of sea turtles; (7) develop a research program to continue experiments with mitigation measures; (8) develop an implementation program to promote the adoption of gear and procedures to reduce sea turtle mortality in cooperation with the respective government agencies and regional organizations; and (9) continue the professional development of the participating scientists from the region. Of course, the final objective is to find a way that allows the continuation of the fisheries without endangering the sea turtle populations.

APPENDIX

PARTICIPANTS

Peru (WWF Peru Program):	
Michael Valqui – WWF Peru (country manager)	Joanna Alfaro – Pro-Delphinus
Nelly de Paz – ACOREMA	Mariela Pajuelo – Pro-Delphinus
Amado García Cruz – WWF Peru	
Ecuador (Overseas Fisheries Cooperation Foundation Program):	
Takahisa Mituhasi – OFCF	Manuel Parrales – Programa Regional, OFCF
Erick Largacha – IATTC	Vanessa Velásquez – Programa regional, OFCF
Liliana Rendón – Programa Regional, OFCF	
Colombia (WWF Colombia Program):	
Luís Zapata – WWF Colombia	Lilian Barreto – WWF Colombia
Panama (WWF Central America Program):	
Lucas Pacheco – WWF CA	
Costa Rica (WWF Central America Program):	
Moises Mug - WWF CA	Álvaro Segura - WWF CA
El Salvador	
Sonia Salavarría – Centro de Desarrollo Pesquero	Arturo Siu - CENDEPESCA
Guatemala:	
Erick Villagrán – UNIPESCA	Mario Jolón - Pro-BIOMA
Ruben López – UNIPESCA	Regina Sánchez – Pro-BIOMA
Sara Pérez – WWF Central America	
Nicaragua, Mexico:	
In early stages of organization	
USA	
NOAA – Fisheries	
Charles Bergman	Yonat Swimmer
Christofer Boggs	John Watson
Jeffrey Seminoff	

COOPERATING INSTITUTIONS AND AGENCIES IN LATIN AMERICA

ASOEXPEBLA – Fish Exporters Association (Ecuador) – Ing. Guillermo Morán
World Wildlife Fund – USA, Peru, Colombia, Central America
FENACOPEC – National Federation of Fishers Cooperatives (Ecuador) – Lic. Gabriela Cruz
Undersecretariat of Fisheries Resources, Ecuador – Ing. Luis Torres
Defenders of Wildlife, Mexico
THE OCEAN CONSERVANCY - USA
STATE Department - USA
National Federation of Fishers from Peru – FIUPAP, Federación de integración y unificación de los pescadores artesanales del Perú – Peru
Fishers Education Center – Paita, Peru
Fishers School – Manta
Polytechnic School of the Littoral – Santa Elena, Ecuador
PROBECUADOR - Observer Program of Ecuador