INTER-AMERICAN TROPICAL TUNA COMMISSION

SCIENTIFIC ADVISORY COMMITTEE

2ND MEETING

La Jolla, California (USA)
9-12 May 2011

DOCUMENT SAC-02-14

RESEARCH PROJECT ON MITIGATING BYCATCH IN THE PURSE-SEINE FISHERY

The IATTC will conduct a collaborative research project with the International Seafood Sustainability Foundation (ISSF) as part of the ISSF's Purse-Seine Bycatch Mitigation Research Project. A purse-seine vessel chartered by ISSF will be operating in the eastern Pacific Ocean (EPO) for a period of 65 days in 2011, to conduct various experiments on tunas and sharks within aggregations associated with drifting fish-aggregating devices (FADs).

This document presents a summary of the objectives and methods of this project, which was developed by the ISSF Scientific Committee on bycatch research and will be implemented by the IATTC staff. During the project, the vessel will adhere to all the rules and requirements of the IATTC and the Agreement on the International Dolphin Conservation Program (AIDCP).

For the complete scientific protocol for this project contact the chief scientist, Kurt Schaefer, at kschaefer@iattc.org

1. ISSF BYCATCH PROJECT

The aim of this three-year project is to find methods to reduce the catch of undesirable sizes of bigeye and yellowfin tuna and mitigate bycatches by purse-seine vessels. The approach is to charter purse-seine vessels on which scientists and fishers can conduct a variety of experiments without regard for fishing efficiency.

The research activities in the various oceans are based on the recommendations of the project's scientific committee. The project also conducts workshops at which fishers and scientists can evaluate and exchange views on possible methods to achieve the goals of the project. At these workshops fishing captains can make proposals to be tested at sea to ultimately determine the best practices, and share ideas and results.

2. 2011 RESEARCH CRUISE IN THE EPO

The research cruise planned for the EPO in 2011 will mainly address solutions to avoid catching small

bigeye tuna around FADs, one of the main issues in this ocean, but will also study the survival of sharks released by purse-seine vessels. The vessel captain will be in charge of all safety issues, while the chief scientist (Mr. Kurt Schaefer, of the IATTC staff) will be in charge of deciding research activities.

Five of the project's 13 research activities will be addressed during the cruise (Sections 3.2-3.6). In addition, the cruise will also address other complementary activities, including evaluations of current and possible future sampling of tunas for species composition and length frequencies through exhaustive sampling of sets at the time of unloading.

3. PLANNED RESEARCH ACTIVITIES FOR THE 2011 CRUISE

3.1. Research activity 1b: Ecological FADs

The goal of the ISSF is to promote the use of "turtle- and shark-friendly" FADs that do not entangle these animals while drifting. The research objective is to test different designs for such FADs, if possible using biodegradable materials.

Some ecological FADs will be deployed at the beginning of the cruise. When the vessel visits one of these FADs, the condition of the FAD, estimates of the biomass of associated tunas, and the presence/absence of entangled turtles and/or sharks will be recorded. If the vessel fishes on one of these FADs, detailed records of the catches will be made.

3.2. Research activity 2a: Catch prediction

The goal of the ISSF is to evaluate and improve the methods followed by captains of purse-seine vessels in their pre-set estimates of the species composition, sizes, and quantities of tuna aggregations associated with FADs, and to provide a methodology for reducing the fishing mortality of undesirable sizes of bigeye tuna by purse-seine vessels by avoiding their capture. The research objective is to evaluate the accuracy of such estimates, and investigate potential improvements through the use of complementary equipment and methods. This will be achieved by verifying the information collected by the captain on the species composition, sizes, and quantities of tunas present at FADs through the use of a workboat operating in close proximity around the FAD.

3.2.1. Methods

The captain will be asked to estimate the species composition, sizes, and quantities of tunas present within an aggregation upon arrival at a FAD. The methods used by the captain to make the estimates, along with a rating of his confidence in those estimates, will be recorded.

If sufficient tunas are present for experiments, a survey of the tuna aggregation will be done from the workboat, using an echo-sounder and an underwater remote-operated vehicle (ROV). If the vessel makes a set on the FAD, this process would be repeated before the set is made.

Following a successful set, the captain will be asked to provide estimates of the catch composition, sizes, and quantities of the tunas after the catch is loaded aboard the vessel. The catch from these sets will be separated within wells aboard the vessel, to permit intensive sampling of those sets at the time of unloading at a designated cannery.

3.2.2. Data analyses

Following each set, the captain and chief scientist will discuss and identify which equipment and methods were useful for improving the accuracy in the catch predictions. The species composition and sizes estimated from the ROV video and echo-sounder aboard the workboat will be compared, with the captain's catch prediction estimates and those from the intensive port sampling scheme.

3.3. Research activity 2c: Behavior of tunas within mixed-species aggregations associated with FADs, and targeting single-species skipjack schools with a purse-seine vessel

The goal of the ISSF is to develop new purse-seine fishing practices that will reduce the fishing mortality

of bigeye tuna and other species of concern by avoiding their capture, while optimizing catches of skipjack tuna. The research objective is to elucidate spatial and temporal differences in the behavior of skipjack, bigeye, and yellowfin tunas within aggregations associated with FADs, that will contribute to achieving the ISSF's goal.

The fine-scale spatial and temporal dynamics of tunas within aggregations associated with FADs will be investigated, and associated skipjack schools that move significant distances away from a FAD will be targeted for capture by the vessel.

3.3.1. Methods

Trials will be conducted at ten separate FADs, each with a minimum of 30 metric tons (t) of associated bigeye and skipjack tunas of various size ranges. Each aggregation of tunas will be evaluated with the echosounder and the ROV from the workboat. Fishing activities will continue until coded acoustic tags are implanted in three each of skipjack, bigeye, and yellowfin tunas, and continuous acoustic tags in three skipjack tunas. Numerically-coded plastic dart tag will also be attached to each fish. Acoustic receivers attached to the FAD will record the presence and depth of tunas tagged with coded tags, and skipjack tuna with continuous tags will be tracked from the workboat. If possible, up to 30 additional skipjack tunas will be tagged with dart tags before and during the experiment.

The horizontal movements of the skipjack relative to the FAD will be recorded and reconstructed using GPS connected to a tracking system, the radar on the workboat, and a radar reflector on the FAD, to obtain simultaneous records of positions of the FAD. The orientation, movements, and behavior of the tuna aggregation relative to the FAD will be monitored from the workboat with the echosounder and the ROV.

After at least 24 hours' observation of the tuna aggregation, any single-species skipjack school that moves a significant distance away from the FAD will be targeted for capture. The presence of tagged skipjack in the catch will confirm that the fish captured were part of the aggregation associated with the FAD.

3.3.2. Data analyses

The presence and depths recorded for each tuna with a coded tag, and the behavior of the tuna aggregations recorded simultaneously with the echo-sounder and the ROV, will be analyzed and evaluated. The horizontal and vertical movements of the skipjack with continuous tags will be reconstructed relative to the position of the FAD and then analyzed and evaluated.

Evaluations of the catch rates by the vessel of skipjack schools which move away from the FADs will be conducted.

3.4. Research activity 3a: Behavior of tunas and sharks within a purse-seine net

The goals of the ISSF are to explore modifications to normal fishing practices by purse-seine vessels targeting tuna aggregations associated with FADs, with the aim of isolating and releasing alive in good condition bigeye tuna and sharks captured in the net. The research objective is to investigate the behavior of tunas and sharks in the net, and determine the spatial and temporal characteristics of any species-specific segregation that may occur.

3.4.1. Methods

The net will be held open for up to six hours following a set by the vessel on an aggregation of tunas associated with a FAD, to observe the behavior of the tunas and sharks in the net.

Data from the echo-sounder and the sonar on the ROV will be recorded and, when possible, the ROV will observe and record the behavior of tunas and sharks within the aggregation. Simultaneously, the behavior of the tunas and sharks within the net will be observed from the mast of the vessel.

3.4.2. Data analyses

The spatial and temporal characteristics of the behavior of tunas and sharks within the net will be analyzed. Any observed spatial segregations of bigeye tuna or sharks within the net will be analyzed and evaluated with respect to the potential for developing methods for isolating and releasing them alive from the net.

3.5. Research activity 4b: Survival of released sharks and assessment of capture stress

The ultimate goal of the ISSF is to minimize both initial and post-release mortality by improving handling and release practices for sharks captured during purse-seine fishing operations.

Captured sharks show signs of stress, which increase as the set progresses, and may also suffer physical trauma during the final stages of sacking-up and brailing. Definitive information on mortality rates is lacking, but the bycatch of pelagic sharks, mainly silky and oceanic whitetip sharks, by the tuna purse-seine fishery on FADs is increasingly a matter for concern. Differences among species in the sensitivity to capture stress need to be considered when evaluating strategies to reduce overall shark bycatch mortality.

The research objective is to determine the mortality, post-release survival, and physiological, biochemical, and molecular responses of sharks captured incidentally in purse-seine nets. More specifically, the aims are to assess the numbers, species composition, at-vessel mortality, and physical condition of sharks brought aboard the vessel during purse-seine operations, quantify the physical and physiological condition of the sharks immediately after being brought aboard and prior to their release, link these data to conditions during the capture process, and measure post-release mortality rates by recording the sharks' vertical and horizontal movement patterns for 30-45 days, using pop-up satellite archival tags (PSATs).