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RECOMMENDATIONS BY THE STAFF FOR CONSERVATION MEASURES IN THE EASTERN PACIFIC OCEAN, 2016

CONTENTS

1. CONSERVATION OF TUNAS

IATTC Resolution C-13-01, which established the conservation and management measures for tropical tunas in the eastern Pacific Ocean (EPO) applicable in the years 2014-2016, expires at the end of 2016. Paragraph 14 of the resolution requires that "in … 2016 the IATTC scientific staff … will propose, if necessary, appropriate measures to be applied in future years." This document addresses this requirement.

The staff's recommendations are based on its current assessment of bigeye (Document SAC-07-05a) and yellowfin (Document SAC-07-05b) tuna, which are updates of the 2015 assessments.

For yellowfin, the staff's conclusion from this year's assessment is that fishing mortality (F) is below F_{MSY}, the level corresponding to the maximum sustainable yield (MSY), as is indicated by the base-case point estimate for the F multiplier[1] of 1.02 (SAC-07-05a, Table 1), which is slightly less than the 1.05 F

1 The ratio of the current fishing mortality ($F_{current}$, defined as the average fishing mortality for the three most recent years (2013-2015)) to the fishing mortality that will produce the maximum sustainable yield (F_{MSY}). An F multiplier of 1.0 means that $F_{current} = F_{MSY}$; if it is below 1.0, fishing mortality is excessive ($F_{current} > F_{MSY}$)

multiplier for bigeye. As of 17 April 2016, the operative capacity[2] of the purse-seine fleet in the EPO is estimated to be about 11.2% greater than the previous three-year average, which means that the *F* multiplier, adjusted for capacity, is 0.92 and 0.94 for yellowfin and bigeye, respectively, and that the measures established in Resolution C-13-01 have fallen short of the intended effect of reducing the fishing mortality, adjusted for capacity, of both species to a level not exceeding the MSY. However, there is a considerable overlap between the target *F* multiplier of 1.0 and the 95% confidence intervals for the *F* multipliers of 0.92 and 0.94, indicating that the evidence supporting a conclusion that fishing mortality is above F_{MSY} is not definitive. Nonetheless, the staff considers that the results support an increase in the purse-seine closure from the 62 days as specified in Resolution C-13-01 to 87 days

As of 17 April 2016, the capacity of the purse-seine fleet operating in the eastern Pacific Ocean[3] (EPO) had increased to 255,972 cubic meters (m^3) of well volume from a capacity of 247,978 (m^3) in 2015, which itself was an increase from 230,379 (m^3) in 2014 (see Figure 2 in SAC-07-03a). This 10% increase in capacity since 2014 is the cause of the recommended 25-day increase in the purse-seine closure. At multiple meetings of the Permanent Working Group on Fleet Capacity, calculations were shown (*e.g.* CAP-12-04) that demonstrated an increase in fleet operative capacity would cause an increase in the recommended purse-seine closure. Of note is that the closures specified in C-13-01 would continue to be appropriate if there had not been an increase in operative fleet capacity since about the second quarter of 2015.

1.1. Yellowfin, skipjack, and bigeye tunas

The staff recommends that the closures of the purse-seine fishery for tropical tunas established in Resolution C-13-01 be increased from 62 days to 87 days during 2017-2019, and that all the other provisions of the resolution be maintained as they are.

1.2. Pacific bluefin tuna

A new assessment of Pacific bluefin tuna was completed in 2014. Projections in which Resolution C-12-09 was extended into the future, as well as the newer forecasts in IATTC-87 INF-B, called for some reductions of catches in the western Pacific, indicate that these would likely lead to increases in stock abundance, provided recruitment continues at average levels. For a low-recruitment scenario, more similar to the most recent years of recruitment estimates, reducing catches of juveniles in the EPO to levels lower than those specified in Resolution C-12-09, and greater reductions in juvenile catches in the western Pacific, are required. Resolution C-14-06, adopted in 2014, provides for such a reduction, as does the recent measure adopted by the WCPFC (CMM-2014-04). Our recommendation is to extend the measures established in the current resolution for two more years and we encourage the WCPFC to adopt additional measures to reduce the catch of adults to in order to reduce the immediate risk of low spawner abundance on recruitment. The IATTC staff will reevaluate bluefin stock status when the ISC working group does another update or full assessment.

1.3. Northern albacore tuna

The latest stock assessment of north Pacific albacore was completed in April 2014 by the Albacore Working Group of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), which includes an IATTC staff member. The Working Group concluded that the north Pacific albacore stock was not experiencing overfishing and was probably not overfished. The fishing

2 The total well volume, in cubic meters, of all vessels actually operating in the EPO, regardless of whether they are on the IATTC Regional Register. This is the capacity used by the IATTC scientific staff for its assessments of the tuna stocks.

3 Defined as the IATTC Convention Area, established in Article III of the Antigua Convention

mortality for the latest years in the assessment ($F_{2010\text{-}2012}$) was estimated to be below that for $F_{2002\text{-}2004}$, which had led previously to the implementation of conservation and management measures for north Pacific albacore by the IATTC in the EPO (Resolution C-05-02, supplemented by Resolution C-13-03) and by the Western and Central Pacific Fisheries Commission (WCPFC) (WCPFC CMM 2005-03)**.** The Working Group noted that there was no evidence that fishing had reduced the spawning stock biomass below thresholds associated with the majority of potential biomass-based reference points, and that population dynamics in the north Pacific albacore stock are largely driven by recruitment, which is affected by both environmental changes and the stock-recruitment relationship (a measure of the degree to which biomass and recruitment are interdependent). The Working Group concluded that the north Pacific albacore stock was healthy, and that the productivity was sufficient to sustain recent exploitation levels, assuming average historical recruitment in both the short and the long term. The staff considers that the latest assessment of northern albacore tuna supports Resolution C-05-02, and recommends the continuation of Resolutions C-05-02 and C-13-03.

2. HARVEST CONTROL RULE (HCR)

Tuna management in the EPO follows an unofficial operational harvest control rule (HCR) for yellowfin, skipjack, and bigeye tunas. The staff recommends that the following interim harvest control rule be adopted:

1. Management measures for the purse-seine fishery, such as closures, which may be fixed for multiple years, will ensure that the fishing mortality rate (F) does not exceed the best estimate of the rate corresponding to the maximum sustainable yield (F_{MSY}) for the species that requires the strictest management.
2. If the probability that F exceeds the limit reference point (F_{limit}) is greater than 10%, management measures that have a probability of at least 50% of reducing F to the target level (F_{MSY}) or lower, and a probability of less than 10% that F will exceed F_{limit}, will be established as soon as is practical.
3. If the probability that the spawning biomass (S) is below the limit reference point (S_{limit}) is greater than 10%, measures will be established that have a probability of at least 50% of rebuilding S to the target level (dynamic S_{MSY}) or greater, and a probability of less than 10% that S will fall below S_{limit} within a period of two generations of the stock or five years, whichever is greater.
4. For other fisheries, management measures will be as consistent as possible with those for the purse-seine fishery.

Further evaluation of this HCR and alternatives will be conducted, so that a permanent HCR can be adopted.

3. CONSERVATION OF SHARKS AND MOBULID RAYS

3.1. General recommendations

1. For all sharks and mobulid rays caught in purse-seine sets, except sharks that will be retained aboard the vessel:
    a. Require that, to the extent possible, sharks and mobulid rays too large to be lifted safely by hand be brailed out of the net or through the use of other methods, such as those recommended in WCPFC-SC8-2012/EB-IP-12[4].
    b. Prohibit the use of gaffs, hooks, or similar instruments for handling sharks and mobulid rays.
    c. Prohibit lifting sharks and mobulid rays by their gill slits or spiracles.

[4] Poison *et al*. 2012. Good practices to reduce the mortality of sharks and rays caught incidentally by the tropical tuna purse seiners

d. Prohibit punching holes in the bodies or fins of sharks and mobulid rays (*e.g*. to pass a cable through for lifting the animal).

2. Require purse-seine vessels that catch sharks and mobulid rays to install equipment, such as ramps, hatches, or doors, to facilitate the release of sharks and mobulid rays without the need to lift them, while providing for the safety of the crew. When sharks or mobulid rays cannot be released safely before being landed on deck, they should be returned to the water as soon as possible. If ramps or escape hatches are not available, the animals should be lowered into the water with a sling or net.

3. Ban the use of "shark lines[5]" in longlines targeting bigeye tuna or swordfish.

4. Change Paragraph 12 of Resolution C-05-03 to read "Paragraphs 2-11 of this resolution apply to sharks caught in association with all fisheries covered by the IATTC Convention" so that reporting of shark catches, by species, and of fishing effort, required by paragraph 11 of the resolution, is mandatory for all vessels engaging in these fisheries.

5. Conduct experiments on mitigating shark catches, especially in longline fisheries, and on the survival of sharks captured by all gear types, with priority given to those gears with significant catches. Survival experiments should include studies of the effects on survival of shorter sets and of the use of circle hooks.

6. Support research on mitigation of shark bycatches as well as data collection projects, and investigate the feasibility of observers aboard purse-seine vessels not currently covered by the IATTC observer program (see Section 11).

7. Request that CPCs share any methods or technology developed on their vessels to improve the release of these species.

8. Improve and expand upon mandates to collect and report shark data, consistent with the report on challenges facing the collection of data on shark fisheries in the EPO, prepared as part of the FAO-GEF project."

3.2. Additional recommendations for silky sharks

An attempt to assess the status of the silky shark in the EPO using conventional stock assessment models has been severely handicapped by major uncertainties in the fishery data, mainly regarding catch levels in the early years. An alternative scientific basis for precautionary management advice is urgently needed and, for that purpose, a suite of stock status indicators (SSIs) has been proposed (Document SAC-05-11a). Purse-seine indices for the silky shark have been updated with data from 2015. The index for all silky sharks for the northern area shows an increase in 2015 relative to 2014, but the index for all silky sharks for the southern area remains at the 2014 level. This increase in the index in the northern area may be in part the result of changes in availability, rather than abundance, due to strong El Niño conditions. Differences among trends computed for sub-areas in the north suggest that the overall recent increasing trend in the north may reflect an integration of spatially-distinct processes, including the effect of fishing pressure closer to the coast, and environmentally-mediated movement of individuals into the tropical EPO from the west. The IATTC staff does not consider the more optimistic recent trends to be strong enough to dismiss the urgent need for precautionary management actions, as recommended previously. It is critical that shark fishery data collection in the EPO be improved, so that conventional stock assessments and/or other indicators of stock status can be developed to better inform management of silky sharks and other shark species in the EPO. Fishing mortality needs to be reduced in order to promote rapid rebuilding of silky shark stocks in the EPO; therefore, the staff makes

[5] Branch lines, or lines attached to buoy lines, at shallow depths, specifically targeting sharks.

the following recommendations:

1. For vessels other than purse-seiners which catch sharks incidentally, limit non-target shark catch to a maximum allowed limit of 30%[6] of the total catch by trip in weight.
2. Close fisheries directed at silky sharks for a three-month period each year[7]. Longliners targeting sharks may choose to take their 3-month closure period within any 3 consecutive months of the year, provided that such designations are made before the start of each calendar year. Fisheries not directed at silky sharks, but which catch them incidentally, may continue to operate during the closure, so long the use of steel leaders is prohibited for the duration of the closure (item 1 applies to these vessels).
3. Limit the catch of silky sharks of less than 100 cm total length during a trip to 20%[8] of the total number of silky sharks caught during that trip.
4. Identify silky shark pupping grounds and prohibit fishing with steel leaders within these areas.

3.3. Additional recommendations for hammerhead sharks

1. Prohibit retention of hammerhead sharks by purse-seine vessels, and require that they be promptly released unharmed, to the extent feasible.
2. Record, through observer programs for purse-seine vessels of all capacity classes, the number and status (dead/alive) of hammerhead sharks caught and released.

3.4. Additional recommendations for whale sharks

Resolution C-15-03 on the collection and analysis of data on FADs, adopted at the 89th meeting of the Commission in June 2015, contains measures for the conservation of whale sharks. However, the staff considers that it would be appropriate to adopt a stand-alone resolution that would include these and other measures specific to whale sharks.

4. CONSERVATION OF SEABIRDS

The Commission should revise Resolution C-11-02 consistent with the current state of knowledge regarding seabird mitigation techniques, as described in document SAC-05 INF-E[9]. The two-column menu approach in C-11-02 should be replaced by a requirement to use at least two of three mitigation methods (line weighting, night setting, and bird-scaring lines) in combination, in a way that will , at the very least, meet the minimum standards in Appendix I. Other mitigation methods should not be approved until their effectiveness is proven.

The Commission should take note of the updated seabird density information, and consider expanding the area of application of measures in the North Pacific.

5. HANDLING OF SEA TURTLES IN LONGLINE FISHERIES

The Commission should encourage the use of videos and other educational materials, such as those

[6] 30% is proposed as an interim limit in the absence of data and scientific analysis on which to base conservation and management measures. This limit could be revised, based on staff recommendations, once improved species-level catch and composition data are available.

[7] The three-month closure is based on the ratio of the best measure of average catch in 2008-2009 to that in 2011-2012.

[8] 20% is proposed as an interim limit in the absence of data and scientific analysis on which to base conservation and management measures. This limit could be revised, based on staff recommendations, once improved species-level catch and composition data are available.

[9] Prepared by ACAP and Birdlife International

available on the IATTC website, to train captains and crews of longline vessels on when and how to dehook or disentangle a turtle, and familiarize them with the correct methods for doing so, as shown in these materials. They should also be provided with guides to identifying leatherback, loggerhead, and hawksbill turtles.

The Commission should also adopt the following additional measures:

1. Require every longline vessel operating in an area where sea turtles may be hooked or entangled to carry: a) a dipnet to safely lift sea turtles aboard the vessel, b) a line cutter that is long enough to reach the turtle without lifting it from the water, c) dehookers (both inverted-V-shaped and a pigtail-shaped), d) a bolt cutter capable of cutting hooks, and e) equipment capable of safely keeping the sea turtle's mouth open.
2. Prohibit lifting of turtles from the water using the fishing lines in which the turtles are hooked or entangled. If a turtle must be removed from the water, an appropriate basket lift or dipnet should be used. If a hooked turtle cannot be safely removed from the water, any remaining line should be cut as close as possible to the hook without inflicting additional harm on the turtle. In no case should the length of line left attached to the hook exceed the length of the turtle's carapace.
3. Prohibit attempts to remove swallowed hooks from turtles, and instead require that the hook be left in place and the line cut as close to the hook as possible without further injury to the animal. Hooks that are visible or easily accessible should be removed if they satisfy the criteria described in the materials available in the IATTC website.
4. Vessel crews should be encouraged to assess the condition of any sea turtle brought aboard the vessel prior to releasing them. To the extent practicable, injured or unresponsive turtles should be kept on board and assisted in a manner consistent with methods described in the FAO's Guidelines to reduce sea turtle mortality in fishing operations and in the materials on the IATTC website.

6. FISHING GEAR CONFIGURATIONS

The Commission should require that vessels submit the purse-seine and longline gear description forms appended to Document SAC-05-05. Any significant modifications made to the gear subsequently should be reported on these forms prior to departing port with the modified gear.

7. NON-ENTANGLING FADS

Hanging any materials, such as net webbing, that may entangle any fauna under FADs deployed in the EPO should be avoided. Any non-entangling materials, such as ropes, may be used, and observer records will be used to verify their performance. The Commission should continue to conduct and support research on the effectiveness of various materials.

8. IDENTIFICATION AND MARKING OF FADS

Vessels should authorize the companies that operate the satellite systems used to track FADs to provide to the IATTC, directly or through whatever mechanism the governments and/or vessel owners consider suitable, the positions of each FAD from deployment to recovery, with a time lag of four months, or other agreed period, to protect the owner's proprietary information.

9. IMPROVING THE QUALITY OF BYCATCH DATA FROM PURSE-SEINE VESSELS

In recent years, the equipment and procedures used to load catches into the wells of purse-seine vessels have changed. Brailers now have larger capacities, and the catch is now unloaded directly from the brailer to the well deck through an opening in the working deck, instead of into a hopper on the working deck. These changes make it increasingly difficult for the observers to determine the species, sizes, and quantities of bycatches. The staff recommends that, for vessels using these new procedures and gear, an

experimental program be undertaken using video cameras on the well deck or other convenient locations to identify means of improving data quality.

10. OBSERVER COVERAGE OF LONGLINE VESSELS

In Resolution C-11-08, the Commission established that "each CPC shall ensure that at least 5% of the fishing effort made by its longline fishing vessels greater than 20 m length overall carry a scientific observer". As of the date of publication of this document, nine Members have provided summary reports of their longline observer programs. The information provided is insufficient for a rigorous evaluation of the adequacy of 5% coverage for their longline fisheries. The data show that 5% is too low a coverage to allow accurate estimates of the catch of species caught infrequently in those fisheries. In other studies in which large amounts of information has been collected, 20% coverage has been calculated to be adequate to provide reliable estimates of the infrequently-caught species.

The staff maintains its recommendation of 20% observer coverage of longline vessels over 20 m length overall until sufficient information is available to justify a revision.

11. OBSERVER COVERAGE OF PURSE-SEINE VESSELS OF LESS THAN 363 T CARRYING CAPACITY

The staff recommends that the Commission give consideration to the establishment of an observer program for purse-seine vessels of less than 363 t carrying capacity, at a level of coverage adequate to reliably monitor these vessels' catches and bycatches. The staff could investigate the feasibility of such a program, including the use of video recordings of some of the vessel's activities, especially in cases in which carrying an observer aboard is not practical. Therefore, the staff recommends that the Commission give it a mandate to examine the feasibility of various options, and report its findings prior to the meeting of the SAC in 2017.

APPENDIX I

MINIMUM STANDARDS FOR SEABIRD BYCATCH MITIGATION MEASURES FOR LONGLINE VESSELS

1. Branchline weighting configurations should consist of weights greater than 45 g attached within 1 m of the hook, or weights greater than 60 g attached within 3.5 m of the hook, or weights greater than 98 g weight attached within 4 m of the hook. Positioning the weight further than 4 m from the hook should not be deemed adequate.
2. All setting of longlines should be started and completed between nautical twilight and nautical dawn.
3. On longline vessels greater than 35 m length overall, two bird-scaring lines should be deployed in a configuration that maximizes their aerial extent, but with a minimum aerial extent of 100 m. Lines should be attached to the vessel at a height of at least 8 m above the water at the stern. Streamers should be brightly colored, a mix of long and short (<1 m), placed at intervals of no more than 5 m, and attached to the line with swivels that prevent streamers from wrapping around the line. All long streamers should reach the sea surface in calm conditions. Baited hooks should be deployed within the area bounded by the two bird-scaring lines, and bait-casting machines should be set so that the baited hooks hit the water within that area .
4. On vessels of less than 35 m length overall, a single bird-scaring line should be deployed in a manner that maximizes its aerial extent, but with a minimum aerial extent of 75 m. Lines should be attached to the vessel at a height of at least 7 m above the water at the stern. Streamers should be brightly colored and attached to the line with swivels that prevent streamers from wrapping around the line. Short streamers (<1 m) should be placed at 1-m intervals along the entire length of the aerial extent.

Longer streamers at 5-m intervals along the first 55 m of aerial extent, to complement the short streamers, could be added at the vessel's discretion. All long streamers should reach the sea surface in calm conditions.