Analysis of Marine Turtle Mitigation Measure Effectiveness in Tuna Longline Fisheries

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Summary

An analysis of mitigation options for tuna longline bycatch of marine turtles will be launched in late 2015 by the Secretariat of the Pacific Community (SPC) with funding provided by the ABNJ (Common Oceans) Tuna Project. IOTC members are invited to contribute relevant data on a voluntary basis in order to construct a comprehensive, and if possible multi-ocean, dataset for analysis. Similar to the shark mitigation analysis conducted by SPC in 2014-2015, this analysis will quantitatively assess the potential for a variety of mitigation measures (e.g. changes in gear designs and fishing methods) to reduce mortality and injury, either singly or in combination. The first stage of the analysis will focus on characterizing baseline marine turtle interaction and mortality rates under existing fishing operations. A data preparatory workshop is planned to facilitate compilation and interpretation of national datasets, with special procedures developed for sharing of data for which there may be confidentiality concerns. The second stage of analysis, to be finalized in a second workshop, will alter the baseline scenario to explore various mitigation options, and if possible, combine these with estimates of absolute impacts, to determine whether any of the simulated mitigation schemes would be able to reduce any unacceptable impacts to marine turtle populations to acceptable levels. The analysis will be coordinated with an ongoing NOAA study of marine turtle mitigation in Pacific and Atlantic fisheries in order to broaden the geographic scope of the findings. This study will inform Pacific bycatch management discussions as well as demonstrate methods and indicative results for other regions.

1   Background

The Areas Beyond National Jurisdiction (ABNJ, or Common Oceans) Tuna Project is a GEF (Global Environment Facility)-funded, FAO-implemented programme of work designed to encourage and reinforce sustainable tuna fisheries. One of the three main components of the project focuses on mitigating bycatch and ameliorating adverse impacts on biodiversity. Funding has been allocated to WCPFC and SPC under the ABNJ work programme to support two studies on bycatch mitigation issues facing t-RFMOs. The first study will focus on an assessment of marine turtle interaction with longline fisheries. The second study, which is still being formulated, will focus on shark mitigation, perhaps on the theme of spatial management.

2   Focus on Mitigation

In response to the problem of unwanted bycatch, a number of potential technological and operational solutions have been proposed. In longline fisheries these have taken the form of tori (streamer) lines to reduce seabird hooking rates, regulations on leader material to reduce shark catches, and restrictions on types of hooks and bait in order to mitigate marine turtle interactions. Although tuna fisheries have adopted these or similar measures to mitigate threats to bycatch species, in many cases the degree to which interaction and mortality is reduced as a result of these measures, both in theory and in practice, remains unknown. This is at least partially because

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studies of the effectiveness of mitigation options often lack statistical power due to small sample sizes and/or represent only a small subset of fishing operations. To overcome these shortcomings, integrated analysis of combined datasets representing different fisheries, locations, and operational variables has been proposed as a better way of assessing the effectiveness of various solutions. Recent SPC studies of shark mitigation options are prime examples of this type of approach[5],[6].

Although marine turtles interact with both purse seine and longline fisheries, a recent ecological risk assessment conducted for the Atlantic suggested that overall mortality from purse seine fisheries is "trivial" compared to longline fisheries[7]. This is likely due to the fact that as predators marine turtles are attracted to baited hooks, and that there may be a higher chance of asphyxiation in longline fisheries particularly when turtles become hooked and can't reach the surface to breathe. (Although there is potential marine turtle mortality associated with FAD entanglement, anecdotal evidence suggests this is negligible in comparison to mortality rates in longline fisheries[8] [9]). Safe release methods are more straightforward in purse seine fisheries[10] as compared to longline fisheries where there is likely to be a considerable danger of post-release trauma and death due to swallowed hooks and leaders[11]. The only tuna RFMO to adopt a conservation and management measure (CMM) that requires specific changes in fishing practices (i.e. beyond safe release) is WCPFC and these practices are required for shallow set longline fisheries (CMM 2008-03).

3   Study Objectives

The proposed study will focus on evaluating mitigation techniques for marine turtle bycatch in pelagic longline fisheries. As the number of scenarios that can be evaluated is limited, it is initially proposed that the workshop analyses focus on depth, soak time, hook width and shape, and bait type. The analysis will aim to cover green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*) and olive Ridley (*Lepidochelys olivacea*) marine turtles. However, the ability to draw species-specific conclusions will depend heavily on the extent to which species-specific data are available.

It is proposed to set the objectives of the analysis in phases and to advance through as many phases as possible given the time, resources and data available. Phase 1 will consist of characterizing baseline marine turtle interaction and mortality rates under existing fishing operations. This phase will require data on interaction (e.g. number caught per set, manner of capture, at-vessel handling and disposition) and mortality rates by species, as well as details of operational data for longline sets (e.g. set and haul start and end times, hooks between floats, branchline and float line lengths, hooks per set, types of hooks used, types of baits used, leader length, location, season and year). While it will be important to obtain access to datasets from observers, logsheets or research experiments, values may also be drawn from published literature. In the event that data are sparse

[5] Caneco, B., C. Donovan and S. Harley. 2014. Analysis of WCPO longline observer data to determine factors impacting catchability and condition on retrieval of oceanic whitetip, silky, blue and thresher sharks. WCPFC-SC10-2014/EB-WP-01.

[6] Caneco, B., C. Donovan and S. Harley. 2015. Monte Carlo analysis of measures to mitigate longline fishery impacts on silky and oceanic whitetip sharks. WCPFC-SC11-2015/EB-WP-02.

[7] Angel, A., R. Nel, R.M. Wanless, B. Mellet, L. Harris and I. Wilson. 2014. Ecological risk assessment of sea turtles to tuna fishing in the ICCAT region. SCRS/2013/134 Collect. Vol. Sci. Pap. ICCAT, 70(5): 2226-2259.

[8] Restrepo, V., L. Dagorn, D. Itano, A.Justel-Rubio, F. Forget, and J.D. Filmalter. 2014. A summary of bycatch issues and ISSF mitigation initiatives to date in purse seine fisheries, with emphasis on FADs. ISSF Technical Report 2014-11, International Seafood Sustainability Foundation, Washington, D.C. USA.

[9] M. Hall, IATTC, personal communication, 4 June 2015

[10] Poisson F., A.L. Vernet, B. Séret and L. Dagorn. 2012. Good practices to reduce the mortality of sharks and rays caught incidentally by the tropical tuna purse seiners. EU FP7 project #210496 MADE, Deliverable 6.2., 30p.

[11] Clarke S., Sato M., Small C., Sullivan B., Inoue Y. and Ochi D. 2014. Bycatch in longline fisheries for tuna and tuna-like species: A global review of status and mitigation measures. FAO Fisheries Technical Paper 588. Rome. 199 p.

it may be necessary to solicit expert judgement regarding various fleets' characteristics, potentially through questionnaires for gear configurations of particular fleets or vessel sizes. The analysis will be designed to handle both empirical and indicative (e.g. questionnaire-based) data and to appropriately account for uncertainty. Results will provide baseline interaction and mortality rates given current fishing gear designs and fishing practices. Phase 1 will not address whether these interaction and mortality rates represent significant unsustainable or otherwise unacceptable impacts to marine turtle populations.

Phase 2 will consist of altering the baseline scenario defined in Phase 1 to represent various mitigation options. Values of operational variables will be adjusted based on these scenarios and the resulting interaction and mortality rates (by species, if possible) will be compared and contrasted. As much as possible these mitigation options will be based on national or international measures already in place, for example the marine turtle mitigation measure adopted by WCPFC[12] or mitigation measures adopted by the United States in domestic waters[13],[14]. Prospective mitigation measures or schemes (i.e. those not yet implemented anywhere) may also be tested to determine their relative impacts as compared to the status quo (Phase 1). Like Phase 1, Phase 2 will only address relative impacts of various types of longline fishing operational characteristics on marine turtles. In other words, it will inform conclusions about whether the impacts of mitigation scheme A has more or less impacts on marine turtles than mitigation scheme B; it will not inform conclusions regarding whether either impact level is threatening marine turtle populations.

Phase 3 will be undertaken only on the condition that absolute impacts on individual marine turtle populations from mortality in tuna longline fisheries have been quantified through a risk assessment or other impact assessment methodology conducted separately. Phase 1 should be revisited, if necessary, to ensure that it replicates, as closely as possible, the baseline scenario assumed under the risk assessment or other impact assessment to facilitate comparison. Phase 3 will combine estimates of these absolute impacts, if available, with the relative impacts from Phases 1 (baseline) and 2 (enhanced mitigation). In this way, conclusions can be drawn regarding whether any of the simulated mitigation schemes would be able to reduce any unacceptable impacts to marine turtle populations to acceptable levels.

The study will commence with SPC surveying potential participants regarding their interest and data holdings, and then compiling available data into a preliminary baseline. SPC will then hold the first workshop to obtain participant's input and further data, and to agree on data descriptions and interpretations to form a baseline of current fishing operations. If time allows, work will progress to specification of Phase 2 simulations of mitigation schemes. Between the first and second workshop SPC will test a variety of mitigation scenarios and investigate how these might be translated into absolute (population–level) impact predictions. The second workshop will review the results of the Phase 2 scenarios, adjusting them if necessary. Absolute population level impacts will also be reviewed, or if not available, the workshop can consider whether an indicative range of impact values can be specified for a hypothetical analysis. In either case, Phase 3 absolute impact

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[12] WCPFC 2008-03 requires that shallow set longline fisheries (provisionally defined as those for which the majority of the hooks are set shallower than 100 m) use one of the following three mitigation measures: (i) large circle hooks with an offset of no more than 10 degrees; (ii) whole finfish bait; or (iii) another measure, mitigation plan or activity approved by the WCPFC Scientific Committee. An exception is provided for shallow set longline fisheries that can demonstrate that there have been "minimal" interactions with marine turtles in the past three years and that observer coverage exceeds 10 percent in each of those three years.

[13] The United States Atlantic pelagic longline fishery imposes bait specifications, use of circle hooks (size of hook depends on fishing locale), and possession and use of marine turtle handling and release gear on board all pelagic longline vessels, as well as time–area closures in various locations.

[14] The Hawaii shallow-set longline fishery requires the use of large circle hooks (size 18/0) and fish bait, has an annual cap on turtle interactions, and requires 100 percent observer coverage.

predictions of various mitigation scenarios is the ultimate goal of the second workshop, time allowing.

After the second workshop, SPC will draft a report summarizing the data inputs and conclusions of the study. After agreement by meeting participants, workshop reports will be made publicly available. The workshop reports may contain the input values for the analyses, or other data-related details, only if these values do not compromise data confidentiality as determined by the data owner. It is expected that findings from both workshops will inform Pacific bycatch management discussions as well as demonstrate methods and indicative results for other regions.

4   Data Issues

It is anticipated that the study may be able to make use of otherwise confidential, nationally-held data (e.g. from observer programmes) in a secure environment. Success of this approach will depend on participants' data contributions being substantive and in a common format to facilitate their pooling into a joint database for analysis. Using the WCPFC Regional Observer Programme data as a starting point, SPC will seek permission from its members to incorporate national observer data into a composite database for use under secure conditions within the workshops. Other data holders which are not SPC members may also wish to contribute data to the analysis and in such cases SPC will negotiate data confidentiality arrangements with each participant as necessary. ABNJ (Common Oceans) Tuna Project partnerNOAA is currently undertaking a similar analysis of marine turtle interactions and the effectiveness of mitigation in its own Pacific and Atlantic longline fisheries. SPC will work closely with NOAA scientists to coordinate statistical approaches, and if possible conduct joint analyses, in order to expand the scope of analysis and produce compatible analytical results. It may also be possible to accept other participants, i.e. those contributing data for fisheries outside of the Pacific, but this will depend on the extent to which those datasets are compatible with the Pacific datasets forming the core of this analysis.

5   Workshop Logistics

The first workshop will be held in the Pacific in early 2016 with the second 6-12 months later. The workshops will be scheduled so as not to conflict with other regional meeting commitments and if possible to take advantage of logistical efficiencies. Funding for workshop participation will be made available, in accordance with GEF procedures, for participants from G77 countries. These funds will be provided directly to the participants from ABNJ (Common Oceans) Tuna Project resources allocated to the Secretariat of the Pacific Community via the WCPFC and FAO. Proposals for workshop venues and locations are sought and will be considered in light of anticipated costs and their budgetary implications. Five-day workshops are proposed in order to allow sufficient time for the database to be queried, any missing input compiled and agreed, and estimates to be produced.

6   Next Steps

IOTC members are invited to consider this opportunity and to inform the ABNJ (Common Oceans) Tuna Project of their interest in participating and contributing data. Available travel funding will be prioritized to support participants from the Pacific but may be available for data holders from other oceans. SPC expects to confirm further details of the first workshop in the last quarter of 2015.