



**TECHNICAL AND COMPLIANCE COMMITTEE
SECOND REGULAR SESSION
28 September – 03 October 2006
Brisbane, Australia**

ADVICE ON MEASURES REQUESTED BY THE COMMISSION

**WCPFC-TCC2-2006/16
15 September 2006**

Paper prepared by the Secretariat

Introduction

1. This paper reviews the Commission's previous deliberations in relation to by-catch of seabirds, sea turtles, sharks and other non-target fish species including by-catch mitigation. It focuses on the outcomes of the second regular session of the Scientific Committee (SC2) in respect of the requests for advice and recommendations from the second regular session of the Commission (Comm2) in December 2005.
2. This paper has been prepared to support further discussion on by-catch and by-catch mitigation at the second regular session of the Technical and Compliance Committee (TCC2) under Agenda Item 5. It has particularly been prepared to assist TCC2 in responding with advice and recommendations to the Commission's specific requests that the TCC:
 - a. undertakes to explore and evaluate mitigation measures for juvenile bigeye and yellowfin tuna taken around FADs, in cooperation with other RFMOs, and present the results annually to the Commission (Agenda Item 5.1);
 - b. considers measures for the mitigation of incidental catch of seabirds, including those applied and tested by CCAMLR (Agenda Item 5.2); and
 - c. shall monitor the progress of CCMs in applying the 'Resolution to Mitigate the Impact of Fishing for Highly Migratory Fish Species on Sea Turtles', and develop relevant strategies for the further consideration of the Commission in 2007 (Agenda Item 5.3).

Background

Inaugural Session of the Commission, 9-10 December 2004, Pohnpei, Federated States of Micronesia

3. The first regular session of the Commission (Comm1) adopted Resolution-2004-01 concerning Conservation and Management Measures. This resolution called for the following advice to be provided to the Commission at its second regular session (Comm2):
 - a. the effects on the stocks of measures to mitigate the catch of juvenile bigeye and yellowfin including controls on setting on floating objects; and

- b. estimates of the mortality of non-target species with an initial focus on seabirds, sea turtles and sharks.
4. The same decision requested the first regular session of the Technical and Compliance Committee (TCC1) to provide advice to Comm2 on issues that may require consideration for the effective implementation of possible conservation and management measures including time/area closures or alternative measures to control sets on floating objects.

First Regular Session of the Scientific Committee, 8-19 August 2005, Noumea, New Caledonia

5. The first regular session of the Scientific Committee (SC1) considered model scenarios to mitigate the catch of juvenile bigeye and yellowfin tuna (JBYT) including controls on sets on floating objects (Table 1 of the SC1 Report), and estimates of the mortality of non-target species with an initial focus on seabirds, sea turtles and sharks.

Scenario	Description
3	Purse seine reductions in tropical regions (all set types)
5	Indonesia/Philippines reductions
6	Reductions in all fisheries
9	A quarterly closure to log/FAD purse-seine fishing in western equatorial Pacific – effort transfer to school set fishery in western equatorial Pacific
9A	A quarterly closure to purse-seine fishing in western equatorial Pacific – effort transfer to eastern equatorial Pacific in each set-type category
10	A quarterly closure to log/FAD purse-seine fishing in eastern equatorial Pacific – effort transfer to school set fishery in eastern equatorial Pacific
10A	A quarterly closure to purse-seine fishing in eastern equatorial Pacific – effort transfer to western equatorial Pacific in each set-type category

6. Effects on stocks of measures to mitigate catch of JBYT was as follows:
- a. Several of the projection scenarios simulated measures to mitigate the catch of JBYT. These included reductions in catch and effort of the purse seine, and Indonesian and Philippines fisheries (scenarios 3 and 5), transfer of purse seine effort from log and FAD sets to unassociated school sets (scenario 6) and various area-season closures of the purse seine fishery (scenarios 9, 9A, 10, and 10A);
 - b. Transfer of effort from log and FAD sets to unassociated school sets resulted in gains in adult biomass as well as an increase in overall catch because of fishery interactions effects (i.e. the reduced catch of juveniles resulted in gains to both the population and the longline catch over the ten-year time horizon).
7. On SC1’s response to Resolution-2004-01, Comm2 noted:
- a. a reduction in the use of fish aggregation devices and floating objects appeared to be the most effective method of reducing by-catch of JBYT;
 - b. although the level of observer coverage required for collecting adequate data for estimating the mortality of non-target species varies among species and from fishery to fishery, rarer species requires a higher level of coverage. Some experts suggested that 20 per cent observer coverage was a reasonable target for purse seine operations and at least 10 per cent for longline operations;

- c. the issue of uncertainty associated with the Scientific Committee's assessments and analysis related to species identification, particularly with respect to JBYT, and the lack of comprehensive information for fisheries in Indonesia and Philippines.

8. SC1 noted that estimates of the mortality of non-target species were regarded as preliminary, because of low observer coverage, the non-representative nature of the coverage and inadequate identification, except for sharks, and that additional analyses of more accurate estimates of catches and mortalities would be required to assess the impact of fisheries on species of special interest.

First Regular Session of the Technical and Compliance Committee, 5-9 December 2005, Pohnpei, Federated States of Micronesia

9. Possible mitigation measures to address by-catch mortality were not proposed by SC1 in its report to the Commission, but were considered at TCC1 (WCPFC/2005/TCC1/18 Suppl. 2,3,4). TCC1 subsequently identified monitoring, control and surveillance (MCS) issues that may require consideration for the effective implementation of possible conservation and management measures in respect of, *inter alia*, time and area closures and mitigation measures (**Attachment A**).

Second Regular Session of the Commission, 12-16 December, Pohnpei, Federated States of Micronesia

Juvenile bigeye and yellowfin tuna

10. In respect of JBYT, Comm2 adopted a Conservation and Management Measure for Bigeye and Yellowfin Tuna in the Western and Central Pacific Ocean (Conservation and Management Measure-2005-01). This measure provided, *inter alia*, that:

- a. the Scientific Committee, at its second meeting, shall identify levels of fishing effort to ensure that the bigeye and yellowfin stocks will remain at an agreed level above B_{MSY} (paragraph 4);
- b. in order to achieve an overall reduction in catch and effort required for bigeye and yellowfin tuna, in accordance with advice and recommendations received from the Scientific Committee, the Executive Director shall work with CCMs during 2006 to develop a proposal for consideration at the third session of the Commission that is consistent with the IATTC arrangements that allow for a system of temporary purse seine closures (paragraph 11.);
- c. the Commission will work with CCMs to develop methods to reduce catches of juvenile bigeye and yellowfin tuna caught in association with FADs (paragraph 14);
- d. beginning in 2006, the Scientific Committee and the Technical and Compliance Committee shall undertake to explore and evaluate mitigation measures for juvenile bigeye and yellowfin taken around FADs, in cooperation with other RFMOs, and present the results annually to the Commission. This work shall continue on an annual basis (Paragraph 15).

Seabirds

11. The Commission also adopted a resolution on the incidental catch of seabirds (Resolution-2005-01) that called for CCM to:

- a. the extent possible, implement the IPOA for Reducing Incidental Catches of Seabirds in Longline Fisheries,

- b. report regularly to the Commission on the implementation of the IPOA-Seabirds, including NPOAs, as appropriate, and
- c. provide the Commission with all available information on interactions with seabirds to enable the Scientific Committee to estimate seabird mortality in all fisheries in the WCPF Convention Area.

12. This resolution also called on the Commission, in consultation with the Technical and Compliance Committee, to consider measures for the mitigation of the incidental catch of seabirds, including those applied and tested by CCAMLR, at its session in 2006.

13. The Commission agreed that the Scientific Committee should take the practical steps necessary for improving the recording and monitoring of seabird interactions, including species involved and rates of total mortality in the Convention Area. Further, the Commission agreed that the Technical and Compliance Committee should monitor the progress of CCM in applying Resolution-2005-01, and report to the Commission and develop relevant strategies for further consideration of the Commission.

Non-target Fish Species

14. Comm2 adopted a Resolution on Non-Target Fish Species (Resolution-2005-03). This resolution called for, to the extent practicable, the prompt release of all non-target fish species to the water unharmed.

Sharks

15. The Commission agreed to defer consideration of the shark conservation resolution, as presented in WCPFC/Comm2/DP21 Rev.1, until the third regular session of the Commission (Comm3). The draft resolution, tabled by FFA members following discussion with several CCM, is presented at **Attachment B**.

Sea turtles

16. Comm2 adopted a Resolution to Mitigate the Impact of Fishing for Highly Migratory Fish Species on Sea Turtles (Resolution-2005-04) that called for, *inter alia*,

- a. implementation of the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations;
- b. the Commission to encourage CCMs to provide the WCPFC with all available information on interactions with sea turtles in the WCPF Convention Area;
- c. the Commission to encourage CCMs to enhance implementation of their respective turtle mitigation measures that are already in place and foster collaboration and the exchange of information in this regard;
- d. specific measures relating to the mitigation of the impact of the purse seine and longline fishery on sea turtles including for the Commission, at its 2006 session, to consider measures relating to the use of circle hook gear technology in longline fisheries (taking into account the results of research and trials);
- e. undertake research associated with the mitigation of impacts of fishing on sea turtles;
- f. exchange information on sea turtle by-catch with IATTC including the development and application of compatible by-catch reduction measures;
- g. strengthening of observer programmes for the collection of information on sea turtle interactions;

- h. use of the SRF to support developing State members and territories with implementation of the FAO guidelines;
- i. CCMs to report on steps taken to implement this resolution as a component of their Annual Report to the commission (Part II); and
- j. for the Commission, through the Technical and Compliance Committee, to monitor progress of CCMs in applying this resolution and to develop relevant strategies for consideration by the Commission in 2007.

17. The Commission agreed that, through the Scientific Committee and the Technical and Compliance Committee, it should develop a programme that includes researching and developing gear and bait alternatives; promoting the use of available by-catch mitigation technology; promoting and strengthening data collection programmes to obtain standardized information for developing reliable estimates of sea turtle by-catch; biological research on sea turtles, including the identification of migration routes or other areas of spatial or temporal importance; industry education, development and promotion of safe handling techniques and other techniques to improve sea turtle conservation.

18. The Commission requested that the Secretariat, in cooperation with the Scientific Committee, centralize by-catch and observer data to obtain better estimates of total catch and mortalities of sea turtles by fisheries that target highly migratory fish species covered by the Convention within the Convention Area. The Scientific Committee was requested to take practical steps necessary to improve monitoring and reporting of sea turtle interactions in the Convention Area, including the development of data standards and, specifications and reporting requirements.

Second Regular Session of the Scientific Committee, 7-18 August 2006, Manila, Philippines

19. SC2 dedicated considerable time to ecosystem and by-catch issues. A list of by-catch related papers presented to SC2 at Manila is included at **Attachment C**.

20. In a presentation by the SPC-OFP it was noted that the WCPF Convention makes little distinction in terms of the management objectives for target and non-target associated and dependent species and that, as a result, the list of species for which the Commission has responsibility is long. It proposed that the Scientific Committee consider the development of a system for prioritization of fisheries monitoring and research effort, and evaluation of potential conservation and management measures.

21. SC2 considered efforts among some CCM to adapt existing fisheries management systems to incorporate a hierarchical approach to Ecological Risk Assessment as described in WCPFC/2006/SC2/ EB WP-14. The ERA includes a method called Productivity-Susceptibility Analysis (PSA), which provides an objective biological basis for assessing the risk of adverse fisheries impacts upon the many species caught. Life-history characteristics and measures of fisheries interactions are scored and plotted along two respective axes: *productivity* and *susceptibility*.

22. The results from the PSA for all species show that target species (tunas, billfish, mahi mahi, wahoo) often score highly with respect to susceptibility, as they are most often encountered and retained; however, these are all relatively highly productive, therefore they score 'low risk' with respect to productivity.

23. Sea turtles and seabirds rank in the middle of the risk scores. Results on "condition at capture" show that birds are most often landed dead; effective conservation measures must therefore prevent capture in the first place.

24. Sea turtles are often landed alive, therefore effective conservation measures can be also directed at treatment post-capture (i.e. de-hooking, rest and recovery, prior to release).

25. Most shark species are ranked in the high risk portion of the plots, due to their low productivity, being live bearing with an average of 15 pups per year, and their high susceptibility, due to high encounter rates in the fisheries but low rates of live discards.

Juvenile bigeye and yellowfin tuna

26. SC2 received a report from the Fishing Technology Specialist Working Group (FT-SWG) concerning work by the Instituto Español de Oceanografía (IEO) from Spain in the Western Indian Ocean to improve species selectivity using echo sounder and sonar data on aggregations around drifting FADs. Although results were initially encouraging it was noted that further multi-frequency and target strength acoustic work is needed to develop and refine the discrimination of different sizes and species in mixed schools.

27. Discussion in the FT-SWG covered various options to reduce the catch of JBYT, including various scenarios of catch and effort reduction (including time/area closures and FAD specific effort reduction), research on acoustic selectivity and species-specific aggregative behaviour on FADs, and input controls of fishing gear and practices. It was suggested that research should be focused on mitigation studies related to selectivity, targeting and tuna behavior, and statistical analysis of effort reduction scenarios.

28. SC2 subsequently recommended:

- a. the Commission's Science Service Provider should review spatio-temporal aspects of catches of JBYT caught in association with FADs and refine analyses of potential management options that the Commission might adopt in order to reduce such catches, including cooperation with other RFMOs to identify appropriate mitigation measures;
- b. CCMs should continue research into acoustic selectivity to avoid JBYT as well as research into the vertical distribution and residence time of JBYT on FADs; and
- c. CCMs should ensure that relevant information (based on gear and operational modes) is being collected through observer programmes and port sampling and submitted to the Commission in order to assess the impacts of FADs and other technological aspects on catches of JBYT.

29. The adopted summary report of SC2's discussion and recommendations on mitigation of JBYT is appended at **Attachment D**.

Seabirds

30. The Scientific Committee's Ecosystems and By-catch Specialist Working Group (EB-SWG) received reports from several CCMs (Australia, Chinese Taipei, Japan, New Zealand, and the USA), on seabird mitigation efforts including progress with implementation of National Plans of Action. A summary of the papers presented and the resulting discussion, as presented in the report of the EB-SWG to the Scientific Committee, is presented at **Attachment E**.

31. This summary reviews the status of seabird populations distributed in the WCPFC Convention Area, overlaps between fisheries and seabird distribution, interactions between fisheries and seabirds, mitigation research that has been undertaken in other RFMOs, seabird mitigation measures adopted in other RFMOs and considerations for observer coverage to reduce the incidental catch of seabirds in the WCPO.

32. In response to the request from Comm2 for estimates of seabird mortality in the Convention Area (Resolution 2005-01, Paragraph 3), SC2 noted that several CCMs included estimates of seabird interactions (including catches) in their Annual Reports (Part I) to the Scientific Committee. SC2 developed two recommendations relating to:

- i) mitigation measures; and
- ii) data collection and research (**Attachment F**).

33. Without the recommended expansion in observer coverage, SC2 was unable to develop reliable estimates of seabird mortality in the Convention Area. Consequently, SC2 deferred responding to the request for estimates of seabird mortality until the third regular session of the Scientific Committee (SC3) and reiterated the need for wider observer coverage and necessary funding to support this work.

Sea turtles

34. In relation to **hook research**, the Scientific Committee's EB-SWG received reports from several CCM [Australia, Japan, New Zealand, Korea, USA and Spain (in respect of experimental work in the Southwest Indian Ocean)] on sea turtle mitigation efforts in longline fisheries through examination of issues such as hook types and catch rates for target species. A summary of the papers presented and the resulting discussion relating to hook research, mitigation measures and a sea turtle research programme (as called for at Comm2), and as presented in the report of the EB-SWG to SC2, is presented at **Attachment G**.

35. Following a review of the requests from the Commission with respect to sea turtles and the IATTC Resolution (C-04-07) on a 3-year program to mitigate the impact of tuna fishing on sea turtles, SC2 made a recommendation to the Commission in relation to sea turtle data collection and a supporting research program (**Attachment H**).

36. In relation to circle hooks, the SC2 advised:

- a. New information presented at the EB-SWG confirms previous understanding of the efficacy of circle hooks in reducing hook ingestion by sea turtles and the efficacy of large sized circle hooks in reducing sea turtle by-catch.
- b. Some new results have indicated variations in catch rates with some sizes of circle hooks, e.g. reduced target species catch rates. This is also similar to previous findings.
- c. The magnitude of impacts on sea turtle by-catch and target species catch varies between the studies conducted to date.

37. Notwithstanding the above, results presented to the EB-SWG clearly show that a specifically designed management regime employing sea turtle by-catch mitigation measures, such as circle hooks and fish baits, applied to a fishery sector with a sea turtle by-catch problem can substantially reduce sea turtle by-catch while maintaining viable target species catch rates.

38. Based on the above, and information that other measures (e.g. fish bait, deep setting) that may also reduce sea turtle by-catch, SC2 recommended that the Commission adopt a flexible approach to sea turtle by-catch mitigation based on scientific experiments/observations testing a range of mitigation techniques to determine the appropriate mitigation measures for a particular geographic area and fishery.

Sharks

39. SC2 was advised that the average proportion of shark observed landed alive, for all shark categories, in longline fisheries is 64 per cent. The average whole-body retention rate for all shark categories is 43 per cent. The rest is discarded. Of the total shark discards in longline

fisheries, the average proportion with fins removed and trunk discarded is 50 per cent; for purse seine fisheries this is 70 per cent. Thus the estimated average proportion discarded alive is 31 per cent for longline and 39 per cent for purse seine.

40. Conservation measures that prohibited the removal of fins from sharks when the trunk is not retained (cf. Resolution-2005-03) could result in a 50 per cent decrease in fishing mortality on sharks, as the average proportion discarded alive could rise to the same proportion that is landed alive. This figure assumes the same whole-body retention rate and no delayed mortality for sharks released alive and intact.

Discussion

41. CCMs are invited to report on national or collaborative efforts relating to the decisions concerning by-catch and by-catch mitigation adopted by Comm2 in December 2005. It is suggested that discussion on these specific issues will be greatly assisted if CCMs bring to TCC2 considered advice and recommendations on each issue, from their particular perspectives.

42. TCC2 is invited to consider and endorse the SC2 recommendations, and if appropriate, further elaborate on processes to support their effective implementation. Taking into account the SC2 outcomes and the work of other RFMOs, TCC2 is also invited to provide advice and recommendations in relation to:

Juvenile bigeye and yellowfin tuna:

- the further exploration and evaluation of technical issues associated with the implementation of mitigation measures for JBYT tuna around FADs, including advice for cooperation with other RFMOs;

Seabirds:

- technical issues associated with the implementation of measures for the mitigation of the incidental catch of seabirds, noting that mitigation measures applied and tested by CCAMLR have been further considered by SC2;

Sea turtles:

- Research, trials and measures relating to the implementation of circle hooks in longline fisheries; and
- Consider strategies to support research and promote efforts to implement measures that mitigate the impact of fishing for highly migratory fish species on sea turtles for further consideration by the Commission when it next meets in December 2007.

Sharks:

- To provide advice and recommendations in relation to the implementation of conservation and management measures for sharks.

43. Noting the relatively short time that TCC2 has available for thorough consideration of the many issues of concern relating to by-catch and by-catch mitigation, it is suggested that TCC2 identifies priority actions for funding in the 2007 TCC Work Program (Agenda Item 6.1).

Attachment H, Summary Record, First Regular Session of the Technical and Compliance Committee, 5-9 December 2006, Pohnpei, FSM

Summary of MCS issues that may require consideration for the effective implementation of possible conservation and management measures that might be adopted at WCPFC2

<i>Conservation & management measure</i>	Possible measures that may be considered by the Commission	<i>Possible MCS issues</i>
Catch and/or effort limits	<ul style="list-style-type: none"> • Catch reductions across all fisheries (5% bigeye and 23% yellowfin, relative to 2001-2003 catches); much larger if related to long term recruitment (33% bigeye and 35%) • Effort reductions across all fisheries (20%) yellowfin) • Cap purse seine effort at current (2003) levels; possible reduction in long term • Reduce catchability in log/FAD purse seine sets by 50% • Control of sets on floating objects • Switch purse seine effort from log/FAD to unassociated sets, all areas • Capacity limits for large purse seine vessels • Capacity limits for large longline vessels • Reduce effort in Indonesia/Philippines fisheries • Moratorium on vessel construction 	<p>Catch/effort monitoring systems (i.e. both recording and reporting catch) – as per SWG resolutions (SC1-ST-1, SC1-ST-2)</p> <ul style="list-style-type: none"> • estimates of annual catch • number of vessels active • catch and effort data aggregated by time period and geographic area • size composition data • role of flag states and coastal states • time periods covered and schedule for the provision of data • definition of WCPFC statistical area • periodic review of requirements for scientific/MCS data <p>Landings data</p> <p>Port state data</p> <p>Catch/effort data as required for specific management measure:</p> <ul style="list-style-type: none"> • time specific as required • fleet specific as required • gear specific as required • locations-specific, as required • species-specific, as required • improvements to historical catch/effort data records <p>Catch/effort reporting at a frequency effective to support the requirements of measure</p> <p>Near real-time catch/effort reporting when near to achieving target so that catch limit is not exceeded</p> <p>Development of predictive capacity for catch/effort monitoring to determine time when catch/effort limits are likely to be reached</p> <p>Flag state reporting (catch/effort declarations from flag states)</p> <p>Catch and effort verification mechanisms:</p> <ul style="list-style-type: none"> • VMS • observers

		<ul style="list-style-type: none"> • Product flow information (reconciliation with catch/landings data) • transshipment data – reconciliation with catch and landing data • export data • import data – cannery/market flows • mechanism for cross-check verification <p>Verification of discards</p> <ul style="list-style-type: none"> • logbooks • observers <p>Vessel lists:</p> <ul style="list-style-type: none"> • list of vessels authorized to fish • list of vessels authorized to fish as they may apply to specific catch/effort limitations • list of active vessels • list of vessels to which capacity or other limits apply <p>Effort monitoring:</p> <ul style="list-style-type: none"> • definition of fishing effort • methods to monitor technology creep and changes in effective effort • establishment of vessel classification system (e.g. definition of ‘large’ purse seiner) • standardization of units used to report effort <p>Capacity limits:</p> <ul style="list-style-type: none"> • Definition of capacity (may be specific to the WCPFC region) • Expression of capacity in terms of number of vessels and tonnage of vessels • Definition of capacity limits by region, member or zone • Elements found in Annex 4 of the Convention (current and historical) <p>Boarding and inspection</p> <p>Records of compliance with past resolutions including ‘reasonable restraint’</p> <p>IUU issues:</p> <ul style="list-style-type: none"> • Quantification of IUU catch • Understanding of IUU activity in the region • Assess compliance/applying sanctions • IPOA implications <p>Reporting and monitoring to be tailored to meet the requirements of the units used to measure the fishery</p> <p>Mechanisms to respond to overages and</p>
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		<p>underages</p> <p>Where moratorium on vessel construction implemented, supply information on vessel construction to Commission</p> <p>Need to obtain better data for stock assessment and associated conservation and management measures, with further development of monitoring scheme in selected EEZs under existing WCPFC project</p>
Capacity limits for large-scale tuna fishing vessels		Capacity limits are considered with catch and effort limits
Time and area closures	Total closure, or by gear, for certain period	<p>Delineation of spatial closure incorporated in VMS and other monitoring systems</p> <p>Observer coverage at level determined by the Commission on fleets impacted by closure</p> <p>VMS</p> <p>Aerial, maritime and satellite surveillance</p> <p>Sighting information from other fishing vessels</p> <p>Report on compliance with closure by Commission members and non-members</p> <p>Definition of gear types (e.g. definition of FAD)</p> <p>Gear marking scheme</p> <p>Partial closures will require similar MCS measures as total closures</p>
	Time/area closures of purse seining (log/FAD sets) in western equatorial Pacific: effort redirected to unassociated sets in same area	
Measures to address impacts of large-scale tuna fishing vessels so as to ensure compatibility between measures applied outside areas of national jurisdiction and measures being applied by coastal states to manage fishing by such vessels within their zones	<p>Compatibility of measures within and outside EEZs</p> <p>(Resolution 4c)</p>	Ensure systems and protocols are in place to address compatibility
Mitigation Measures	<p>Seabirds, sea turtles and sharks</p> <p>(Resolution 4e)</p>	<p>Observers</p> <p>Development of educational materials and mechanisms for technology transfer</p>

		<p>Active cooperation and participation of fishers</p> <p>At sea inspection by enforcement officers</p> <p>Gear modifications and enforcement of those modifications by inspection</p> <p>Port inspections (e.g. in relation to shark fin)</p> <p>Data collection that included by-catch species</p>
Other Measures		(None identified at this stage)



DRAFT FOR DISCUSSION
RESOLUTION ON THE CONSERVATION OF SHARKS CAUGHT IN
ASSOCIATION WITH FISHERIES IN THE WESTERN AND CENTRAL
PACIFIC OCEAN

WCPFC2/Comm2/DP21 Rev1

Proposal Submitted by FFA Members

The Commission For The Conservation And Management Of Highly Migratory Fish Stocks In The Western And Central Pacific Ocean

In accordance with the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean:

Recognising the ecological and cultural significance of sharks in the western and central Pacific Ocean (WCPO);

Recalling that the United Nations Food and Agriculture Organisation (FAO) International Plan of Action for the Conservation and Management of Sharks calls on FAO members, within the framework of their respective competencies and consistent with international law, to cooperate through regional fisheries organisations with a view to ensuring the sustainability of shark stocks as well as to adopt a National Plan of Action for the conservation and management of sharks;

Recognising the need to collect data on catch, effort, discards, and trade, as well as information on the biological parameters of many species, as part of shark conservation and management;

Resolves as follows:

1. Commission Members, Cooperating non-Members, and participating Territories (called CCMs) shall implement the FAO International Plan of Action for the Conservation and Management of Sharks.
2. CCMs shall advise the Commission annually on their implementation of the IPOA-Sharks, including, as appropriate, the status of their National Plans of Action for the Conservation and Management of Sharks.
3. National Plans of Action for sharks should include measures to minimise waste and discards from shark catches and encourage the live release of incidental catches of sharks, especially juveniles.

4. In fisheries for tunas and tuna-like species that are not directed at sharks, CCMs shall encourage the release of live sharks, especially juveniles, to the extent practicable, that are caught incidentally and are not used for food and/or subsistence.

5. The Commission, at its next annual session in 2006, shall adopt measures to address the sustainability of shark stocks in the Convention Area and measures directed at promoting full utilization of any retained catches of sharks. Such measures will be consistent with decisions on shark conservation and management adopted by other RFMOs in 2004 and 2005 and measures taken by CCMs in areas under their national jurisdiction. The Commission shall take into account the best available scientific information when adopting these measures.

6. CCMs shall, where possible, undertake research to identify ways to make fishing gears more selective.

7. CCMs are encouraged, where possible, to conduct research to identify shark nursery areas.

8. Each CCM shall, where possible, include shark species in their annual reporting to the Commission of annual catches and catch and fishing effort statistics by gear type, including available historical data, in accordance with the WCPF Convention and agreed reporting procedures;

9. The Commission shall consider appropriate assistance to developing CCMs for the implementation of the IPOA and collection of data on shark catches.

10. Paragraphs 2-7 of this resolution shall apply to sharks caught in association with fisheries managed under the WCPF Convention, and to sharks listed in Annex 1 of the 1982 Convention occurring in the Convention area.

11. Beginning in 2006, CCMs shall include in their Annual Report to the Commission (Part II) a comprehensive report on the steps taken to implement this resolution.

Work Program

The Scientific Committee, in cooperation with the Inter-American Tropical Tuna Commission (IATTC) and the International Scientific Committee (ISC) to the extent practicable, shall take the steps necessary to develop recording and monitoring programs for shark catches in the Convention area and provide advice on the status and vulnerability of major stocks (e.g., complete a preliminary ranking of shark species by stock status in the WCPO and develop a plan for conducting comprehensive assessments of key shark species).

The Commission, through the Technical and Compliance Committee, shall monitor the progress of CCMs in ~~compliance with this resolution, and report to the Commission,~~ and develop compliance strategies for the further consideration of the Commission in 2007.

List of by-catch mitigation-related documents tabled at the Second Regular Session of the Scientific Committee, 8-18 August, 2006, Manila, Philippines

Symbol	Title
GN IP-3	Secretariat. Information on seabird mitigation measures of other RFMOs
FT WP-3	Dagorn L., Holland K., Puente E., Taquet M., Ramos A., Brault P., Nottestad L., Georgakarakos S., Deneubourg J.-L., Aumeeruddy R., Josse E., Dalen J. FADIO (Fish Aggregating Devices as Instrumented Observatories of pelagic ecosystems): a European Union funded project on development of new observational instruments and the behavior of fish around drifting FADs. Institut de recherche pour le développement (IRD), Seychelles, Indian Ocean. France
FT WP-4	Itano, D., Holland, K. and L. Dagorn. Behaviour of yellowfin (<i>Thunnus albacares</i>) and bigeye tuna (<i>T. obesus</i>) in a network of anchored Fish Aggregation Devices. Pelagic Fisheries Research Programme, Honolulu, Hawaii, USA; Hawaii Institute of Marine Biology, Kaneohe, Hawaii; Institut de recherche pour le développement (IRD), Seychelles, Indian Ocean
FT WP-5	Itano, D. and D. Kirby. Standardized fishery terms to facilitate the communication within Scientific Committee and with the WCPFC. Pelagic Fisheries Research Programme, Honolulu, Hawaii, USA,; Secretariat of the Pacific Community, Noumea, New Caledonia
FT WP-6	Itano, D. An examination of vessel, gear and operational details useful for fishery-specific effort standardization, including FAD-related gear and fishing strategies. Pelagic Fisheries Research Programme, Honolulu, Hawaii, USA
FT WP-7	Babaran, R. FAD Fishing and its Effects on Tuna Stocks. College of Fisheries and Ocean Sciences, University of the Philippines in the Visayas, Miag-ao, Iloilo, Philippines
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Annex XIII, Summary Record, Second Regular Session of the Scientific Committee, 8-18 August 2006, Manila, Philippines

FULL RECORD OF DISCUSSION AROUND MEASURES TO MITIGATE AGAINST CAPTURE OF JUVENILE BIGEYE AND YELLOWFIN TUNA BY PURSE SEINE

1. Information addressing Agenda item 5.3 on by-catch mitigation of juvenile bigeye and yellowfin tuna (JBYT) was presented by D. Itano who served as chairman for this session and lead discussion on this topic. An informal information paper had been circulated to provide basic information and stimulate discussion on recommendations that might arise from the SC regarding the reduction of JBYT fishing mortality. The chairman for this session drew the attention of the meeting to two documents from PrepCon and SC-1 of relevance to the session in relation to the management of bigeye and yellowfin catch and in particular, the fishing mortality of JBYT taken in association with floating objects¹.

2. It was noted by the meeting that the directive from the Commission to the SC was specific to the evaluation of mitigation measures for JBYT taken around FADs². The directive, from the Commission's Conservation and Management Measure-2005-01 states:

Beginning in 2006, the Scientific Committee and the Technical and Compliance Committee shall undertake to explore and evaluate mitigation measures for juvenile bigeye and yellowfin taken around FADs, in cooperation with other RFMOs, and present the results annually to the Commission. This work shall continue on an annual basis.

3. Discussion focused initially on various options to reduce the catch of JBYT identified in the information paper. The chairman noted the paper was a comprehensive list of all potential ways to reduce JBYT fishing mortality that included various scenarios of catch and effort reduction, research on acoustic selectivity and aggregative behavior of JBYT on FADs, and input controls to fishing gear and practices.

4. Differing views over the appropriateness of development and consideration of mitigation options related to catch and effort reduction, such as time/area closures or FAD specific effort reduction were expressed by the meeting. Some CCMs suggested that the SC should only be concerned with JBYT mitigation that can be addressed in a research-based environment, such as studies related to selectivity, targeting and tuna behavior. Other viewpoints were tabled supporting the investigation of certain effort reduction scenarios that could be analyzed within a scientific and statistical environment. The chairman supported this compromise position, noting that several working papers had already been submitted to SCTB and SC1 that had addressed JBYT catch and mitigation, such as papers examining spatial and temporal abundance of bigeye in purse seine fisheries, and modeling scenarios examining resource trade-offs between floating-object and unassociated fishing modes.

5. There were specific requests to the WCPFC Secretariat as to which areas of mitigation the SC should concentrate their discussions and recommendations. The WCPFC Secretariat advised that the SC should remain open and flexible in regards to which areas of research the SC could consider when developing studies to address JBYT fishing mortality.

¹ WCPFC/PrepCon/WP.24
SC1/FT WP-4

² defined as any man-made device, or natural floating object, whether anchored or not, that is capable of aggregating fish

6. Some CCMs supported the importance of having accurate spatial and temporal data on catches of JBYT available to the SC to facilitate the evaluation of mitigation measures and development of research priorities. The chairman sought clarification as to the SC ability to collate information on catches of catches of JBYT taken in association with FADs. The SPC OFF advised their group could provide these data if directed by a detailed information request. It was suggested that catch and effort data for JBYT in five degree square areas encompassing MULTIFAN CL areas 3 and 4 of the 6-area model would suffice. The chairman advised that due to limitations in time during plenary, a more thorough experimental design to examine specific management options would have to be developed after SC2.

7. The reduction of effort by FAD directed purse seine effort was proposed by a CCM as an effective mitigation measure to reduce JBYT catch. It was recognized that directed management of fisheries considered to be primarily responsible for JBYT fishing mortality was an efficient way to proceed. However, the chairman noted that implementation of specific management options was the responsibility of the Commission rather than the SC whose role was to support the science behind management decisions.

8. There was discussion from CCMs as to the relative importance of acquiring data and managing fisheries of the Philippines and Indonesia versus the importance of regulating JBYT fishing mortality from high seas zones. It was noted that an over-riding and common feature of JBYT catch from both the Philippine/Indonesia and high seas fisheries was the use of FADs. There was substantial discussion of what basic information on FADs and JBYT catch is needed from both high seas and coastal states. It was noted that the SC and WCPFC would benefit from examining the experience and actions of other RFMOs in regulating FADs and JBYT in their respective areas. CCMs noted that examination of seasonal and area closures of the Gulf of Guinea by ICCAT may be particularly useful.

9. There was general comment on the importance of FADs to the purse seine fleets for some CCMs and a question as to whether the Commission was seeking guidance on research needs in relation to FADs and reducing catches of JBYT. The chairman noted that some research on acoustic selectivity and behavior of FAD associated tuna and other species was available, but additional research was required. Reference was made to the tagging project recently initiated by SPC and the National Fisheries Agency (PNG) and its importance in providing valuable information on the impact of FADs and the behavior of associated tuna species. A recently initiated FFA study to review FAD use by fleet and the management of FAD-based purse seine effort was noted that will assist in clarifying these issues.

10. The chairman noted that data inputs necessary to design experiments and allow evaluation of management options based on gear design and operational aspects can be collected by well designed observer and port sampling programmes. The need to increase and improve the quality and level of monitoring of WCPO fisheries was noted. .

11. Discussion followed to develop specific recommendations in response to the Commission request to evaluate mitigation measures for juvenile bigeye and yellowfin taken around FADs. The following recommendations were developed by the meeting and adopted by consensus.

RECOMMENDATIONS TO THE COMMISSION

1. The Commission's Science Service Provider should review spatio-temporal aspects of catches of juvenile bigeye and yellowfin tuna caught in association with FADs and refine analyses of potential management options that the Commission might adopt in order to reduce such catches, including cooperation with other RFMOs to identify appropriate mitigation measures.

2. CCMs should continue research into acoustic selectivity to avoid juvenile bigeye and yellowfin as well as research into the vertical distribution and residence time of juvenile bigeye and yellowfin tuna on FADs.
3. CCMs should ensure that relevant information (relevant to mitigation based on gear and operational modes) is being collected through observer programmes and port sampling and submitted to the Commission in order to assess the impacts of FADs and other technological aspects on catches of juvenile bigeye and yellowfin.

Summary of the Report of the Ecosystems and By-catch Specialist Working Group in relation to seabird mitigation to the Second Regular Session of the Scientific Committee, 8-18 August, 2006, Manila, Philippines

1. The EB-SWG report to the Scientific Committee summarized research supported by BirdLife International that highlighted the importance of the WCPFC area for albatross populations (41% of global distribution). Distribution is concentrated north of 20°N and south of 30°S, corresponding to an area overlapping with an estimated 100-110 million hooks of WCPFC longline fishing effort per year.
2. Information relating to the distribution of seabird species within the WCPFC Area presented to the Scientific Committee was based on a combination of at-sea sightings, band recoveries, satellite telemetry, and individual-species studies. It was reported that the distributions of 99 species of albatross (Procellariidae) and petrel (Diomedidae), 16 species of albatross and 60 species of petrel occur within the area of the WCPFC, and are potentially vulnerable to fisheries by-catch. These include species with IUCN classification of Critically Endangered (n = 1), Endangered (n = 7), Vulnerable (n = 26) and Near Threatened (n = 7). The remaining 30 species are classified by the IUCN as Least Concern. It was reported that there is evidence of interactions with shearwaters in Australia and NZ at 20–30°S, but that there were little data for equatorial regions.
3. The Scientific Committee heard that while seabird by-catch data have been collected within New Zealand and Australian EEZs, and by the US in waters within and adjacent to the EEZ surrounding Hawaii, few seabird by-catch data currently exist for WCPFC longline fisheries in high seas and many coastal areas. Observer coverage of approximately 25% for the US longline fleet based in Hawaii has resulted in good information on seabird interactions in the tropical equatorial band of the WCPO. These data, however, are limited longitudinally. In addition, a new observer programme is being initiated for American Samoan vessels, which will provide additional data, although again this will be restricted spatially. Initial indications are that seabird interaction rates are low in American Samoa.
4. Available data highlight the variability of recorded seabird by-catch rates which reflects the seasonal and spatial clustering of seabird abundance, the effect of environmental factors, the significant effect of small differences in fishing gear configuration, and differences in methods of data collection by observers. It was noted that the development of standardized methods for recording seabird by-catch within the Commission's regional observer programme for longline fisheries will be important in helping to reduce this variability and/or understand the factors that cause it.
5. With regards observer coverage, 100% was considered the ideal, particularly for quantifying rare and highly variable events, such as seabird interactions. CCAMLR and the Hawaii swordfish fishery, for example, have 100% coverage. This level, however, is not always practical for all fisheries. As a first step, it was suggested that high rates of coverage (e.g., 20%) might be initially implemented for several years to obtain a detailed understanding of levels and associated variability of quantities. Effective observer programs could then be designed on the basis of that initial information.
6. Factors influencing the appropriateness and effectiveness of a mitigation device include the fishery, vessel, location, seabird assemblage present and time of year (i.e. season). As such, there is no single solution to reduce or eliminate seabird by-catch across all fisheries. It is recommended that a combination of measures is required, and even within a fishery there is likely to be individual vessel refinement of mitigation techniques in order to maximize their

effectiveness at reducing seabird by-catch. Retention or strategic management of offal and discards has the potential to avoid seabird by-catch although it was also noted that storage limitations impacts on the capacity of small vessels to store large volumes of offal. Other methods recommended to mitigate against seabird by-catch include paired bird-scaring lines, line weighting, tori lines, side setting, weighted swivels (which involves some consideration of crew safety) and night setting.

7. The EB-SWG also considered whether other fishing methods used in the WCPFC Convention Area, such as purse seining, trolling and poling, interact with seabirds. It was agreed that generally those other fishing methods are not of great concern because they are pursued in tropical areas. Albacore trolling, which occurs at high latitudes, may need to be assessed because there has been little observer coverage and New Zealand advised that it intends to deploy observers on albacore trolling vessels in the upcoming season. Low seabird catch rates occur in purse seine fisheries. However, northern giant petrels are caught in the purse seine fishery but observer coverage is not adequate to assess this interaction effectively.

Summary Record, Second Regular Session of the Scientific Committee, 8-18 August, 2006, Manila, Philippines [paragraphs 5.1 to 5.6]

SEABIRD BY-CATCH MITIGATION AND RESEARCH

RECOMMENDATION 1: SEABIRD BY-CATCH MITIGATION

1. All longliners should thaw their bait before it is deployed.
2. In addition, south of 30°S and north of 23°N, CCMs should require their longline vessels to use at least two of the mitigation measures presented in Table 1, including at least one from Column A.

Table 1: Recommended mitigation measures*

Column A	Column B
Side setting with bird curtain	Tori line ³
Night setting with minimum deck lighting	Weighted branch lines
Tori line	Blue-dyed bait
	Deep setting line shooter
	Bait caster
	Underwater setting chute
	Management of offal discharge

*If accepted by the Commission, detailed definitions and specifications of each measure would need to be developed.

1. In other areas, where necessary, CCMs are encouraged to employ one or more of the seabird mitigation measures listed in Table 1.
2. Other mitigation measures may be tested under *bona fide* research programmes.
3. Every effort should be made to ensure that seabirds captured alive during longlining are released alive and that wherever possible hooks are removed without jeopardizing the life of the seabird concerned.
4. CCMs are encouraged to seek feedback from fishers and observers on the effectiveness and practicality of mitigation measures.
5. *These measures should be reviewed regularly, particularly when information becomes available on new or existing measures or on seabird interactions from observer or other monitoring programmes. An updated suite of recommended measures should then be considered.*
6. To the extent possible CCMs should endeavor to harmonize their NPOAs with these measures.

RECOMMENDATION 2: IMPROVED DATA COLLECTION AND RESEARCH PROGRAMME

³ If tori line is selected from both Column A and Column B this equates to simultaneously using two (i.e. paired) tori lines.

DATA COLLECTION

Objective: To identify areas of spatial and temporal overlap of seabird species and fishing effort (areas of high and low interaction rates for seabirds) so that CCMs can target mitigation measures in areas where they will be most needed.

Activity: Improved Observer Programme

a) Coverage:

To adequately characterize rare events, up to 100% observer coverage may be required statistically. But bearing in mind the practicalities involved, the programme should:

1. Initially be spatially and temporally representative of each fishery operating in the Commission area. Given diminishing benefits of greater coverage, the programme should aim to observe 20% of the fishing effort over a two year period. As a practical matter, however, a sudden increase to this level (from the current level of 0.5%) is unlikely to occur, as a result, the statistics SWG recommended that initially a minimum of 5% of the fishing effort be observed. When areas of greater importance are found, the observer programme may be restructured to optimize coverage in these areas.
2. If the operation requires the observer to work below deck, in order to ensure that both fishery data, as well as seabird and turtle catches are quantified within a statistically correct framework, at least 50% of hooks should be observed during the haul. The observer must report the portion of the haul that was monitored.

b) Data to collect:

1. Cross-check the SPC observer manual and data sheets with other RFMO and national programmes to ensure that all the necessary data collection details are included (to be addressed through the Statistics SWG recommendation on observer data (ST SWG report, par. 30 (a)).

Although these will be addressed through the Statistics SWG's recommendations the data elements for observers on longliners required to ensure that the objectives of the Data Collection and Research Programme are met, should include:

- Gear, e.g. branch line length, light sticks, bait type
 - Operational, e.g. time of set, position
 - Seabird catch, e.g. number and species caught
 - Seabird abundance estimate, e.g. number of seabirds around the vessel
 - Use of and effectiveness of mitigation measures, e.g. tori lines
2. Ensure standardized data collection and clearly specify programme priorities for observer monitoring of seabird catches, interactions during hauling and setting, and mitigation measures.

RESEARCH PROGRAMME

Objective: Reduce the capture and injury of seabirds by fishing gear. Research into mitigation directed at ensuring fewer seabirds are caught should continue to focus on the development and implementation of effective mitigation measures.

1. Encourage parties to conduct experimental tests of mitigation measures, and to develop appropriate measures for particular fisheries and areas. In particular, the benefits of offal discharge management and mitigation measures during the haul need to be investigated.
2. Quantify the survival rates of released birds (e.g. bird banding).
3. Conduct Industry Education and Training –
 - i. CCMs should be responsible for providing training to fishers on seabird identification, handling and release, including provision of a manual on seabirds (which would include information on mitigation, identification, handling and release). This may facilitate fishers assisting in data collection.
 - ii. Self-reporting (logbook reporting) of seabird identification and release condition (alive, dead, how hooked, gear remaining on seabird).
 - iii. Commission should make available existing education material which CCMs could use to provide information to their fishers on how to reduce captures and mortality of seabirds.

Cooperation: - Given the distribution of albatrosses and petrels across regions and ocean basins, the WCPFC Secretariat is encouraged to collaborate with relevant RFMOs (e.g. IATTC, CCSBT) and other organisations (e.g. ACAP and CCAMLR) to address seabird by-catch issues.

Summary of the Report of the Ecosystems and By-catch Specialist Working Group in relation to hook and mitigation research in relation to sea turtles to the Second Regular Session of the Scientific Committee, 8-18 August, 2006, Manila, Philippines

Hook research

1. Japanese researchers in the North Pacific reported there was no difference in hooking rates of loggerhead sea turtles (*Caretta caretta*) between tuna-hooks and small-sized circle hooks, but large-sized circle hooks had the potential to reduce the hooking rates of loggerheads. The ingestion of circle hooks, especially the large-sized hooks, occurred less frequently than with tuna hooks, which suggests that circle hooks have the potential to improve post-hooking survival of sea turtles. The use of circle hooks had little effects on the catch rates of tuna, but large-sized circle hooks showed negative impacts on billfish catch. Research was continuing to determine the influence of the shape and size of circle hooks on mortality of sea turtles through fishing and captive experiments. To improve post-hooking survival of sea turtles in the North Pacific, simple and practical de-hooking devices were developed and distributed to some fishermen for on-site performance.
2. The results of a study to compare the catch rates of target and by-catch species between J hook and circle hooks in the North Pacific was also presented to the Scientific Committee by researchers from Korea. In the target species group no significant differences were observed for target species among 3 types hook, between size 4.0 traditional tuna hooks (J-4) and size 15 circle hooks (C15), and between C15 and size 18 circle hooks (C18), but significant differences were found between J-4 and C18. In the by-catch species group significant differences were found among 3 types hook, between J 4 and C15, and between J-4 and C18, but no significant differences were revealed between C15 and C18. Large circle hook (C18) had the lowest catch rate for tunas and for other fishes, and the small circle hook (C15) had lowest rate for billfishes and sharks.
3. Preliminary Australian work on circle hooks also indicated few size differences between fish caught on the different hook types, as well as the existence of differences in fish condition at capture (alive versus dead), suggesting benefits in product quality with circle hooks as more fish are boated alive. The Committee took note of the need to record bait types used in hook experiments, and the position of hooks on the catenary curve as both can have a significant influence on catch rates of both target and non-target species.
4. The EB-SWG also received a report on the impacts of regulations to reduce sea turtle interactions for the shallow set swordfish fishery in Hawaii. The regulations were based on research conducted in the U.S. North Atlantic longline swordfish fishery and came into effect for the Hawaii-based pelagic longline swordfish fishery in May 2004. Significant reductions in sea turtle and shark capture rates and reduced proportion of deeply hooked sea turtles, indicating increased post release survival prospects, without comprising target species catches were reported. The study included examination of the viability and potential for temporal and/or spatial closures to reduce turtle capture rates, a comparison between 2005 and 2006 turtle catch rates and the hook position in a basket catching sea turtles and retained fish.
5. It was reported that trials comparing the two hook types without bait changes have repeatedly shown a significant decrease in swordfish CPUE with circle hooks (experiments in Hawaii, the US fishery in the North Atlantic, and elsewhere) although not every study shows a decrease or a statistically significant decrease (e.g. preliminary study results from the Italian swordfish longline fishery off Sicily or from the Brazilian longline fishery in the South Atlantic).

6. In conclusion, the EB-SWG noted that research with altered gear in regular longline fisheries have clearly shown that hook and bait combinations can reduce sea turtle by-catch. An issue that remains is the uncertain impacts on target species catch rates in particular fisheries. In fisheries where the turtle by-catch rate is low (e.g. in all the deep-setting fisheries targeting bigeye tuna that have so far been examined), experimental determination of the effects of hook type and bait on turtle by-catch is not practicable because of the low statistical power available and the huge sampling effort that is required. Therefore a goal of a research programme in these fisheries can be to test whether gear alterations believed to reduce turtle by-catch or turtle injury based on other studies (e.g. use of larger hooks, circle hooks, deeper set hooks, or fish bait) can maintain commercial catch rates for valued catch species. If these studies show success, then wide commercial adoption of the improved gear could eventually demonstrate benefits to sea turtles when sufficient effort has been observed.

7. Post-release mortality studies are underway, and more are needed, to look for more evidence of reduced injury and improved post-release survival in sea turtles (and other by-catch) that is hooked externally or in the mouth in comparison with by-catch that ingests the hooks. The most consistent benefit of the shape of circle hooks versus other hook shapes is in reduced hook ingestion. Although this appears an obvious benefit for improving turtle post-release survival, more rigorous scientific evidence would be very helpful to resolve debate over the merits of circle hooks.

Research programme

8. Drawing on information provided by some CCMs (New Zealand and the USA (Hawaii)) the Scientific Committee was advised that a sea turtle **research program** should assimilate:

- details of fishery operations are most important for sea turtle issues and should be recorded by fisher and observers;
- spatial and temporal distributions of the different sea turtle species;
- diving abilities of the various species
- Advice on the best mitigation measures for sea turtles, including an differences among sea turtles species; and
- the effect of these mitigation measures on the catches of target (e.g. tunas and swordfish) and by-catch (e.g. sharks and other fish and non-fish species) species.

9. The EB-SWG recommended that the turtle programme should include collaboration between scientists, the fishing industry, fishery agencies and NGOs such as has been so effective in the programs in Hawaii, Latin America, Australia, Japan, Indonesia and South Africa and elsewhere. It is also important to view the reduction of turtle and other by-catch as a process of improvement and refinement in fishing practices in relation to a spectrum of environmental impacts including captures of other protected and endangered species, changes in fishing effort, target species, and fishing grounds in response to management measures, and other fishery and socioeconomic consequences.

10. The research programme should employ an ecosystem based approach to developing and evaluating management measures. The process of improvement and refinement may well involve changing management measures as fishers, scientists, and other collaborators try measures and develop alternatives. The hook type, hook size, bait type, fishing depth, and fishing effort measures to reduce turtle by-catch will need testing and evaluation as they are tested and adopted in various fisheries. It will be important that management measures not inhibit the testing of new alternatives, such as deeper fishing, hooks with appendages, alternate light lures, and other possible measures that are now being investigated.

11. The Commission's research programme should support by-catch reduction mitigation measures that are science based. The much wider area and need for comprehensive biological research on sea turtles is beyond the Commission's programme. It was recommended that the Commission's programme focus on manageable goals based on the expertise, infrastructure, and resources that are available and rely heavily on the wider turtle research community for collateral support.

12. Also, to assess the impact of fisheries on turtle populations there is need to encourage the wider research community to assist in understanding turtle population dynamics. A vigorous and comprehensive research programme already exists on stock identity and heterogeneity. To evaluate the need and efficacy (for population recovery) of reducing by-catch in particular fisheries, the Commission's programme needs to include investigation, modeling, and assessment of the sources of turtle mortality throughout their life cycle.

13. Entanglement and mortality of sea turtles in FADs was an area that the EB-SWG considered required additional work. In relation to this, the IEO also made a presentation to the Scientific Committee concerning the testing of alternate drifting FAD designs to mitigate by-catch entanglement with particular emphasis on eliminating entanglement of sea turtles without reducing catches of target species in the Western Indian Ocean.

14. In a broader context, the research programme needs to seek information on impacts of fisheries and other anthropogenic impacts within and outside its jurisdiction, and to learn more about the extent and status of nesting habitats as well as foraging habitats where turtle populations are most impacted by human activity. Without such information it is not possible to select and require a management programme that will be effective for population recovery, or to counter proposals to eliminate whole fisheries.

Observer programme

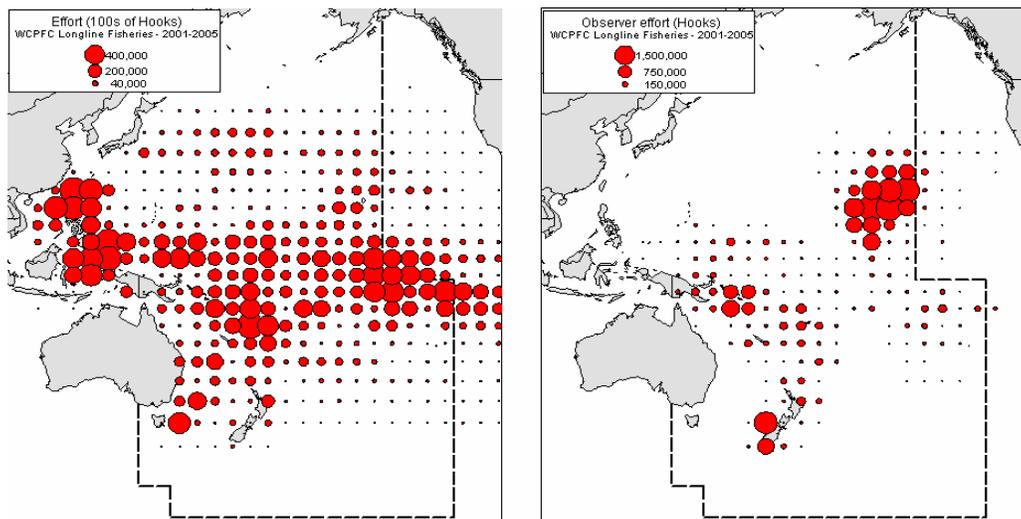


Figure 1. Distribution of longline fishing effort (left) and observer coverage (right) held by SPC in the WCPO. Note that observer data for the Australian Eastern Tuna and Billfish Fishery have not been included in this figure due to technical difficulties.

15. The EB-SWG recommended to the Scientific Committee that the Commission's programme will require an observer programme that provides a much more representative view of the deployed effort (see Figure 1) and pursue other means of determining the spatial and temporal distribution of sea turtle vulnerability to fishing gears. The SWG advised that the programme focus on tracking and tagging work as well as observer programme development to reveal such patterns. Continuing research into by-catch mitigation measures must also continue to monitor and evaluate impacts on other species, e.g. sharks, with respect to circle hooks.

16. Improving observer coverage, and the ability of observers to identify catch to species level, is paramount in order to improve future ecological risk assessments. This is particularly true for purse seine fisheries, where “length” and “condition at capture” data are rarely recorded.

Annex XII, Summary Record, Second Regular Session of the Scientific Committee, 8-18 August, 2006, Manila, Philippines



**SCIENTIFIC COMMITTEE
SECOND REGULAR SESSION**
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SEA TURTLES DATA COLLECTION AND RESEARCH PROGRAM

The research program should acknowledge the huge breadth of biological research being undertaken by the worldwide turtle research community and focus the Commission's activities to support objectives for which it has particular expertise, resources, and responsibility.

Objective: Identification of areas of spatial and temporal importance to fishery interactions and population impacts on sea turtles, so that the Commission can target time area strata of major importance for by-catch mitigation measures and other actions.

An illustrative example of achieving this objective would be the much clearer picture available on seabird distributions in relation to fishing effort that has allowed some Commission members to efficiently target management measures in specific regions. The research program should support the following activities directed towards defining sea turtle stock distributions and vulnerability to fishing gear.

1. Activity: A More Comprehensive Fishery Observer Program

- a. **Coverage:** To adequately characterize statistically rare events, up to 100% observer coverage can be required. But bearing in mind the practicalities involved, the programme should:
 - i. Initially be spatially and temporally representative of each fishery operating in the Commission area.
 - ii. Given diminishing benefits of greater coverage (SC2 ST WP-1), the programme should aim to observe 20% of the fishing effort over a two year period. As a practical matter, however, a sudden increase to this level (from the current level of 0.5%) is unlikely to occur, as a result, that initially a minimum of 5% of the fishing effort be observed. When areas of greater importance are found, the observer programme may be restructured to optimized coverage in these areas.
- b. **Data collection:**
 - i. The SPC observer manual, reporting forms, and standards should be used as a model, and should be cross-checked with the corresponding Hawaiian and other manuals and standards to ensure all the necessary turtle data collection details are included, and, where

relevant, data on other species potentially affected by new mitigation measures. Some of these programs have focused intensely on the requirements for sea turtle by-catch management. (This activity will be addressed through the Statistics SWG recommendation on observer data, Statistics SWG report, par. 29 (a)).

- ii. There should be clearly specified program priorities and how observation time is directed towards sea turtle observation versus other objectives. Other activities can effectively prevent effective by-catch observation, so this documentation is essential for interpreting the effective observer coverage, including historical coverage.
- iii. Observer data should be submitted to the Commission for centralized collection and analysis.

2. Activity: Tagging and Telemetry

- i. Tagging should be widely expanded to include conventional styles of tagging (e.g. flipper tagging, pit tagging) by trained fishers and observers (see Fishers Education) to provide information on post-release survival and movements
- ii. Satellite and Archival Telemetry should be encouraged to achieve broader coverage than is sometimes achieved by the very active turtle telemetry research community. The Commission should encourage and support further effort of this community by making trained observers available for satellite/archival tagging on fishing vessels. Researchers should be encouraged and supported to broaden the habitats and regions where sea turtles are tagged.
- iii. Information from tagging should be provided to the Commission, and shared with SPREP.

3. Activity: Documenting Other Sources/Areas of Population Impact

- i. Turtle nesting beach habitats should be comprehensively surveyed, monitored, and evaluated for the opportunity to undertake activities supporting population recovery.
- ii. Comprehensive information and investigation of impacts on turtle populations from sources outside the fisheries jurisdiction of the Commission should be requested from members. Information on overall anthropogenic mortality and other sources of mortality is just as essential as information on other vital rates (e.g. age and growth) for assessing the dynamics and status of the populations and for choosing effective management strategies.

Objective: Reducing the capture and injury of sea turtles in fishing gear.

The Ecosystem and By-catch SWG provided a good review of recent progress as well as a recommended approach for research on gear improvements and for incremental, flexible implementation of management measures.

1. Activity: Improved mitigation measures

Scientific experiments should be undertaken testing a range of mitigation techniques to determine appropriate mitigation measures for a particular fishery or area. Research should also continue to be focused on the development and implementation of improved mitigation measures and turtle handling and release methods.

2. Activity: Industry Education

- i. CCMs should be responsible for providing training to fishers in sea turtle identification, handling and release, including provision of a manual on sea turtles (which would include information on mitigation, identification, handling and release). This may facilitate fishers assisting in data collection.
- ii. Self-reporting (logbook reporting) of turtle identification and release condition (alive, dead, how hooked, gear remaining on sea turtles).
- iii. Tagging of sea turtles by trained fishermen prior to release.
- iv. Commission should make available existing education material which member nations could use to provide information to their fishers on how to reduce captures and mortality of sea turtles.

3. Activity: Development and Sharing of Improved Release Methods.

New methods for releasing sea turtles caught on circle hooks are needed and are under development. Observers and fishermen's recent experiences with circle hooks indicate greater difficulty in releasing sea turtles caught with circle hooks than with more traditional J and tuna hook types. Programs in the US and Latin America are experimenting with new methods. The Program should monitor and potentially adopt these newly developed methods as appropriate.

4. Activity: Expand the existing initiatives to investigate turtle mortality from FAD entanglement.

This is an area of concern that should be evaluated for its priority and for potential management measures.