REPORT OF THE SCRS SPECIES GROUPS MEETING OF THE SUB-COMMITTEE ON ECOSYSTEM

(*September 28, 2012, Madrid, Spain*)

1. Opening, adoption of Agenda and meeting arrangements

The Meeting was held on September 28, 2012 at the offices of the ICCAT Secretariat in Madrid, Spain during the 2012 SCRS Species Group Meetings. The Sub-Committee on Ecosystems Co-Conveners, Dr. Shannon L. Cass-Calay (USA) and Dr. Alex Hanke (CAN) co-chaired the meeting.

The following participants served as rapporteurs:

Section	*Rapporteurs*
Item 1	S. Cass-Calay
Item 2-3	C. Small
Item 4	S. Cass-Calay
Item 5	A. Hanke, S. Cass-Calay

2. Review of new scientific information

2.1 Bycatch

Document SCRS\2012\165 was presented on interactions between marine mammals and the European tropical purse seine fishery in the Indian and Atlantic Oceans. Marine mammals are an ecologically important species and play an important role in the trophic network of aquatic ecosystems. The tuna fishing industry holds an important place in the Indian and Atlantic Oceans and these large marine organisms were observed during fishing activities and were sometimes encircled with the net when fishing tuna schools, before being released. The relationship between fishing fleets and marine mammals was studied considering two complementary data sets: 31 years logbook data systematically filled by captains of the French and Spanish tuna purse seine fleets (1980-2011) and 16 years of data from observer programs (1995-2011) with partial and variable coverage. The spatio-temporal distribution (season and year) of co-occurrence between fishing activities and small toothed whales, big toothed whales and baleen whales, and the possible impact on their mortality, was studied. Marine mammals aggregated in the coastal zone of Gabon and were found from April to September in the Atlantic Ocean. In the Indian Ocean whales were observed near the Seychelles from December to March and fewer in the Mozambican Channel from April to May. The impact of European tuna purse seine fishing on the total mortality of marine mammals was low (6%).

The Group discussed whether the observation of marine mammals associated with sets was due to vessels intentionally setting around marine mammals, and while this could not be determined with the current data, it was noted that whales were indicators of aggregations of tuna. The trend in purse seine activities was also noted (Fig 2), and clarification sought on whether this metric could be used as a measure of effort. The Group also asked how marine mammals escaped or were released from nets (25-30% cases), and the methods used to assess post release survival. Large whales generally break out of the net with little apparent damage while small whales like dolphins may break out of the net or are released by the crew and may suffer greater impacts. The condition of the animal was evaluated by an observer rather than by a release survival study.

Document SCRS\2012\166 was presented on interactions between whale sharks (*Rhyncodon typus*) and the European tropical purse seine fishery. These sharks are the world's largest living chondrichtyan and are found in both oceanic and coastal tropical waters. The tuna fishing industry holds an important place in the Indian and Atlantic Oceans and this large marine organism was observed during fishing activities in both oceans and was sometimes encircled with the net when fishing tuna schools. The spatio-temporal distribution (season and year) of co-occurrence between fishing activities and the whale shark, and the incidental mortality was assessed using the two datasets described in Document SCRS 165. The results highlight a seasonal and annual variability in the distribution of fishing activities and whale shark sightings. The whale shark was aggregated in coastal zone of Gabon and was found from April to September in the Atlantic Ocean and in the Mozambican Channel of the Indian Ocean from April to May. The incidental mortality resulting from encounters with whale sharks was

extremely low (1%). The data provided a unique view of the whale shark's distribution and its interaction with fishing activities.

The Group sought clarification on the times of year when interactions with whale sharks were highest, and questioned whether this reflected fishing effort patterns or the shark's behavior. The highest interactions were observed in April-September, and this was considered to be a function of the animal's behavior as the fleet fished everywhere during the entire year. The Group noted the interest in whale sharks in other tuna commissions, and agreed that it would be valuable to establish some directed research to collect data on post release survival. ISSF expressed its interest in working with others in such research.

Document SCRS\2012\153 assessed the temporal and spatial variation of the EU purse seine fishery interactions with marine turtles in the Atlantic and Indian Oceans. Data were organized and analyzed by ocean, fishing mode (FAD vs. FSC) as well as by year, quarter and statistical square of 1°. The study was based on data collected through French and Spanish observer programs from 1995 to 2011, a period where more than 230,000 fishing sets were undertaken by the EU fleets in both oceans. A total of 15,913 fishing sets were observed, including 6,515 on drifting Fish Aggregating Devices (FAD) and 9,398 on Free Swimming Schools (FSC). Over the study period, 597 turtles were caught, 86% being released alive at sea. At the same time, from 2003 to 2011, 14,124 specific observations were carried out on floating objects whether they ended in a set or not. 354 marine turtles were observed, of which 80% were already free or entangled alive and therefore released alive. In order to evaluate the impact of this fishery in both oceans, bycatch distribution was compared to the total fishing effort of the EU fleet, as well as to the known marine turtle post nesting migration routes, nesting population abundances and known feeding areas. The species composition, the size and sex structure of bycatch were also assessed. Finally, an attempt to raise the data to the total fishing effort was carried out. Based on observations of marine turtle by-catches in sets it was estimated that globally 3500 marine turtles were accidentally captured by the EU purse seine fleet in the Atlantic Ocean from 1995 to 2010, and around 2000 in the Indian Ocean from 2003 to 2010, with a corresponding annual bycatch rate of 218 (SD=150; survival rate =91%) and 250 (SD=157; survival rate =77%) respectively in the Atlantic and Indian Ocean. However, because of important uncertainties mainly due to the low observation coverage and the scarcity of marine turtle bycatch events, it was impossible to produce solid and reliable global estimates of marine turtle bycatch and mortality due to PS activity.

The Chair noted that some of the data analyzed in this data set would be valuable to include in the forthcoming ICCAT risk assessment on turtle. These data were not previously available as they were awaiting validation, but can now be supplied. The Group also noted that a paper has been submitted to IOTC summarizing guidelines on handling turtles which was made available to ICCAT-ECO. The Group encouraged presentation of these guidelines to skippers. The presenter agreed that this would be valuable, but noted that within the European purse seine fleet, crews were typically already highly aware and taking care with handling turtles.

Document SCRS\2012\181 assessed the bycatch associated with semi-pelagic longline gear (LLSP), a gear in recent use in the Spanish Mediterranean that exploits mesopelagic waters, deeper than those fished by surface longlines. Catch rates of the bycatch and target species were compared with other longline gears used by the fleet. The results indicated that the use of semi-pelagic longlines increased the catch rates of the target species (swordfish) in comparison with surface longlines while reducing bycatch. In comparison with bottom longline (LLPB), both gears had high CPUE for swordfish and low impact on bycatch species populations. Although LLSP caught a significantly minor amount of by-catch specimens than LLPB, LLPB has less of an impact on vulnerable groups as seabirds, sea turtles and marine mammals. It was concluded that the increasing use of LLSP by the Spanish Mediterranean longline fleet fishery targeting swordfish has reduced bycatch.

A question was raised on whether there were other differences in gear types (e.g. hook type) which could affect bycatch species composition in addition to depth. Clarification was also sought on the differences in bycatch species between the surface, bottom and semi-pelagic longlines. In general, surface longlines have bycatch of turtles, seabirds and marine mammals. Semi-pelagic longlines catch fewer turtles, seabirds and marine mammals; however, survival of marine mammals is lower than in surface fisheries. Bottom longlines have bycatch of bottom dwelling species such as sting rays.

The objective of Document SCRS\2012\182 was to analyze the influence of soak time on catches of the semi-pelagic longline fishery targeting swordfish in the western Mediterranean, and its impact on the conservation of biodiversity. Soak time was estimated for each section of the longline. This was estimated as the time difference between longline "setting" and the "haul-back" of the set. Differences between the median set times were tested using a Mann-Whitney U test and the relationship between soak time and catch rates were modeled assuming a non-linear model. Finally, to assess the impact of soak time on biodiversity, the Biodiversity Conservation

Concern index (Fattorini) was used. Correlations were found between by-catch per unit effort (CPUE) and soak time. The highest catch rates of bycatch occurred on sets of intermediate duration. However for swordfish (fish of the size larger than at the size at first maturity) catch rate increased asymptotically as the soak time increased. Catch rates of swordfish less than the size at first maturity, were directly proportional to the soak time. The biggest impact on the conservation of biodiversity corresponded to longline set with intermediate soak time.

The Group had no further questions for the author.

Document SCRS\2012\183 presented an assessment of bycatch of Cory's shearwater (*Calonectris diomedea*) in the Spanish commercial longline fishery operating in the East Atlantic using data recorded by an onboard observer program. Cory's shearwater is an important non target seabird species caught by the longline fleets operating in the Mediterranean Sea. Until now, no data have been published on the incidence of its bycatch in the Spanish longline fishery in the Atlantic Ocean, which is an important area in relation to wintering areas of the species. A total of 152 fishing sets were observed, and the number of seabird by-catches was only 1 bird. Accordingly, the longline fishery did not appear to be an important threat for the conservation of Cory's shearwater in the East Atlantic, possibly because the spatial distribution of the fishing effort did not overlap with the migratory routes and foraging areas described for the species in the literature.

Clarification was sought on the time of setting in this fishery, and whether this may also be affecting low seabird bycatch rates. There was not sufficient data to analyses time of setting in this fishery.

Document SCRS\2012\025 reported on a pilot study of an electronic monitoring system on a tropical tuna purse seine vessel operating in the Atlantic Ocean. The data collected by onboard observers during tropical tuna purse seine fishing operations are commonly used for management purposes. For some types of data, such as discards, observer programs can be the most reliable, and sometimes the only source of information available for management of the fishery. Electronic monitoring (EM) systems are being used in some fisheries as an alternative, or a complement to human observers. The overall objective of this study was (1) to make comparisons between data collected using EM and observers to determine if EM can reliably document fishing (effort, set-type, catch, and bycatch) of the tuna purse seine fishery, and (2) to evaluate the operational aspects of using EM to monitor the tuna purse seine fishery. EM was deployed on the Playa de Bakio, based out of Abidjan, Ivory Coast for three commercial fishing trips between November 28, 2011 and March 27, 2012. During these three trips, 61 sets were monitored using EM systems and by observers. Set-type was correctly identified using EM for 60 of the 61 sets. Tuna catch per set was not significantly different between EM and observer data sets, however, for larger volume sets, EM underestimated tuna catch. Catch composition matched well between EM and observers however, in sets that were mainly comprised of skipjack, yellowfin tuna were underestimated. Overall, bycatch species were underestimated by EM, but large bodied species such as billfishes were well documented. Based on this research, EM is a viable tool for monitoring effort, set-type, tuna catch, and some types of bycatch within the tropical tuna purse seine fishery. Operational aspects that need to be considered for an EM program to be implemented include defining monitoring objectives, standardizing installation and onboard catch handling methodology, and developing data and field service provision frameworks to support the program.

The Group discussed whether experiments to assess the accuracy of observer data, given that this paper compares electronic monitoring with observer data, have been conducted. It was agreed that a study involving retention of catch would assist in comparisons between observers and electronic monitoring. The Group also inquired if there had been an economic assessment of costs saved by electronic monitoring in comparison to observer programs. Economic assessment has not yet been done in this case, but has been done elsewhere. However, given that the fishery has only one set per day, economic advantages of electronic monitoring might be expected.

2.2 Ecosystems

Expansion of oxygen minimum zones

A national scientist from the United States presented progress made in describing the Oxygen Minimum Zone in the tropical Atlantic Ocean. Studies indicate ongoing dissolved oxygen depletion and vertical expansion of the oxygen minimum zone (OMZ) in the tropical northeast Atlantic Ocean. OMZ shoaling may restrict the usable habitat of billfishes and tunas to a narrow surface layer increasing vulnerability to surface fishing gear. There was a reported decrease in the upper ocean layer exceeding 3:5 ml l-1 dissolved oxygen at a rate of >1myr-1 in the tropical northeast Atlantic (25-N, 12–30-W), amounting to an annual habitat loss of about a 5.95 x 1013 m3,

or 15% for the period 1960–2010. Habitat compression and associated potential habitat loss was validated using electronic tagging data from 47 blue marlin.

The Chair asked about the availability and spatio-temporal resolution of the data that would be needed by ICCAT working groups to allow them to address this issue in stock assessments. The data would be given to the SCRS and was considered appropriate for linking to catch data. Clarification was sought on the apparent decrease in volume of the OMZ in 2010. This was attributed to data gaps.

The Group also discussed whether rising sea surface temperatures were linked to changes in the OMZ. It was noted that there are predictions that Atlantic sea surface temperature could increase by 5°C under climate change scenarios, and that some have predicted this will dramatically increase the distribution of OMZ across the Atlantic, with foreseen catastrophic impacts on fisheries. Finally, the Group questioned whether accounting for spatial variability in the CPUE standardization would mean that the impact of OMZ on CPUE was already accounted for to some extent. The presenter noted that the trend for fisheries to converge on the OMZs might not allow the standardization to fully account for the impacts of OMZ on abundance estimates.

3. Review of the report of the inter-sessional meeting

The Chair noted the highly valuable contribution of Rui Coelho to the intersessional meeting, as the consultant hired to provide inputs for the ICCAT turtle risk assessment and proposed that he be involved in the ICCAT intersessional meeting of 2013. The group agreed.

Regarding agenda item 6 (Plan of action (2013-2015) to evaluate the efficacy of the seabird bycatch mitigation measures defined under Rec. [11-09]) it was noted that there had not been time or background papers available to the intersessional meeting to address this issue fully. The need was recognized for identification of the data that will be needed for the evaluation and there was agreement to add this to the 2013 work plan for discussion at the intersessional meeting. The focus will be on identifying the data needs and methodology for a future evaluation.
There was a request to extend Recommendation 1(c) from the intersessional meeting, to recommend the development of an MOU with the Inter-American Convention for Protection and Conservation of Sea Turtles. This was agreed by the Group.

4. Responses to the Commission

Paul DeBruyn gave an update on progress in developing ICCAT observer data reporting forms. Draft forms have been developed, drawing from existing Atlantic observer programs and from recommendations from the recent workshop on purse seine observer data harmonizing. Recognizing that some CPCs are willing to provide data at fine scales, the aim will be to develop a database that is capable of handling a range of spatial and temporal resolutions and levels of aggregation. The group noted that several Atlantic observer programs have their own complex databases, and noted the benefits of devising a system by which data could be extracted and presented from these systems for ICCAT rather than requiring separate forms to be filled. It was agreed that this mode of data submission could be accommodated and for those CPCs that submit raw data, an agreement would be drawn up with the Secretariat registering the aggregation level and restrictions that would be applied to the data prior to the Secretariat making it available. Attention was drawn to Document SCRS\2012\169, which describes the FishFrame initiative for data exchange, could be a useful format for ICCAT to consider. It was also noted that, if feasible, it would be valuable to ensure that the ICCAT reporting system be consistent with that developed by IOTC, both to facilitate reporting for vessels operating in both oceans, but also to facilitate analysis for bycatch species which migrate between the two oceans. In recognition of the scale of work required, the Chair recommended that this may be best undertaken by a 6 month consultancy post with the aim for completion by mid-2013.

Lastly, it was noted that Rec. [11-10] asks for data to be contributed in a manner consistent with data confidentiality agreements and that it would be an important first step to determine what limitations those agreements put on the data prior to formally requesting data from CPCs. The Secretariat acknowledged the value of this preliminary step.

4.1 Evaluate the national observer programmes conducted by CPCs to report the Commission and to provide advice on future improvements, Rec. [10-10] paragraph 6.

Rec. [10-10] stated that CPCs shall provide a preliminary report to SCRS by 31 July 2011 on the structure and design of their domestic observer programs to be followed by an updated report on 31 July 2012.

In 2011, twelve CPCs submitted information to the Secretariat: Chinese Taipei, Ghana, Korea, Iceland, Japan, Tunisia, Mexico, Namibia, United States, Canada, Uruguay and EU France.

The Commission also recommended [Rec. 10-10, paragraph 6] that beginning in 2012 and every three years thereafter SCRS shall:

1) report to the Commission on the coverage level achieved by each CPC by fishery
2) provide the Commission with a summary of the data and information collected and reported pursuant to this Recommendation and any relevant findings associated with that data and information
3) review the minimum standards established for CPC observer programs as set out in this Recommendation; and
4) make recommendations as necessary and appropriate on how to improve the effectiveness of observer programs in order to meet the data needs of the Commission, including possible revisions to this Recommendation and/or with respect to implementation of these minimum standards by CPCs

In 2012, Canada, China, Chinese Taipei, EU France, Malta, Mexico, Portugal, Russia, Tunisia, Turkey, United States and Uruguay submitted reports on national observer programs using the supplied forms (ICCAT, 2013, Appendix 2). In addition, Algeria, Brazil, Egypt, Ghana, EU Greece, Iceland, EU Italy, Japan, Korea, Mauritania, Namibia and South Africa also submitted information regarding their national observer programs, but in a different format so they do not appear in ICCAT (2013), Appendix 2.

Information provided to the Secretariat in 2011 and 2012 were submitted using different formats which limit the utility of this information, and the Committee's ability to respond to the Commission. To correct this issue, the Secretariat and the Committee have developed an observer data reporting form (**Table 1**) for the submission of information from national observer programs. This form was developed to be consistent with the objectives and recommendations of the Kobe Process and the Joint t-RFMO Bycatch Technical Working Group (e.g., interoperability across tRFMOs) and national data confidentiality requirements. This form will facilitate CPCs to submit national observer program data to the Secretariat using a consistent format beginning in 2014. CPCs who prefer to provide raw observer program data to the Secretariat may exercise that option. Regardless of how the data is submitted, the Secretariat will protect the confidentiality of the data either through aggregation or by assigning new vessel and trip identifiers as per the CPCs instructions.

4.2 Evaluate sea-turtles data provided by CPCs and by-catch mitigation information, Rec. [10-09].

Information on turtle bycatch and bycatch mitigation measures was provided by CPCs and was evaluated by the SCRS. The Committee also reviewed available methodologies for assessing the impact of ICCAT fisheries on sea turtle populations. As directed by the Commission, the Committee plans to complete the analysis and prepare a response to the Commission in 2013.

5. Workplan for 2012 and 2013

5.1 Workplan pertaining to bycatch

2012

1. The Secretariat will circulate a new call for sea turtle data amongst CPCs. This will be drafted by the Sub-Committee on Ecosystems/By-catch Convener and the SCRS Chair, and will be reviewed, approved and circulated by the Secretariat. The data will be required no less than four months prior to the assessment meeting. The data request will include, for example:

    a) Estimates of BPUE for sea turtles (standardized if possible)
    b) Estimates of observer coverage
    c) Estimate of total extrapolated bycatch of sea turtles, if available
    d) Estimates of mortality at release

2. The Sub-Committee on Ecosystems/By-catch Convener will organize a subgroup to develop the required elements of an Ecological Risk Assessment/Productivity Susceptibility analysis, for example the Leslie Matrix parameters to estimate the intrinsic rate of population growth. Following collation of the required elements, collaboration with other t-RFMOs could be sought to contrast and improve the product, as necessary. The resulting product will be presented to Sub-Committee on Ecosystems in 2013 to facilitate the Sub-Committee deliberations. The work of this subgroup will be conducted intersessionally.
3. The Sub-Committee on Ecosystems/By-catch Convener, the SCRS Chair and the Secretariat will communicate with the Joint t-RFMO Technical Working Group on Bycatch Chair to request that ICCAT lead efforts to harmonize data reporting protocols (e.g., minimum standard data collection) for longline observer programs.
4. The Sub-Committee on Ecosystems will review the draft form to be prepared by the Secretariat for the reporting of data from national observer programs [Rec. 11-10].

2013

1. Compile/develop estimates of sea turtle bycatch in ICCAT fisheries from CPC data and other sources.
2. Compile/develop estimates of sea turtle bycatch in non-ICCAT fisheries from CPC data and other sources.
3. Assess relative magnitude of turtle bycatch in ICCAT vs. non-ICCAT fisheries.
4. Review the work products of the subgroup (e.g., ERA-PSA). Make recommendations regarding the parameterization and use of these approaches.
5. Review sea turtle available bycatch mitigation and safe-release protocols measures, and make recommendations as necessary.
6. Prepare response to the Commission regarding Rec. 10-09.
7. Review other matters related to bycatch and bycatch mitigation.

5.2 Work Plan Pertaining to Ecosystems

The Sub-Committee determined that the following ecosystem related activities would be important to complete in 2013:

1. Populate a list of indicators reflecting stated fishery resource, ecological, economic and social objectives.
2. Determine which indicators of ecosystem status can be used in a traffic light report card.
3. Identify a suitable domain as a test case for implementing the Ecosystem Based Fisheries Management (EBFM) approach.
4. Review the progress that has been made in implementing ecosystem values in enhanced stock assessments or an EBFM.
5. Review conceptual models for EBFM that explore the potential impact of perturbations on the model elements, reveals data gaps, identifies important relationships and identifies thresholds for change within the system.
6. Investigate ways of including ecosystem values in the standardization and assessment of the stocks assessed by the SCRS Species Working Groups.

Reference

ICCAT, 2013. Secretariat Report on Statistics and Coordination of Research in 2012. *In* Report for Biennial Period, 2012-13, Part I (2012) – Vol. 4 – Secretariat Reports.

Table 1. A schematic of the recommended data fields to be contained in the bycatch data reporting form. CPCs have the option to provide aggregated data or more detailed information.

Categorisation of data submitted	Vessel information	Trip information	Fishing Activity	Harvest details	Biological information	Tagging
- Aggregated data - Disaggregated - Bycatch species only - All species	For disaggregated data submissions - Vessel identifiers - Vessel characteristics - Equipment	Information will vary according to level of aggregation - Flag states - Areas fished - Dates - Effort information (fishing days, hooks etc.) - Observer information	- Vessel - General Gear - Dates - Positions For disaggregated - Detailed gear info - Haul and set identifiers	- Target species catches (if applicable) by number or weight - Discard dead - Discard alive - Bycatch by species or main grouping by number or weight	- Species - Lengths - Weights - Units of length and weight - Condition	- Haul/set/trip - Date - Species - Length - Weight - Location