REPORT OF THE 2008 MEETING OF THE
SUB-COMMITTEE ON ECOSYSTEMS
(Madrid, Spain - March 10 to 14, 2008)

1. Opening, adoption of Agenda and meeting arrangements

The Meeting of the Sub-Committee on Ecosystems was held at the ICCAT Secretariat in Madrid, from March 10 to 14, 2008. Mr. Papa Kebe opened the meeting and welcomed participants ("the Group") on behalf of the ICCAT Executive Secretary.

Dr. H. Arrizabalaga (EC-Spain), meeting Chairperson, welcomed meeting participants and thanked the Secretariat for the effort made to prepare the meeting. Dr. Arrizabalaga proceeded to review the Agenda which was adopted with minor changes (**Appendix 1**).

A list of meeting participants is attached as **Appendix 2.** The list of scientific documents presented at the meeting is attached as **Appendix 3.**

The following participants served as Rapporteurs for various sections of the report:

Section	*Rapporteurs*
1, 9	P. Pallarés
2, 3, 4	C. Small, G. Tuck, M. Favero, R. Phillips, C. Palma
5	H. Arrizabalaga
6	G. Díaz
7	V. Restrepo
8	G. Scott

2. Analysis of overlapping between fishing effort and bird area distribution

The 2007 Inter-sessional Meeting of the Sub-Committee on Ecosystems discussed the methodology for the ICCAT seabird assessment and adopted a six stage framework:

1) Identify seabird species most at risk;
2) Collate available data on at-sea distribution of these species;
3) Analyze the time area overlap between species distribution and ICCAT longline fishing effort;
4) Review existing by-catch rate estimates for ICCAT longline fisheries;
5) Estimate total annual seabird by-catch (number of birds) in the ICCAT Convention area;
6) Assess the likely impact of this by-catch on seabird populations.

2.1 Update of the overall Atlantic longline fishing effort dataset (EFFDIS)

During the last Ecosystems meeting held in Madrid in February, 2007 (Anon, 2007) a preliminary attempt was made to estimate the Atlantic overall longline fishing effort (hooks) stratified by major flag, quarter and 5x5 degree squares (EFFDIS). Aiming to attain the Objective 3 of the assessment framework, during this meeting the Secretariat revised the EFFDIS dataset estimate, with a slight improvement on the methodology.

− *Methodology*

The EFFDIS estimate now considers 17 flags, an improved time resolution (stratification by month) and 5ºx5º squares. The methodology consists basically in raising the effort submitted in Task-2 catch and effort (T2CE), by the yearly catch ratios (for the 9 major species combined) between Task-1(T1NC) and T2CE. This approach assumes that, T2CE partial data fully represents the overall time-space allocation of longline effort of a given flag. Only T2CE information with enough time-area resolution (time: month and quarter; area: 1x1 and 5x5 squares) were used in the estimates. T2CE datasets quarterly stratified (only Venezuela 1981 and Mexico 1994, 2001 and 2002), were equally broken into month periods.

The flag selection criteria, which has now two rank models, increased the number of flags from 10 to 17 and reduced the negative effect of the remaining flags combined, "others", with no (or poor quality) Task-2 data. The flags were ranked with the following criteria:

- 12 major flags: (number of years with T1NC info) + 2 x (number of years with T2CE info)
- 5 flags: (number of years with T2CE info / number of years with T1NC info): only coverage ratios >= 50%

The generic substitution rule adopted for the cases of a given flag/year combination where there is no T2CE data was to use the T2CE dataset of closest year of the same flag.

- *Raw data corrections*

Over the last year, various errors were identified on T2CE raw information (inconsistencies in effort and catch units, erroneous 5x5 squares, inconsistency in gears between Task-1 and Task-2, etc.) some of which, seriously affected the overall EFFDIS estimates. The most important ones are described below:

- Wrong effort units and/or catch units
  - Cuba (1983, 1984, 1986, 1987, 1990)
  - Korea (1993)
  - Mixed (KOR+PAN): (1985, 1986, 1987)
  - Mexico (2006)
- Inconsistencies between T1NC and T2CE
  - Mexico (1995, 1996): omission of Task-1 catches other than billfish

Additionally, this new estimate incorporates the result of large quality control made to T2CE raw data during a two month period, when CATDIS dataset estimate was also revised. Practically all unlikely geographical squares were removed on the new EFFDIS estimate.

The outcome of this revised estimates are shown in **Figures 1 and 2**, which present, respectively, the estimated total overall hooks by year, and the cumulative number of hooks by flag and year. It is clear that, the series shows now a smoother and consistent evolution of the number of hooks in time. The geographical distribution maps, by decade and month, for the last decade, are shown in **Figures 3 and 4**. It was noted the lack of Mediterranean effort during the first two decades. This is due to the inexistence of enough and coherent T2CE data for Italy, which is an important flag in the area, and had to be included in "others" flag group. Future improvements are expected at the methodological level and at T2CE coverage level (Italy has provided recently various years of T2CE data that were not incorporated in this estimate).

The Group highlighted the provisional status of 2006 estimates, in particular the cases of Japan with no T2CE reported and Chinese-Taipei with partial T2CE data (bigeye target fleet only).

2.2 Methods used to investigate seabird distribution in the ICCAT area and overlapping with longline effort

Document SCRS/2008/029 presented the methodology and preliminary results for Objectives (ii) and (iii) of the ICCAT seabird assessment, which are to collate the at-sea distribution of seabird species in the ICCAT area, and to analyze the spatial and temporal overlap between seabird distribution and ICCAT longline fishing effort. For three of the four seabird populations for which results were presented, the calculated Overlap Index 2 (see below for definition) was 3-10 times higher in the southern hemisphere winter compared to the spring. This is a function of seasonal variation in seabird distribution and higher levels of fishing effort below 30ºS in the second and third year quarters. Comments were sought from the Sub-Committee on Ecosystems on the proposed methods for estimating the seabird distribution and for calculating overlap.

The Group reviewed the purpose of Objective (iii) of the seabird assessment. The intent is to estimate the degree of spatial and temporal overlap between seabird distributions and ICCAT longline fishing effort. It does not attempt to account for the catchability of different seabird species (some species are more prone to being attracted to, and caught by, fishing vessels; others may have high spatial/temporal overlap with ICCAT longline fishing effort but may still be unlikely to be caught as by-catch). The measure also does not account for variations in fishing gear or practices between fleets, which can make seabird by-catch more or less likely. These issues are addressed by Objectives (v) and (vi) of the assessment. It was also noted that overlap represents the proportion of the distribution, not number of birds, in each 5 x 5 grid square.

The Group agreed the following:

- Overlap will be calculated by month rather than year quarter
- For the purposes of this analysis, the ICCAT area will be defined as those 5x5 grid squares in which ICCAT longline fishing effort occurred in the period 2000-2005.
- A simpler method to estimate seabird distribution was suggested as follows:
  a) For all 41 seabird populations in the assessment (or at least for the 15 high priority species), calculate total distribution based on (a) non-breeding range, (b) foraging radius, (c) an assumed proportion of non-breeding, juvenile and immature birds within the population. This reduces the number of life history stages for which distributions are estimated.
  b) For the five species that will be assessed in Objective (vi) of the seabird assessment, undertake the more complex estimation of seabird distribution based on methods used in SCRS/08/029, and compare the results to the simple method above.
- Three measures of overlap will be used for each seabird population:
  1. Percent seabird distribution within the ICCAT area, by month (this reflects the percent of the seabird distribution in which ICCAT longline fishing effort occurs) [Overlap Index 1]
  2. For each 5x5 grid square, the percent seabird distribution multiplied by number of hooks, by month [Overlap Index2]
  3. Percent ICCAT longline fishing effort which overlaps with each seabird distribution, by month [Overlap Index 3]
- Included in the outputs will be maps combining data for all seabird populations identified as High Priority by the Risk Assessment exercise (Objective 1 of the seabird assessment).
- For the five seabird populations that will be included in Objective (vi) of the seabird assessment, a historical time series of overlap will be calculated (with an assumption that seabird distribution has remained constant between years)
- It is recommended that, for the five seabird populations above, overlap will also be calculated for other non-ICCAT fisheries, allowing an assessment of overlap with ICCAT longline fishing effort relative to other fisheries.

3. Review of bird catch rate estimates

Document SCRS/2008/027 provided estimates on seabird by-catch by the Maltese fishery (bottom and pelagic longliners). This is the first study in the area and a first step of a four-year project. Through surveys (of fishermen) they estimated the occurrence of mortality and approximate numbers for two main species, the Cory's shearwater (*Calonectris diomedea*) and the yelkouan shearwater (*Puffinus yelkouan*). These species suffer (or suffered) other threats on land, such as pollution, predation and hunting. Bottom longliners were responsible for the highest seabird by-catch. Vessels are using side setting and weighting lines. In addition to providing preliminary information about seabird by-catch, surveys showed that almost 60% of the fishermen are receptive to use mitigation measures. The next stages in the project will include at sea observations and implementation of mitigation measures.

Document SCRS/2008/030 provided seabird by-catch information from the Chinese Taipei longline fishery in the Atlantic. The data come from 35 observed trips between 2002 and 2006 (15 million hooks observed). Seabird by-catch averaged 0.0075 birds/1000 hooks, with a maximum of 0.2266 birds/1000 hooks. While the Chinese Taipei fishing effort is concentrated in tropical waters, seabird BPUE were higher south to 30°S, particularly in the East and West Atlantic. The discussion stressed the importance of temporal and spatial stratification in the analysis of seabird by-catch.

Document SCRS/2008/032 provided seabird by-catch estimates for the Brazilian domestic pelagic longline fleet (period 2001-2007) operating within the Brazilian EEZ and adjacent international waters. A regional review of by-catch rates was also provided. There is a significant overlap between longline fishery and seabird distribution in southern Brazil, especially during the winter. Overall seabird mortality rate was 0.229 birds/1000 hooks (63 cruises, 656 sets, 788,446 hooks), with a maximum of 0.542 birds/1000 hooks. There was a strong seasonal variability with higher catch rates observed in the cold season (June-November). Main species affected were black-browed albatross (*Thalassarche melanophris*), white-chinned petrel (*Procellaria aequinoctialis*), spectacled petrel (*Procellaria conspicillata*) and Atlantic yellow-nosed albatross (*Thalassarche chlororhynchos*).

Previous estimations based on logbooks or fishermen interviews tended to underestimate captures, whereas those based on small number of hooks and/or seasonally biased tended to overestimate catch rates. Detailed studies with large sample sizes are required for a comprehensive approach of causes determining the incidental capture.

Document SCRS/2008/036 analyzed the spatial and temporal variability in by-catch of black-browed albatross (*Thalassarche melanophris*), yellow-nosed albatross (*Thalassarche chlororhynchos*) and white-chinned petrel (*Procellaria aequinoctialis*) in the Uruguayan fleet. Data were obtained between 2004 and 2007 by the National Observers Program during 47 trips (954 sets and more than 2 million hooks). The three species were also captured in waters off Brazil and the northern Patagonian shelf. The distribution of mortalities varied significantly in space and time. This analysis shows the strong variability of seabird by-catch in space and time and the importance of a stratified analysis (and large sample size to allow a robust analysis). It also highlighted the relevance of having observers trained for specific tasks on seabird observation.

4. Estimation of total number of birds caught in ICCAT fisheries and effect of the bird by-catch mortality on seabird populations

Document SCRS/2008/031 described preliminary estimates of recent total seabird by-catch in the ICCAT Convention Area. By-catch estimates and annual hook counts from recent studies were used to estimate total by-catch from demersal and pelagic longline fisheries. An estimate of by-catch by species or species group from ICCAT pelagic longline fisheries was also calculated. Preliminary results suggest that the proportion of the total by-catch within the ICCAT Convention area attributed to ICCAT pelagic longline fisheries was considerably lower than for demersal fisheries. The analysis suggests that about 60% of the pelagic longline seabird catch was albatrosses. Limitations in data availability meant that several important assumptions were required to fill gaps. The Group recognized the need to update and verify some of the by-catch rates applied in the model and incorporate the recommendations below.

The Group noted that a high percentage of the by-catch from demersal longline fisheries is likely to be from species that are not threatened. The Group agreed that an analysis of by-catch by taxonomic group for the demersal longline fisheries would be useful. Additional studies were identified that should be used to assign by-catch rates to areas. The Group agreed that if by-catch data on a 5 degree basis are available, then this should be used instead of single values spread across broad regions. Fleet-specific values should be used wherever available. Seabird spatial distributions should be utilized in order to prevent by-catch rates being applied in areas outside the birds' range.

The Group agreed that the analysis should use ICCAT effort data for 2003-2005. Further methods e.g. Kriging, Decision Trees, for calculating by-catch rates in areas where data do not exist should be considered. The Group noted that an analysis of the estimated by-catch in relation to population size would provide a coarse measure of potential relative impact.

Document SCRS/2008/028 described preliminary results from a population modeling assessment of the impact of by-catch on wandering albatross (*Diomedea exulans*) from South Georgia. The model integrates information on seabird biology from field studies at South Georgia from 1960 to 2006, with fishing effort data from all pelagic and demersal longline fisheries that are known to incidentally catch albatrosses. The biological model includes juvenile, incubating, brooding, post-brooding and non-breeding life-history stages, with each stage having a well described foraging distribution and parameters that define the rates of transition between the stages. Fishing effort data is broadly categorized into fleets with similar physical characteristics, referred to as super-fleets. These super-fleets included demersal longline, IUU demersal longline, southern (south of 30ºS) Japanese pelagic longline and other pelagic longline fleets.

Results, although preliminary, provide good fits to observations of breeding pairs, breeding success and adults but not juvenile survival. The Group agreed that further exploration of the model's lack of fit to juvenile survival rates should be conducted. Suggestions to explain the lack of fit included the existence of a key impacting fishery that is not included in the model or an increase in catchability of the competitively inferior juveniles as adult numbers have declined. The Group suggested that the overall model performance be evaluated by first investigating the structure and parameters of the population model and consistency with the observed data. The effort data could be removed and annual fishing mortalities estimated to match the observations to determine if the implied fishing mortalities and patterns in observed data are reasonable. To investigate the performance of the fitting procedure the population model could be used to simulate data under various patterns of exploitation and then the model fit with actual effort data.

The Group agreed that the general method for assigning effort to super-fleets was appropriate. The Group identified the need to consider the pelagic longline swordfish fishery as a separate super-fleet due to its tendency to set lines at night when birds are less susceptible to capture. The main nations reporting to ICCAT that catch swordfish South of 30 degrees South were Spain, Portugal (both > 90%) and Uruguay (71%). South Africa also catches a high proportion of swordfish (36%). The Group recognized that some fleets, in addition to the southern Japanese fleet, have introduced regulations mandating mitigation in recent years which should be considered in the model. These fleets include Chinese Taipei, Korea, South Africa, Australia, New Zealand and the demersal fleets reporting to CCAMLR. To assist the model in assigning catch to fleets, it was agreed that fleet-specific estimates of by-catch rate should be included in the fitting procedure at the same spatio-temporal resolution as the effort data, if available.

The Group considered a number of diagnostics that might help determine model performance. In addition to the presented time-series of fits to biological data, these would include catches separated by life-stage and fleet, and spatial maps of by-catch. The Group discussed the outputs of the assessment that would assist decision making. These included (i) projections of the population under alternative future effort scenarios, (ii) reductions in catchability either by fleet or spatial region as a means of modeling effects of increased vessel mitigation or spatio-temporal closures, (iii) examining the potential impact of ICCAT fisheries by including and then excluding ICCAT effort data and comparing the predicted catch and population trajectories, (iv) determining whether ICCAT fisheries alone can explain the observed declines in population size, and (v) sensitivity to the input parameters. The Group suggested that biological reference points could be useful when considering if management action is necessary for the assessed populations.

5. Review the new information concerning ecosystems

Three documents were presented in this section:

Document SCRS/2008/038 illustrated the application of machine learning procedures to estimate unreported data on loggerhead turtle (*Caretta caretta)* by-catch in the western South Atlantic Ocean between 1998 and 2007. The authors applied Classification and Regression Trees, Random Forests, CForest and Support Vector Machines to determine the best method to predict the total catch of loggerhead turtles by the Uruguayan longline fleet. Random Forests was the method selected because it provided the lowest predictive error rate. This method estimated a total catch of 12,958 loggerheads for the study period. These are very relevant results for this species because it is listed in the IUCN Red List as vulnerable. Machine Learning procedures appeared to be a useful technique in the case where access to information is limited, particularly in fisheries where the information of the total captures recorded in logbooks is under-reported or missing altogether.

The Group noted that these tools may be useful to estimate unreported catch of other by-catch and target species.

Document SCRS/2008/037 presented a relative abundance index of loggerhead turtle (*Caretta caretta)* in the southwest Atlantic based on standardized CPUE estimated from data collected by observers in Brazilian and Uruguayan pelagic longliners. The database had information of 4,276 fishing operations that occurred between April 1998 and November 2007, with a total of 6,272,344 hooks observed. A delta lognormal model was used for standardization purposes and the variables Year, Quarter, Sea Surface Temperature, Area, Gear and Vessel length, as well as their first order interactions, were considered as explanatory variables. In the final model, positive catch rates were explained by Year, Area, Gear, Year*Quarter and Year*Area, and the proportion of positive catch rates included Year, Quarter, Area, Sea Surface Temperature, Gear, Year*Quarter, Year*Area and Sea Surface Temperature*Gear as explanatory variables. The standardized CPUE was variable through the time series with an increasing trend around 2007.

The Sub-Committee noted the merits of computing a relative abundance index from joint observer datasets for juvenile and sub-adult turtles, as there are few studies of this kind. While it is known that sea turtles from remote populations are also present in the area, as shown by previous genetic studies (SCRS/2007/124), most of the sea turtles where from local Brazilian nesting beaches, for which detailed offspring data exist. The Group recommended investigating the relationship between the standardized CPUE time series and the direct abundance observations in Brazilian beaches, as a possible tool to track trends in recruitment.

Document SCRS/2008/035 presented a comparative study of catch rates of “G” hooks (18/0, 10 ° offset) vs “J” hooks (9/0) in the Uruguayan longline fleet. The experiment was conducted onboard a longliner operating in the southwest Atlantic. Between January and November 2007, a total of 77,628 hooks (39,026 “J” hooks and 38,602

"G" hooks) were deployed in 165 longline sets. Sixty-nine sea turtles (*Caretta caretta*) were caught in this experiment, 28 with "G" hooks and 41 with "J" hooks, with a CPUE of 0.73 turtles per 1000 hooks and 1.05 turtles per 1000 hooks, respectively. The total catch in numbers for tunas was significantly higher with "G" hooks than "J" hooks being statistically significantly higher for three tuna species (BET, $X^2 = 13.9$, $p<0.05$; YFT, $X^2 = 4.5$, $p<0.05$; y ALB, $X^2 = 17.3$, $p<0.05$) and blue shark (BSH, $X^2 = 98.7$, $p<0.05$). Although the sample size was small (n=16), the study did not show significant differences in the catch rate of sea birds between the two hook types.

The Sub-Committee noted that during last year's meeting an extensive review of studies comparing the performance of different type of hooks was conducted The revision highlighted the importance of considering, besides hook type, other factors such as bait type, hook size and degree of offset when comparing catch rates between hooks. The Sub-Committee indicated that this study should be made part of the review mentioned above.

6. Review the observer data availability and progress towards building the observer meta-database

Following the advice of the Sub-Committee regarding the effort to build a meta database of international observer programs, the United States presented document SCRS/2008/034 describing its pelagic longline observer program (POP). The POP started in 1992 as a mandatory program. The scientific observers placed onboard longline vessels collect detailed information on the fishing operation and gear configuration. Information on the status of boarded fish (alive, dead, or injured) and fate of the catch and by-catch (retained, discarded dead, released alive) is also recorded together with the size (measured or estimated) of the target and non target fish caught. In addition, the program collects biological samples of a portion of the fish caught (e.g., otoliths, scales, spines, gonads, tissue samples). The interactions with marine mammals, sea turtles and sea birds are also recorded as well as the result of such interactions (dead, injured, etc.). The target coverage of the POP is 8% of the sets deployed in each quarter/area stratum. The document also provided the forms used by the US observers to collect the required information.

The Sub-Committee prepared a questionnaire to be filled by countries with observer programs in ICCAT fisheries. The goal of the questionnaire is to gain knowledge on the information collected by each country through their observer programs. An initial version of the questionnaire is presented in **Table 1**. The structure of the questionnaire allows collection of information for longline, purse seine, baitboat, and troll fleets. However, countries should complete a questionnaire for each fleet for which an observer program exists. The Subcommittee agreed to circulate the questionnaire among SCRS Officers for comments and suggestions that might improve this first version before being distributed among National Scientist for its completion.

7. Other matters

7.1 Priorities for the next inter-sessional meeting

The Group discussed the items that should be covered at the next inter-sessional meeting (possibly in March 2009). Work on the seabird assessments should be completed. But the meeting should also address other issues such as: (a) completion of a meta-database on observer programs (with inputs received in the intersessional period from national scientists); and, (b) carry out ecological risk assessments for all species covered by the Convention, as well as for other species caught incidentally by ICCAT fleets. It was noted that the results from (b) could be used to establish priorities for research and for future work by the Sub-Committee.

7.2 Educational material

In 2007, the Sub-Committee recommended the preparation of educational material to increase awareness in the fisheries community about seabird by-catch. With the subsequent adoption of the *Recommendation by ICCAT on Reducing Incidental By-catch of Seabirds in Longline Fisheries* [Rec. 07-07] which requires certain mitigation measures, the Group felt that it was very important to produce and distribute this material in a timely manner. There was considerable discussion about the exact objectives of the educational material depending on the target audience. One objective could be to improve species-specific information on seabird by-catch. To achieve it, the educational material would be either guides with species groups (e.g., albatrosses, shearwaters, etc) targeting fishers, or detailed guides for species identification targeting observers. Another objective would be to make fishers aware of the vulnerability of some seabird species and to provide guidance for mitigation measures.

The Group decided to produce a poster to increase awareness according to the second objective, above. The draft (**Appendix 4**) is purposely designed to have a simple message with as few words as possible. The Group agreed that the draft poster be circulated to experts (including ACAP and Birdlife) for comments. The Convener, in consultation with the SCRS Chairman, will then finalize the poster. R. Caruana will help with artwork and design. Upon finalization of the poster, the Sub-Committee recommends that the Secretariat translate the poster into three official languages and also request national scientists to translate it into languages appropriate to their fleets and to identify the number of poster needed to be distributed for broad fleet coverage. Upon receipt of this information, the Secretariat should supply the required number of poster to national scientists for distribution.

8. Recommendations

While there has been some improvement in the information reported from observer programs regarding seabird (and other species) by-catch for some fleets, it is apparent that sufficient observer sampling is lacking for most fleets, to fully address these by-catch issues. Due to a lack of fleet-specific information, the Sub-Committee advises that broad assumptions need be made to provide the Commission advice on the impacts of the Atlantic tuna fleets on seabird populations. Should the Commission wish improved advice on the tuna fishery impacts on the ecosystem, larger research investment should be made for these studies. For this reason the Sub-Committee continues to recommend that, if they have not yet done so, Contracting Parties and Cooperating non-Contracting Parties, Entities or Fishing Entities (CPCs) institute data collection procedures which permit quantifying the total catch (including by-catch) composition and disposition by the tuna-fleets and report those data to ICCAT. As in the past, the Sub-Committee recommends that scientific observer and logbook programs, in combination, be used for this purpose and further recommends that CPCs adequately fund such programs in order to meet data reporting obligations.

Substantial progress has been made on conducting the seabird assessment, as outlined in the 2007 report of the Sub-Committee. It is expected that this assessment, as outlined, will be fully realized during a working group meeting held in the early part of 2009. To this end, the Sub-Committee provided a number of recommendations on the modeling assumptions and formulations that will provide the basis for advising the Commission on the impacts of the Atlantic tuna fleets on seabirds identified as at risk. In order to minimize the assumptions needed, the Sub-Committee recommends that national scientists provide 5x5 bird by-catch rates for the years, months, and grids for which that information is available.

While there are measurable impacts of the ICCAT tuna fisheries on seabird populations, because they have distributions broader than the Convention area, they are also impacted by fisheries under jurisdiction of other RFMOs, including the other four Tuna RFMOs. The assessment underway makes use of available information on fishing effort patterns from the five Tuna RFMOs and other RFMOs overseeing fisheries targeting demersal species. Due to the global nature of the issue, the Sub-Committee recommends that the scientific committees of the RFMOs involved should be advised of our progress on this assessment and be invited to participate in the 2009 assessment meeting.

Continuing on from its previous recommendation, to develop a meta-database of observer programs, the Sub-Committee developed a draft questionnaire and meta-data format to be completed by national scientists knowledgeable about observer programs being conducted in the Convention area. After review by the SCRS Officers, the Secretariat should distribute this electronic form to Head Scientists and request response in time for the 2008 SCRS.

Also acting upon its previous recommendation, the Sub-Committee prepared a draft set of educational materials for distribution to fisherman active in the Convention area. These materials identify conservation issues related to seabirds in the Convention area and also identify easily implemented mitigation measures that have been demonstrated to reduce their unintentional catch and/or decrease incidental mortality in addition to the required use of bird scaring lines for vessels specified in [Rec. 07-07]. Upon finalization of this material, the Sub-Committee recommends the Secretariat translate the poster into three official languages and also requests national scientists to translate the material into languages appropriate to their fleets and to identify the number of pamphlets needed to be distributed for broad fleet coverage. Upon receipt of this information, the Secretariat should supply the required number of pamphlets to national scientists for distribution.

During discussion of the draft of this material, the Sub-Committee considered that additional seabird identification materials should be developed for inclusion in the *ICCAT Manual* and that an additional section

for the Manual be developed providing best practice guidelines for the collection of data on unintentional catch of seabirds, turtles, marine mammals and other species of concern.

In view of the expectation that the Sub-Committee's bird assessment will be fully realized during a working group meeting held in the early part of 2009, it is recommended the Sub-Committee embark upon conduct of a productivity-susceptibility analysis for the full suite of species known to interact with the Atlantic tuna fleets, to provide a basis for prioritizing future work of the Sub-Committee on by-catch issues. This work should be initiated during the intersessional period and progress on the approach should be discussed during the 2009 intersessional meeting of the Sub-Committee.

9. Adoption of the report and closure

The report was adopted by the Group. The Chairperson thanked the participants and the Secretariat for their work and the meeting was closed.

Literature cited

ANON. 2007. Report of the 2007 Meeting of the Sub-Committee on Ecosystems *(Madrid, Spain, February 19 to 23 2007).* (SCRS/2007/010).

CARACCIO, M.N., A. Domingo, A. Márquez, E. Naro-Maciel, P. Miller, P., and A. Pereira. 2007. Las aguas del Atlántico sudoccidental y su importancia en el ciclo de vida de la tortuga cabezona (*Caretta caretta*): Evidencias a través del análisis del ADNmt. (SCRS/2007/124).

Table 1 Tentative structure for a questionnaire to be filled by countries with observer programs in ICCAT fisheries.

Flag of vessels:							
Year updated							
Fleet/gear observed							
Target species:	SWO	BET	YFT	BFT	ALB	TUN	SHK
Range of vessel size							
Years of operation of the program							
Season of operation							

	Units	19??	19??	19??
Target coverage:				
Number of vessels/trips with observer onboard				
Number of vessels/trips in fishery				
% vessels/trips observed				
Number of hooks (LL), sets (PS) or days (BB, TROL) observed				
Total fishing effort in the fishery				
% of total effort in the fishery observed				
% of total catch discarded				
Total weight of discards				

MARK WHICH OF THE FOLLOWING INFORMATION IS RECORDED BY THE OBSERVERS

Meterological/oceanographic data:

		Time Period
Sea Surface Temperature (SST)		
Wind		
Swell		
Cloud coverage		
Other:		

Vessel data:

		Time Period
GRT		
Holding capacity		
HP		
Length		

	Gear mensuration devices		
	Electronic devices		
	Others:		

Gear and effort data: Time Period

	Latitude-Longitude coordinates		
	% of hooks observed		
	Time of set		
	Seeting speed		
	Main line length		
	main line materials		
	Time of retrieval		
	Number of hooks		
	Hook type (Circle, J)		
	Hook size		
LL	Number of hooks between buoys (floats)		
	Hooks spacing		
	Gear Depth		
	Bottom depth		
	Bait type		
	Bait condition		
	Use of Ligth sticks		
	Ligth stick number		
	Ligth stick color		
	Use of wire trace		
	Others		
PS	% of PS sets observed		
	Number of PS sets		
	Were FADs used?		
	Number of FADs used		
	Type of PS sets		
	Does the PS fleet use supply vessels?		
	Trip duration		
	Length of the net		
	Depth of net		
	Does the net have depth meters attached?		
	Number of panels		
	Mesh size		

BB/TROL	Others	_____	
	%of fishing operations observed	_____	_____
	School detection mode	_____	_____
	Number of hooks/lines/poles	_____	_____
	Bait type	_____	_____
	Time of fishing	_____	_____
	Others	_____	

Catch data:

		Time Period
Number/weight of each species caught	_____	_____
Length of each fish caught	_____	_____
Length of a sample of fish caught	_____	_____
Weight of each fish caught	_____	_____
Wight of a sample of fish caught	_____	_____
Boarding condition	_____	_____
Fate	_____	_____

Discard data:

		Time Period
Species discarded	_____	_____
Quantity discarded	_____	_____
Reason for discard?	_____	_____
How are total discards estimated?	_____	_____

By-catch data:

(marine mammals, sea turtles, sea birds)

		Time Period
Number of each species discarded	_____	_____
Size	_____	_____
Sex	_____	_____
Boarding condition	_____	_____
Fate	_____	_____
Collect tag/band data	_____	_____
retained carcasses	_____	_____
Photo ID	_____	_____
Others		

By-catch data:

(Other species)

Time Period

Number of each species discarded	_____	_____
Size	_____	_____
Sex	_____	_____
Boarding condition	_____	_____
Fate	_____	_____
Collect tag/band data	_____	_____
retained carcasses	_____	_____
Photo ID	_____	_____
Others		

Biological data:

		Time Period
Length of fish	_____	_____
Type of length measurement	_____	_____
Are biological samples taken?	_____	_____
List of biological samples taken:	_____	_____
	_____	
	_____	
	_____	
	_____	

Mitigation measures:

		Time Period
Are mitigation measures used?	_____	_____
For what species?	_____	_____
List mitigation measures used	_____	_____
	_____	_____
	_____	_____
	_____	_____
Are predator-prey interactions recorded?	_____	_____

Has the Observer Program conducted scientific cruises/experiments? _____

If 'Yes', what years the cruises were conducted? _____

What was the purpose of the cruise? _____

Information on sampling strategies should be presented to the SCRS as a document. The fields below provide a link to such documents.

SAMPLING STRATEGY:

Describe methodology for

	Link
a) Sampling of Vessel/trips	
b) Sampling of effort within a trip	
c) Estimation of total and observed effort	
d) Sampling strategy for catch composition	
e) Sampling strategy of discards	
f) Sampling strategy of fish size	

SUMMARY DATA:

Provide list and/or links to document/reports/peer reviwed publications that used observers data

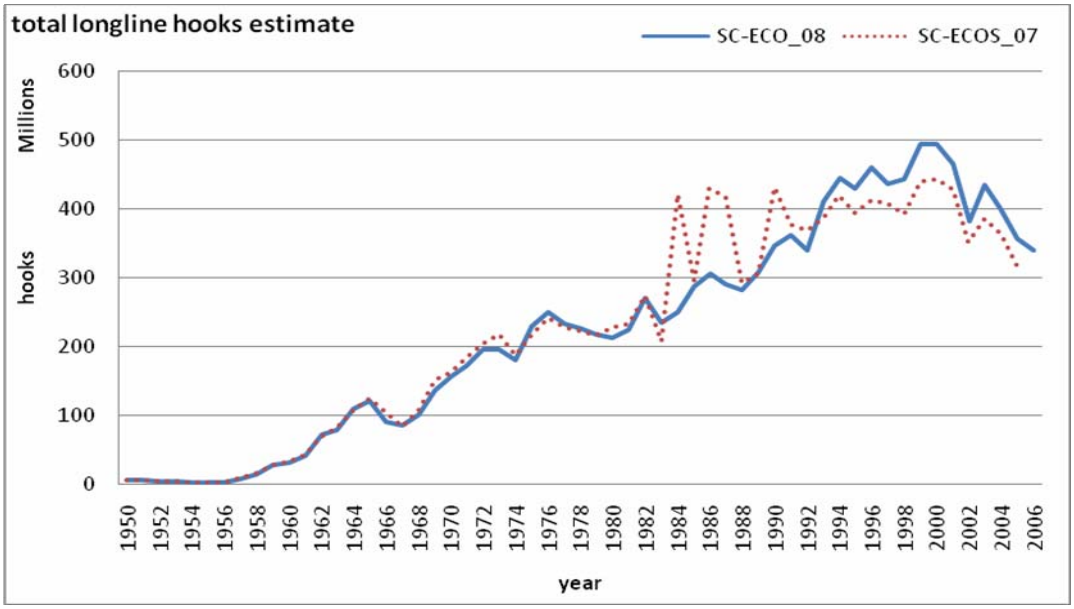

Figure 1 Comparison between total overall hooks estimates by year, obtained during last year meeting (SC-ECO_07) and the revised estimates obtained during the meeting (SC-ECO_08).

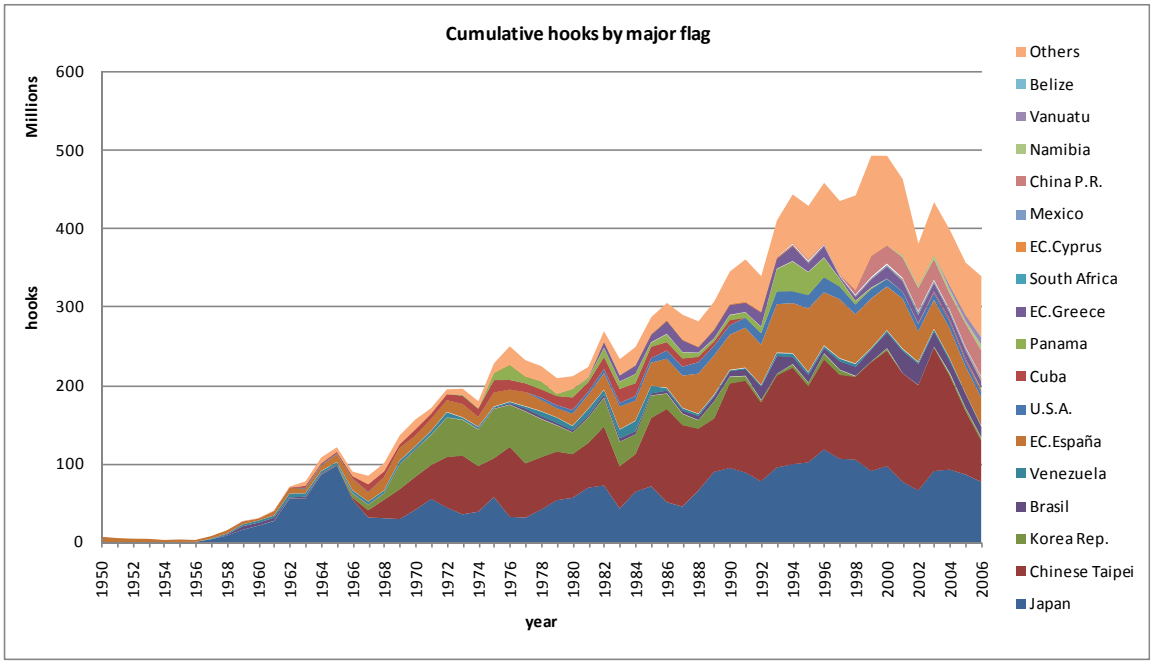

Figure 2 Cumulative estimated number of hooks by major flag and year obtained during the meeting.

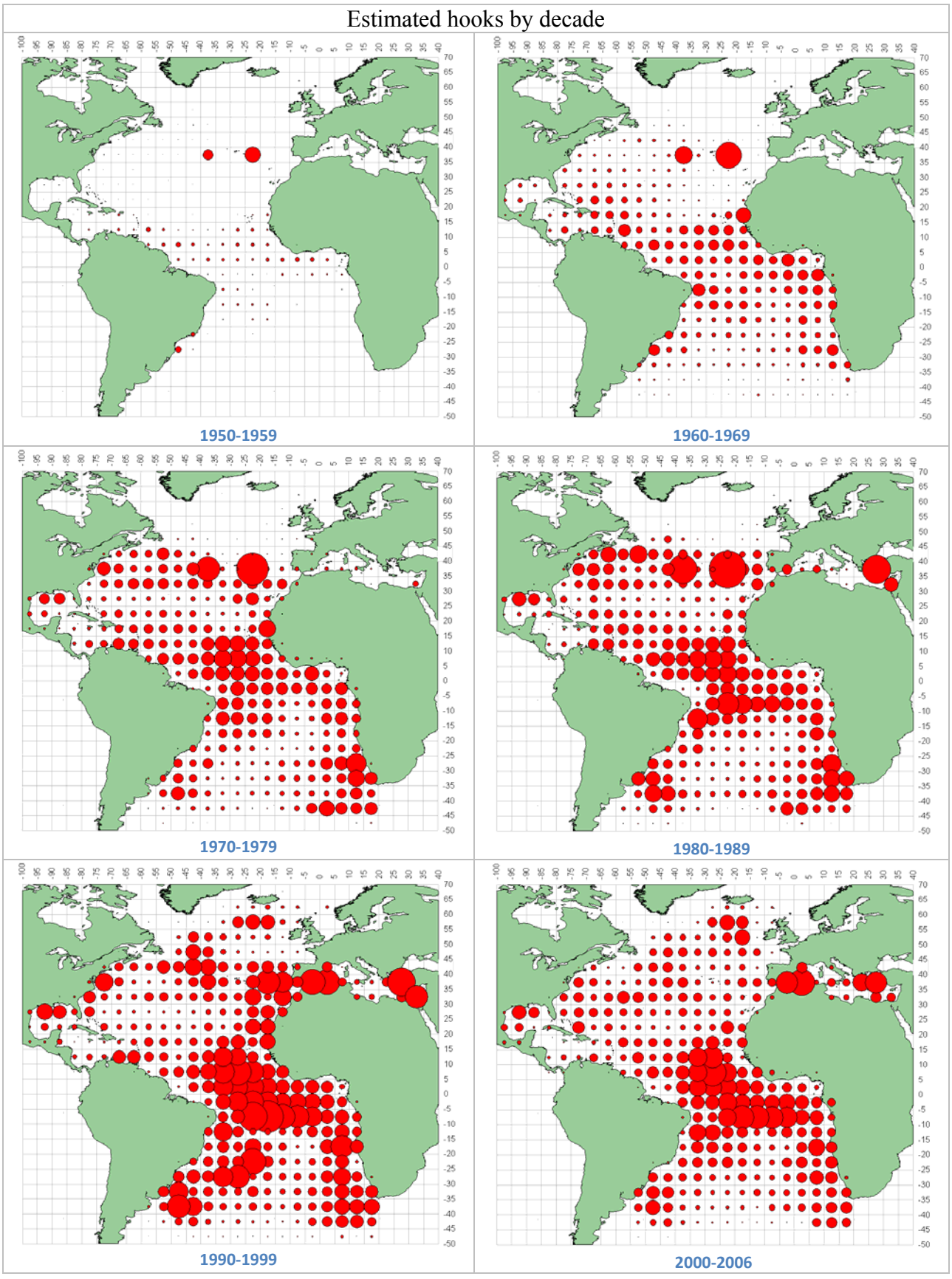

Figure 3 Estimated number of hooks by decade.

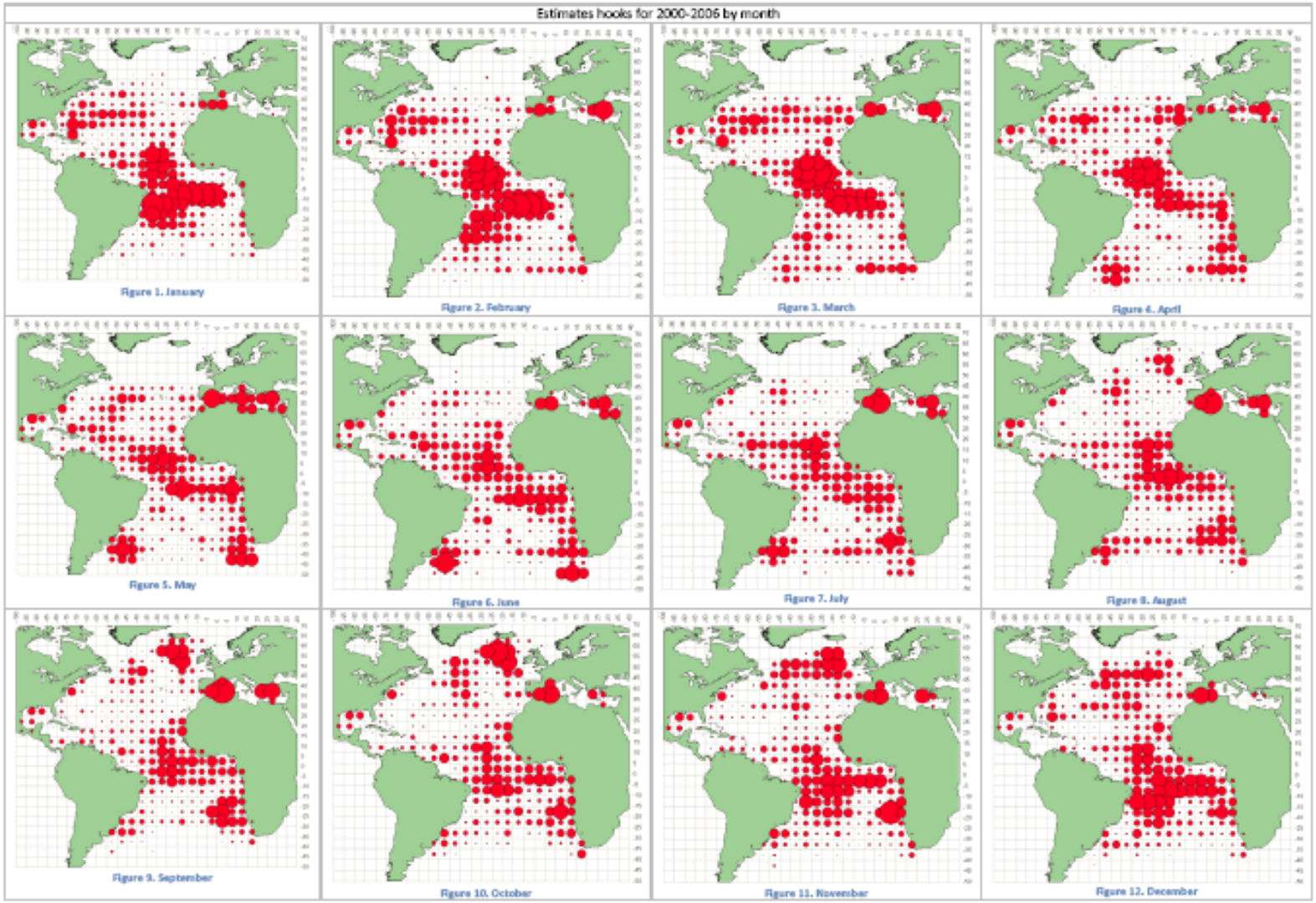

Figure 4 Average number of hooks by month for the period 2000-2006, as estimated during the meeting.

Appendix 1

Agenda

1. Opening, adoption of the Agenda and meeting arrangements
2. Analysis of overlapping between fishing effort and bird area distribution
   2.1 Update of the overall Atlantic longline fishing effort dataset (EFFDIS)
   2.2 Methods used to investigate seabird distribution in the ICCAT area and overlapping with longline effort
3. Review of bird catch rate estimates
4. Estimation of total number of birds caught in ICCAT fisheries and effect of the bird by-catch mortality on seabird populations
5. Review the new information concerning ecosystems
6. Review the observer data availability and progress towards building the observer meta database
7. Other matters
8. Recommendations
9. Adoption of the report and closure

Appendix 2

List of Participants

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Appendix 3

List of Documents presented

SCRS/2008/027 Preliminary data on seabird by-catch from the Maltese longline fishery (central Mediterranean). DIMECH, M., M. Darmanin, R. Caruana and H. Reine.

SCRS/2008/028 Modeling the impact of fishery by-catch on wandering and black-browed albatrosses of South Georgia. THOMSON, R., R.A. Phillips, G.N. Tuck.

SCRS/2008/029 Spatial and temporal overlap between seabird distribution in the Atlantic Ocean and ICCAT longline fishing effort. SMALL, C. and F. Taylor.

SCRS/2008/030 The impact of Taiwanese longline fisheries on seabirds in the Atlantic Ocean. HUANG, Hsiang-Wen, Ke-Yang Chang and Ju-Ping Tai.

SCRS/2008/031 Preliminary estimates of total seabird by-catch by ICCAT fisheries in recent years. KLAER, N. and A. Black.

SCRS/2008/032 Seabird by-catch on Brazilian pelagic longline fishery and implications for the conservation in the South Atlantic. BUGONI, L., P. Luciano Mancini, D. Silveira Monteiro, L. Nascimento, T. Silva Neves.

SCRS/2008/034 Description of the U.S. Pelagic Observer Program (POP). DIAZ, Guillermo A., Larry R. Beerkircher, and Victor R. Restrepo.

SCRS/2008/035 Anzuelos circulares vs. anzuelos "J" en la flota palangrera uruguaya. DOMINGO, A., C. Barceló, Y. Swimmer, M. Pons and P. Miller.

SCRS/2008/036 Patrones espacio-temporales en la captura incidental de *Thalassarche melanophrys*, *T. chlororhynchos* y *Procellaria aequinoctialis* con palangre pelágico en el Atlántico sudoccidental. JIMENEZ, S., M. Pons and A. Domingo.

SCRS/2008/037 Estandarización de la CPUE de la tortuga cabezona, *Caretta caretta*, en el Atlántico sur occidental. PONS, M., A. Domingo, G. Sales and B. Giffoni.

SCRS/2008/038 Machine learning procedures: an application to by-catch data of the marine turtles *(Caretta caretta)*. PONS, M., S. Marroni, I. Machado, B. Ghattas and A. Domingo

Appendix 4

Draft Poster to Increase Awareness of Fishermen