

Minute Report of the 1st WORKSHOP ON JOINT ANALYSIS OF SEA TURTLE MITIGATION EFFECTIVENESS

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The full report is available at the following web address:

http://www.commonoceans.org/fileadmin/user_upload/common_oceans/docs/Tuna/FirstSeaTurtleWorkshopReport.pdf

Participants: 31 from 14 countries and 9 international Institutions

1. Context and objectives:

- **Context:** The Areas Beyond National Jurisdiction (ABNJ, or Common Oceans) Tuna Project is a Global Environment Facility (GEF)-funded, FAO-implemented programme of work designed to encourage and reinforce sustainable tuna fisheries. One of the three main components of the project focuses on mitigating bycatch and ameliorating adverse impacts on biodiversity. Taking its cue from a work plan developed by the Joint t-RFMO Technical Working Group-Bycatch, the ABNJ Tuna Project aims to progress prioritized research on sea turtle bycatch mitigation through encouraging data sharing and collaborative analysis (Joint Tuna RFMOs 2011). Funding has been allocated to WCPFC and The Pacific Community (SPC) under the ABNJ work programme to support two sets of workshops on bycatch mitigation issues facing t-RFMOs. The first workshops (this one and another to be held in late 2016) are designed to focus on assessing the effects of mitigation on interaction and at-vessel mortality rates of sea turtles in pelagic longline fisheries.
- **Participants:** The WCPFC workshop announcement gather:
 - Experts from countries all over the world with experience in sea turtle longline interaction or observer program (Brazil, Uruguay, USA, UE, Chine Taipei, Japan, Australia, Tonga, Fiji, Cook Island, Palau, Papua New Guinea),
 - the Secretariats of WCPFC
 - four inter-governmental organizations (SPC, SPREP, IAC and IOSEA)
 - two non-governmental organizations (WWF and ISSF)
- **Workshop Objectives:** evaluating mitigation techniques for sea turtle bycatch in pelagic longline fisheries. This first workshop was intended to characterize current (or “baseline”) sea turtle interaction and mortality rates under existing fishing operations (involving depth, soak time, hook width and shape, and bait type and include the species of sea turtles most likely to interact with pelagic longline tuna fisheries in the Pacific).

- **Targeted species:** green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*) and olive ridley (*Lepidochelys olivacea*).
- **Data management and confidentiality:** Special arrangements were agreed to protect the confidentiality of shared data. Under these arrangements, SPC compiled contributed data into a common format and securely maintained these data throughout the workshop without releasing them to participants. All data analyses were conducted by the SPC statistician and SPC database manager with results being projected onto a screen for discussion by the workshop

The report also provides status of Pacific sea turtles as well as current status of Mitigation Implementation targeting longline fisheries.

2. Ifremer's contribution under UE request

Ifremer's contribution under UE request was to act and contribute as an expert in marine turtle interaction with pelagic fisheries. No preliminary work or analysis was then done. However, further to its contribution as an expert on the topic of the workshop and due to

- (1) the lack of experts in biology and ecology of sea turtle,
- (2) the importance raised by all participants at the first day of the meeting on having an estimation of the density of turtle at sea to be included in the global model,

UE-Ifremer contribution was also on the development of an approach to integrate information on sea turtle at sea estimated abundance in the final aggregated model.

3. Main conclusions:

Available datasets

- WCPFC Regional Observer Programme data;
- National observer programme data held by SPC on behalf of its members (i.e. American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Northern Mariana Islands, New Zealand, Palau, Papua New Guinea, Pitcairn Island, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, the United States, Vanuatu, and Wallis and Futuna);
- National observer programme data provided by Japan and Chinese Taipei under data confidentiality agreements specific to these two workshops; and
- Observer data for the Reunion longline fishery provided by Institut de Recherche pour le Développement (IRD) through an existing data confidentiality agreement with SPC.
- The dataset includes more than 2300 interaction with marine turtle for a total of more than 70 000 sets information's available, 65% coming from US-Hawaii and Taiwan-China fleets

NOTE: the ANBJ/WCPFC initiative allowed gathering for the first time and for the duration of this workshop all raw data on by-catch from Chinese Taipei, Japan at the scale of the Pacific Ocean to be used in the global analysis performed by SPC experts. This is a unique situation that should be highlighted and encouraged.

NOTE: Compared with other Oceans, the number of turtles reported by an observer as having interacted with Pacific longline fleet is relatively low. Such an ABNJ/WCPFC approach for the WCPFC area of competence should be extended and implemented in other Oceans.

Modelling approach

The following modelling framework was proposed:

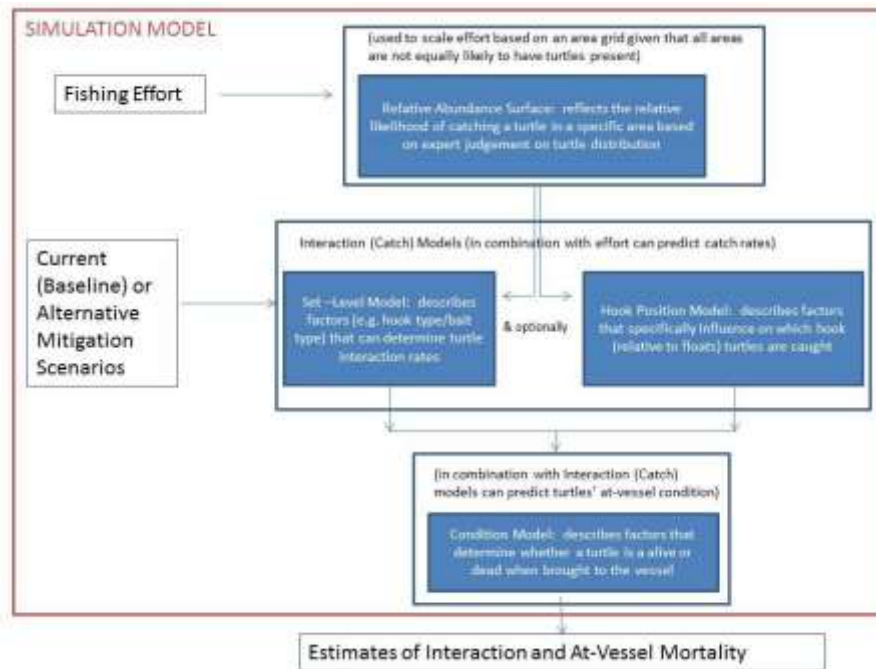


Figure 1: Schematic diagram of the simulation model used in this workshop and its components.

- **Modelling interaction rates at the set level as a function of explanatory variables to determine the effect of gear configurations on turtle interaction rates (Set Level Model);** based on data available, participants identified the following operational variables: Soak time, Time of day of set, Hooks between floats, Bait and hook types, Hook Size and SST. Results from this preliminary model are for example that J hooks had lower catch rates than C hooks which were in turn lower than T (tuna and Teracima) hook catch rates. In addition, bait comprised of fish or a combination of fish and squid had lower catch rates than bait comprised of squid only.
- **Modelling interaction rates by hook position to determine where turtle bycatch is found in relation to floats, i.e. is there a higher probability of turtle catch on hooks closer to a float (Hook Level Model);** based on data available, participants identified the following operational variables (Hook position, Hooks between floats, Floating length and Species. Results of the initial modelling run suggested for example that in the deep set model there is declining catch with increasing hook position, with the exception of leatherback turtles which are found at a wide range of depths and have a higher propensity to be entangled rather than hooked.
- **Modelling the condition at capture of turtle bycatch to determine the effects of gear configurations on the proportion of turtles caught dead/alive (Condition Model);** based on data available, participants identified the following operational variables: species, Hooks between floats (hbf), Time of day of set, Soak time, Length of the floatline. Results indicated

for instance that the variables with the greatest influence on the survival rate were hooks between floats and species

- **Combining information from the three models in a simulation model to estimate overall turtle interactions and at-vessel mortalities.** The objective here was not to assess the quality of the some scenarios, rather to define the strategy to be tested in the 2nd workshop, with the definition of baseline scenarios.

Abundance at sea of sea turtle being also a key issue to improve the estimation of sea turtle interaction with longline fishery, a preliminary tentative approach to integrate information on sea turtle abundance was also investigate during the workshop.

5. Problems encountered and deficiencies:

- The main issue is related to the at sea abundance mapping, an issue that was not supposed to be developed during the workshop but that was raised by all participants as an important issue to be also investigate. Due to the objective, time and data available during the workshop, the work done during the workshop on the density at sea by species is clearly not satisfactory and representative of reality. The first investigation done (based on nester abundance and RMU boundaries raw data – figure 2&3) is clearly not conclusive and further work integrating environmental parameters such as SST and PP associated to available data on migration and juvenile dispersion need to be done to better identify potential area of interaction.
- Available data on fisheries (effort, catches...) where only available at the scale of WCPFC area, while the presence and known RMU for marine turtle are at the scale of the Pacific Ocean, with clear overlapping between Pacific FMO boundaries. Same data as the ones used in the WCPFC area should be gathered from IATTC for the next workshop.
- Some participants considered that it might be important to take account of turtle life stage in the model by using available information on turtle size. Some information is available in the datasets and indicated that most of the turtle are juveniles. Such information should be collected systematically by observers.

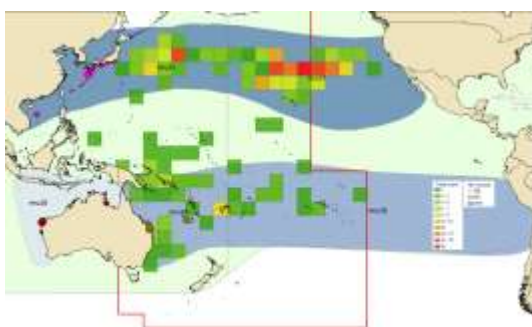


Figure 2: Example of input information for the relative abundance surface for loggerhead sea turtle (*Caretta caretta*). The shaded areas are taken from the SWOT and represent RMU boundaries for the Pacific Ocean. Blue shading indicates relative abundance of nesting females (the number of females is estimated). Circles ranging in color from pink to blue indicate nesting sites. The total number of turtle interactions recorded by observers on purse seine and longline vessels is shown in 5x5 grids. Red lines indicate the WCPFC Convention Area boundary.

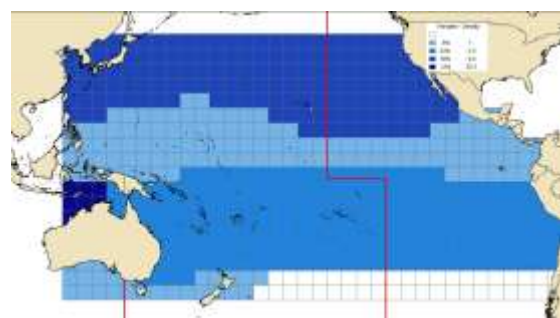


Figure 3: Example of density mapping done: relative abundance surface for loggerhead sea turtle (*Caretta caretta*). The shading represents the relative abundance surface (blue areas from the preceding figure) weighted by the number of nesting females in each area (from the preceding figure) with the weighting categories listed as "density" in the legend. "Females" in the legend indicates the percentage of estimated nesting females per area. Where shown, white areas represent areas outside the global distribution of the species. Red lines indicate the WCPFC Convention Area boundary.

4. Keys issue for management and implication

- This first workshop was dedicated to technical issues, not mitigation issues. The objective was to start developing a global integrated model that includes all known key parameters (i.e. the set related model (bait type, hook type, soak time... available for most of the datasets), a hook position model (related to the position in the water column of the hook – highly dependent on the available and quality of data), a condition model (fate) and a relative abundance model (where are the marine turtle, and how many) that works and to assess its robustness. The first results indicated that such an approach is realistic, feasible, very informative, and could be used to proposed global mitigating measures for Longline. However, at this stage, the approach needs to be further tested mainly based on sensitive cases.
- This initiative is very promising and should be encouraged in other ocean. Marine turtle interaction with longline fishery is a key issue in all Oceans but is clearly longline fishery strategy' dependant (gear configuration, time, area...) and the level of interaction differ considerably according to Ocean, and region in a same Ocean. Supported by other RFMO in the Atlantic and/or Pacific Ocean, and developed under a global internationally recognised approach (such as the present workshop), such an initiative (1) that gather data usually not available (*ie* Chinese Taipei and Japan observer data), (2) that associated with intra-ocean experts and (3) that could bring available biological/ecological available data (dispersal modelling, migratory corridors...) by Ocean could allow improving the development of mitigation measures for pelagic Longline that are definitely time, area and gear dependent.
- Observer data on marine turtle by-catch in the Pacific Ocean also has the potential to improve the Regional Management Units (RMU) of marine turtle currently developed by IUCN/Red-list-Marine Turtle specialist Group by redefining open sea boundaries.

6. Others considerations

The 2nd and last workshop will be held in the second part of the year; the place of the workshop is not yet defined. Based on the work done by the UE-Ifremer expert during the workshop, the Chair of the workshop recommended that this expert join the second and last workshop. Such a decision will be taken by UE and Ifremer in due time.