Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
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Final Report of the Regional Observer Scheme Evaluation, Training and Planning Workshop

Muscat, Oman 18–22 October 2015

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ACRONYMS

ABNJ	Areas Beyond National Jurisdiction
CPC	Contracting and Cooperating non-contracting parties
CMM	Conservation and Management Measure
CMS	Convention on the Conservation Migratory Species
IFO	Iranian Fisheries Organisation
IOSEA	Indian Ocean – South East Asian (Marine Turtle Memorandum of Understanding)
IOTC	Indian Ocean Tuna Commission
NOAA	National Oceanic and Atmospheric Administration
RFMO	Regional Fisheries Management Organisation
ROS	Regional Observer Scheme
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

OPENING SESSION

The workshop was attended by 21 delegates from I.R. Iran, Oman and Pakistan as well as 7 invited experts. Unfortunately 3 attendees from Pakistan were unable to make the workshop for administrative reasons. The full list of participants is provided in Appendix I. The workshop was organised by the IOTC Secretariat in collaboration with the Ministry of Agriculture and Fisheries of Oman, the Convention on Migratory Species (CMS Office – Abu Dhabi, IOSEA Marine Turtles MoU and Sharks MoU) and WWF-Pakistan/ABNJ initiative with specific inputs from internationally invited experts from the CMS Sharks MoU Advisory Committee, the Gulf Elasmo Project, the IOSEA Technical Advisory Committee, WWF-Pakistan and the IUCN Cetacean Specialist Group.

The workshop was opened under the patronage of His Excellency Dr. Hamad Al-Oufi, the Undersecretary of the Ministry of Agriculture and Fisheries and the opening speech was delivered by the recently appointed Chairman of the Indian Ocean Tuna Commission, Dr Ahmed Al-Mazrui, who welcomed participants from I.R. Iran, Oman and Pakistan as well as the invited experts. Dr Sarah Martin, IOTC Secretariat, warmly thanked the hosts for the welcome, providing the meeting venue and arranging the field visits, the CMS IOSEA and CMS Sharks MoUs for their financial, in-kind and organisational support for the participation of three invited experts and WWF-Pakistan for financing the participation of an invited expert.

OBJECTIVES

The sixteenth session of the Indian Ocean Tuna Commission (IOTC) Scientific Committee, held in 2013, made a number of recommendations related to training and capacity building to support data collection and bycatch mitigation for gillnet fleets:

Paragraph 39: *"The SC RECOMMENDED that the Commission allocate funds in its 2014 and 2015 budgets for the IOTC Secretariat to facilitate training for CPCs having gillnet fleets on bycatch mitigation methods, species identification, and data collection methods…*.[specifically mentioned were:] *"two training workshops: I.R. Iran/Oman and Sri Lanka".*

Paragraph 53 (b) 3: "*Encourage CPCs to use IOSEA expertise and facilities to train observers and crew to increase post-release survival rates of marine turtles*."

The lack of progress in the implementation of the Regional Observer Scheme (ROS) by gillnet fleets was further noted at the 17th session of the Scientific Committee in 2014:

Paragraph 157. *"The SC **EXPRESSED** its strong concern regarding the low level of reporting to the IOTC Secretariat of both the observer trip reports and the list of accredited observers since the start of the ROS in July 2010. Such a low level of implementation and reporting is detrimental to the work of the SC, in particular regarding the estimation of incidental catches of non-targeted species, as requested by the Commission. Capacity building activities are planned for 2015 in I.R. Iran, Pakistan and Sri Lanka in support of the Regional Observer Scheme to assist CPCs with implementation and development of their national programmes".*

Paragraph 84. *"The SC **NOTED** that, while I.R. Iran has implemented a logbook program for its drifting gillnet fisheries, to date no catch and effort data have been reported to the IOTC. I.R. Iran is yet to implement provisions of the Regional Observer Scheme, in particular boarding of observers on its industrial purse seine and drifting gillnet fleets, and provision of observer trip reports to the IOTC. In this regard the SC **REQUESTED** that I.R. Iran make the necessary arrangements to report catch-and-effort data to the IOTC, and size frequency data by IOTC grid, and implement provisions of the Regional Observer Scheme, and to seek assistance from the IOTC Secretariat with these tasks, where required".*

To date, I.R. Iran, Oman and Pakistan have yet to establish their national onboard observer schemes in order to fulfil the requirements of Resolution 11/04 and improve the quality of data collected and reported. As basic catch and effort data submitted to the IOTC by I.R. Iran, Oman and Pakistan for gillnet fleets in recent years has been very limited, observer data is particularly important to improve understanding of the fisheries and to provide accurate information for stock assessments.

This workshop aimed to fulfil the requests of the Scientific Committee to improve data reporting by supporting the implementation of the Regional Observer Scheme. It comprised an interactive workshop for fisheries staff working on the gillnet fleets of I.R. Iran, Oman and Pakistan. The workshop participants comprised senior fisheries staff who are to be involved in designing and managing observer programmes and leading training, so the workshop was tailored towards leading to the next stages of development of national observer schemes as well as the presentation of materials to be used as training resources. The workshop also provided an opportunity for observer scheme managers to learn from each other and share ideas and experiences about the implementation of an observer scheme in CPCs with gillnet fisheries.

The main objectives were to:

- Evaluate progress made to date in the implementation of national observer schemes – to discuss successes and failures as well as key issues which may be currently holding up or preventing implementation of the scheme in each country.
- Develop draft plans for the next stages of implementation of the observer scheme in each country - including discussion of how to overcome key issues identified, what further training is required and how national training programmes can be developed further based on the material presented.
- Provide training to support implementation of national programmes on issues requested by participants prior to the workshop (mainly regarding species identification, data collection and best practice release methods for bycatch).
- Provide an opportunity for input to and feedback on the IOTC ROS requirements given the very low level of trial and implementation in gillnet fisheries. Data reporting requirements were recently reviewed and revised by the scientific committee so the interactive nature of the workshop provided an opportunity for those with expertise in gillnet fisheries to review the requirements in more detail and provide feedback.

The workshop agenda was reviewed and approved by participants prior to the meeting and is provided in Appendix II.

BACKGROUND

Dr Sarah Martin gave a presentation providing an introduction to the Regional Observer Scheme (ROS), giving background to the objectives of the scheme, outlining the requirements in IOTC Resolution 11/04[1] and providing an update on the implementation of the scheme to date across the IOTC area of competence. This was followed by a presentation from Mr Lyle Glowka, Executive Coordinator, CMS Office – Abu Dhabi on the Convention on Migratory Species. This provided an overview of the Convention, including its membership, species covered and the main mechanisms used by CMS to conserve migratory species. By-catch is a particular threat to marine turtles, marine mammals, seabirds, sharks and rays. CMS's long-standing work on by-catch dates from 1999 and extends to the present with CMS COP Resolution 10.14 (By-Catch in Gillnet Fisheries). CMS Parties are urged to assess the risk of by-catch arising from their gillnet fisheries including through observer programmes and/or other methods, implement best practice mitigation measures and to regularly collect data to assess the problem.

The CMS Scientific Council has a dedicated By-catch Working Group led by a Conference of Parties appointed scientific councillor. Memoranda of Understanding (MoUs) have been concluded under CMS for the conservation and management of all six marine turtle species occurring in the Indian Ocean South East Asia Region (IOSEA Marine Turtle MoU) and seven species of sharks occurring globally (Sharks MoU). These and other CMS instruments have work streams on by-catch. I.R. Iran and Pakistan are both Parties to CMS while I.R. Iran, Oman and Pakistan are all Signatories of the IOSEA Marine Turtle MoU, however, none are yet Signatories to the Sharks MoU.

At their 3rd and 5th Meetings, Signatories to the IOSEA Marine Turtle MoU urged IOTC CPCs to implement the FAO Guidelines and to develop appropriate fishing gear to avoid, and collect data on, marine turtle by-catch. The Sharks MoU[2] is global in scope. It foresees, inter alia, to develop programmes to monitor catches of sharks to establish baseline data and facilitate reporting at a species specific level on shark catch rates, fishing gear used in shark fisheries, the amount of incidental and directed taking, the amount of waste and discards, size and sex of individuals caught and fisheries methods that are sustainable and responsible and protect their habitat. The Convention now includes 13 species of shark, two species of manta ray, all sawfish species and all species of Mobula on either CMS Appendix I and/or II creating obligations for parties with respect to these species. Parties to CMS have instructed the Secretariat[3] to continue to liaise with RFMOs and other relevant stakeholders to promote coordinated actions for the conservation and sustainable use of sharks and rays.

Ms Lucia Pierre provided an introduction to the fisheries data held by IOTC for I.R. Iran, Oman and Pakistan highlighting the importance of northern Indian Ocean gillnet fleets and the main data reporting issues for these fisheries. The total annual catch within the IOTC area of competence is approximately 1.5 million tonnes, of which roughly 40% is currently taken by gillnet fleets, making them the single most important gear type in terms of catch quantity in the Indian Ocean (Figure 1).

[1] www.iotc.org/cmm/resolution-1004-regional-observer-scheme

[2] www.cms.int/sharks/

[3] CMS Resolution 11.20

Around 26 countries have gillnet fleets in the Indian Ocean, but 46% of gillnet catches come solely from the fleets of I.R. Iran, Pakistan and Oman, highlighting the importance of these fleets in the Indian Ocean.

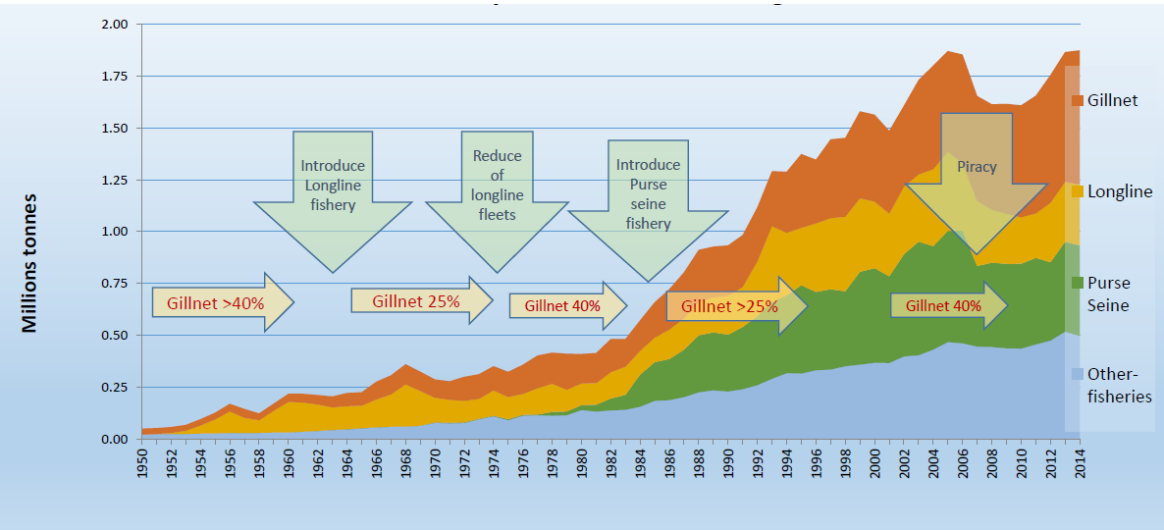

Figure 1. Indian Ocean catch trends over time by gear type

The current status of data reporting to IOTC is outlined below and detailed in Appendix III for each CPC.

Iran

- Iran has been reporting nominal catch data since 1985. Initially, data were aggregated by species group, but this became disaggregated for tuna species and for the last 3 years the sharks and billfish have also been reported by species.
- Incomplete catch and effort data are reported
- Size frequency data are reported annually, however, no records exist for billfish or sharks

Oman

- Nominal catch data have not been reported for all years and are not always available by gear type for all species
- Limited catch and effort data reported
- No size data reported since 1999

Pakistan

- No nominal catch data reported since 2012
- No catch and effort data reported
- Limited data size frequency data available for tuna species up to 2011. No data submitted since 2012

To date, no onboard observer data for gillnet fisheries have been submitted to the IOTC Secretariat. The observer coverage that has been achieved for longline fleets is currently <1%, while for purse

seine fleets it is approximately 4%. For pole and line and gillnet fleets, reported coverage is currently zero. Full details of CPCs reporting observer coverage are found in Appendix V.

EVALUATION OF NATIONAL PROGRESS MADE IN IMPLEMENTATION OF THE REGIONAL OBSERVER SCHEMES TO DATE

With this background information, the workshop participants were then provided with an overview on the progress of implementation of the ROS in each country.

Oman

Mr Yasser Abdullah Saif Al-Muslhi gave a presentation providing some background information on the tuna fisheries of Oman. The majority of the fleet comprises artisanal vessels (98%), with smaller coastal (1%) and commercial (0.8%) fisheries as well as some aquaculture (0.2%). The artisanal vessels are made up of ~20,000 skiffs undertaking day trips, and ~700 dhows (9-24m length) undertaking longer trips of 1-10 days duration. There is currently little information on where the dhows are fishing so there are plans to implement GPS surveillance onboard these vessels in the near future.

To date no onboard observer scheme has yet been implemented in Oman, however a port sampling system has been established comprising 42 data collectors who cover over 156 landing sites. The data collection system is designed to record fish species and weights as they are landed but does not include more detailed information such as length data. An electronic tablet data recording system is used which has an inbuilt catalogue of species which can be used for identification during data collection and this system is reported to have improved the detail of information reported.

I.R. Iran

The Iranian fishing fleet for tuna and tuna-like species comprises 6900 vessels, of which 9 are classified as industrial scale vessels, about 1400 fishing dhow and the rest small boats. There are also expansion plans for the offshore fisheries. The vast majority of catches come from the gillnet fleets (95%), however there are plans to reduce the use of this gear type and move towards the use of other gears, such as longlines instead.

I.R. Iran has not yet implemented an onboard observer scheme, however, plans are underway for this and a number of potential observers have been identified for training. There is currently a port sampling scheme that covers 10-12% of the artisanal vessels, while logbooks are used by the industrial fleet. The Iran Fisheries Organisation (IFO) has also implemented some training courses and extension brochures and posters regarding to bycatch reduction of marine mammals, sea birds and turtles.

Some of the objectives for implementation of an observer scheme in I.R. Iran include: combatting IUU fishing, improving port state control, controlling infractions, quality of catches and at-sea

transhipments, as well as the collection of scientific data. The IFO has identified a number of difficulties that they have faced with implementing an observer scheme, including a lack of qualified observers who are willing to work on small-scale vessels, the provision of adequate living and safety conditions on small scale vessels and the financial resources required to monitor the large number of vessels.

Pakistan

Pakistan currently has a fleet of >5,000 vessels, of which ~700 are offshore gillnetters between 15-35m average length. These vessels usually take 12-18 crew and trip length ranges between 12 and 30 days. The government has implemented a number of initiatives to improve fisheries management, including banning destructive fishing gear, control of post-harvest losses, improving compliance with national and international regulations, having a closed season, promoting aquaculture, promoting longline fishing, improving data collection for stock assessments and training stakeholders.

There are currently limited data collection systems in place at the landing sites and no onboard observer coverage. To implement an onboard observer scheme the Marine Fisheries Department has identified the need for sufficient observer training to take place and funding sources to be sought to pay for this as well as to cover the cost of observer salaries.

OBSERVER TRAINING

Species identification

Species identification was identified as a priority topic for the workshop, so a number of presentations, practical demonstrations and exercises were given by the invited experts over the course of the week. These sessions covered the following species groups:

- Tuna and tuna-like species (Dr Juma Al-Mamry)
- Billfish and other fish species (Mr Moazzam Khan)
- Sharks and rays (Dr Rima Jabado and Dr John Carlson)
- Marine turtles (Dr Rob Baldwin)
- Cetaceans (Mr Tim Collins)
- Seabirds (Mr Moazzam Khan)

Presentations covered the theory of species identification through morphological features as well as information on sexing, identifying maturity stage, taking samples for genetic analysis, taking appropriate length measurements as well as best practice handling and release methods. A full set of training materials was provided to participants for use in national observer training courses which were explained in full during the course of the session.

The group noted the shark identification guides[4] specific to the Arabian Seas that have been produced by Dr Rima Jabado and distributed at the workshop and noted that WWF-Pakistan is currently working on producing a seabird identification guide for the northwest Indian Ocean region which will be made available to all workshop participants when it has been finalised.

Conservation and Management Measures

Dr Sarah Martin provided an overview of the main IOTC CMMs relevant to the ROS on topics including other IOTC data collection and reporting requirements, Resolutions related to sharks and other bycatch species, IUU fishing and observer data confidentiality. These are detailed in Appendix IV. It was highlighted that implementation of a national observer scheme could therefore improve compliance with a number of Resolutions beyond Resolution 11/04 and substantially improve overall compliance ratings. This was illustrated in Appendix V.

The group noted that nets greater than 2.5km total length are banned on the high seas according to the IOTC (Resolution 12/12) as well as the United Nations General Assembly Ruling (Resolution 44/225). The group also noted that under Resolution 11/03 (*On establishing a list of vessels presumed to have carried out illegal, unreported and unregulated fishing in the IOTC area of competence*) CPCs should report all vessels presumed to be IUU fishing, not just those of other CPCs.

Observer data collection and reporting

The data collection forms and observer trip reporting template were presented to the group with the manual (all available at: http://www.iotc.org/science/regional-observer-scheme-science). An example of trip information from a gillnet vessel was prepared and an exercise was undertaken to input the data into the correct fields in the data collection forms. The resources for this exercise and set of completed forms were provided for potential use in observer training. Participants completed the exercise and used the opportunity to review the data collection forms. The main comment was that the level of detail required is very high and so at the next revision some simplification of the forms for gillnet fisheries should be undertaken, based on data collection priorities.

Observer programme management

Dr John Carlson provided a presentation on general aspects to be taken into consideration when managing an observer programme, including strategies for appropriate sample design to achieve the target observer coverage for the fleet based on the research requirements, sampling target and bycatch species within sets and how to avoid potential bias. This included examples from the shark gillnet fishery off the east coast of the USA and the US East coast gillnet fishery and Atlantic pelagic longline fishery.

Dr John Carlson also gave a presentation on managing the flow of data from observer schemes, from the raw data collected by the observer, through the various error-checking procedures to the final data to be used for analysis and shared with other users. This included a comprehensive introduction to the establishment of observer debriefing protocols. It was recommended that mistakes should be noted

[4] www.cms.int/en/publication/sharks-arabian-seas-identification-guide

and corrected immediately, and if other sources of raw data such as notebooks have been used on the trips, these are also submitted and used in the debriefing process. All data should have been thoroughly verified in this way before any data submissions are provided to the IOTC.

KEY ISSUES ARISING

Ensuring the safety of observers was a key problem arising from discussions about the practicalities of implementing observers on small-scale gillnet vessels. Many of these boats have low safety standards and the fishers work in a high risk environment on the high seas, meaning that CPCs struggle to provide the safe working environment required by Resolution 11/04 (para.5).

The small vessel size also limits the feasibility of having an additional person onboard in terms of the physical space available for the observer to carry out duties such as sampling and collection of measurements, as well as being constrained in terms of available bunk and living space. These constraints may mean that the observer must take the place of a crew member, thereby reducing the fishing activities and potentially even making the trip not financially viable. Cultural and language differences are also considered to be an issue for some fleets where a high proportion of fishers are non-nationals and observers from the fisheries ministries are nationals. Long trip lengths are also common for the high seas vessels, meaning that the observer must spend substantial periods of time away from home, possibly sacrificing family life.

These factors contribute to making onboard observer duties a fairly unattractive prospect for government fisheries staff, who are generally well-qualified national scientists. A good level of education and understanding of the fisheries is required for the role, but recruiting senior fisheries staff for the work remains an issue, and even where there has been recruitment success, retention of trained staff is an issue. An example was provided from the WWF-Pakistan initiative where observers (students, family members of fishers or educated fishers) were trained but the scheme ultimately failed due to the extremely high drop-out rate.

To attract and retain observers with a suitable skill set, a high level of funding is required to compensate for the more negative aspects of the job, however, in many cases even this will not be enough to ensure retention of observers. While the vessels are small, they are present in extremely large numbers, meaning that a higher number of observers are required to provide 5% coverage of sets than for large-scale industrial vessels where fewer observers can cover a substantial proportion of fishing activities. A high level of funding is therefore required for the training, management and salaries of these observers.

POTENTIAL SOLUTIONS

Dr John Carlson and Mr Moazzam Khan presented experiences from the NOAA and WWF-Pakistan observer schemes respectively, providing ideas for solutions to achieving good quality observer data from small-scale gillnet fisheries. This was followed by a group discussion on the issues and potential solutions/alternatives which are outlined below.

Differentiation between smaller vessels

The workshop discussed the range of safety measures, working conditions and facilities available for vessels under 24m overall length and the resulting differences in implications for onboard observer coverage. Developing a finer level of distinction, such as categorising vessels further (e.g. <15m and ≥15m) may be appropriate in determining the feasibility of implementing the onboard component observer scheme as there may be fewer issues with the relatively larger vessels. With further categorisations such as this, it may be possible to implement onboard observer coverage for vessels between 15m and 24m, while alternative monitoring methods may be sought for the vessels below 15m length. Nevertheless, this is something to be considered carefully when designing appropriate stratification of observer coverage as it could introduce substantial bias to a scheme and would therefore need to be taken into consideration appropriately when performing any kind of extrapolation from the data.

Port sampling

Port sampling was identified as a way of overcoming the safety, practical and feasibility issues with placing observers onboard vessels and to reduce costs by having a single sampler monitoring the landings of multiple vessels at a landing site. However, there are a number of shortcomings of this approach in terms of data collection, including:

- Lack of information on bycatch/discards
- Lack of set level information on catch and effort
- Lack of spatial catch and effort information
- Port sampler may be overwhelmed by the high number of vessels landing at the same time, as often occurs
- Fishers use multiple ports for departure and landing, and may not even land at a designated port, just landing site on beach

Therefore, port-sampling alone is not sufficient and additional methods of collecting this information were also discussed.

Onboard electronic monitoring

Electronic monitoring is an approach that has already been suggested by the IOTC Scientific Committee (SC17, para 166) as a method to be trialled in addition to human onboard coverage. Using electronic monitoring methods such as installing cameras onboard vessels overcomes the practical and safety issues with having an observer onboard and can also reduce costs. The workshop also noted the example provided demonstrating the success of e-monitoring implemented by NOAA in the SW Florida shrimp trawl fishery based on a relatively simple system suitable for small-scale vessels with a single camera mounted on a telescope aluminium pole and linked in with a solid state hard drive (essential for a moving platform) to store video data.

Potential issues with the method were also considered. These included the level of acceptance by fishers, which can be lower than acceptance of a human observer, the inability of a camera to take biological samples and more detailed biological information, the need for power, space for onboard equipment, issues with filming at night, the large amount of footage produced which can be highly time-consuming to process and the potential for manipulation of the cameras.

Many of these issues could be overcome through modifications to the system such as the requirement for the camera to be a very high resolution, technology to accommodate night hauling, a 360 degree array, a non-tamper box, sufficient battery power to cover the trip length. The time taken to review footage could be slower than an onboard observer, or may be faster if hydraulic sensors and drum rotation sensors are used so that cameras are triggered to only record when the drum rotates for setting and the hydraulics are activated during hauling. However, these all contribute to increasing the cost of the systems, and a substantial amount of technological support would be needed for the development, installation and maintenance of such technologies which may not be readily available in some countries. Therefore a review of the costs and benefits of systems with different levels of complexity would be needed to balance the collection of comprehensive, good quality data with the level of coverage required across the fleets.

Nevertheless, as a complementary approach, this is a strategy that could be employed to monitor vessels where safety standards, space and cost are prohibitive to onboard human observer coverage. The approach that may be particularly useful for the smaller vessels (<15m) for which onboard human observer coverage is most difficult to implement and for which fewer resources may be needed is to implement electronic coverage.

Pilot trials will be needed to fully test the difference in the quality of data collected by human observers compared with e-monitoring systems before any systems are widely installed across the fisheries. WWF-Pakistan are currently trialling an Automatic Identification System (AIS) in the region as part of the Areas Beyond National Jurisdiction funded project component for gillnet fisheries (IOTS-2014-WPEB10-INF27) and will be keeping the Commission updated with progress on this project. The IOTC Secretariat is also working with interested parties to develop a proposal for the development of trials for an e-monitoring system for gillnet vessels[5]. The IFO expressed an interest in involvement in this project through pilot trials in the Iranian fisheries and so offered to collaborate on the development of the proposal with the IOTC Secretariat.

Electronic reporting

Electronic reporting was also discussed as an approach to simplifying the data collection process, thereby making it easier for data collectors. This would reduce the costs needed in terms of training time for observers as well as reducing inefficiencies in the data entry, processing and management

[5] *Para. 166. "**NOTING** that electronic monitoring (including video) has been trialled and successfully implemented in many fisheries worldwide (e.g. Australia, European Union, USA, New Zealand), with the aim of supplementing scientific observers on board vessels; and given the current difficulties cited as reasons for not deploying scientific observers under the IOTC Regional Observer Scheme (ROS) on board large-scale gillnet vessels operating in the Indian Ocean; the SC **RECOMMENDED** that the Commission considers assigning the IOTC Secretariat, in consultation with interested IOTC scientists, to develop a project on electronic monitoring in the IOTC area of competence. This would allow an evaluation of the efficacy of electronic monitoring in the collection of information on catch, discards and fishing effort as a means to supplement scientific observer coverage for large-scale gillnet vessels. The trial will include an evaluation of the main challenges of using electronic monitoring data such as the accurate identification of IOTC and bycatch species, weight and size of catches and the time taken to process the footage and extract the required data. The concept note/proposal shall also include a clear indication that the IOTC data confidentiality policy (Resolution 12/02) will need to be modified to ensure any data/information collected is for the sole purpose of scientific analysis and not for compliance purposes. The concept note should include a detailed budget and be communicated to a range of potential funding organisations".*

process and facilitate easier reporting to IOTC. Nevertheless, there are also issues with this approach such as the expense and time for development of the software, potentially slower data entry process if there are multiple data fields to scroll through, possible increased learning time, issues with screen glare or water on the screen if used onboard. Again, these issues may be overcome, but will increase development time and costs.

The electronic tablet reporting application that is currently under development by NOAA was discussed, and the group notated that on completion of the project this code will be made open source so may be developed further by other users and modified for different fisheries. The workshop also noted that the IOTC is currently coordinating a project, due to start in 2016, for the development of an electronic reporting tool to facilitate data entry and management. This will be based on a user-friendly, offline interactive-pdf application that will be possible to use with any computer hardware system and is due to be trialled in willing CPCs in late 2016.

Self-monitoring/ex-crew trained as observers

Experiences were shared from the crew-based observer programme currently being implemented in Pakistan by WWF. This scheme was established in response to the problems with obtaining and retaining qualified fisheries scientists as observers. The initiative involved selecting ex or current crew member and training them in observer data collection activities and paying them to go back onto the vessel on which they were working previously to collect data.

This approach is thought to have been relatively successful for a number of reasons. The crew are experienced fishers and therefore have a good knowledge of the fish species and a good understanding of the fishing procedures. The observer will not be taking up any additional space onboard the vessel as he/she is still contributing to the fishing activities through assisting with net hauling where needed and so is not an additional expense for the vessel or compromising financial productivity. The crew member is also accustomed to the vessel environment, rough seas, cramped and basic living conditions. There is a good working relationship already established between the crew member and the other members onboard the vessel so they are assist to help the observer with his/her tasks as necessary and not be restrictive.

Nevertheless, a critical issue with this approach are the lack of independence of the data collected, given the conflict of interest which is not consistent with the IOTC Code of Conduct for onboard observer monitoring. The reliability of the data collected may therefore be compromised by a lack of reporting of incidents known to be a conflict with national or international regulations. But surprisingly, trials have indicated that this has not been an issue so far, demonstrated by the reporting of fishing methods and practices that are not permitted. However, this is something to be monitored closely as any actions taken to address fisher behaviour based on these data may impact the quality of future data collected.

Another key issue is the relatively low education level of the crew which has resulted in the collection of information that is less detailed than IOTC requirements. This means that the data collector may require more intensive training and have more problems in completing data collection forms and understanding the recording processes. Due to the nature of data collection, in which a lot of video footage is involved, substantial time is also required by managers of the scheme to process the data onshore. But despite these issues, scientists from WWF consider the data that are reported in Pakistan

to be of good quality and have already generated some of the most fine-scale information on bycatch interactions with tuna fisheries to date.

The scheme identified some poor bycatch handling practices so has also introduced a system of incentives for fishers to release bycatch alive through payment in the form of cash as replacement nets in return for video footage demonstrating successful live releases. Footage of disentanglements and successful live releases were viewed by workshop participants and considered to be a very useful approach to bycatch mitigation.

NEXT STEPS

The workshop noted that while the approaches discussed are not accepted as alternatives to 5% onboard coverage outlined in Resolution 11/04, the Scientific Committee has encourage the trial and testing of these approaches.

SC17, Paragraph 158. *The SC **AGREED** that, in addition to the implementation of the ROS which is likely to take time, the collection of scientific data by all other means available including self-sampling (collection of data by trained crew) such as that carried out for the small-scale components of the EU,France longline fleet and electronic monitoring (sensors and video cameras) be encouraged and developed, and for CPCs to report on progress at the next WPEB meeting. This is particularly important for fleets which are not achieving the target level of coverage of human observers due to factors such as the small size of vessels, such as the gillnet fleets.*

The workshop agreed that there is a need to evaluate the effectiveness of many of the methods and ideas discussed through trial in IOTC gillnet fisheries and to present the results to the IOTC through working party meetings. This will allow peer review of the approaches being developed, enable other CPCs with small-scale fleets to learn from experiences and to keep the wider IOTC scientific community informed of progress. Results from these trials may indicate that a combination of approaches is a suitable method of collecting data for some CPCs.

National plans for implementation of the ROS

Pakistan

The Marine Fisheries Department of Pakistan presented a draft plan for the implementation of onboard observers for 35 gillnet vessels (5% of fleet). This will form part of a government led initiative which will hire observers privately and train them according to IOTC standards, but will be based on the experiences of the WWF-Pakistan crew-based observer initiative. The MFD intends to develop this proposal further in more detail and will present the more developed plan to IOTC. As the project is likely to need a substantial outlay of expenditure, the MFD will be seeking funding from external sources to support the initiative. Due to the high costs of training and funding observers, the implementation will constitute a phased in approach to ensure there is enough long-term support. The MFD are also considering trialling an e-monitoring in addition to the onboard observer coverage. The next steps that need to be taken include: modification of certain clauses in national legislation to ensure there is appropriate legal coverage for observers and reconciliation between federal and

provincial governments regarding jurisdictional issues to enable observers to be placed onboard vessels.

I.R. Iran

The Iranian Fisheries Organisation presented a proposal to increase port sampling to >10% coverage by gear type in addition to the implementation of logbook systems and installation of VMS on all vessels ≥24m or operating offshore by 2019. This is already mandatory for vessels covered by the onboard component of the ROS as outlined in Resolution 15/03.[6] To supplement these data collection activities, I.R. Iran plans to implement a feasibility study trialling electronic monitoring at the national level for the offshore gillnet vessels. The IFO will be preparing a national plan for implementation of the ROS in 2016 and will present this to the next Working Party on Ecosystems and Bycatch. The IFO plans to select observers from two provinces to participate in a training workshop to be held in I.R. Iran in early 2016 and has requested support for further training from experts in the region. Based on an evaluation of current conditions the IFO forecast that I.R. Iran will be able to achieve 50% coverage by 2017 and full coverage by 2019. The presentation to the workshop also included a proposal to revise Resolution 11/04 to provide a more realistic timeframe for implementation of the scheme for countries that have not yet managed to establish an observer scheme.

Oman

The group discussed the applicability of the ROS to Oman, given the small size of the vessels and the port sampling scheme that is currently taking place through the data collectors working at landing sites. For Oman, the onboard component of the ROS is relevant for the registered active industrial scale longline fleet, whereas the artisanal component of the ROS will be relevant for the inshore part of the fleet. The uncertainty associated with where the dhows are fishing was discussed and the Omani Ministry outlined plans for a project involving the implementation of VMS on these vessels to determine how far offshore they are fishing, with proposed coverage extending to all fleet components. It was further noted that Oman is planning to expand its fleet through increasing the size and fishing capacity of vessels as well as to expand the range further offshore. As onboard observer coverage will be required for these vessels, the Ministry of Agriculture and Fisheries will be developing plans to implement the ROS alongside fleet development plans and will present these to IOTC through the working party meetings and Scientific Committee.

Development of guidelines for observer data collection for artisanal fisheries

The workshop discussed the guidelines that are still to be developed for small-scale fishing vessels (<24m) operating within inshore waters which were approved as part of the IOTC work plan for 2016. The group advised that the protocols set are not designed to be overly complex, but to prioritise data collection fields so that they may be practically implemented for the artisanal fleets.

Follow-up observer training

[6] http://www.iotc.org/cmm/resolution-1503-vessel-monitoring-system-vms-programme

The workshop noted the training course to be held by WWF-Pakistan as part of the FAO Areas Beyond National Jurisdiction gillnet project for northwest Indian Ocean countries. This is likely to take place in January 2016 in I.R. Iran and will provide an opportunity for the further development of national observer schemes. WWF-Pakistan will be providing more information about this to participants in due course.

CLOSE

The participants at the workshop thanked the Ministry of Agriculture and Fisheries of Oman for hosting the meeting, the staff from the IOTC Secretariat for organising and leading the workshop and the invited experts for their valuable contributions to the training sessions. The participants were thanked for their contributions and the workshop was closed at approximately 14:30 on Thursday 22nd October 2015.

APPENDIX I - List of participants

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APPENDIX II - Schedule of work

Day 1 – Sunday 18th October, 2015			
Time	**Topic**	**Lead**	**Activity**
0900 - 0915	Opening address	AMA	Presentation
	Objectives of workshop and proposed work plan	SM	Presentation
0915 – 0945	Introduction and background to the IOTC Regional Observer Scheme (IOTC)	SM	Presentation
0945 - 1015	Introduction to CMS Main species covered by CMS and daughter agreements - CMS Appendices I and II (inc 16 cetaceans on App I, 43 on App II) - IOSEA Marine Turtle MoU - Sharks MoU - Dugong MoU CMS Resolutions 9.18 and 10.14 on By-catch and Resolution 11.20 on the conservation of sharks and rays IOSEA Resolutions 3.1 and 2008	LG	Presentation
1015 - 1045	Introduction to IOTC fisheries and data, highlighting the importance of NIO GN fleets and issues for data reporting from these fisheries	LP	Presentation
Morning tea and coffee break			
1115 – 1130	Background to fisheries of Oman Update on current progress in implementation of the ROS	YA	Presentation
1130 – 1145	Background to fisheries of I.R. Iran Update on current progress in implementation of the ROS	RS	Presentation
1145 - 1200	Background to fisheries of Pakistan Update on current progress in implementation of the ROS	MM	Presentation
1200 - 1330	Species identification – sharks and rays	RJ	Presentation
1330 - 1430	Species identification – tuna and tuna-like species	JA(MK)	Presentation
Lunch			
1530 - 1630	Species identification – billfish and other fish species	MK(JA)	Presentation
Close			

Day 2 – Monday 19th October, 2015			
Time	**Topic**	**Lead**	**Activity**

0800 - 0830	Travel to Muscat wholesale fish market		
0830 – 0900	Species identification – tuna & tuna-like species	JA(MK)	Exercise
0900 – 0930	Standard length measurements and biological sampling of tuna and tuna-like species	MK&JA	Exercise
0930 – 1000	Species identification – billfish(?) and other fish species	MK(JA)	Exercise
1000 – 1030	Standard length measurements and biological sampling of billfish and other fish species	MK(JA)	Exercise
Morning tea and coffee break			
1100 - 1130	Species identification – sharks and rays	RJ	Exercise
1130 - 1200	Standard length measurements and biological sampling – sharks and rays	JC	Presentation
1200 – 1230	Best practice approaches for handling and successful live release – sharks and rays	JC	Presentation
Move to training room			
1230 - 1300	Species identification – marine mammals	TC	Presentation
1300 – 1330	Species identification – marine mammals	TC	Exercises
1330 - 1400	Best practice approaches for handling and successful live release – marine mammals	TC	Presentation
1400 - 1430	IOTC CMMs related to the ROS	SM	Presentation
Lunch and close, return to hotel			

Day 3 – Tuesday 20th October, 2015			
Time	**Topic**	**Lead**	**Activity**
0800 - 0900	Sampling protocols – taking appropriate samples, stratification and methods to reduce bias at each stage of sampling (spatial, temporal, observer coverage, catch sampling, biological sub-sampling)	JC	Presentation
0900 - 1030	IOTC data collection and reporting requirements – manual and data collection forms (gillnets)	LP (SM)	Presentation + exercise
Morning tea and coffee break			
1100 - 1200	Debriefing protocols – reviewing and verifying data	JC	Presentation
1200 - 1230	Debriefing protocols – reviewing and verifying data	JC	Exercise
1230 - 1300	Species identification– marine turtles	RB	Presentation
1300 - 1330	Species identification– marine turtles	RB	Exercise
1330 - 1430	Best practice approaches for handling and successful live release and standard length measurements and biological sampling – marine turtles	RB	Presentation

Lunch and close

Day 4 –Wednesday 21st October, 2015			
Time	**Topic**	**Lead**	**Activity**
0500 - 1200	Visit to Muttrah landing site to observe tuna and shark catches, followed by a trip to Seep harbour to observer catches from gillnet vessels	All	Observation and practical
1200 - 1400	Return to Platinum Hotel for lunch		
Lunch and close			

Day 5 – Thursday 22nd October, 2015			
Time	**Topic**	**Lead**	**Activity**
0800 – 0900	Species identification – seabirds + best practice handling and release	MK	Presentation + exercises
0900 – 0945	Lessons learned, examples of success and failures from: NOAA gillnet fisheries observer programme	JC	Presentation
0945 - 1030	Lessons learned, examples of success and failures from: Pakistan crew-based observer initiative	MK	Presentation
Morning tea and coffee break			
1100 – 1200	Issues with implementing the ROS and discussion of potential solutions	All	Group discussion
1200 - 1300	Development of specific action plans for the next steps in implementing the ROS in I.R. Iran, Oman and Pakistan	tbc	3 parallel group sessions
1300 - 1345	Plenary discussion of action plans and next steps	Each group lead	Presentation from each group followed by discussion
1345 - 1400	Wrap up and presentation of certificates		Presentation
Lunch and close			

APPENDIX III – IOTC compliance by CPC

IRAN, ISL. REP (14% of total catch in 2014)

69% compliance

Fully compliant
Partially Compliant
Non-compliant
Not applicable

IRAN, ISL. REP.	Coastal fleets	Industrial surface and longline fleets
	EEZ vessels less than 24 m LOA	Vessels with LOA ≥ 24 m and all high seas vessels
Annual catches (NC+DI)	Nominal catch	Nominal catch
	Discards	Discards
Active Crafts (FC)	Fishing Craft	Active Vessel List
Catch-and-Effort (CE)	Catch-and-Effort	CE Surface fisheries / FADs / PS-Supply vessels
		CE Longline fisheries
Size data (SF)	Size frequency	Size frequency
Scientific observer data	Sampling Coverage	Trip Reports
Socio-economic data	No standards have been set as yet	
Foreign fleets EEZ catch	Not applicable	CE EEZ Licensed Foreign Fleets

OMAN (2% of total catch in 2014)

53% compliance

Fully compliant
Partially Compliant
Non-compliant
Not applicable

OMAN	Coastal fleets	Industrial surface and longline fleets
	EEZ vessels less than 24 m LOA	Vessels with LOA ≥ 24 m and all high seas vessels
Annual catches (NC+DI)	Nominal catch	Nominal catch
	Discards	Discards
Active Crafts (FC)	Fishing Craft	Active Vessel List
Catch-and-Effort (CE)	Catch-and-Effort	CE Surface fisheries / FADs / PS-Supply vessels
		CE Longline fisheries
Size data (SF)	Size frequency	Size frequency
Scientific observer data	Sampling Coverage	Trip Reports
Socio-economic data	No standards have been set as yet	
Foreign fleets EEZ catch	Not applicable	CE EEZ Licensed Foreign Fleets

PAKISTAN (3% of total catch in 2014)

5% compliance

Fully compliant
Partially Compliant
Non-compliant
Not applicable

PAKISTAN	Coastal fleets	Industrial surface and longline fleets
	EEZ vessels less than 24 m LOA	Vessels with LOA ≥ 24 m and all high seas vessels
Annual catches (NC+DI)	Nominal catch	Nominal catch (?)
	Discards	Discards (?)
Active Crafts (FC)	Fishing Craft	Active Vessel List (?)
Catch-and-Effort (CE)	Catch-and-Effort	CE Surface fisheries (?) / FADs / PS-Supply vessels
		CE Longline fisheries
Size data (SF)	Size frequency	Size frequency (?)
Scientific observer data	Sampling Coverage	Trip Reports (?)
Socio-economic data	No standards have been set as yet	
Foreign fleets EEZ catch	Not applicable	CE EEZ Licensed Foreign Fleets (?)

APPENDIX IV – CMMs relevant to the ROS

In addition to Resolution 11/04 there are a number of related IOTC CMMs that observers should be aware of:

Data reporting

- IOTC Resolution 15/02 *Mandatory statistical requirements for IOTC Members and Cooperating non-Contracting Parties (CPCs)*

"…alternatively size data for longline fleets may be provided as part of the Regional Observer Scheme where such fleets have at least 5% observer coverage of all fishing operations".

Data collection

- IOTC Resolution 15/01 *On the recording of Catch and Effort by fishing vessels in the IOTC Area of Competence*

Seabird logbook data for LL and GN

"...when a CPC is fully implementing the observer program the provision of seabird data is optional"

Sharks

- *IOTC Resolution 05/05 Concerning the conservation of sharks caught in association with fisheries managed by IOTC*

"CPCs shall require their vessels to not have onboard fins that total more than 5 % of the weight of sharks onboard, up to the first point of landing. CPCs that currently do not require fins and carcasses to be offloaded together at the point of first landing shall take the necessary measures to ensure compliance with the 5 % ratio through certification, monitoring by an observer, or other appropriate measures".

- IOTC Resolution 12/09 *On the conservation of thresher sharks (familly Alopiidae) caught in association with fisheries in the IOTC area of competence*

"Fishing Vessels flying the flag of an IOTC Member or Cooperating Non-Contracting Party (CPCs) are prohibited from retaining on board, transhipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family Alopiidae, with the exception of paragraph 7".

" Scientific observers shall be allowed to collect biological samples (vertebrae, tissues, reproductive tracts, stomachs, skin samples, spiral valves, jaws, whole and skeletonised specimens for taxonomic works and museum collections) from thresher sharks that are dead at haulback, provided that the samples are part of the research project approved by the IOTC Scientific Committee (or IOTC Working Party on Ecosystems and Bycatch (WPEB)). In order to obtain the approval, a detailed document outlining the purpose of the work, number and type of samples intended to be collected and the spatio-temporal distribution of the sampling work must be included in the proposal. Annual

progress of the work and a final report on completion of the project shall be presented to the IOTC WPEB and the IOTC Scientific Committee".

- IOTC Resolution 13/06 *On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries*

" CPCs shall require fishing vessels flying their flag and on the IOTC Record of Authorised Vessels or authorised to fish for tuna and tuna-like species managed by the IOTC on the high seas to promptly release unharmed, to the extent practicable, of oceanic whitetip sharks when brought alongside for taking onboard the vessel. However, CPCs should encourage their fishers to release this species if recognised on the line before bringing them onboard the vessels".

"CPCs shall encourage their fishers to record incidental catches as well as live releases of oceanic whitetip sharks. These data shall be kept at the IOTC Secretariat".

"Scientific observers shall be allowed to collect biological samples (vertebrae, tissues, reproductive tracts, stomachs, skin samples, spiral valves, jaws, whole and skeletonised specimens for taxonomic works and museum collections) from oceanic whitetip sharks taken in the IOTC area of competence that are dead at haulback, provided that the samples are a part of a research project approved by the IOTC Scientific Committee (SC)/the IOTC Working Party on Ecosystems and Bycatch (WPEB). In order to obtain the approval, a detailed document outlining the purpose of the work, number of samples intended to be collected and the spatio-temporal distribution of the sampling effect must be included in the proposal. Annual progress of the work and a final report on completion shall be presented to the SC/WPEB".

- IOTC Resolution 13/05 *On the conservation of whale sharks (Rhincodon typus)*

"CPCs shall require that, in the event that a whale shark is unintentionally encircled in the purse seine net, the master of the vessel shall:

a) take all reasonable steps to ensure its safe release, while taking into consideration the safety of the crew. These steps shall follow the best practice guidelines for the safe release and handling of whale sharks developed by the IOTC Scientific Committee;

b) report the incident to the relevant authority of the flag State, with the following information:

i. the number of individuals;

ii. a short description of the interaction, including details of how and why the interaction occurred, if possible;

iii. the location of the encirclement;

iv. the steps taken to ensure safe release;

v. an assessment of the life status of the animal on release, including whether the whale shark was released alive but subsequently died.

"CPCs using other gear types fishing for tuna and tuna-like species associated with a whale shark shall report all interactions with whale sharks to the relevant authority of the flag State and include all the information outlined in paragraph 3b(i–v)".

"CPCs shall report the information and data collected under paragraph 3(b) and paragraph 4 through logbooks, or when an observer is onboard through observer programs, and provide to the

IOTC Secretariat by 30 June of the following year and according to the timelines specified in Resolution 10/02 [superseded by Resolution 15/02] (or any subsequent revision)".

Other bycatch

- *IOTC Resolution 12/06 On reducing the incidental bycatch of seabirds in longline fisheries*

"CPCs shall record data on seabird incidental bycatch by species, notably through scientific observers in accordance with Resolution 11/04 and report these annually. Observers shall to the extent possible take photographs of seabirds caught by fishing vessels and transmit them to national seabird experts or to the IOTC Secretariat, for confirmation of identification".

- *IOTC Resolution 12/04 On the conservation of marine turtles*

"CPCs shall collect (including through logbooks and observer programs) and provide to the IOTC Secretariat no later than 30 June of the following year in accordance with Resolution 10/02 (or any subsequent revision), all data on their vessels' interactions with marine turtles. The data shall include the level of logbook or observer coverage and an estimation of total mortality of marine turtles incidentally caught in their fisheries".

"CPCs shall require fishermen on vessels targeting species covered by the IOTC Agreement to bring aboard, if practicable, any captured marine turtle that is comatose or inactive as soon as possible and foster its recovery, including aiding in its resuscitation, before safely returning it to the water. CPCs shall ensure that fishermen are aware of and use proper mitigation, identification, handling and de-hooking techniques and keep on board all necessary equipment for the release of marine turtles, in accordance with handling guidelines in the IOTC Marine Turtle Identification Cards".

- IOTC Resolution 13/04 *On the conservation of cetaceans*

"Contracting Parties and Cooperating Non-Contracting Parties (collectively, CPCs) shall prohibit their flagged vessels from intentionally setting a purse seine net around a cetacean in the IOTC area of competence, if the animal is sighted prior to the commencement of the set".

"CPCs shall require that, in the event that a cetacean is unintentionally encircled in a purse seine net, the master of the vessels shall:

a) take all reasonable steps to ensure the safe release of the cetacean, while taking into consideration the safety of the crew. These steps shall include following the best practice guidelines for the safe release and handling of cetaceans developed by the IOTC Scientific Committee;

b) report the incident to the relevant authority of the flag State, with the following information:
i. the species (if known);
ii. the number of individuals;
iii. a short description of the interaction, including details of how and why the interaction occurred,if possible;
iv. the location of the encirclement;

v. the steps taken to ensure safe release;
vi. an assessment of the life status of the animal on release, including whether the cetacean was
released alive but subsequently died".

"CPCs using other gear types fishing for tuna and tuna-like species associated with cetaceans shall report all interactions with cetaceans to the relevant authority of the flag State and include all the information outlined in paragraph 3b(i–vi)".

"CPCs shall report the information and data collected under paragraph 3(b) and paragraph 4, through logbooks, or when an observer is onboard through observer programs, and provide to the IOTC Secretariat by 30 June of the following year and according to the timelines specified in Resolution 10/02 (or any subsequent revision)".

Illegal Unregulated and Unreported fishing activities

- IOTC Resolution 11/03 *On establishing a list of vessels presumed to have carried out illegal, unreported and unregulated fishing in the IOTC area of competence*

"CPCs shall transmit every year to the IOTC Executive Secretary at least 70 days before the Annual Meeting, a list of the vessels presumed to have been carrying out IUU fishing activities in the IOTC area of competence during the current and previous year…"

- IOTC Resolution 12/12 *To prohibit the use of large-scale driftnets on the high seas in the IOTC area*

"CPCs shall include in their Annual Reports a summary of monitoring, control, and surveillance actions related to large-scale driftnet fishing on the high seas in the IOTC area of competence".

Data confidentiality

- IOTC Resolution 12/02 *Data confidentiality policy and procedures*

"Observer data grouped by 1° longitude by 1° latitude for surface fisheries and by 5° longitude by 5° latitude for longline, stratified by month and by fishing nation are considered to be in the public domain, provided that the activities /catch of no individual vessel can be identified within a time/area stratum"

APPENDIX V – potential for improved compliance scores with implementation of the ROS

The tables below summarise the improvements in compliance ratings that could be made across a number of IOTC resolutions through implementation of the ROS.

Table 1. Current compliance ratings

Resolution	Requirements	IRN	OMN	PAK
Res. 10/02 - Costal State CPCs	Catch & Effort Surface fisheries	N/A	N/A	
	Catch & Effort LL provisional	N/A	N/A	
	Catch & Effort LL Final	N/A	N/A	
Res. 05/05	Submission of data regarding Sharks - Nominal catch			
Res. 05/05	Submission of data regarding Sharks - Catch & effort			
Res. 05/05	Submission of data regarding Sharks - Length Frequency			
Res. 12/09	Prohibition on thresher sharks - family Alopiidae			
Res. 13/06	Prohibition on oceanic whitetip sharks			
Res. 12/04	Sea turtles report			
	Carry line cutters and de-hookers on board (Longliners)	N/A		N/A
	Carry dip nets (Purse seiners)		N/A	N/A
Res. 10/06	Seabirds report	N/A		N/A
	Implementation of mitigation measures south of 25°S	N/A		N/A
Res. 13/04	Instances of Cetaceans encircled		N/A	N/A
Res. 13/05	Instances Whale Sharks encircled		N/A	N/A
Res. 11/03	IUU listing			
Res. 07/01	Compliance by nationals			
Res. 14/06	At sea transhipments – CPC report	N/A		N/A
	Transhipments in port report			
	List of Authorised carrier vessels	N/A		N/A
	Report on results of investigations on possible infractions	N/A		N/A
	ROP fee	N/A		N/A
Res. 11/04	Regional Observer Scheme2 (No. of vessels monitored and coverage by gear type)			
	5% Mandatory, at sea (> 24m)			N/A
	5% Phasing in, at sea (< 24m)			
	5 % Phasing in Artisanal landings			
	Observer reports			
Res. 01/06 - Statistical document programme	1st Semester report	N/A	N/A	
	2nd Semester report	N/A	N/A	
	Annual report	N/A		
	Information on authorised institutions and personnel	N/A		
Res. 05/03	Port inspection programme			
Res. 10/11	List of designated ports			
	Designated competent Authority			
	Prior notification periods			
	Inspection report			
	At least 5% inspection of LAN or TRX			
	Denila of entry in port			
Res. 10/10	Report on import, landing, transhipment of tuna & tuna-like fish products in ports			

Resolution	Requirements	IRN	OMN	PAK
Art. X Agreement	Report of Implementation			
Res. 10/09	Compliance Questionnaire			
SC04	National report			
S17	Feedback letter			
Res. 14/04	Documents listed in this resolution on board			
	Marking of vessels			
	Marking of gears			
	Marking of FADs		N/A	N/A
	Logbook on board			
	Official ATF			
Res 13/03	Official fishing logbook			
Res. 12/12	Ban on large-scale driftnets			
Res. 13/08	FADs mgt plan		N/A	N/A
Res. 10/08	List of Active vessels			
Res. 12/11	Fleet Development Plan (FDP)			
	List of vessels for Tropical Tuna during 2006			
	List of vessels3 for SWO and ALB during 2007	N/A		
Res. 14/04	List of Authorized vessels 24 metres in length overall or more			
	List of Authorized vessels (less than 24m, operating in waters outside EEZ of the flag state)			N/A
Res. 14/05	List of foreign vessels licensed in EEZ	N/A	N/A	
	List of foreign vessels denied a licence	N/A	N/A	
	Access agreement information	N/A	N/A	
	Official coastal State fishing License	N/A	N/A	
Res. 06/03	Adoption VMS for all vessels greater than 15 metres in length overall			
	VMS report on the progress and implementation			
Res. 10/02 - Flag State CPCs	Nominal Catch Coastal fisheries			
	Nominal Catch Surface fisheries		N/A	
	Nominal Catch LL Provisional	N/A		N/A
	Nominal Catch LL Final	N/A		N/A
	Catch & Effort Coastal fisheries			
	Catch & Effort Surface fisheries		N/A	
	Catch & Effort LL provisional	N/A		N/A
	Catch & Effort LL Final	N/A		N/A
	Size Frequency Coastal fisheries			
	Size Frequency Surface fisheries		N/A	
	Size Frequency LL provisional	N/A		N/A
	Size Frequency LL Final	N/A		N/A
	Fish Aggregating Devices (FAD) - Supply vessels	N/A	N/A	N/A
	Fish Aggregating Devices (FAD) - Days at sea by supply vessels	N/A	N/A	N/A
	Fish Aggregating Devices (FAD) - FADs set by type	N/A	N/A	N/A

Table 2. Potential for improved compliance rating with implementation of ROS (CMMs related to the ROS highlighted in blue)

Resolution	Requirements	IRN	OMN	PAK
Res. 10/02 - Costal State CPCs	Catch & Effort Surface fisheries	N/A	N/A	
	Catch & Effort LL provisional	N/A	N/A	
	Catch & Effort LL Final	N/A	N/A	
Res. 05/05	Submission of data regarding Sharks - Nominal catch			
Res. 05/05	Submission of data regarding Sharks - Catch & effort			
Res. 05/05	Submission of data regarding Sharks - Length Frequency			
Res. 12/09	Prohibition on thresher sharks - family Alopiidae			
Res. 13/06	Prohibition on oceanic whitetip sharks			
Res. 12/04	Sea turtles report			
	Carry line cutters and de-hookers on board (Longliners)	N/A		N/A
	Carry dip nets (Purse seiners)		N/A	N/A
Res. 10/06	Seabirds report	N/A		N/A
	Implementation of mitigation measures south of 25°S	N/A		N/A
Res. 13/04	Instances of Cetaceans encircled		N/A	N/A
Res. 13/05	Instances Whale Sharks encircled		N/A	N/A
Res. 11/03	IUU listing			
Res. 07/01	Compliance by nationals			
Res. 14/06	At sea transhipments – CPC report	N/A		N/A
	Transhipments in port report			
	List of Authorised carrier vessels	N/A		N/A
	Report on results of investigations on possible infractions	N/A		N/A
	ROP fee	N/A		N/A
Res. 11/04	Regional Observer Scheme2 (No. of vessels monitored and coverage by gear type)			
	5% Mandatory, at sea (> 24m)			N/A
	5% Phasing in, at sea (< 24m)			
	5 % Phasing in Artisanal landings			
	Observer reports			
Res. 01/06 - Statistical document programme	1st Semester report	N/A	N/A	
	2nd Semester report	N/A	N/A	
	Annual report	N/A		
	Information on authorised institutions and personnel	N/A		
Res. 05/03	Port inspection programme			
Res. 10/11	List of designated ports			
	Designated competent Authority			
	Prior notification periods			
	Inspection report			
	At least 5% inspection of LAN or TRX			
	Denila of entry in port			
Res. 10/10	Report on import, landing, transhipment of tuna & tuna-like fish products in ports			

Resolution	Requirements	IRN	OMN	PAK
Art. X Agreement	Report of Implementation			
Res. 10/09	Compliance Questionnaire			
SC04	National report			
S17	Feedback letter			
Res. 14/04	Documents listed in this resolution on board			
	Marking of vessels			
	Marking of gears			
	Marking of FADs		N/A	N/A
	Logbook on board			
	Official ATF			
Res 13/03	Official fishing logbook			
Res. 12/12	Ban on large-scale driftnets			
Res. 13/08	FADs mgt plan		N/A	N/A
Res. 10/08	List of Active vessels			
Res. 12/11	Fleet Development Plan (FDP)			
	List of vessels for Tropical Tuna during 2006			
	List of vessels3 for SWO and ALB during 2007	N/A		
Res. 14/04	List of Authorized vessels 24 metres in length overall or more			
	List of Authorized vessels (less than 24m, operating in waters outside EEZ of the flag state)			N/A
Res. 14/05	List of foreign vessels licensed in EEZ	N/A	N/A	
	List of foreign vessels denied a licence	N/A	N/A	
	Access agreement information	N/A	N/A	
Res. 06/03	Official coastal State fishing License	N/A	N/A	
	Adoption VMS for all vessels greater than 15 metres in length overall			
	VMS report on the progress and implementation			
Res. 10/02 - Flag State CPCs	Nominal Catch Coastal fisheries			
	Nominal Catch Surface fisheries		N/A	
	Nominal Catch LL Provisional	N/A		N/A
	Nominal Catch LL Final	N/A		N/A
	Catch & Effort Coastal fisheries			
	Catch & Effort Surface fisheries		N/A	
	Catch & Effort LL provisional	N/A		N/A
	Catch & Effort LL Final	N/A		N/A
	Size Frequency Coastal fisheries			
	Size Frequency Surface fisheries		N/A	
	Size Frequency LL provisional	N/A		N/A
	Size Frequency LL Final	N/A		N/A
	Fish Aggregating Devices (FAD) - Supply vessels	N/A	N/A	N/A
	Fish Aggregating Devices (FAD) - Days at sea by supply vessels	N/A	N/A	N/A
	Fish Aggregating Devices (FAD) - FADs set by type	N/A	N/A	N/A

APPENDIX VI – ROS update

ESTIMATED OBSERVER COVERAGE FOR LONGLINE VESSELS[7]

	Total effort (no.hooks)					Observed effort (no. hooks)					Coverage				
MEMBERS	**2010**	**2011**	**2012**	**2013**	**2014**	**2010**	**2011**	**2012**	**2013**	**2014**	**2010**	**2011**	**2012**	**2013**	**2014**
Australia	622,461	359,832	672,398	609,995	449,387	15330	6232	89490		20040	2.46%	1.73%	13.31%	0.00%	4.46%
Belize	653,332	693,449	1,626,217	315,470	1,639,340						0.00%	0.00%	0.00%	0.00%	0.00%
China	16,993,970	4,136,710	11,295,050	23,439,470	19,212,540	95205		185742	216640		0.56%	0.00%	1.64%	0.92%	0.00%
–Taiwan,China	219,630,038	182,770,834	170,510,584	199,408,593	204,860,159						0.00%	0.00%	0.00%	0.00%	0.00%
Comoros															
Eritrea															
EU - France	3,855,936	3,862,073	3,486,795	4,160,931	3,692,302		113269	74502	96379	67831	0.00%	2.93%	2.14%	2.32%	1.84%
EU - Portugal	949,134	903,600	685,206	1,558,000	1,460,464		140317	73685	127580	90894	0.00%	15.53%	10.75%	8.19%	6.22%
EU - Spain	3,174,705	3,758,516	4,673,785	6,262,822	6,262,823						0.00%	0.00%	0.00%	0.00%	0.00%
EU - UK	61,400	92,300	71,400	55,000	84,700						0.00%	0.00%	0.00%	0.00%	0.00%
Guinea	575,706										0.00%				
India	67,647,814	86,414,352	65,307,478	68,888,882	68,568,466						0.00%	0.00%	0.00%	0.00%	0.00%
Indonesia	124,235,772	147,671,304	212,043,061	201,002,634	200,923,010						0.00%	0.00%	0.00%	0.00%	0.00%
Iran, Isl. Rep. of															
Japan	37,032,932	28,854,054	31,460,928	29,125,098	31,851,882	1150505	603157	953098			3.11%	2.09%	3.96%	2.87%	1.71%
Kenya	188,663										0.00%				
Korea, Rep. of	6,013,391	5,862,681	4,350,708	5,337,464	6,740,247	389042		282656	546927	213225	6.47%	0.00%	6.50%	10.25%	3.16%
Madagascar	461,202	378,092	352,179	329,795	329,795			6140	16578	17192	0.00%	0.00%	1.74%	5.03%	5.21%
Malaysia	17,662,451	13,573,214	4,152,912	5,670,899	5,016,015						0.00%	0.00%	0.00%	0.00%	0.00%
Maldives				3,054,590	3,040,716									0.00%	0.00%
Mauritius	267,063	252,480	182,300	150,560							0.00%	0.00%	0.00%	0.00%	
Mozambique	387,200	387,200	387,200		7,249			1100			0.00%	0.00%	0.28%		0.00%
Oman, Sultanate of	17,564,313	16,337,868	6,379,166	2,620,599	1,465,331						0.00%	0.00%	0.00%	0.00%	0.00%
Pakistan															
Philippines	2,784,696	560,653	7,317,740	3,759,626	2,016,101						0.00%	0.00%	0.00%	0.00%	0.00%
Seychelles	4,375,885	3,080,822	3,400,912	3,876,173	21,366,998						0.00%	0.00%	0.00%	0.00%	0.00%
Sierra Leone															
Somalia															
Sri Lanka	121,441,429	116,173,257	145,167,205	150,323,057	176,697,025						0.00%	0.00%	0.00%	0.00%	0.00%
Sudan															
Tanzania, United															
Rep.of	774,399	2,388,937	2,444,933	2,607,116	2,607,116						0.00%	0.00%	0.00%	0.00%	0.00%
Thailand	1,489,193	1,041,600	1,061,363	784,881	765,787						0.00%	0.00%	0.00%	0.00%	0.00%
United Kingdom															
Vanuatu	916,919		1,269,690								0.00%		0.00%		
Yemen															
COOPERATING NON CONTRACTING PARTIES															
Bangladesh															
Djibouti															
Liberia															
Senegal															
South Africa	1,751,043	1,219,015	1,176,125	959,285	565,705			293685	836759	543543(7910)*	0.00%	0.00%	0.00%	0.00%	1.40%
Other	7,393,335	7,854,251	9,807,823	9,770,241	9,725,867						0.00%	0.00%	0.00%	0.00%	0.00%
Total	**658,904,383**	**628,627,093**	**689,283,159**	**724,071,182**	**769,349,025**	**1,650,082**	**862,975**	**1,960,098**	**1,840,863**	**409,182**	**0.25%**	**0.14%**	**0.28%**	**0.25%**	**0.05%**

NB: the ROS came into force mid-way through in July 2010 so annual coverage rates are expected to be relatively lower for 2010.

Portugal and Madagascar: the number of hooks are estimated based on the number of reported fishing days and previous hooks - fishing day ratios.

Japan: the data received by the Secretariat on the number of observed hooks for 2011-2012 are provisional, and will be revised by Japan in 2015

*South Africa: observed hooks are based on foreign fleets, other than the bracketed number in 2014 which was for a S. Africa flagged vessel.

Key: TOTAL EFFORT (#HOOKS): Total number of hooks set by longliners, by fishing fleet and year, including:

Total effort available (green font)

Total effort not available: total effort estimated using the nominal catches available and sampled effort or catch rates from other fleets or year periods (red font)

[7] IOTC–2015–WPEB11–08 Rev_1

ESTIMATED OBSERVER COVERAGE FOR PURSE SEINE VESSELS

	Total effort (no. fishing days)					Observed effort (no. fishing days)					Coverage				
MEMBERS	**2010**	**2011**	**2012**	**2013**	**2014**	**2010**	**2011**	**2012**	**2013**	**2014**	**2010**	**2011**	**2012**	**2013**	**2014**
Australia	175	130	148	133	115						0.00%	0.00%	0.00%	0.00%	
Belize															
China															
–Taiwan,China															
Comoros															
Eritrea															
EU - France	2801	3114	3052	3390	2662		360	425	364		0.00%	11.56%	13.92%	10.74%	
EU - Portugal															
EU - Spain	3531	3555	3684	3899	4224						0.00%	0.00%	0.00%	0.00%	
EU - UK															
Guinea															
India															
Indonesia															
Iran, Isl. Rep. of	128	139	168	172	183						0.00%	0.00%	0.00%	0.00%	
Japan	96	95	72	36	35						0.00%	0.00%	0.00%	0.00%	
Kenya															
Korea, Rep. of			94	387	519				33				0.00%	8.52%	
Madagascar									14*	118*					
Malaysia	12										0.00%				
Maldives															
Mauritius				27	277									0.00%	
Mozambique															
Oman, Sultanate of															
Pakistan															
Philippines															
Seychelles	2144	2166	1969	1670	1904						0.00%	0.00%	0.00%	0.00%	
Sierra Leone															
Somalia															
Sri Lanka				62										0.00%	
Sudan															
Tanzania, United Rep.of															
Thailand	137										0.00%				
United Kingdom															
Vanuatu															
Yemen															
COOPERATING NON CONTRACTING PARTIES															
Bangladesh															
Djibouti															
Liberia															
Senegal															
South Africa															
Other															
Total	**9,025**	**9,199**	**9,188**	**9,777**	**9,919**	**0**	**360**	**425**	**397**	**0**	**0.00%**	**3.91%**	**4.63%**	**4.06%**	**0.00%**

NB: the ROS came into force mid-way through in July 2010 so annual coverage rates are expected to be relatively lower for 2010

*Madagascar: observers onboard foreign vessels

Key: TOTAL EFFORT (#FDAYS): Total number of days fished by tuna purse seiners, by fishing fleet and year, including:

Total effort available (green font)

Total effort not available: total effort estimated using the nominal catches available and sampled effort or catch rates from other fleets or year periods (red font)

CPCs	Active Vessels LOA≥24m or High Seas vessels[8]				Progress	List of accredited observers submitted	Number of observer reports provided[9]					
	LL	PS	GN	BB			2010	2011	2012	2013	2014	2015
MEMBERS												
Australia	3	5			Australia has implemented an observer programme for the longline fleet	**YES: 21**	**2(O)**	**1(O)**	**3(O)**	**No**	**2(O)**	**No**
Belize	4				No information received by the Secretariat.	**No**	**No**	**No**	**No**	**No**	**No**	**No**
China –Taiwan,China	47 241				China has implemented an observer programme	**YES: 3** **YES: 54**	**1(O)** **No**	**No** **No**	**1(O)** **No**	**1(O)** **No**	**No** **No**	**No** **No**
Comoros					Comoros does not have vessels ≥ 24m. Two observers were trained under the IOC Regional Monitoring Project, and 5 by SWIOFP.	**YES: 7**	N/A	N/A	N/A	N/A	N/A	N/A
Eritrea	No information received				No information received by the Secretariat.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
European Union	15 6 22 2	13 0 15 0			EU has an observer programme on-board its purse seine and longline fleets. To date, no information has been received from EU,Spain and EU,UK.	Partial: **EU,France: 52** **EU,Portugal: 4** **EU,Spain : 9** **EU,UK : No**	**No**	EU, France: 13+9**(O)** EU, Portugal: 1**(O)**	EU, France: 13+7**(O)** EU, Portugal: 1**(O)**	EU, France: 15+7**(O)** EU, Portugal: 1**(O)**	EU, France: 18(O) EU, Portugal: 1**(O)**	**No**
Guinea					Guinea has had no vessels operating in the Indian Ocean since 2006	N/A	N/A	N/A	N/A	N/A	N/A	N/A
India					India has not yet developed an observer programme.	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Indonesia	458				Indonesia has 13 registered IOTC observers and a number of initiatives, however, no data have been submitted to the IOTC Secretariat	**YES:13**	**No**	**No**	**No**	**No**	**No**	**No**
Iran, Isl. Rep. of		5	1223		30 observers have been selected and are due to be deployed in 2016. IOTC observer training will be taking place in 2015.	**No**	**No**	**No**	**No**	**No**	**No**	**No**

[8] The number of active vessels is given for 2014
[9] Year in which the observed trip has started (E: Electronic; O: Other)

CPCs	Active Vessels LOA≥24m or High Seas vessels[8]				Progress	List of accredited observers submitted	Number of observer reports provided[9]					
	LL	PS	GN	BB			2010	2011	2012	2013	2014	2015
Japan	53				Japan started its observer programme on the 1st of July 2010, and currently deploys 19 observers in the Indian Ocean.	YES: 19	6(E)	8(E)	7(E)	No	No	No
Kenya					Kenya is developing an observer programme and 5 observers have been trained by SWIOFP. Kenya has had no vessels listed in the active vessel registry since 2010.	YES: 5	No	N/A	N/A	N/A	N/A	N/A
Korea, Rep. of	10	4			Korea has had an observer programme since 2002 and has 28 observers registered in the Indian Ocean.	YES: 28	2(O)	No	2(O)	3(O)	3(O)	No
Madagascar	7				Madagascar has developed an observer programme. Five and three observers have been trained through SWIOFP and IOC respectively.	YES: 7	No	No	5(O)[10]	8(O)	7(O)	No
Malaysia	11				Malaysia is developing plans for the implementation of an observer programme.	No	No	No	No	No	No	No
Maldives	27			317	Maldivian vessel landings are monitored by field samplers at landing sites. Maldives is currently developing an at-sea observer programme.	YES: 4	No	No	No	No	No	No
Mauritius		7			Mauritius is developing an observer programme. Five observers have been trained through SWIOFP and three through the IOC.	YES: 8	No	No	No	No	No	No
Mozambique	2				Mozambique has an observer programme and has submitted one trip report, but did not have any active vessels ≥24m in 2013.	YES: 11	No	No	1(O)	N/A	No	No
Oman	3				No onboard observers have yet been deployed, however IOTC training will take place in 2015.	No	No	No	No	No	No	No
Pakistan					Onboard observers have been deployed through WWF-Pakistan, however no data has been submitted to the IOTC Secretariat. Training will be taking place in 2015.	No	No	No	No	No	No	No
Philippines	4				No information received by the Secretariat.	No	No	No	No	No	No	No
Seychelles	31	8			Seychelles is developing an observer programme. Four observers have been trained through SWIOFP and three through the IOC.	YES: 7	No	No	No	No	No	No

[10] Reports from Madagascar include observers onboard foreign vessels

CPCs	Active Vessels LOA≥24m or High Seas vessels[8]				Progress	List of accredited observers submitted	Number of observer reports provided[9]					
	LL	PS	GN	BB			2010	2011	2012	2013	2014	2015
Sierra Leone	No information received				No information received by the Secretariat.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Somalia	No information received				No information received by the Secretariat.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sri Lanka	13	7	1589		Sri Lanka has begun a pilot observer initiative and submitted observer data from pilot trips in 2015 for review.	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Sudan	No information received				No information received by the Secretariat.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tanzania, United Rep.of	3				Tanzania does not currently have an observer programme in place.	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Thailand	6				No information received by the Secretariat.	**No**	**No**	**No**	**No**	**No**	**No**	**No**
United Kingdom (OT)					The UK(OT) does not have any active vessels in the Indian Ocean.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanuatu					Vanuatu does not currently have an observer programme in place.	**No**	**No**	N/A	**No**	**No**	**No**	**No**
Yemen	No information received				No information received by the Secretariat.	**No**	**No**	**No**	**No**	**No**	**No**	**No**
COOPERATING NON-CONTRACTING PARTIES												
Bangladesh					No information received by the Secretariat.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Djibouti					No information received by the Secretariat.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Liberia					No information received by the Secretariat.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Senegal					Senegal has not had any active vessels in the Indian Ocean since 2007.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
South Africa	6				South Africa currently only operates an observer programme for foreign vessels operating within the EEZ.	**YES: 16**	**No**	**13(O)[11]**	**10(O)**	**13(O)**	**9(O)**	**No**

[11] Reports from South African observers onboard foreign vessels operating in the EEZ of South Africa, except for one report in 2014 on a S. Africa flagged vessel.