

A PILOT PROJECT FOR THE IOTC REGIONAL OBSERVER SCHEME

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EXECUTIVE SUMMARY

Since its origination in 2009, national implementation of the Regional Observer Scheme remains very low among IOTC CPCs. Artisanal fisheries are hugely important in the Indian Ocean and yet the implementation of observers in these fisheries remains particularly low. Where observer programmes have been established, these are wide ranging and highly variable in the type and quality of information collected and the reporting of data to IOTC standards remains poor and so the data that are submitted and stored regionally are currently of little value.

In recognition of these issues and in a positive step towards addressing the problems and seeking solutions, the IOTC adopted Resolution 16/04 *On the implementation of a pilot project in view of promoting the Regional Observer Scheme of IOTC* earlier this year. This paper therefore outlines a comprehensive plan for the ROS Pilot Project as part of a long-term, holistic strategy for supporting the implementation of the Regional Observer Scheme in the IOTC area of competence.

This project proposal aims to tackle each of the key issues that currently preventing the collection and analysis of high quality data to contribute to stock assessment and management advice through the development of new technologies, tools, standards and processes. A critical component in all of the workstreams proposed is the piloting phase and Resolution 16/04 provides a framework for trialling these innovations by drawing together the outputs from the various work streams and operationalising them in selected voluntary CPCs. The project framework is centred around five key components.

The first component addresses the problem of establishing observer programmes from scratch where there are few resources, expertise and experiences to draw on through the development of a full observer training programme package. This is intended to produce a set of working protocols, tools and materials for observer managers to assist them in setting up new observer programmes and providing a training package to be used for the training of observers. Alongside this the development of a set of standards for observer programmes and observers are required in order to assist the harmonisation of schemes that are currently in place and under development to assure that data have been collected in a standardised way, are of sufficiently good quality to be used for analysis and to allow for observer exchange among CPCs where vessels may be entering multiple coastal EEZs.

The second project component aims to tackle the issues with poor data reporting such as the data that are currently being submitted in hard copy, hand-written format, in flowing prose in non-IOTC languages or other non-standard methods meaning that the extraction of pertinent data may be complex, time-consuming and costly. This is to be addressed through the development of an electronic reporting tool which will facilitate the submission of data at both the national and at the regional level, improving the quality of data through error-checking procedures and creating time-saving efficiencies for CPCs and the IOTC Secretariat. A closely linked third project component is the development of a regional database to host observer data and the population of

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this database with historic data that has been submitted in non-standard formats or has not yet been submitted at all due to various reasons.

The fourth project component is the development of Electronic Monitoring Systems (EMS) for small-scale fisheries, specifically gillnet fleets, in the Indian Ocean. Developing coastal states with large fleets of small vessels have identified a number of difficulties they face with implementing an onboard observer scheme. These include concerns about adequate safety-at-sea, inadequate working and living conditions onboard the small vessels, lack of human and financial resources required for sufficiently monitoring the large number of vessels and coordination of an observer scheme. Given the successes of EMS that have been evidenced in other oceans and fisheries, it is important that this is trialled for gillnet fleets in the Indian Ocean, particularly where no observer coverage has yet been implemented. In conjunction with this, the fifth project component will involve the development of data collection protocols for port sampling to complement data collected by EMS and onboard observers.

The development of these tools and technologies will run concurrently and be trialled together in three selected voluntary CPCs. Once tested and verified, long-term resourcing strategies will be developed for the continuation of activities and expansion to other CPCs, where applicable. A Project Steering Committee will be established to provide direction and oversight over the course of the project lifetime and a mid-term and final review will be conducted by the IOTC Scientific Committee. Further details, including detailed project activities, timelines and budgets are including in this proposal.

PURPOSE

To provide the SC19 with the opportunity to consider, review, contribute to the development of and adopt the proposal for a pilot project to support the Regional Observer Scheme.

BACKGROUND

Fisheries observer data is vitally important for fisheries management, providing an independent source of detailed, high quality information on fishing activities and catches at a sufficient level of resolution to be used for analyses such as the standardisation of catch rates and analysis of bycatch mitigation measures. At the 13th Session of the Commission (S13), the Commission adopted Resolution 09/04 *on a Regional Observer Scheme*, which was superseded in 2010 by Resolution 10/04, and again in 2011 by Resolution 11/04. The main objective of the IOTC Regional Observer Scheme is to *'collect verified catch data and other scientific data related to the fisheries for tuna and tuna-like species in the IOTC area of competence'* [Res 11/04, para. 1].

Resolution 11/04 *On a Regional Observer Scheme* makes provision for the development and implementation of national observer schemes among the IOTC CPCs starting in July 2010 and covering *"at least 5 % of the number of operations/sets for each gear type by the fleet of each CPC while fishing in the IOTC Area of competence of 24 meters overall length and over, and under 24 meters if they fish outside their EEZs shall be covered by this observer scheme. For vessels under 24 meters if they fish outside their EEZ, the above mentioned coverage should be achieved progressively by January 2013"*.

At its 13th Session the IOTC Scientific Committee (SC13) reviewed the report of the technical workshop organised in May 2010, and endorsed the documents produced by the IOTC Secretariat: an Observer Manual², including a set of guidelines, standards and supporting information for observer data collection, reporting and training, an Observer Trip Report template³ containing the minimum reporting requirements and data forms containing minimum data collection requirements. These were formally adopted at the 15th session of the Commission where it was noted⁴ *"Minimum data requirements were adopted as well as an observer report template that will be reviewed and revised as necessary"*.

² IOTC-2010-SC11

³ IOTC-2010-SC12

⁴ IOTC-2011-S15-R[E]

At the 17th session of the Scientific Committee, “*the SC **NOTED** the revisions to the observer reporting templates proposed by the WPEB10 and the WPDCS10 to improve the quality of the data submissions for scientific purposes such as stock assessments and other such scientific work as requested by the IOTC Scientific Committee*”. Further “***NOTING** that improving the quality of data submissions is a process that evolves and develops over time, the SC **ADOPTED** the revised observer templates as interim reporting templates for immediate use by CPCs where ready and for preliminary use by CPCs where further time is required for review. The SC **AGREED** that the IOTC Secretariat will make these templates available in 2015 and update the guidance in the manual accordingly. Following implementation in interim format, the SC **AGREED** that these will be reviewed and modified further as appropriate in 2015*”. The revised reporting templates, updated version of the manual and data collection forms are available on the IOTC website⁵.

The Resolution also states that “*the number of the artisanal fishing vessels landings shall also be monitored at the landing place by field samplers*” and that “*the indicative level of the coverage of the artisanal fishing vessels should progressively increase towards 5% of the total levels of vessel activity (i.e. total number of vessel trips or total number of vessels active)*”. There are currently no established guidelines for the collection of data from artisanal vessels fishing within their national EEZ so this remains an area for further development.

A large number of observer programmes have now been established for industrial fleets across the Indian Ocean and these are used to collect scientific fisheries data by onboard observers, according to specific research requirements specified by each of the coordinating organisations. Data are collected and reported at the regional level to the IOTC Secretariat as summarised in paper IOTC-2016-SC19-07.

RECOMMENDATION/S

That the Scientific Committee:

- 1) **AGREE** on a Project Steering Committee to oversee the development and implementation of the ROS Pilot Project.
- 2) **REQUEST** Contracting Parties to provide their comments and suggestions within one month after the IOTC Executive Secretary transmission of the draft project, following the Scientific Committee.
- 3) **RECOMMEND** the Commission considers and approves the plan for the ROS Pilot Project

⁵ www.iotc.org/science/regional-observer-scheme-science

Implementation of the observer scheme

Since the establishment of the IOTC Regional Observer Scheme, a number of key issues have been identified which are hindering progress in reaching the ultimate objectives of providing good quality, comprehensive, independent data to be used to inform management advice. The main issues are outlined below.

Low level of implementation

Although 7 years have now passed since the Resolution first came into force (in its first iteration, 09/04), the level of implementation of national observer schemes is still very low. Developing coastal states with large fleets of small vessels have identified a number of difficulties they face with implementing an onboard observer scheme. These include concerns about adequate safety-at-sea, inadequate working and living conditions onboard the small vessels, lack of human and financial resources required for sufficiently monitoring the large number of vessels and coordination of an observer scheme. There are also complex socio-cultural issues involved with deploying scientific observers on vessels who are of different nationalities and socioeconomic backgrounds to the crew members with the associated various language and cultural barriers. Observer coverage for coastal fisheries continues to be low, while no observer data for gillnet fleets has been reported to the IOTC Secretariat to date (IOTC-2016-SC19-07).

The SC has acknowledged the low level of implementation and agreed on capacity building activities to be undertaken: “...*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*” (SC17 para. 157).

These capacity building missions have been conducted by the Secretariat, however, due to the limited resources, the extent and duration of missions is necessarily limited. This has also been acknowledged by the Scientific Committee:

*“NOTING that training of observers and crew is long-term and necessarily meticulous work that should be done in a recurrent way in order to optimise the efficiency of observers, the SC **RECOMMENDED** that the IOTC Secretariat increases its effort in training observers, including species identification. This would only be possible if the Commission were to increase staffing at the IOTC Secretariat and allocate specific funding for the Regional Observer Scheme implementation” (SC18).*

Nevertheless, the implementation of an observer scheme is not something that a few ad hoc capacity building missions can accomplish and is hindered by the lack of a set of agreed regional minimum standards for scientific observer programmes, competency standards for observers and lack of a comprehensive training programme including tools and materials.

Low level of reporting to IOTC

The information received by the IOTC on the implementation of observer schemes is also very low. In some cases this is due to a lack of implementation, while in others it is simply lack of reporting from the established schemes.

As of 9th August 2016, fifteen CPCs (Australia, China (including Taiwan,China), Comoros, EU (France⁶, Spain and Portugal), Indonesia, Japan, Kenya, Rep. of Korea, Madagascar, Maldives, Mauritius, Mozambique, Seychelles, South Africa and Thailand) have submitted a list of observers and have been allocated an IOTC observer registration number. This makes a total of 348 currently registered observers.

⁶ Including Mayotte due to its status as a French outermost region since January 2014

As of 9th August 2016, 352 observer trip reports have been submitted to the IOTC Secretariat by Australia, China (including Taiwan,China), EU(France, Portugal and Spain), France OT, Indonesia, Japan, Rep. of Korea, Madagascar, Mauritius, Mozambique, Seychelles, Sri Lanka and South Africa.

The low level of reporting has been noted by the Scientific Committee on many occasions, e.g. “*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...*” (SC17 para. 157).

This low level of data reporting might be due to limited resources or time for data processing, lack of technical expertise, or lack of knowledge of the reporting requirements and timescales for data reporting. Improvements in data reporting methods will result in improved efficiency for both CPCs and IOTC Secretariat receiving the information.

Variability in observer programmes

There is a vast array of different observer programmes that have been developed across the Indian Ocean, established both prior to and since the implementation of Resolution 11/04 by a range of organisations. These include IOC, SWIOFP, TAAF, SFA, CSP, OCUP, AZTI, WWF, Orthongel and IRD. While the IOTC has developed and published broad guidelines and some standards for observer schemes in the region, the range of observer programmes in place has led to a corresponding lack of standardised procedures for national observer schemes. Different training curricula have been developed, using different resources and data collection methods and procedures based on different national data reporting requirements and systems and adhering to different standards. Many of these schemes are fleet specific and include coastal fisheries as well as Indian Ocean tuna fisheries. The result of this is an assortment of data collected of varying quality, with many inconsistencies and not reported in a standard way. The issues associated with this variety of standards and programmes and lack of coordination have already been identified in some areas such as the southwest Indian Ocean region where foreign fleets fish within the waters of a number of different coastal EEZs and are required to have national observers on their vessels as part of their Fisheries Partnership Agreements. Here, the mixing of observer roles has also arisen between compliance and science objectives and activities, causing some confusion and conflict.

Enhancing regional harmonisation of observer programmes will be beneficial for CPCs, particularly where there are agreements between foreign fishing vessels and coastal states where the deployment of a single observer to operate when the vessel is fishing in coastal waters or on the high seas.

Lack of data reporting to IOTC standards

At the 17th session of the Scientific Committee, “*the SC **NOTED** the revisions to the observer reporting templates proposed by the WPEB10 and the WPDCS10 to improve the quality of the data submissions for scientific purposes such as stock assessments and other such scientific work as requested by the IOTC Scientific Committee*”. Further “***NOTING** that improving the quality of data submissions is a process that evolves and develops over time, the SC **ADOPTED** the revised observer templates as interim reporting templates for immediate use by CPCs where ready and for preliminary use by CPCs where further time is required for review. The SC **AGREED** that the IOTC Secretariat will make these templates available in 2015 and update the guidance in the manual accordingly. Following implementation in interim format, the SC **AGREED** that these will be reviewed and modified further as appropriate in 2015*”.

The interim reporting templates, updated version of the manual and data collection forms were made available on the IOTC website: www.iotc.org/science/regional-observer-scheme-science and CPCs were reminded that the data can be submitted in any electronically readable format as long as the agreed data required for reporting are provided. While a number of CPCs are now reporting according to the new requirements, many are still reporting a range of data in a variety of other formats, including hard copies, pdf and word formats, sometimes

in flowing prose and languages other than English or French. This prevents the data from being readily collated and analysed.

Summary

While some progress is being made in implementing the Regional Observer Scheme across the Indian Ocean, there are a number of key issues that still need to be addressed, namely: (i) the low level of implementation of onboard observers; (ii) the low level of data reporting to the IOTC; (iii) the variability in national observer programmes currently in place across the Indian Ocean and (iv) the lack of data reported according to IOTC standards and in electronic readable format. Nevertheless, the most urgent issue to be addressed is the low level of implementation through the development of national observer schemes in the many CPCs where there is currently no monitoring.

RESOLUTION 16/04

These issues described above have been identified and discussed by the IOTC Scientific Committee who have agreed that, while challenging, exploring possible methods of overcoming these problems is critical to the success of the Scheme. The Commission has also agreed that there is a need for a long-term, holistic strategy to address these issues and to develop solutions at the regional level and, as such, has adopted resolution 16/04 *On the implementation of a pilot project in view of promoting the Regional Observer Scheme of IOTC*.

Given the gaps in available information in the IOTC database and the importance of basic fishery data in order to assess the status of stocks and for the provision of sound management advice, the intention of this Resolution is to:

“Create a pilot project aiming to enhance the implementation of the Resolution 11/04 *on a Regional Observer Scheme* and to raise the level of compliance to the implementation of Resolutions 15/01 and 15/02, respectively *on the recording of catch and effort data by fishing vessels in the IOTC area of competence and on mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating non- Contracting parties (CPCs)*”.

This Resolution makes provisions for the trial of initiatives developed to support implementation of the ROS and to improve compliance with Resolutions 11/04, 15/01 and 15/02 through pilot projects.

PROPOSAL FOR A PILOT PROJECT

This paper outlines a plan for the ROS Pilot Project to develop a long-term, comprehensive strategic framework for supporting the implementation of the Regional Observer Scheme in the IOTC area of competence.

Given the issues identified with current progress of the ROS, there is a certain amount of essential groundwork that is required before regional level capacity building support efforts can take place. A number of initiatives are therefore planned to support the implementation of the ROS through the development of new technologies, tools, standards and processes. A critical component in all of these workstreams is the piloting phase and Resolution 16/04 provides a framework for trialling these innovations by drawing together the outputs from the various work streams and operationalising them in selected voluntary CPCs. This framework is centred around five key project components which contribute to the higher level goals in a complementary way:

1. Observer training programme and minimum standards
2. Electronic reporting project
3. Observer database development and historic data collation
4. Electronic monitoring project
5. Observation in-port

The overall workflow, inter-relationships and linkages among these component projects are shown in Figure 1 and each work stream is described in more detail in each of the sections below.

Project Steering Committee

A Steering Committee will be established to provide oversight and direction as well as to monitor progress, including a mid-term review and a final term review. The Steering Committee should include the Chairperson of the SC, the Executive Secretary of the IOTC and other appropriate representatives as selected by the SC19.

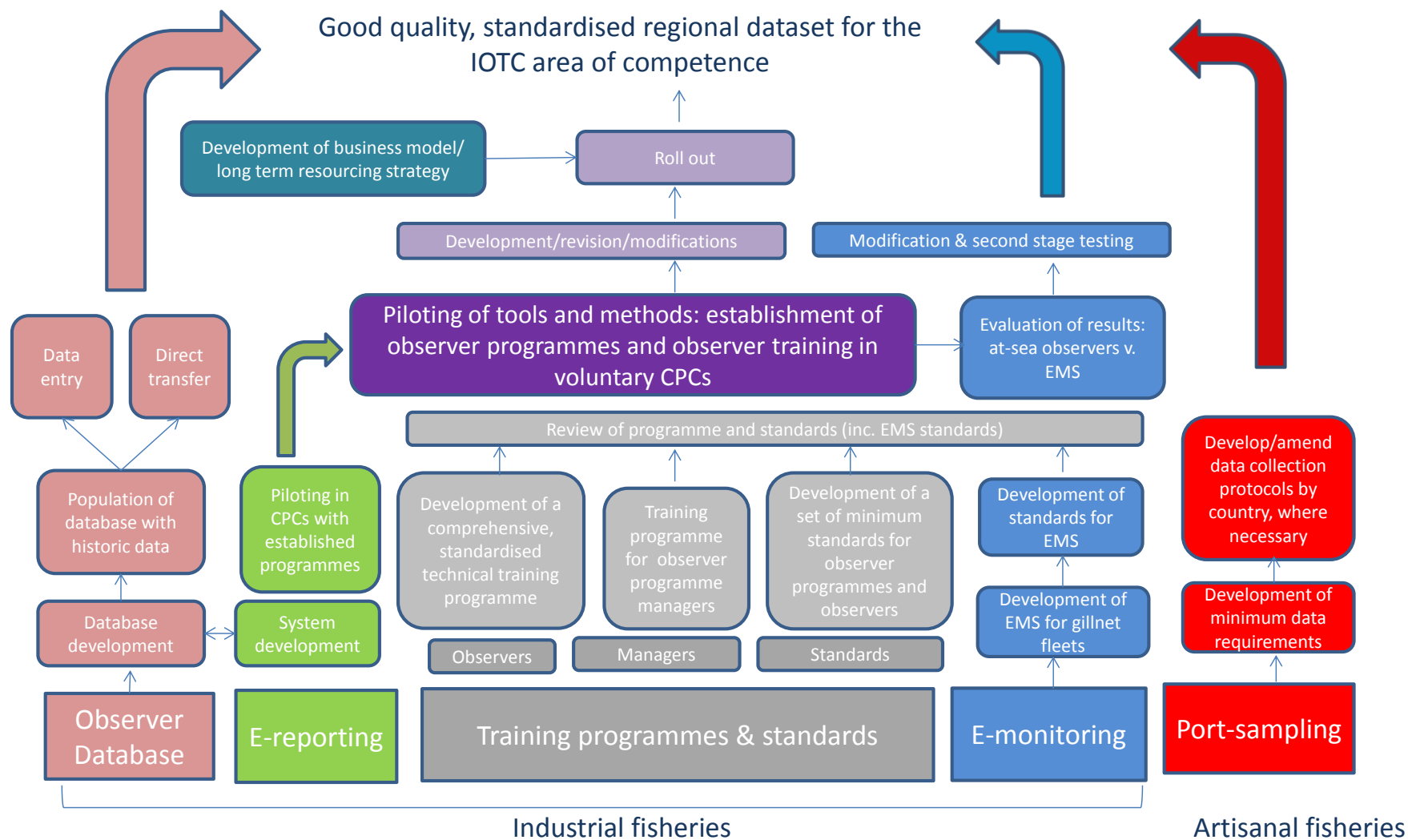


Figure 1. Proposed workflow of project streams for the ROS Pilot Project, Resolution 16/04

1. OBSERVER TRAINING PROGRAMME AND MINIMUM STANDARDS

This project component aims to address the issues associated with starting up observer programmes where none currently exist by providing the basic information, set of tools and materials required to support CPCs in establishing their national observer programmes. It also aims to address the varying quality and type of data collected and reported by established observer programmes by developing a basic set of standards for observer programmes and competency standards for observers to ensure that a minimum level is attained.

A) MANAGEMENT OF NATIONAL OBSERVER PROGRAMMES – STANDARDS, PROTOCOLS AND TRAINING

Good logistical management of observers deployed at-sea is a crucial aspect in ensuring the success of an observer programme. National observer scheme coordinators have the responsibility of ensuring that their schemes are functioning well through providing full support to observers in all technical and logistical aspects, reviewing the information submitted and ensuring high-quality data are reported at the regional level in a timely fashion (within 150 days of completion of the trip). To support the role of observer scheme coordinators, this project component outlines the development of a set of standards for observer programmes, working protocols and full training programme for coordinators. This should build on and develop the guidance provided in the IOTC ROS Observer Manual and include detailed sections on the following topics.

- ***IOTC Resolutions***

Observer programme coordinators must be aware of all IOTC Resolutions of relevance to the observer scheme and corresponding requirements. This includes aspects such as the flag vessel responsibility to have an observer onboard vessel, the level of coverage required, the species for which there is a retention ban or safe handling and release measures required as well as many others. These will be collated and presented in an easily readable format as part of a reference document.

- ***Guidelines for strategic planning***

Guidelines for the logistical coordination of national observer schemes should be provided. This will include guidance on initiating an observer programme where none currently exists covering aspects such as the necessary institutional structure for managing a programme, resourcing requirements, legal requirements, selection of vessels for observer coverage based on an appropriate stratified sample design to reach the minimum required coverage of 5% for each gear type within the fleet.

- ***Safety-at-sea***

The IOTC currently has agreed minimum safety requirements for pre-sea safety vessel checks, mandatory Survival Techniques and Occupational Health and Safety at Sea training (STCW95 compliant); and a recommended observer safety equipment issue. The observer programme coordinator is responsible for ensuring that the checks are completed and that certificates remain in date.

- ***Observer recruitment***

Minimum pre-requisites for observers include medical certificates and safety-at-sea certificates as listed in the IOTC ROS manual v1.2 must be provided to the IOTC Secretariat in order for the observer to be registered. A full observer training programme will be developed for selected observers (see section B).

- ***Observer deployment***

1. Observer briefing standards, methods and tools to cover the briefing process that takes place prior to boarding. An observer briefing template will be developed for ensuring that observers are adequately prepared before embarking on a trip. This will include checklists for observer health and safety equipment issue, technical equipment (based on ROS Manual v1.2), briefing on data collection protocol for the trip, specific tasks, ensuring adequate supply of data collection forms etc.

2. Observer deployment protocols to cover all logistical aspects of deployment, including the development of MoUs with vessel operators covering items such as the terms and conditions for observers working onboard and minimum requirements to be established before boarding.
3. Communication while at-sea, coordination with observer programmes of other CPCs where shared observers may be required
4. Observer debriefing standards, protocols and tools, including the development of a template to be used for debriefing. This should be based on the documentation already developed by other organisations where applicable for harmonisation and to avoid duplication of efforts⁷. This will provide a mechanism for the debriefer to verify the data collected, flag and address any issues arising before the information is reported, explore whether any other information can be recorded about the trip, give observers timely feedback on their data collection and the opportunity to suggest improvements.

- ***Data management, processing and reporting***

Protocols for reviewing the quality of data collected, managing this and reporting it to the IOTC will be developed. This will encompass the specific IOTC data requirements including the mandatory and recommended data collection and reporting requirements as specified in ROS manual v1.2 and describe potential data reporting formats. These will be general enough to cover the wide range of programmes and systems in place and will also be partially covered by the electronic reporting project for fleets that use the newly developed system.

Outputs

- A set of standards for observer programmes in the Indian Ocean region
- A training programme for observer programme coordinators including:
 - A set of working protocols for observer programme management detailed in a reference documents for managers to refer to on an ongoing basis
 - Templates and forms to assist with observer management, including briefing, deployment and debriefing
 - A full set of materials for presentation

Standards and protocols should be functional and minimal for the purposes of assisting with the development of observer schemes without creating undue burdens on the administrators of schemes by developing unnecessary requirements. The proposed timeline is presented in Table 1.

⁷ www.spc.int/Oceanfish/en/publications/cat_view/116-ofp-publications-a-documents/309-fisheries-monitoring/260-pirfo/262-pirfo-observer-debriefer

Table 1. Timeline for the development of a training programme for observer scheme coordinators

	2017 (first half)	2017 (second half)	2018	2019
Standards for national observer schemes	Development of minimum standards for national observer schemes to adhere to, including safety, observer briefing and debriefing standards. Developed by consultant/s with oversight by the IOTC Secretariat and SC Chair.	Review of standards by ad hoc observer working group, followed by WPDCS and approval of IOTC Scientific Committee	Approval of standards by the Commission. Standards published online and made available for use. All national observer programmes must assess whether they meet the standards for the scheme to be regionally recognised.	Extended uptake of tools and rollout of observer programmes by CPCs
Working protocols	Working protocols for observer programme managers to be prepared by a consultant/s. This should include specific items on data management, reporting, briefing and debriefing.	Review of protocols by ad hoc observer working group, followed by WPDCS and approval of IOTC Scientific Committee		
Training and reference materials	Development of materials for training by consultant/s. This will include templates and forms for debriefing, observer prerequisites and IOTC requirements.	Review of training and reference materials by ad hoc observer working group, followed by WPDCS and approval of IOTC Scientific Committee		

B) SCIENTIFIC OBSERVERS – STANDARDS, WORKING PROTOCOLS AND TRAINING PROGRAMME

Observer training can be undertaken by a range of different organisations, including national entities or be outsourced to specialised organisations/consultants, however, whatever type of training is carried out, it is important that basic observer competency standards are met.

This project component is developed to support observer programme coordinators from the first steps of establishing an observer programme by providing an ‘off the shelf’ package containing all the tools and materials, describing data collection methods and procedures required for the training of observers to a level of competency that has been agreed and accepted at the regional level. A comprehensive training programme will be produced, further developing the basic competency standards and working protocols outlined in the IOTC ROS Observer Manual v1.2. The project should build on and develop the established guidance further, producing fishery-specific components for the main IOTC gear types in usage: gillnet, longline, purse seine and pole and line. This will serve as a practical tool for those implementing observer training courses across the region and will be supported by a set of underlying standards which will provide a benchmark for harmonisation amongst the different programmes currently in operation.

Observer training curriculum

A comprehensive observer training curriculum will be developed based on the outline provided in Appendix IV of the ROS Manual v1.2 (p 141-142). This should cover all technical and scientific aspects of training required.

Observer working protocols

Detailed course content will be developed from this curriculum, based on the existing guidelines in the ROS manual and drawing on methodologies and procedures that have already been developed by other programmes to increase harmonisation and avoid reinventing the wheel. Specific topics to be developed further include sampling methodologies to be used onboard vessels when determining which sets to use on a trip as well as within-set sampling procedures and the reduction of associated bias as well as the documentation of estimation procedures. A priority area for development of best practice advice on working processes and procedures is the gillnet fleets. Guidelines developed should be clear and specific so that they may be operationalised easily.

Observer tools and materials

A comprehensive set of training materials corresponding to the curriculum should also be developed, including presentations, templates, notes, exercises, video footage and any additional resources required for training. Standard presentations for classroom sessions should be provided with training notes. Materials for species identification should be collated and developed, including forms for practical exercises. Photos should be sourced to assist with items such as explaining gear configuration, identifying vessel characteristics or for species identification exercises. Diagrams and video footage illustrating best practice handling for safe release of bycatch species should be collated. Standard exercises for training should be developed, such as completing data forms based on example information. All documentation produced should be clear, functional and concise, and developed on the basis that they will be used as working materials and translated into multiple languages. The ROS manual will be revised and updated to include all relevant reference material.

Observer competency standards

A complete set of required observer competencies will be developed. This will include the basic prerequisites described on page 39 of the ROS Manual v 1.2 and will further develop the technical competencies outlined:

- *Have sufficient knowledge and experience to identify species and collect information on different fishing gear configurations;*
- *Have satisfactory knowledge of the IOTC Conservation and Management Measures;*
- *Have the ability to observe and accurately record data collected under the scheme;*
- *Have the ability to collect biological samples; and*

- *Not be an employee of a fishing vessel company involved in the observed fishery. (page 140 and 39 of the ROS Manual v 1.2).*

A standard set of assessment criteria will be developed to ensure that the observer has acquired these skills by the end of the training course. These can then be certified as IOTC accredited observers by CPC and submitted to IOTC Secretariat for registration. Provisions will be set out for participants who do not meet these criteria, such as the requirement to undertake further training. Standards developed will be designed to take into account the different levels of capacity of CPCs within the Indian Ocean to ensure that they contain only essential elements and are not prohibitively restrictive to the establishment of observer programmes in resource-limited situations. There is a substantial amount of material that has been developed for other fisheries, particularly by SPC, and these should be used as a starting point and adapted and modified where necessary for the Indian Ocean fisheries, including the gillnet fleets. The Proposed timeline for these activities is presented in Table 2.

Table 2. Timeline for the development of observer training programme and competency standards

		2017 (first half)	2017 (second half)	2018	2019
Observer training programme	Course curriculum	Development of observer training curriculum by consultant with oversight by IOTC Secretariat.	Review of course curriculum by ad hoc observer working group, followed by WPDCS and approval of IOTC Scientific Committee	Following approval by the IOTC Scientific Committee, working protocols, methods, tools and materials will be published online and made available for wider use.	Extended uptake of tools and rollout of observer programmes by CPCs
	Observer working protocols	Development of observer working protocols	Review of observer working protocols by ad hoc observer working group, followed by WPDCS and approval of IOTC Scientific Committee		
	Tools and reference materials	Development of tools and materials	Review of tools and materials by ad hoc observer working group, followed by WPDCS and approval of IOTC Scientific Committee		
Observer standards	Observer competency standards	<ul style="list-style-type: none"> • Medical • Safety-at-sea • Technical competency Minimum competency standards for scientific observers to be developed by consultant with oversight by the IOTC Secretariat and SC Chair.	Review of standards by ad hoc observer working group, followed by WPDCS and approval of IOTC Scientific Committee	Approval of standards by the Commission. Standards published online and made available for use.	Only observers meeting these agreed competency standards will be submitted to the IOTC Secretariat for regional recognition.

Technical review

There will be three main phases of review of the observer standards and training programme. The initial review will take place via a regional ad hoc observer working group. This working group will be established to provide a detailed technical review and input to the development of the standards and protocols. This will be an open working group and will aim to incorporate representatives from the main sub-regional observer programmes and fleets currently in operation in the IOTC Area of Competence. Invitations to the workshop will be extended to representatives from the main observer training programmes across the Indian Ocean, and CPC representing national programmes. Representation will be sought from each of the main fleets (longline, purse seine, pole and line, gillnet and handline) and from CPCs from the east and western Indian Ocean.

The consultant/(s) will provide the first set of draft documentation to working group participants a minimum of one month in advance of the meetings and will present the programme during the course of the meeting. A final workshop report will be produced detailing the decisions made, and the consultant will use this to revise the materials. This will then be submitted to the IOTC Working Party on Data Collection and Statistics for a second review and to the Scientific Committee for final review and approval of the training programme. The agreed set of standards will go through the same review process but will also be put forward to the Commission for approval.

Funding

Total estimated costs: US\$50,000 to fund a 5-month consultancy

Budget: EU Science Grant/IOTC Regular budget

2. ELECTRONIC REPORTING AND DATABASE DEVELOPMENT

The second key workstream of the ROS pilot project is an integrated reporting system that will enable observers to conveniently collect required data (also for reporting purposes) and eventually share the results of their collection efforts with national institutions, in order for the latter to build a comprehensive National Database of observer data and share the required reporting information with IOTC for inclusion within the Regional Database.

The electronic reporting system is therefore logically divided into three components:

1. **The e-reporting interface:** a simple and comprehensive software tool that Observers are expected to use to collect all mandatory and optional information for data collection and reporting, as per IOTC requirements. The set of information that can be managed through this interface is an exact copy of the data fields described within document *IOTC-2015-ROS 11_04 Observer Manual version 1.2* (as available on October 2015);
2. **Multiple National Databases** (one for each CPC involved in the pilot project): a simple, Microsoft Access-based database where all information collected by national Observers (both for collection and reporting purposes) will be stored and made available to national Scientists. Each National Database will act as the official repository where all observer information is stored and from which data for reporting purposes will be extracted and shared with IOTC;
3. **A single Regional Database** (hosted by IOTC): a specific repository integrated with the main IOTC database, where reported information from each National Database will be collected, harmonized and stored.

In terms of technical requirements and overall expertise necessary to successfully exploit and manage the first two components, we strived to ensure that the e-reporting interface could be installed on Observers' computers in the simplest and quickest way possible. Currently, it completely depends on open-source tools and libraries that users can conveniently install on their working machines with a few mouse clicks. Furthermore, it has no

special hardware requirements (can run successfully on low-end laptops as well) and is operating-system independent (works on Windows / Mac / Linux right out of the box).

The e-reporting interface does not require an active internet connection: network connectivity is necessary only to perform the reference data synchronization with the IOTC database (codelists and other ancillary data) which is a process that should normally be completed prior to each observer trip.

Observer data collected through the e-reporting interface are stored locally on the observer's machine, and are expected to be submitted (as e-mail attachments or as files copied on an USB stick) to national focal points responsible for their ingestion within the corresponding National Database.

Each National Database is basically an Access DB with a complementing set of tools and user interfaces to allow importing observer-submitted data, produce simple charts and summary tables and export the content of the repository for further processing by national scientists. It will be the responsibility of the national focal points to ensure that new data available within their local National Databases is submitted to IOTC in a timely manner through a dedicated functionality, but the national focal points will not be expected to perform any other tasks or procedures to successfully manage their National Databases.

National Databases are designed to store data required for both collection and reporting purposes, however, only the latter (data for reporting purposes) that is expected to be submitted to IOTC for integration within the Regional Database.

The Regional Database will be the collection point for all reporting information collected and shared by National Institutions as part of the ROS pilot project: the proposed workflow will ensure that each national focal point will be able to submit the most up-to-date information, once available, ensuring that reported data is not accounted multiple times and is always synchronized between the National and Regional Databases.

Once the Regional Database is populated with national data (once again, limited to information expected for reporting purposes only) its content will be integrated with the other standard IOTC datasets (Nominal Catch, Catch-and-Effort, Size-Frequency etc.) and used to complement the information already submitted by CPCs as part of their mandatory statistical data reporting requirements under resolution 15/02.

The IOTC Secretariat will ensure that the data confidentiality policy and procedures outlined in Resolution 12/02 for observer will be adhered to, namely that:

“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” (para. 2c);

The e-reporting interface will make it possible for end-users to record all required information in a simple and straightforward way. This is an expected improvement over the existing data collection forms for the following reasons:

- It manages data on a per-trip and multiple-trip basis (whereas IOTC data collection form are on a per-trip basis only);
- It does not require keeping track of trip / set numbers across multiple forms, as this is inherently accounted by the interface itself;
- It provides supporting tools (e.g. dropdown lists with predetermined values, search-as-you-type functionalities etc.) that will help observers in their daily duties and possibly reduce the numbers of errors and mistakes.

For this to be possible, a revised *conceptual model* of all observer-collected data has been designed on the basis of the requirements expressed in the *IOTC-2015-ROS 11_04 Observer Manual version 1.2* document.

This model is independent of the data collection and transport mechanisms and therefore much more flexible when dealing with highly structured information such as observer data.

At the same time, this conceptual model can materialize as an XSD (*XML Schema Definition*) document that is a formal way of describing the requirements and the structure of the data it refers to. This means that on the basis of this same XSD, third parties can (assuming they have the required level of expertise) design their own applications and processes for improved or customized observer data management, as well as implement transformation filters from the conceptual model (and the data defined accordingly) to and from any other format of choice (e.g. ICCAT form ST09, IRD *Observe* data, SWIOFP database etc.).

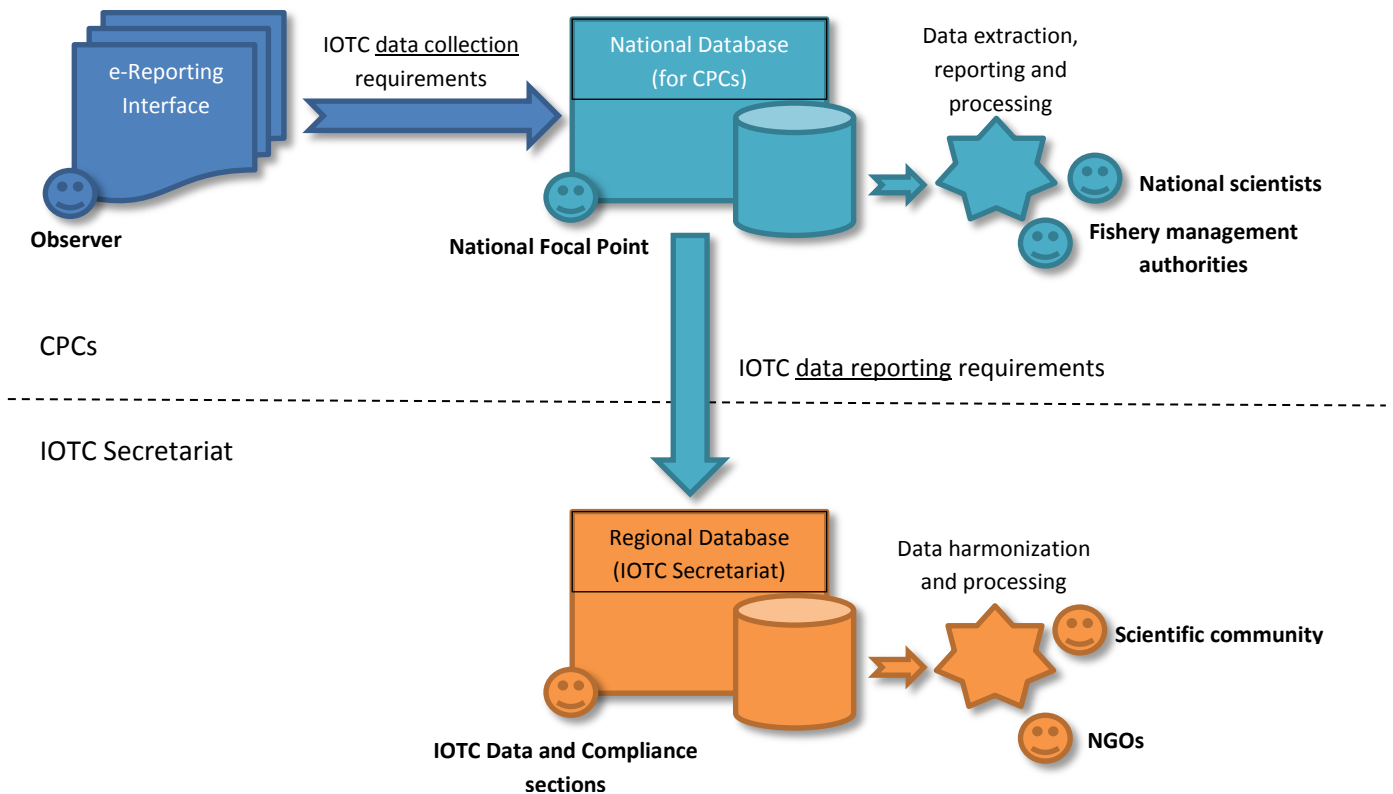


Figure 2. Schematic of the ROS data flow

Budget

Total estimated costs: US\$100,000

Source: NOAA/EU DG-MARE Grant

3. REGIONAL DATABASE AND HISTORIC DATA COLLATION

Another component of this project will address the relatively huge amount of legacy (historical) observer data provided in recent years to the Secretariat as well as the historical data that CPCs would like to submit to fulfil

their reporting obligations. A separate stream of work has been developed to incorporate historical information within the Regional Database in order to build a comprehensive and accurate baseline (wherever possible) prior to the acquisition of new information as part of the renewed Regional Observer Scheme data flow.

Historic data stored at the IOTC Secretariat

The IOTC Secretariat has received data from a number of CPCs dating back to the start of the observer scheme in 2010. Once the IOTC observer database has been developed, the following phase of work will involve the entry of all the information that has been made available to the IOTC Secretariat to-date. The data are currently received in a variety of formats including hard copies of data forms, scanned letters to the Executive Secretary, word or pdf documents (either in the 2010 IOTC template format or other forms of narrative text and tables), or excel spreadsheets. Therefore, these will need various forms of processing to be integrated into the database and a substantial amount of direct data entry is also likely to be required.

Extraction of data from existing database platforms

There are also a number of established observer databases used by single or multiple countries. Examples include the SWIOFP database used by many of the countries in the southwest Indian Ocean and the IRD *Observe* database currently used by the EU, France, EU, Spain and Seychelles. In many instances, code (usually an R script) is run to extract data from a nationally-held database to generate a pdf document, which is sent to the IOTC Secretariat from which information has to be manually extracted to enter into the regional database. In these situations it would be more efficient for a process to be developed whereby data are exported directly from one database to another without the need for interim formats for data transfer. It is proposed that an IT specialist works with individual CPCs, as requested and as needed, to develop mechanisms for direct data transfer as part of the ROS pilot project. This is aimed to create an efficient process so that, once developed, CPCs will have the option of directly submitting information (corresponding to the agreed data reporting requirements) with little time spent on the submission process. This will greatly save resources for both CPCs and at the IOTC Secretariat.

Budget

Total estimated costs: Estimated total of US\$ 10,000 for an IT consultant to work on the historic data entry procedures.

Source: NOAA/EU DG-MARE Science grant

4. ELECTRONIC MONITORING SYSTEMS

Electronic Monitoring Systems (EMS) offer a practical solution to the logistical issues of placing human observers onboard vessels – and refer to wide range of technologies including Vessel Monitoring Systems (VMS), electronic logbooks, video (including cameras, digital recording systems and monitors), and the integration of video with other data sources such as radio frequency identification (RFID) tag readers, net pinger hydrophones, winch sensors, and hydraulic pressure monitors.

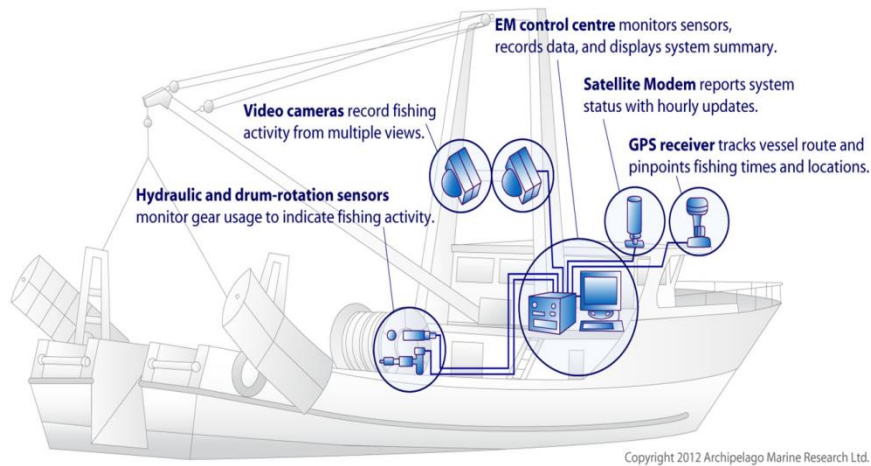


Figure 3. Schematic of a standard electronic monitoring system.

(source: AFMA, <http://www.afma.gov.au/monitoring-enforcement/electronic-monitoring-program/>).

EMS offers the potential to improve the accuracy of data collection and coverage levels for the Regional Observer Scheme, compared to human onboard observers; for example:

- i. Electronic monitoring provides an independent and verifiable record of fishing activity.
- ii. Placement of cameras in different areas of the vessel allows for the complete and simultaneous monitoring of all steps in the fishing operation – including the gear setting, during the hauling, sorting of target species and bycatch, discards, and storage of catch, as well as direct monitoring of the environment around the vessels.
- iii. The potential for continuous 24hr monitoring using EMS enables sampling of much larger numbers of fish than compared to human observers, which in turn improves the accuracy of species composition estimates – particularly in the case of purse seine catches where large volumes of fish are processed quickly and sent to wells.
- iv. Functionality for automated species identification and data capture of basic biological data, such as length measurements, is now possible with EMS. In many cases levels of accuracy are generally considered to be on par, or higher, compared with onboard observers or port samplers.
- v. In some cases, EMS may be more cost effective than onboard observers, and can be used to increase observer coverage in situations where deployment of scientific observers is impractical.

Electronic monitoring has already been successfully trialled in a number of industrial fisheries, notably in the Atlantic and Pacific Oceans on commercial longline vessels (Hosken et al., 2014⁸) and purse seiners (Chavance et al.,⁹ Monteagudo et al.¹⁰, ABNJ Project¹¹), although there are relatively few case studies of EMS deployed for fisheries based in the Indian Ocean (e.g., Seychelles purse seiners¹²). Development of electronic monitoring on

⁸ Hosken, M. et al. (2014), *Preliminary Report on the Solomon Islands Longline E-Monitoring Project*. WCPFC-SC10-2014/ST-WP-03.

⁹ Chavance, P., et al. (2013), *Comparing observer data with video monitoring on a French purse seiner in the Indian Ocean*, IOTC-2013-WPEB09-43.

¹⁰ Monteagudo, J.P., et al (2014), *Preliminary study about the suitability of an electronic monitoring system to record scientific and other information from the tropical tuna purse seine fishery*, IOTC-2014-WPEB10-INF19 (<http://www.iotc.org/documents/preliminary-study-about-suitability-electronic-monitoring-system-record-scientific-and>).

¹¹ ABNJ Project, *Electronic Monitoring System (EMS) pilot activities onboard tuna vessels in Fiji and Ghana*, <http://www.commonoceans.org/news/news-detail/en/c/380064/>.

¹² Seychelles flagged vessels, and foreign flagged vessels licensed to operate in Seychelles. Collaboration between ABNJ, Seychelles Fishing Authority, and the Organization of Associated Producers of Large Tuna Freezers (OPAGAC), <https://iss-foundation.org/improving-monitoring-control-and-surveillance-tools-in-indian-ocean-tuna-fisheries/>.

small scale vessels – particularly in developing coastal states – is also less advanced; although a limited number of pilot trials have been implemented in Australia¹³, the USA¹⁴, Mexico, Peru and Indonesia (WCPFC, 2016¹⁵).

At the 17th Session of the Scientific Committee in 2014, a recommendation was made for an evaluation of electronic monitoring to support the implementation of the ROS, noting that EMS are intended to complement, rather than replace the work of onboard scientific observers:

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”.*

Funding has now been confirmed by EU DG-Mare for an IOTC EMS project, while the Scientific Committee has also made a commitment to support this activity through the IOTC Regular budget:

(SC18, para. 142): *“NOTING the upcoming projects planned to support the ROS (including the development of an electronic reporting system, and a proposal for an electronic monitoring system), the SC **AGREED** that funding from the IOTC regular budget should be allocated to support these activities over the next few years. The IOTC Secretariat has been tasked by the Commission to develop a proposal and budget for its consideration”.*

The proposal is for the development and trial of electronic monitoring tailored to small-scale fisheries¹⁶ in the Indian Ocean, and is planned to begin in early 2017.

The initial phase of the project will include a technical review of current EMS and guidance over the suitability of equipment for deployment on small sized vessels, in consultation with organizations already experienced in the implementation of EMS (e.g., NOAA, the Australian Fisheries Management Authority, WWF-Pakistan, and the Digital Observer Services). A number of CPCs with important gillnet fleets have already expressed a strong interest in participating in this pilot, including I.R. Iran, Pakistan and Sri Lanka.

Objective

To develop and pilot an electronic monitoring system (EMS) suitable for the collection of information on catches, bycatch, and related scientific data in support of the Regional Observer Scheme reporting requirements,

¹³ Eastern Tuna and Billfish Fishery, the Western Tuna and Billfish Fishery and the Gillnet, Hook and Trap fishery, <http://www.afma.gov.au/monitoring-enforcement/electronic-monitoring-program/>.

¹⁴ NOAA, shrimp trawlers based in Florida,

http://sero.nmfs.noaa.gov/sustainable_fisheries/documents/pdfs/em_er_implementation_plan_southeast.pdf.

¹⁵ WCPFC, Second E-Reporting and E-Monitoring intersessional working group meeting (WR and EMWG2), Draft summary report,

www.wcpfc.int/system/files/draft%20Summary%20Report%20for%20ERandEMWG2_for%20CCM%20comments.pdf.

¹⁶ For example, gillnetters (including offshore gillnet vessels), or combination gillnet-longline fisheries.

particularly from semi-industrial or small-scale artisanal fisheries (e.g., offshore gillnetters, gillnet-longline combination vessels) where IOTC observer coverage is either lacking or non-existent.

Main activities

- i. Development of an Electronic Monitoring System (EMS) integrating, e.g., cameras, haul detection sensors and positional information (e.g., VMS/AIS) suitable for small-scale vessels.
- ii. Training in EMS on-board implementation for crew and on-board observers, as well as training in data extraction and processing of EMS data for land-based observers.
- iii. Implementation of EMS on small-scale vessels with/without an onboard observer.
- iv. Evaluation of results from the land-based observers; comparison and cross-validation of results between at-sea observers and EMS, as well as port sampling and oversampling.
- v. Evaluation of the pilot project, including:
 - Practicalities of implementing EMS on small-scale artisanal fisheries, and factors for consideration (e.g., fishery, gear type, monitoring and reporting requirements, cost effectiveness, and available funding)
 - Accuracy of data capture (e.g., identification of IOTC and bycatch species) and collection of weight and size of catches.
 - Assessment of resource required to process and extract EMS data suitable for reporting to the IOTC.
 - Implications on data sharing policies and IOTC data confidentiality [Resolution 12/02].
 - Presentation of results for review at the Working Party on Data Collection and Statistics, and Scientific Committee.

Budget

Estimated total of ≈US\$200,000 (TBC)

Source: IOTC Regular Budget/ ISSF, EU DG-MARE Science grant/ other third party donors.

5. OBSERVATION IN-PORT

Complementing the development of Electronic Reporting and Electronic Monitoring aimed at improving the collection of ROS data, Resolution 16/04 also includes provisions for port-sampling, targeted at small-scale/artisanal fisheries where deployment of on-board observers is impractical:

(para 6) *“The pilot project will explore the possibilities offered by electronic observation and observation in port”.*

The current Regional Observer Scheme manual¹⁷ only covers the industrial (i.e., at-sea) component of the observer scheme, while Resolution 11/04 *On a Regional Observer Scheme* also does not provide any guidance on the data collection from artisanal fisheries, other than:

(para 4) *“The number of the artisanal fishing vessels landings shall also be monitored at the landing place by field samplers. The indicative level of the coverage of the artisanal fishing vessels should progressively increase*

¹⁷ <http://www.iotc.org/science/regional-observer-scheme-science>

towards 5% of the total levels of vessel activity (i.e. total number of vessel trips or total number of vessels active)."

Despite a number of IOTC capacity building activities in recent years aimed at strengthening sampling of coastal fisheries¹⁸, in addition to other related studies which examine procedures for data collection or estimation of catches for coastal fisheries¹⁹, there are no formal IOTC guidelines on standards for port sampling for coastal fisheries – which account for well over 60% of the total catches of IOTC species.

Hence the development of data collection protocols for artisanal fisheries is an activity that has been identified as a high priority in the IOTC Working Party on Data Collection and Statistics programme of work (IOTC-2015-WPDCS11-R, p25). Specifically:

- i. Developing minimum data requirements for the routine collection of data at the landing place, through sampling by enumerators.
- ii. Develop general guidelines for data collection from artisanal fisheries; including development of a set of indicators to be used to assess the quality of data collection and management systems for artisanal fisheries
- iii. Develop or amend fisheries specific data collection protocols, by country, where necessary
- iv. Assist implementation of pilot sampling activities in countries/fisheries not/insufficiently sampled in the past; with priority to be given to the following coastal fisheries: Indonesia, India, Pakistan, Sri Lanka, Yemen, Madagascar, and Comoros.

While Resolution 11/04 makes provisions for observation at port for vessels <24m fishing within coastal waters, port sampling has also been discussed by some CPCs as a feasible alternative to onboard observation for small vessels fishing on the high seas. Paper IOTC-2016-SC19-11 outlines a proposal presented by Sri Lanka for the collection of data consistent with observer data collection requirements, as far as is possible, from port sampling. Therefore it is important that this project component explores the possibilities port sampling offers for small high seas vessels as well as for the coastal fleets.

The specific activities and workplan are due to be discussed and developed further at the upcoming WPDCS12.

Budget

Estimated cost: tbc (US\$30,000 (1.1.1 & 1.1.2) + US\$125,000 (1.1.1 & 1.1.4)
(SC17, para. 177 and IOTC-2015-SCAF12-05)

Source: IOTC Regular budget/EU DG-MARE Science grant

TRIAL AND TESTING

¹⁸ IOTC-2015-WPDCS11-08, IOTC capacity building activities in support of developing coastal IOTC CPCs: <http://www.iotc.org/documents/iotc-capacity-building-activities-support-developing-coastal-iotc-cpcs>.

¹⁹ References to be added in due course.

A critical component in all of these components of the pilot project is the piloting phase and Resolution 16/04 provides a framework for trialling these innovations by drawing together the activities and operationalising them in selected CPCs.

Voluntary CPCs

Three participatory Contracting Parties or Cooperating Non-Contracting Parties (CPCs) that volunteer to participate will be selected for this project. The IOTC Secretariat has had requests for support in the implementation of their national observer programmes from I.R. Iran and Sri Lanka. Given the network of observer programmes within the southwest Indian Ocean, it would also be beneficial to include a representative CPC to maintain coordination with the activities and harmonisation efforts taking place at the sub-regional level. The gillnet, purse seine and longline fisheries are represented within these CPCs and so they provide an opportunity to trial the tools developed for each of the main IOTC fisheries.

Cooperation coordination mechanism between participating CPCs

An MoU will be drawn up between the selected CPCs participating in the pilot project to ensure coordination of activities and recognition of observer programmes and observers by each CPC²⁰. This may be extended to other fleets once the pilot project has ended, providing the option for uptake of observers trained through this scheme to be deployed on vessel flagged by other CPCs or when operating in the EEZs of other CPCs.

Project kick-off meeting

An initial meeting will be held with the Project Steering Committee, the focal points of each participating CPC, the Chair of the ad hoc observer working group, the IOTC Secretariat and the consultant/(s). The aim will be to discuss the main issues to overcome with implementing an observer programme in each country and establish an agreed way forward. This will cover institutional, legislative, resourcing, technical and logistical issues that may be faced and will provide sufficient background for a detailed plan to be drawn up for each fleet and for the training programme to be tailored as needed for each CPC in advance of the country missions.

Observer coordinator training and planning

A workshop will be held with the nominated observer programme managers from each participating CPC to undertake the observer coordinator training programme. In addition to the training material developed under Project component 1, the coordinators will be introduced to the electronic reporting systems and national databases designed under Project component 2 during a week-long workshop.

Observer programme set-up and training

This will be followed by individual missions to each CPC to follow up. The consultant(s) will work directly with the programme coordinators in each CPC to prepare for the establishment of the observer programme. This will involve the selection of observers, identification of the vessels for monitoring, sourcing technical and safety equipment and making arrangements for the training courses.

This will be followed by observer training (6-week period):

- Survival-at-Sea training compliant with STCW 2010, including fire-fighting (2 weeks)
- Technical training (3 weeks)
- Training (and trialling) the e-reporting system (1 week)

During this period, the training materials will be fully reviewed by trainers and participants. Short tests will be conducted prior to and on completion of the training to evaluate progress as well as final performance level.

²⁰ Resolution 16/04 para. 2 (e) "cooperation coordination mechanism between CPCs participating in the project"

Participants will also be provided with evaluation forms to provide specific feedback on all programme components.

Observer deployment at-sea

The newly trained observers will undergo a series of deployments on vessels and will collect and report data to the controlling organisations and to the IOTC Secretariat. This will include deployment onboard the larger gillnet vessels, where this is possible, safety standards permitting.

Evaluation of tools and training success

A follow-up workshop will be held with the trainers, observer coordinators and observers to review the success of the training programme and tools. Participants will be provided with feedback forms and asked to discuss the main training areas that were missing or inadequate from the initial training provided. The information collected by observers will be reviewed and problem areas identified and addressed through discussions as to the underlying causes of misunderstanding and will subsequently be followed by appropriate revision of the programme. Based on the outcomes of the workshop, the training programme will be revised to include any gaps identified and to improve on any sections deemed to be require more attention. Follow-up training will be implemented as required.

The outcomes of the trials, with the final programme and set of materials will be summarised and presented to the Scientific Committee in 2017 for review and will be made publically available. This will enable the Scientific Committee to evaluate the successes and failures of each project component as they progress, providing the opportunity for review and revision of activities to improve the efficiency and effectiveness of support provided for national observer schemes.

Trial of e-monitoring system in combination with port sampling

Observers trained through on the new training programme will be evaluated in terms of competency and those who perform well will be selected to undertake onboard trials to compare data collected to that obtained through ESM and port sampling. Land based observers will be trained to monitor video footage in addition to conducting port sampling activities. These activities will be used in combination to verify the data collected through different methods and assess gaps and complementarities. While EMS may be used to obtain positional data, information on fishing effort and methods and discards, port sampling might be used to collect additional information from the same vessels on return to port. This monitoring can be used to verify the total retained catch quantities and species, obtain length frequency information and take biological samples where necessary, as well as record gear specifications such as mesh sizes used, length and material of nets etc.

Budget

Estimated cost for implementation: US\$150,000 per CPC

Source: IOTC Regular budget/EU DG-MARE Science grant/ tbc

MID-TERM REVIEW

The mid-term review will provide an opportunity for all areas of work to be evaluated and for progress to be reviewed by the SC. This will be followed by a second stage where appropriate modifications, revisions and amendments are made where necessary and where areas for further development are identified. These will be further tested through the pilot project through a second stage trial.

FINAL PROJECT PHASE – SUSTAINABILITY

Both technical and financial support are required in many instances for implementation of national observer programmes, whether they establish and manage the scheme directly or under contract through observer management organisations, however, resourcing is a key constraint in the implementation of observer schemes at the national level. This has been identified as a crucial limitation in the recruitment, training and deployment of observers. Key areas for improved resourcing include:

- Observer programme management – at the very minimum a logistical coordinator and data manager are required for the implementation of a national programme
- Observer remuneration and insurance – this should be at a rate that is competitive enough to attract new recruits and to retain well-trained, highly competent observers
- Training – the provision of funds for well-qualified instructors to provide training in key technical areas such as species identification, data collection methodologies and safety-at-sea.
- Technical equipment – the provision of equipment sufficient to enable an observer to complete the scientific tasks requested. This includes calipers, deck tapes, digital cameras, hand-held GPS systems, scales, binoculars, compass, knives, tablets/laptops
- Safety equipment – the provision of equipment needed to ensure the observer is able to utilise the sea survival skills learned during training where these are not present such as life rafts, life vests, first aid kits and communications equipment.

A final review will be conducted to evaluate progress at the culmination of the Pilot Project. This will include recommendations on how to expand the experiences and results of the pilot project to the entire IOTC area of competence (Resolution 16/04, para.4). Establishing continued resourcing for those workstreams that prove successful during the pilot stage of the project will be critical to the success of the scheme. Therefore, an investigation into potential ongoing financing for the activities will be drawn into the final project phase as indicated in Figure 1. Ongoing resourcing is required and may be sought through a range of potential channels. Examples include:

- Industry funding through mechanisms such as fishing licences
- Government funding of management teams based within the Fisheries Ministry
- National or regional fisheries development projects
- Increased funding due to market incentives brought about through MSC certification or FIPs
- Private sector funding from companies with Corporate Social Responsibility strategies with environmental or livelihoods improvement objectives, allowing them to make payments for environmental services.

Table 3. Pilot Project timeline – development and review

	2016	2017	2018	2019
Review and oversight	<p>Proposal development by the Scientific Committee and distribution by Executive Secretary</p> <p>Comments from Contracting Parties to be provided one month following circulation of the proposal</p>	<p>Revised draft proposal (including detailed budget) to be submitted to the Compliance Committee and Standing Committee on Administration and Finance for review.</p> <p>Review and approval of project by Commission</p>	<p>Mid-term review by Scientific Committee</p>	<p>Final term review by Scientific Committee</p> <p>Recommendations on how to extend the project to the entire IOTC area of competence</p>

	2016		2017				2018				2019				2020			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Observer database																		
1. IOTC database development																		
2. Historic data entry - old data submissions																		
3. Historic data entry - direct transfer mechanisms																		
e-reporting																		
1. National database (capacity building)																		
2. e-data collection and reporting system																		
4. Trial and testing																		
5. Review and revision																		
6. Roll out																		
Observer training programme - tools and protocols																		
1. Development of observer training curriculum & training materials																		
2. Development of observer coordinator training curriculum & training materials																		
3. Review of training programme by ad hoc working group inc representatives from different fleets and sub-regional programmes																		
4. Revision and finalisation of training programme & materials																		
5. Development of observer standards																		
6. Review of standards by WPDCS & adoption by SC20																		
7. Roll out																		
e-monitoring systems																		
1. Development of e-monitoring system for gillnet fleets																		
2. Development of draft standards for e-monitoring system for gillnets and training for land-based observers																		
3. Preliminary camera testing phase																		
4. Implementation of e-monitoring system on trial gillnet vessels in conjunction with onboard observer (1x CPC) and evaluation of results comparing onboard and land-based observer information																		
5. Modification of e-monitoring system and revision of standards																		
6. Second stage pilot trial (1 x CPCs)																		
7. Final review																		
1. Development of min. data requirements for port sampling																		
2. Develop/amend specific data collection protocols by CPC																		
3. Review																		
Pilot trial implementation phase																		
1. Proposal development by SC																		
2. Review by Commission																		
3. Project Steering Committee meeting																		
4. Observer coordinator training and planning (1 x CPC)																		
5. Observer training workshops (1 x CPC)																		
6. Trial deployment of observers (1 x CPC)																		
7. Evaluation of results - Steering Committee (& SC20)																		
8. Deployment of selected at-sea observers for e-monitoring trial																		
9. Second stage training as required																		
10. Ongoing periodic support and follow-up																		
11. Extension to other developing CPCs																		

Mid-term review

Final review

CPC 1

CPC 2

CPC 3

CPC 1

CPC 2

CPC 3

CPC 1

CPC 2

CPC 3

CPC 1

CPC 2

CPC 3

CPC 1

CPC 2

CPC 3

