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REPORT OF THE JOINT TUNA RFMOS MEETING OF EXPERTS TO SHARE BEST PRACTICES ON THE PROVISION OF SCIENTIFIC ADVICE

(Barcelona, Spain, May 31 to June 2, 2010)

1. Opening of the meeting

The Joint Tuna RFMO Meeting of Experts to Share Best Practices on the Provision of Scientific Advice is the first of four workshops recommended by the Second Joint Meeting of Tuna RFMOs (San Sebastian, Spain, June 29 to July 3, 2009). This Workshop, hosted by the European Union, has been organized by the ICCAT Secretariat.

The meeting was chaired by Mr. Vincent Grimaud (European Union) Welcoming remarks were made by Mr. Driss Meski (Executive Secretary of ICCAT). The meeting included participants from 42 Members and cooperating non-Members of the five tuna RFMOs (IATTC: Inter-American Tropical Tuna Commission, ICCAT: International Commission for the Conservation of Atlantic Tunas, IOTC: Indian Ocean Tuna Commission, WCPFC: Western and Central Pacific Fisheries Commission, and CCSBT: Commission for the Conservation of Southern Bluefin Tuna), as well as representatives of the Secretariats of the five tuna RFMOs, three inter-governmental organizations, and two non-governmental organizations.

2. Nomination of rapporteurs

Rapporteurs for the meeting were Drs. Laurence Kell (ICCAT Secretariat), Naozumi Miyabe (Chairman, WCPFC Scientific Committee), Miguel Herrera (IOTC Secretariat), Richard Deriso (IATTC Chief Scientist), Robert Kennedy (Executive Secretary, CCSBT) and Francis Marsac (Chairman, IOTC Scientific Committee).

3. Adoption of the Agenda and meeting arrangements

The Agenda was adopted and is attached as **Appendix 1.** The List of Participants is attached as **Appendix 2**.

4. Keynote speaker: Why such a workshop on tuna RFMOs and their provision of scientific advice?

The Keynote speaker and Workshop General Coordinator, Dr. Alain Fonteneau, outlined the reasons for the meeting. This meeting was called because of the similar problems faced by all the tuna RFMOs, in that same tuna species are fished worldwide within similar offshore pelagic ecosystems, whilst most tuna fleets and gears are highly mobile using the same technology and selling within similar markets. Therefore, the scientific problems faced in stock assessment by all tuna RFOs are very similar. The workshop will therefore review and make recommendations on future priorities in data and tuna research that would allow the RFMOs to provide more efficient and fully transparent scientific advice on their tuna stocks and their pelagic ecosystems.

5. Routine data collected by year: Catch, effort and size data

Dr. Ziro Suzuki (Japan) presented an overview of the fisheries data collection, reporting and processing methods used by the Tuna RFMO bodies of the world. He noted that although data collection is often seen today by scientists as a time-consuming and quite unrewarding activity, it is of critical importance to stock assessment and management. Tuna RFMOs have reported a number of issues concerning the completeness and quality of basic fisheries statistics, in particular in the case of artisanal fisheries, stressing the need for each RFMO to address these issues as a matter of priority. Also despite the fact that most Tuna RFMOs have adopted provisions for the collection of similar types of information, including catch, effort and size data under the same resolution various issues need to be addressed, such as late reporting of data to the Tuna RFMOs, as this compromises the use of recent data in the assessments. Data release policies are different depending on the RFMO as well as data confidentiality standards within and among RFMOs.

Estimation of species composition remains a problem with all tropical tuna purse seine fisheries, in particular because of the difficulty in identification of juvenile bigeye tuna, stressing the need for the RFMOs to further evaluate the existing data collection systems. Also, there is insufficient or inconsistent collection of size frequency data and lack or insufficient data to assess changes in fishing efficiency, observer data, socio-economic data, environmental data or other types of basic fisheries data required for stock assessment and management. For tuna there is also a lack of fishery independent data, especially in the case of bluefin tuna species, as well as the need for tuna RFMOs to ensure high data quality standards through improved validation of existing data. Dr. Suzuki noted that the use of data other than those officially reported should sometimes be promoted. Finally, he noted the growing importance of fisheries in developing coastal States in all areas, stressing the need for Tuna RFMOs to promote capacity building activities as required. He also noted that in some instances the time area coverage of fishery data is decreasing, e.g. the Japanese offshore long line fleet.

5.1 Discussion of routine data collection by year: catch, effort and size data

The meeting agreed in principal with the actions proposed by Dr Suzuki to address the problems highlighted in his presentation, in particular the need for T-RFMO's to:

- Promote the timely reporting of data from all their members, according to the existing mandatory data requirements in order to facilitate the work of T-RFMO technical bodies in the provision of a scientific advice which is based on the most recent information
- Use alternative sources of data to both validate the information that is routinely reported by RFMO members and estimate catches from non-reporting fleets, in particular observer data
- Evaluate the existing data collection schemes for industrial and artisanal fisheries, in particular those existing for industrial tuna purse seine fisheries
- Promote the collection of fishery independent data and data collected through tagging programmes, where required
- Facilitate access to the data gathered, through T-RFMO Web Sites or by other means
- Socio-economic data should also be collected to help in improving scientific advice.

6. Biological data

Stock assessments need to be underpinned by sound knowledge of and data on biological processes and Dr. John Hampton of SPC reviewed the biological data requirements for modern tuna stock assessments. These included data on length, weight and growth, fecundity and natural-mortality-at-age as well as information on stock movement and structure and where relevant sex specific issues. Data on the fisheries are also required and in particular vulnerability to and size selectivity of fishing gear. There are also important interactions with the environment which can have effects on biological processes. The importance of regular systematic tagging experiments for estimating natural mortality and other parameters for stock assessments was stressed, and it was recommended that tagging surveys should be implemented as part of the regular work programme in all tuna RFMOs to provide "somewhat fishery-independent" data for stock assessment. Archival tagging can also be useful for providing new insights into tuna behaviour and vulnerability and must be an ongoing feature of tagging programs. It was also noted that large-sample individual weight observations from longline catches are an under-utilized but valuable source of information on size structure, selectivity, growth, recruitment. Increasingly, spatial assessments and management are becoming more important and these need to be supported by data. The development of new high-resolution spatial modeling frameworks now offer the opportunity to better integrate biological features of tuna stocks and their environment.

6.1 Discussion of biological data

During the discussion that followed, the potential underestimation of movements by tagging, particularly of larger tuna was noted, due for example to a low level of reporting of tagged tuna by longliners Archival tagging data are mostly limited to a short period at liberty and there could be real movements of older fish that will only be observed when we have longer-term archival tag records.

Regarding growth it was pointed out that assessment models generally consider growth as a static process when there will be variability in time and space. The need to check for persistent changes or trends was considered as these could have an impact on assessment results. As regards natural mortality (M), which is a key issue in stock assessment, the use of tagging can allow M to be estimated, noting that M can be biased if the longline tag reporting rate is low, and then the estimated the estimated M could be too high.

The need of large-scale tagging programs to improve stock assessment was recognized as being important as was the high cost of such efforts. Based on experience in WCPFC and IOTC, it was highlighted that the annual cost would be less and there would be certain cost efficiencies, particularly in the tag recovery process, of maintaining a continuous activity.

Financial assistance for tagging and other research activities by Contracting Parties and other sponsors was recognized as fundamental and the need to incorporate other potential sponsors such as NGOs was considered.

7. Stock assessment

Dr. Victor Restrepo presented a talk on stock assessment. Assessments are a framework to integrate different sources of information in order to provide advice for fisheries management. A number of different methods are used by the different Tuna RFMOs, and the choice of method primarily depends on data types available. Some of the more complex models are spatially-explicit and they could be used to guide management in finer scales than at the stock level.

A number of factors contribute to uncertainty in stock assessment results. These have to do primarily with data (e.g., gaps in fisheries data, insufficient knowledge of changes in fishing technology, insufficient knowledge of complex biological processes, misreporting, etc.) and with the fact that models are, by necessity, a simplification of a complex reality.

There are well-established procedures for quantifying uncertainty for most of the models being used by RFMOs. However, it is not straightforward to quantify the uncertainty resulting from the use of different models at the same time. In other fields, such as storm forecasting, the past performance of models can be used as weighting criterion. However, past performance is more difficult to assess in fishery models because the fish populations are not observed directly. Management Strategy Evaluations (MSE) could be used as a tool to investigate model performance.

There are a number of steps that could be taken to ensure the soundness of assessments. First, it is important to ensure that assessments are based on sound data, so it is imperative to ensure that the basic fishery-dependent data are collected and reported. In addition, Peer Review can be used to check the soundness of subjective model choices.

Because different methods are used for different data situations, it seems improbable that RFMOs will need to agree on a single common methodology. However, RFMO scientific bodies could jointly develop quality-control procedures that ensure minimum standards for stock assessment.

7.1 Discussion of stock assessment

The presentation prompted a wide-ranging discussion, including the importance of difference types of data, how to compare results from simple and complex models, the frequency of assessments and the use of indicators. Difficulties in using fishery-independent methods for tunas, such as the egg production method, was noted although for some species, like bluefin tuna, it may be possible to carry out acoustic surveys.

Although environmental and economic data are important, they are used infrequently. The frequency of assessments depends on the life history and animals with short life spans require more frequent assessments as do those that are depleted. Assessments also require significant resources and the frequency of assessments has increased in recent years. Complex models are not easy to teach and capacity building has to be performed in order to assist in understanding the methods. The increased complexity and uncertainty adds to confusion in interpreting the results. Presentation of results from multiple models could be done by producing multiple Kobe plots or by combining them in a single graph although there is no general agreement on how to combine multiple model results. The projection time frame is not a scientific question but rather it depends on what risk managers are willing to take, i.e., it is a management choice.

Increases in fishing efficiency presents difficulty for management and data on operational details, since not just the number of vessels needs to be collected to permit estimation of changes in fishing power. However, data collection needs are difficult to forecast. For example, logbook records historically omitted some types of information that we now know was important and this cannot be recovered. Also, observers may not be

authorized to collect some kinds of data that could be useful. We need to think about our objectives for the data, not just on compliance issues.

Standardisation of training manuals for stock assessments among the various RFMOs could generate economies of scale, as may harmonization of methods. That data should be looked upon as an investment as more data provides for better management. The benefits of peer reviews were discussed and it was suggested that perhaps once every five years would be appropriate and these do not have to be conducted in the same year as the assessment.

Stock-recruitment assumptions are important in stock assessments and it was noted that the stock recruitment relationship is a difficult thing to estimate. Current practice is to make comparisons among similar species.

It was also noted that there is not much research on marine protected areas (MPA) for tuna and MPAs are often set without adequate evaluation. To do this, detailed spatial models would be required for such analysis.

The use of MSE is important but will require an exchange of information between scientist and managers beyond what it currently done in assessments.

Research on the use of indices of abundance for stock assessment, coming from fisheries other than Japanese longline, in particular some small-scale fisheries, industrial purse seine fisheries and the longline fishery of Chinese Taipei should be further developed.

8. Communication between RFMOs and the world

The communication of scientific advice to the RFMOs and beyond was presented by Dr. Gerald Scott. There are three kinds of audience to which fisheries scientists have to communicate: the Commissions which are the primary target, other scientists and research institutions (peers) and finally the general public. These different audiences require specific ways of communication. In communicating with the Commissions, the challenge is to transmit main results in a way that can be easily utilized for decision-making. Kobe-1 allowed substantial progress towards a standardized form for presenting results through the so-called "Kobe plot". Other methods allow communicating, in a user-friendly way, how uncertainty implies risk of failure of achieving objectives. The next logical step is the development of the Kobe-2 Strategy Matrix (K2SM) proposed at the San Sebastian Kobe-2 meeting in July 2009. The K2SM summarises potential management actions, for example TAC and time-area closures, that correspond to specific probabilities of reducing over fishing or rebuilding the stock within specific timeframes. Additional recommendations were provided by the ICCAT SCRS to facilitate K2SM construction and interpretation. Other ways can also be developed to harmonize communication tools between scientists and managers, e.g., standardized executive summaries and summary tables. The communication with peers focuses on explaining approach, assumptions and application to assure repeatability and transparency. As regards the general public, the challenge is to deliver scientific information that is not in conflict with Commission policies, using professional ways of disseminating information.

This topic was complemented by a short presentation made by Dr. Jon Brozniak on the decisional process based on the K2SM.

8.1 Discussion of communication between RFMOs and the world

The participants recognised the great potential of K2SM to communicate efficiently between all stakeholders and guide the decision-making process according to various levels of risk. The many uncertainties identified in the assessments cannot be ignored but even in such context, decisions have to be taken. It is acknowledged that the K2SM should try to incorporate those uncertainties. The communication to the general public, especially the media, should be handled cautiously as flawed messages have occurred in the past.

9. Enhanced cooperation among tuna RFMOs

Dr. Hilario Murua presented this point of the Agenda linked to the European Project TXOTX (Technical Experts Overseeing Third Country Expertise) (www.txotx.net) whose objective is to develop a network of scientists from different countries in order to compare and gather information on data collection, assessment methods and management systems in different regions with the ultimate aim to improve coordination of research programmes

promoted by different bodies. In short, the purpose of this project is to contribute to a coherent approach towards research directed at assessment and management of marine resources.

Although there are differences in RFMOs structures in relation to scientific activities to provide the scientific advice for fishery management (from a Secretariat model such as IATTC to a Working Group (WG) model such as ICCAT/IOTC/CCSBT, to a mix-model of WCPFC), the various WGs presented in each tuna RFMO are addressing similar subjects. Several cooperation activities are taking place among the scientific groups of the tuna RFMOs (courses, ad-hoc meetings, international tuna research projects, et.) to tackle global issues of tuna RFMO interest. However, this cooperation is not done by formal agreement. Thus, one recommendation to enhance the cooperation of scientific activities of tuna RFMOs would be to create, by formal agreements, joint horizontal WGs to address global issues which would include research priorities identified globally in the joint tuna RFMO meeting (i.e. issues of data, assessment methods, Precautionary Approach, Ecosystem Approach to Fisheries Management, etc.). A second recommendation that arose from the presentation was to develop regional and global Strategic Research Plans developed by all tuna RFMOs to identify research priorities, joint collaborative effort and funding resources globally.

9.1 Discussion of enhanced cooperation among tuna RFMOs

Some participants commented that there would be benefits from joint, horizontal working groups devoted to cross-cutting issues such as seabird by-catch and data standardizations issues. However, participants felt strongly that joint working groups should not be formed if they resulted in an increase in the total number of regular workshops. If any joint working groups were to be formed, they should be balanced by a reduction in existing working group meetings within individual RFMOs, have specific tasks with focused terms of reference and be likely to show a tangible result. It was also noted that issues associated with by-catch and observer programs would be dealt with in the next two Kobe workshops and that the by-catch and observer issues should be left for those forums.

Possibilities were raised for increasing cooperation, precisely to include IATTC's practice of hosting of visiting researchers, and a workshop focused on management strategy evaluations to share lessons learned, models and computer code with the aim of improving efficiency.

A recommendation was made that the five Scientific Committee Chairs liaise with each other to develop a prioritized list of cross-cutting issues that may be best dealt with by a joint t-RFMO working group.

10. Other presentations

Dr. Shiham Adam made a presentation on capacity building and its importance in managing tuna resources for coastal countries and small-island developing countries (SIDs). He discussed the challenges faced by coastal countries and why capacity building is critical in the coastal countries. It was thought that the Kobe Process could usefully undertake a review of tuna management capacity in coastal countries and SIDs and including a review of the effectiveness of the capacity building assistance that has already been provided. Increased and sustained funding commitment from the developed countries, particularly distant water fishing nations (DWFNs), to improve capacity for the coastal countries and SIDs was thought to be important, as was provision of regular training for fishery officers of the SIDs and coastal states, which has been very effective in the Pacific thanks to SPC.

During the discussion of capacity building it was stressed that tuna stocks were a shared resource and that there was a need to build capacity across all members of tuna RFMOs to allow full participation in the scientific process and management decisions. It was agreed that the KOBE Process would be important for undertaking a review of the tuna management capacity in the coastal countries and small-island developing States and that there was a need to undertake a review of the effectiveness of the capacity building assistance that had already been provided in the past. It was also noted that complementary courses are being held across tuna RFMOs, and that sharing of materials or holding common courses should be supported. Also, that observer programmes had been useful in that they provided better knowledge of the fisheries and that many people who were originally trained as observers have subsequently become active participants with tuna RFMOs. During the discussion it was pointed out that as well as regional and global initiatives there were many sub-regional and national initiatives that had been important, and that in the case of small-island developing States there was a need to work with neighbouring States since resources were limited. The need to provide regular training for fishery officers and observers of the SIDs and coastal States was also stressed, particularly since gaps still exist

particularly in the processing of data, while in some nations data are not even collected. The development of local synergies is also important to help meet requirements of stock assessment, for example universities with mathematics and modelling teams should be involved in the scientific work of tuna RFMOs. The need for coastal States to develop the necessary expertise and capacity to participate in the tuna fisheries was also recognised. Benefits are not limited solely to science but extend to many issues, for example reinforcing capacity at institutional and national levels, for example workshops for managers and scientist to learn how an RFMO operates and how science is used for advice had been very successful in the IOTC. Efforts have also been carried out by ICCAT in collaboration with Contracting Parties in relation to training and attendance at meetings. These showed how Member States can benefit from being involved in the process. Long-term programmes, such as financing of Ph.D. and Master programmes were also considered important, but it was also recognised that trained personnel may leave to find work elsewhere and training should be a continuing process.

Dr. John Annala presented a talk on the selection of management procedures (MP, also known as Management Strategy Evaluation) for southern bluefin tuna (SBT). He summarized several advantages of the MP, such as more robust decisions, but there are several technical challenges in developing and testing an operational model and decision rule, such as choice of decision rule. He described the elements of an MP, including a clearly defined set of management objectives, measurable performance indicators, and a harvest strategy. The development of a MP began in 2002 and they hope to implement it by 2011. The management objective agreed to in 2006 included restoring the stock biomass to at least the 1980 level by 2020 and maintain it above that level. Several performance statistics were calculated in their MP simulation testing. In 2010 they plan to define a new MP. There are several specifications already defined for the new MP including a frequency of TAC changes set at every three years.

The advantages of MPs were summarised, i.e. they provide a better chance of achieving management objectives (pre-testing to identify robust strategies); they provide greater certainty for all stakeholders (agreed rules for decision making); they are designed to achieve an agreed balance between competing management objectives; they are designed to be robust to current scientific uncertainty, and they demonstrate responsible management to the community.

Dr. Jacek Majkowski (FAO) presented the FAO activities specific to tuna which involve the collation, analysis, synthesis and dissemination of data and other information; the provision of fora for international consultation and technical discussions; the resolution of technical problems and the provision of technical advice and assistance. FAO also publishes various global reviews related to tuna. A second presentation was also given on the FAO classification of stock status, which has three categories: Not fully exploited, Fully exploited and Overexploited.

Dr. Francis Marsac (IOTC) gave a presentation of CLIOTOP integrated and coordinated ecosystem-based research for improved scientific advice on tuna fisheries at a global scale. The main requirements for further development of the CLIOTOP program, notably the parameterization of spatialized models are: (i) full availability of fisheries data, including tagging data, from all RFMOs using standardized stratification levels; (ii) a better use of spatialized ecosystem models reflecting the processes, from environment to top predators, coupled with economic models; and (iii) setting up a collective, collaborative and coordinated action worldwide, e.g. a working group that could be held within the next two years.

It was noted during the discussion that although the recommendations were reasonable when taken individually, they would require a large commitment undertaken together. It was suggested that it would be important to identify priorities for implementation.

11. Recommendations

Routine data collected by year: Catch, effort and size data

1. All members of t-RFMOs are called upon to give a top priority to the provision of data of good quality in a timely manner, according to the existing mandatory data requirements of tuna RFMOs, in order to facilitate the work of tuna RFMOs scientific bodies in the provision of scientific advice based on the most recent information.

2. Lags in the submission of fishery data should be reduced making a full use of communication technologies (e.g. web based) and efforts should be undertaken that basic data formats are harmonized.

3. Efforts should be undertaken so that basic data used in stock assessment (catch, effort and sizes by flag and time/area strata) provided by members should be made available via the websites of tuna RFMOs or by other means.

4. Fine scale operational data should be made available in a timely manner to support stock assessment work, and confidentiality concerns should be addressed through RFMOs rules and procedures for access protection and security of data.

5. Tuna RFMOs should ensure adequate sampling for catch, effort and size composition across all fleets and especially distant water longliners for which this information is becoming limited.

6. Tuna RFMOs should cooperate to improve the quality of data, in particular for methods to estimate: (1) species and size composition of tunas caught by purse seiners and by artisanal fisheries and (2) catch and size of farmed tunas.

7. Tuna RFMOs should use alternative sources of data, notably observer and cannery data, to both validate the information routinely reported by Parties and estimate catches from non-reporting fleets.

Biological data

8. Regular large scale tagging programs should be developed, along with appropriate reporting systems, to estimate natural mortality growth and movement patterns by sex, and other fundamental parameters for stock assessments.

9. Archival tagging should be an ongoing activity of tagging programs as it provides additional insights into tuna behavior and vulnerability.

10. Spatial aspects of assessment should be encouraged within all tuna RFMOs in order to substantiate spatial management measures.

11. The use of high-resolution spatial ecosystem modeling frameworks should be encouraged in all tuna RFMOs since they offer the opportunity to better integrate biological features of tuna stocks and their environment.

Stock assessment

12. Tuna RFMOs should promote peer reviews of their stock assessment works.

13. Tuna RFMOs should use more than one stock assessment model and avoid the use of assumption-rich models in data-poor situations.

14. Chairs of Scientific Committees should jointly develop checklists and minimum standards for stock assessments.

Communication by tuna RFMOs

15. Standardized executive summaries should be developed for consideration by all tuna RFMOs to summarize stock status and management recommendations. These summaries should be discussed and proposed by the chairs of the Scientific Committees at Kobe 3.

16. The application of the Kobe 2 strategy matrix should be expanded and applied primarily to stocks for which sufficient information is available.

17. Tuna RFMOs should develop mechanisms to deliver timely and adequate information on their scientific outcomes to the public.

18. All documents, data and assumptions related to past assessments undertaken by tuna RFMOs should be made available in order to allow evaluation by any interested stakeholder.

Enhanced cooperation between tuna RFMOs

19. Chairs of Scientific Committees should establish an annotated list of common issues that could be addressed jointly by tuna RFMOs and prioritize them for discussion at the Kobe 3 meeting.

20. Tuna RFMOs should actively cooperate with programs integrating ecosystem and socio-economic approaches such as CLIOTOP to support the conservation of multi-species resources.

Capacity-building

21. Where determined by a Tuna RFMO, a review of the effectiveness of capacity-building assistance already provided should be undertaken. Reviews of tuna scientific management capacity in developing countries, within the framework of the respective RFMO may also be conducted at their request.

22. Developed countries should strengthen in a sustained manner their financial and technical support for capacity-building in developing countries, notably small island developing States, on the basis of adequate institutional arrangements in those countries and making full use of local, sub-regional and regional synergies.

23. Tuna RFMOs should have assistance funds that cover various forms of capacity-building (e.g. training of technicians and scientists, scholarships and fellowships, attendance to meetings, institutional building, development of fisheries).

24. Tuna RFMOs, if necessary, should ensure regular training of technicians for collecting and processing of data for developing states, notably those where tuna is landed.

25. The structural weaknesses in the receiving mechanism for capacity building within a country should be improved by working closely with Tuna RFMOs

12. Other matters

No other matters were discussed.

13. Adoption of report and adjournment

The Report was adopted. The meeting was adjourned.

Appendix 1

AGENDA

1. Opening of the meeting
2. Nomination of rapporteurs
3. Adoption of the agenda and meeting arrangements
4. Keynote speaker: Why such a workshop on tuna RFMOs and their provision of scientific advice?
5. Routine annual collected data: catch, effort and size data
6. Biological data
7. Stock assessment
8. Communication between RFMOs and the world
9. Enhanced co-operation among tuna RFMOs
10. Other presentations
11. Recommendations
12. Other matters
13. Adoption of report and adjournment

Appendix 2

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