iotc ctoi Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien

Report of the Third Session of the IOTC

Working Party on Methods

Bangkok, Thailand

25 October, 2008

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1. OPENING OF THE MEETING AND ADOPTION OF THE AGENDA

1. The third meeting of the Working Party on Methods (WPM) was opened on 25 October 2008 in Bangkok, Thailand, by the caretaker Chairperson Dr Iago Mosqueira.

2. Dr Mosqueira welcomed the participants (Appendix I) and the agenda for the Meeting was adopted as presented in Appendix II. The list of documents presented to the meeting is given in Appendix III.

2. PAPERS PRESENTED

Notes on two new ASPM software based on "AD model builder" and "SS3" (IOTC-2008-WPM-04)

ASPM

3. ASPM software coded using FORTRAN was made available by Victor Restrepo (ICCAT, 1997) has been used in the assessments for Indian Ocean yellowfin and bigeye tuna over the last eight years. However, this FORTAN-based ASPM has the following limited capabilities:

- very slow operating speed especially to conduct the bootstrap to estimate variances (it takes more than 10 hours if re-sampling is large);

- It can handle only four fleets (max.);

- It estimates steepness i.e. steepness cannot be fixed. This has caused problems in the past, e.g. for many cases in the past steepness has been estimated as 0.999, which is unrealistic

4. To improve these problems, ASPM software was newly developed for this time using two platforms, i.e., AD Model Builder and SS-V3.

5. Table 1 summarizes differences between FORTAN ASPM and AD Model Builder ASPM.

Table 1. Summary of the differences between FORTAN ASPM and AD Model Builder ASPM

	FORATN ASPM	AD Model Builder ASPM
Fleets	4	No limits
steepness	Estimated	Estimated or Fixed between 0 and 1
computing speed	1	5-10 times faster
catch equations	Pope's approximation	Baranov catch equations
minimization routines	simplex algorithm	automatic differentiation
uncertainty (variances) estimation	bootstrap	delta method MCMC
Others		Negative log likelihood is computed without the constants.

6. The new software was tested using the bigeye tuna input data used in the 2006 ASPM stock assessment. The results of the FORTRAN ASPM and ADMB ASPM were almost identical. It is considered that there are very few discrepancies that arise due to the different type of optimization methods used between two ASPMs. We consider that FORTARN ASPM picked up the quasi local minima while ADMB ASPM picked up the correct ones as the AD Model Builder applies a more powerful optimization method. The AD Model Builder ASPM software will be released in public after it is finalised.

SS3 ASPM

7. Richard Methot (NOAA, USA) developed SS-V3 software which has a core structure similar to that of ASPM. SS3 has been modified to make it possible to run ASPM (named as SS3 ASPM). This latest SS3 was completed recently and its documentation is still under preparation. The input files in SS3 ASPM contain many comments to help users to interpret how to make changes. The SS3 ASPM software has only been road tested with test data on at this stage and has not been applied in a full scale stock assessment. The software is not currently ready to be released.

8. The WPM agreed that such models are useful for certain exploratory analyses such as those examining uncertainty of parameters but they have limited use in deriving weightings for certain hypotheses.

FLR: an open-source framework for the evaluation and development of management strategies (IOTC-2008-WPM-INF01)

9. The WPM was informed about a recent publication describing the FLR framework (Fisheries Library for R), a development effort directed towards the evaluation of fisheries management strategies. The overall goal is to develop a common framework to facilitate collaboration within and across disciplines (e.g. biological, ecological, statistical, mathematical, economic, and social) and, in particular, to ensure that new modelling methods and software are more easily validated and evaluated, as well as becoming widely available once developed. Specifically, the framework details how to implement and link a variety of fishery, biological, and economic software packages so that alternative management strategies and procedures can be evaluated for their robustness to uncertainty before implementation. The design of the framework, including the adoption of object-orientated programming, its feasibility to be extended to new processes, and its application to new management approaches (e.g. ecosystem affects of fishing), is discussed. The importance of open source for promoting transparency and allowing technology transfer between disciplines and researchers is stressed.

10. One of the authors of the paper informed the WPM that the initiative relies on a limited number of involved developers and this limits the ability to improve and debug the software. Development is being funded through a series of EU-funded projects, and the release of a much improved version 2.0 is expected for the start of 2009.

Potential bias in multispecies sampling of purse seiner catches (IOTC-2008-WPTT-INF02)

11. This paper discusses the various potential biases associated with species and size sampling carried out in the Atlantic Ocean during landings of purse seiners. The paper is a follow up of the 4th meeting of the WCPFC Scientific Committee during which there were serious doubts expressed about the bias caused by the sampling schemes used in the Atlantic since 1980. The conclusion of the paper is that the sampling scheme currently used in the Atlantic appears to be consistent and satisfactory, but that minor potential biases in this sampling should be better identified and reduced by improvements in the current sampling and data processing. It is recommended that an international working group is organized to identify these uncertainties and to improve the multispecies sampling schemes and the data processing of their results.

Species composition of tuna catches taken by purse seiners (IOTC-2008-WPTT-05)

12. A presentation on species composition of tuna catches taken by purse seiners accompanied the above paper. Port sampling has been routinely used in the IOTC area since the early 1980's to correct the species composition of purse seine catches. The corrected statistics are the only ones released to IOTC and used by scientists. Analyses of species composition data of FAD associated purse seine catches in the Indian Ocean as recorded in the log books and those after correction of their species composition from the port sampling revealed large amounts of small yellowfin and small bigeye are misclassified as skipjack in the log books and in the landing statistics. The same result has been observed each year in both the Atlantic and Indian Ocean. The effects of these species corrections are important for bigeye tuna assessments as they correct for large amounts of amount of small bigeye that were previously identified as skipjack. Similarly, there are increases of the numbers of small yellowfin in the catches.

13. The WPM was informed that Spanish scientists have examined this matter using their data from the Indian Ocean and concluded that their sampling methods do not appear produce the bias found in the Pacific Ocean data.

14. Overall, while it is not known whether these biases associated with species and size sampling exist in the data obtained from the Indian Ocean, the WPM agreed that this matter should be further investigated and

concurred, with the WPTT (who also discussed this matter), to recommend that an international working group be organized in 2009 to bring together scientists working in the Atlantic, Indian, Eastern and Western Pacific oceans in order to examine the issues of potential biases in the current purse seine sampling programmes and where necessary identify ways to improve the multispecies sampling schemes and understand the implications for analyses of the data collected.

15. The WPM recommended that IOTC work on methods should be carried out in conjunction with other tuna commissions. The possibility of establishing some channels of communication among interested parties on the various tuna commissions should be explored by both the chairman and the Secretariat.

16. Further on this matter, the WPM recommended that work needs to undertaken to examine the efficiency of sampling programmes, understand the effect of sample size, and obtain variance estimates for samples (which are required for some assessment models). A suggestion was made for this matter to be tackled in cooperation with researchers in other oceans, possibly using the opportunities for collaboration the Kobe Agreement provides.

17. The WPM was informed that the high coverage of observer data in the Pacific had enable SPC scientists to examine the efficacy of port sampling programmes. One of the results was that port sampling regimes need to be tailored and what works for one ocean or gear may not work for another. Also, the WPM agreed it was very important to sample at the most appropriate place and time. For those catches undergoing transhipment, the first point of transhipment is the ideal location for obtaining more accurate data.. Although the issue presented here has been raised in relation to PS catches, it is assumed similar issue are likely to be of potential impact on all fisheries.

18. The difficulties of extrapolating data from a limited number of random samples taken at a single point to the fleet level highlighted the importance of observer programmes as alternative sources of information that could be used to validate port sampling and similar schemes.. The WPM concurred that the best means for obtaining accurate fisheries statistics including data on target, bycatch and associated species is from a combination of sources, on which observer programmes should play an increasingly important part. To this end, the WPM joined the WPTT and the WPEB in strongly recommending that IOTC Recommendation 05/07 *Concerning a management standard for the tuna fishing vessels*, to deploy if appropriate, scientific observers on-board the vessels according to the Commission's Resolution (Appendix I-ii), become binding on members.

Models for exploring information content of RTTP-IO tagging data (IOTC-2008-WPM-04)

19. Tagging data are a major information asset if they can be used in the stock assessment process - especially in an integrated framework. However, the nature of an integrated framework means that it can be difficult to look at fine-scale trends in the tagging data. It may also be difficult to estimate parameters such as M reliably, given the correlation among parameters. By examining the data in a more focused way a number of issues such as release event consistency, potential changes in availability between years and also the possibility of obtaining estimates of M can be addressed.

20. Some of the issues to overcome in the analyses included: most recaptures are from one gear type only; estimates of reporting rate are available for a subset of the catches of the major recapture gear type; it is difficult to include the tag recaptures from other gears furthermore there are no estimates of reporting rate from other gears; dispersal of the releases into the different gear types has a spatiotemporal structure – there is a need to try and account for this in the tag dynamics model.

21. The methods of analysis included; age and length based models; estimates quarterly exploitation rates (for each gear type) and abundances using a Petersen-type approach for predicting tag recaptures; use of over-dispersed Poisson probability model for the tag recapture process; and Bayesian and MCMC methods to explore the uncertainty in the parameters

22. Age-based model were applied to YFT and BET initially; however, given outstanding growth issues and the ad hoc growth model assumed this year for YFT, it was difficult to sensibly define length-transition matrix. It may be useful to examine the length-based application for YFT and BET in the future when growth and growth variability is better understood. For skipjack an age-based model was examined applied (assuming a value of t0). As tagged lengths do not coincide with the recruitment lengths a length-based model was not attempted.

3. SUMMARY OF WPM RECOMMENDATIONS IN 2008

DATA
1. That an international working group be organized in 2009 to bring together scientists working in the Atlantic, Indian, Eastern and Western Pacific oceans in order to examine the issues of potential biases in the current purse seine sampling programmes and where necessary identify ways to improve the multispecies sampling schemes and understand the implications for analyses of the data collected. (Paragraph 14)
2. The WPM recommended that IOTC work on methods should be carried out in conjunction with other tuna commissions. The possibility of establishing some channels of communication among interested parties on the various tuna commissions should be explored by both the chairman and the Secretariat. (Paragraph 15)
3. That work needs to undertaken to examine the efficiency of sampling programmes, understand the effect of sample size, and obtain variance estimates for samples (which are required for some assessment models). A suggestion was made for this matter to be tackled in co-operation with researchers in other oceans, possibly using the opportunities for collaboration the Kobe agreement provides. (Paragraph 16)
4. The WPM joined the WPTT and the WPEB in strongly recommending that IOTC Recommendation 05/07 Concerning a management standard for the tuna fishing vessels, to deploy if appropriate, scientific observers on-board the vessels according to the Commission's Resolution (Appendix I-ii), become binding on members. (Paragraph 18)

4. ITEMS PUT FORWARD BY THE WPM FOR CONSIDERATION BY THE SCIENTIFIC COMMITTEE IN 2008

23. Research recommendations and priorities for endorsement. (Section 3)

5. OTHER BUSINESS

24. None.

6. ADOPTION OF THE REPORT

25. The Report of the Tenth Session of the Working Party on Methods was adopted by correspondence received up until 12 December 2008.

APPENDIX I
LIST OF PARTICIPANTS

Dr. Emmanuel CHASSOT
Research scientist
CRH
Avenue Jean Monnet
BP 171 34203 SETE cedex
FRANCE
Fax: 00499573295
E-mail: Emmanuel.Chassot@ird.fr

Ms Alicia DELGADO DE MOLINA ACEVEDO
Scientific
Avenida Tres de Mayo, 73
38005 Santa Cruz de Tenerife
SPAIN
Fax: 0034922549554
E-mail: alicia.delgado@ca.ieo.es

Dr John HAMPTON
Manager, Oceanic Fisheries Programme
Secretariat of the Pacific Community
B.P. D5
98848 Noumea Cedex
NEW CALEDONIA
Fax: +687-263818
E-mail: JohnH@spc.int

Dr. Richard HILLARY
Imperial college of Science,
Technology and Medicine
8 princess Garden
127, SW 7 1 NA
UNITED KINGDOM
Phone:+44-207 589 5111
Fax:+44-207 589 5319
Email: r.hillary@imperial.ac.uk

Mr Adam LANGLEY
Independent Consultant
IOTC
7 Van Diemen St Nelson, NZ
NEW ZEALAND
Tel.: 0064 35456306
E-mail: adam_langley@xtra.co.nz

Dr Francis MARSAC
Head, THETIS Research Group
Centre de Recherche Halieutique
Avenue Jean Monnet - BP 171
34203 Sète Cedex
FRANCE
Fax: +33 4 99 57 32 95
E-mail: marsac@ird.fr

Iago MOSQUEIRA SÁNCHEZ
Scientist
Lowestoft Laboratory
Pakefield Rd.
Lowestoft, NR33 0HT
UNITED KINGDOM
Fax: +441502552451
E-mail: iago.mosqueira@cefas.co.uk

Dr Hilario MURUA
Researcher
+34 943 004800
EUROPEAN COMMUNITY
Fax: +34 943 004801
E-mail: hmurua@pas.azti.es

Dr. Tom NISHIDA
Scientist , National Research Institute of Far
Seas Fisheries (NRIFSF), Fisheries Research
Agency
5-7-1, Orido Shimizu-Ward, Shizuoka-City,
JAPAN 424-8633
Phone/Fax: 81 543366052
Email: tnichida@affrc.go.jp

Ms Praulai NOOTMORN
Director of Andaman Sea Fisheries Research
and Development Center
Department of Fisheries
77 Sakdedej Road, Vichit Sub-District,
Muang District, Phuket 83000
THAILAND
Email: nootmorn@yahoo.com

M. Renaud PIANET
Scientist
BP 570
Victoria
Mahé, SEYCHELLES
Fax: +248 22 47 42
E-mail: renaud.pianet@ird.fr

Dr Tom POLACHECK
CSIRO
GPO Box 189 Hoburt, TAS
AUSTRALIA
Tel.: 61 3 6267 4104
E-mail: tom.polacheck@csiro.au

Dr Hiroshi SHONO
Senior Researcher
National Research Institute of Far Seas
Fisheries Tropical Tuna Division,
Mathenuatical Biology Section
5-7-1 Orido Shimizu-ku, Shizuoka-shi , 424-
8633,
JAPAN
Phone : +81-543-36-6000 ext. 43
Fax : +81-543-35-9642
E-mail : hshono@affrc.go.jp

Dr Maria SOTO RUIZ
Scientist
Corazón de María 8, 28002 Madrid, Spain
SPAIN
Fax: 34914135597
E-mail: maria.soto@md.ieo.es

Dr David WILSON
Senior Scientist
Bureau of Rural Sciences
Fisheries and Marine Science Program
GPO Box 858
Canberra ACT 2601
AUSTRALIA
Fax: +61-2-62724018
E-mail: david.wilson@brs.gov.au

IOTC Secretariat
PO Box 1011
Victoria
SEYCHELLES
Phone: +248 225494
Fax: + 248 224364

Mr Alejandro ANGANUZZI
Executive Secretary
E-mail: aa@iotc.org

Mr Julien MILLION
Tagging Assistant
E-mail: jm@iotc.org

Dr Chris O'BRIEN
Deputy Secretary
E-mail: cob@iotc.org

Thanks to the support team from the Department of Fisheries
Dr. Smith Thummachua

Ms. Montana Piromnim
Ms. Chutima Tawachsupa
Ms. Suchittra Mawade
Mr. Pattapol Bualombai
Ms. Jidapa Ta-vay-teekul
Ms. Rattana Tia-ye

APPENDIX II
AGENDA OF THE MEETING

1. Standardization of CPUE to account for spatial, temporal and technical factors: new approaches and experiences.

2. Methods and models for analyzing tagging data.

3. Stock assessment methods that incorporate tagging data: current state of the art and future uses in iotc.

4. Providing management advice using management strategy evaluation and stochastic simulation.

5. Research recommendations and priorities

6. Other business

APPENDIX III
LIST OF DOCUMENTS PRESENTED TO THE MEETING

Document	Title
IOTC-2008-WPM-01	Agenda of the Working Party on Methods
IOTC-2008-WPM -02	WPM List of documents
IOTC-2008-WPM -03	Notes on two new ASPM software based on "AD build modeler" and "SS3". Edited by *T. Nishida*
IOTC-2008-WPM -04	Models for exploring information content of RTTP-IO tagging data. *R. Hillary*
IOTC-2008-WPM -05	Species composition of tuna catches taken by purse seiners. *A. Fonteneau. PowerPoint presentation*
IOTC-2008-WPM –INF01	FLR: an open-source framework for the evaluation and development of management strategies *L. T. Kell, I. Mosqueira, P. Grosjean, J-M. Fromentin, D. Garcia, R. Hillary, E. Jardim, S. Mardle, M. A. Pastoors, J. J. Poos, F. Scott, and R. D. Scott*
IOTC-2008-WPTT-INF02	Potential bias in multispecies sampling of purse seiner catches. *A. Fonteneau Alain, E. Chassot, F. Abascal and S. Ortega*