



**SCIENTIFIC COMMITTEE
FOURTH REGULAR SESSION**

11–22 August 2008
Port Moresby, Papua New Guinea

REPORT ON THE 2008 STOCK ASSESSMENT TRAINING WORKSHOPS

WCPFC-SC4-2008/GN WP-6

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Report on the 2008 Stock Assessment Training Workshops

19th June - 4th July 2008
SPC Headquarters
Noumea
New Caledonia



Contents

Contents	2
1. Background	3
1.1. Introduction	3
1.2. Recognition of tuna as a vital longterm resource	3
1.3. Legal obligations and the importance of stock assessment	5
1.4. A problem relating to scientific and legal capacity	6
2. General Approach to Increasing Developing States Capacity to Interpret and Use Information From Regional Stock Assessments	6
3. 2008 Workshop	9
3.1. Objectives	9
3.2. Overall design	9
3.3. Facilities and materials	10
4. Communication strategy	10
5. Participation	13
6. Additional funding	13
7. Final Budget	13
8. Facilitators	13
9. Assessment of workshop	14
10.1 Assessment of participants performance	14
10.2 Assessment by participants	16
10.3 Self assessment by SPC	18
10. Conclusion	20
Appendix I - Participants	22

1. Background

1.1 Introduction

The Oceanic Fisheries Programme (OFP) of the Secretariat of the Pacific Community (SPC) hosted two Stock Assessment Workshops (SAWs) for fisheries officers from Pacific Island Countries and Territories, at SPC headquarters in Noumea, New Caledonia, during the period 19th June – 4th July 2008. These workshops follow on from the previous stock assessment workshops held in 2006 and 2007. While previous workshops were funded predominantly by the Global Environment Facility (GEF) under the Oceanic Fisheries Management Project (OFMP), funding for the 2008 workshops was predominantly provided by the Japanese Government funded “WCPFC Project on Capacity Building in Fisheries Statistics, Regulation and Enforcement for Small Island Developing States” as administered by the WCPFC. The workshops also utilized funding from ProcFish OCT and SPC itself. The workshops were recognized/endorsed by the WCPFC Scientific Committee as an important regional capacity building endeavour in 2006 and 2007. The following section provides background information to explain the need for and purpose of these workshops, including a brief review of the outcomes and recommendations of the 2006 and 2007 workshops. Subsequent sections will outline the 2008 workshops design, content and outcomes.

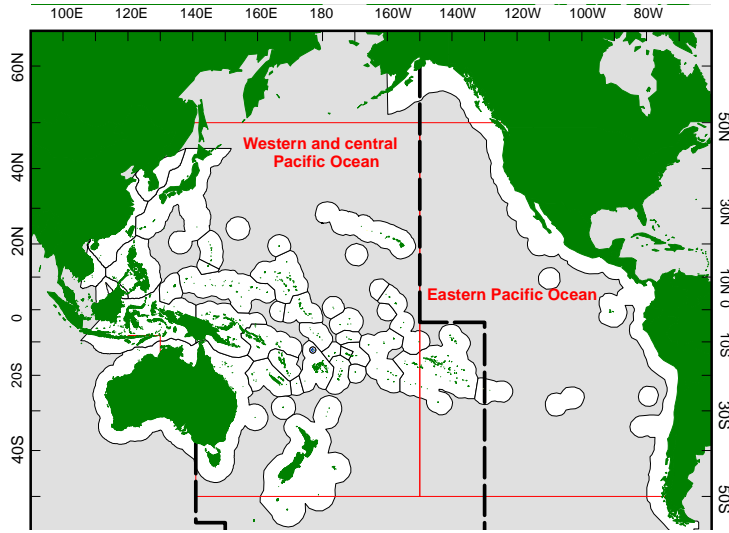
The SAWs were initially instigated in 2006 as one component of the much larger Oceanic Fisheries Management Project (OFMP), but have since been expanded to include other developing states who are not participants in that project (Bromhead and Molony, 2007). That project was instigated through the combined initiative of 15 governments within the WCPO region (Figure 1a); Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tokelau, Tuvalu and Vanuatu.

1.2 Recognition of tuna as a vital long-term resource

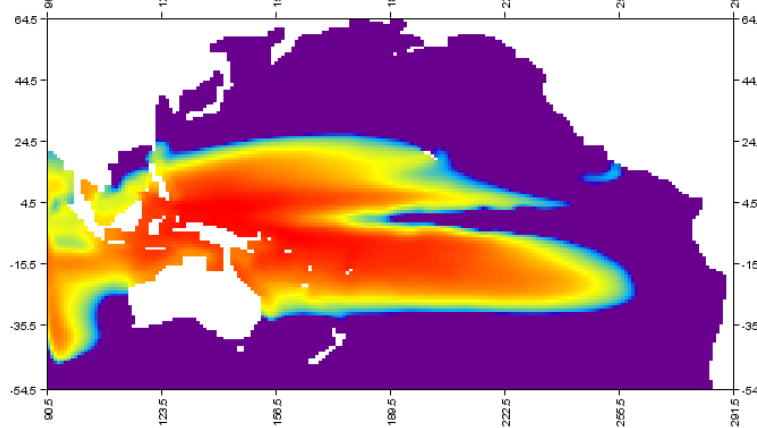
For a long time, these countries (along with other Pacific Island Countries and Territories) have recognized that they are collectively the custodians of one of the largest marine ecosystems in the world (the warm pool large marine ecosystem – LME – Figure 1b), within which resides the world’s largest tuna resource. Approximately one half of the world’s total tuna catch is taken from this region, with catches consistently increasing over the past three decades (Figure 1c) and surpassing 2 million tonnes per annum in recent years.

For some time these countries have had concerns over the sustainability of this resource which represents one of the only significant natural resources in the region and which is one of the most economically important resources for these countries. Most PICTs are characterised as developing countries with limited

A.



B.



C.

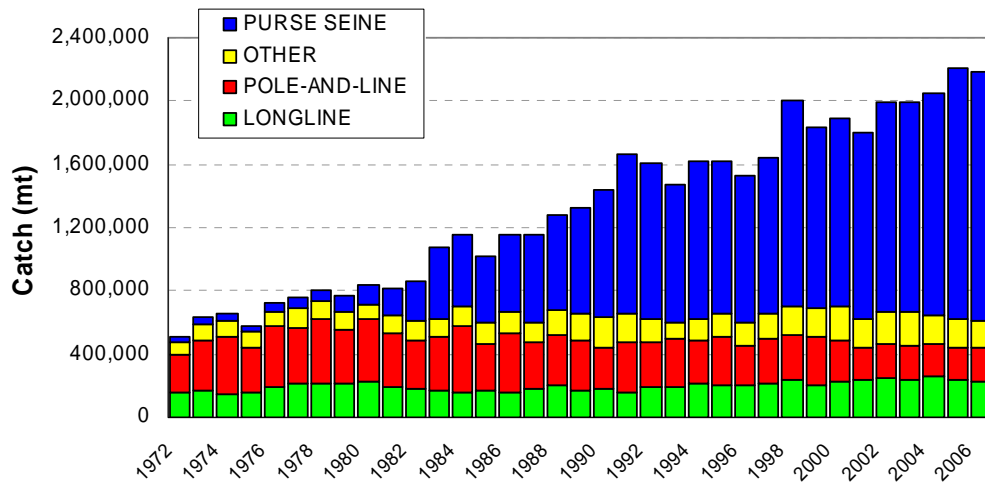


Figure 1 – A) The jurisdictional boundaries of the Western and Central Pacific Fisheries Commission encompasses the EEZs of many Pacific Island Countries and Territories. B) The boundaries of the warm pool large marine ecosystem can be defined in part by water temperature. Here, warm colours indicate the region of the warm pool in the Pacific Ocean (using an example month and year). C) Annual catches of tuna by gear in the WCP-CA. (Source: SPC, 2008).

resources and for some, tuna fishing access fees constitute greater than 40% of total government revenue. The long term economic and social aspirations of many of these countries rely heavily on the long term sustainability of the tuna resource.

1.3 Legal obligations and the importance of stock assessment

There are a number of legally binding international conventions and agreements that are designed to ensure that global fish stocks are managed sustainably through cooperation. These include the United Nations Convention for the Law of the Sea (UNCLOS) and the UN Fish Stocks Agreement (UNFSA). In addition, many Pacific Island countries have negotiated and are party to cooperative regional agreements (e.g. legally binding treaties including the Niue Treaty, Nauru Agreement, Palau Arrangement, FSM Arrangement and US Multilateral Treaty) and are members of institutions (e.g. the Pacific Islands Forum Fisheries Agency - FFA) to ensure cooperation amongst themselves regarding the sustainable management and development of fisheries in the region. Most recently, these countries negotiated and became Contracting Parties to the Western and Central Pacific Fisheries Convention (hereafter referred to as the Convention) and as members of the Commission established by the Convention (hereafter referred to as the Commission), are bound by its mandate.

Within the two key international agreements of UNCLOS and UNFSA, and the Convention, are specific provisions for the use of stock assessments to assist in sustainable management of fish stocks.

Article 61 of UNCLOS makes direct reference to maximum sustainable yields (MSY) as an objective for sustainable fisheries, while the UN Fish Stocks Agreement states that any nations fishing on the high seas should:

“Adopt measures for long term sustainability, based on best available scientific advice, applying the precautionary approach”.

Both general scientific advice regarding sustainability, and the precautionary approach, are currently based on the outputs from stock assessments. The Convention being the first regional fisheries agreement to be adopted since the conclusion of UNFSA, similarly provides for the need to base conservation measures on best available scientific advice, maintaining stocks at MSY and applying the precautionary approach.

Given that there are both economic and legal imperatives that WCPO tuna stocks are managed sustainably, and the key role of stock assessment in providing advice on sustainability, it is clearly critical for the countries and territories in the region to have the capacity to interpret and use stock assessments in their domestic and regional decision making processes.

1.3 A problem relating to scientific and legal capacity

In recent years, it has become very apparent to the governments and people of PICTs and other developing states that while they have considerable obligations to meet under UNCLOS, UNSFA and the Convention, few if any of them have the required legal and scientific capacity to ensure that they can meet these obligations. Both the WCPFC Project and the OFMP incorporated elements specifically designed to increase the capacity of participating countries in the relevant areas of technical and scientific expertise.

More specifically, PICTs and other developing states have recognised that they have limited capacity to interpret and use stock assessments (and associated scientific analyses) and to incorporate stock assessment outputs into decision making processes. This lack of capacity represents a significant impediment to the development and revision of tuna management plans, the ability to participate in regional fora (e.g. the Scientific Committee of the Commission) and to an improvement in understanding the potential consequences of different management options for the sustainable harvesting of tuna resources.

Both the current Japanese Government funded “WCPFC Project” proposal (from SPC) and the previous OFMP, contained objectives relating specifically to the need for increased understanding of stock assessment. These objectives state an aim to *“strengthen national capacities to use and interpret regional stock assessments, fisheries data and oceanographic information at the national level, to participate in Commission scientific work, and to understand the implications of Commission stock assessments”*.

The intended outputs associated with this objective are:

1. Training of national technical and scientific staff to understand regional stock assessment methods, and interpret and apply the results, and to use oceanographic data; and to
2. Hold regional workshops on stock assessment methods and analyses of oceanographic impacts on fisheries.

2. General Approach to Increasing Developing States Capacity to Interpret and Use Information From Regional Stock Assessments

The original design of the OFMP held SPC responsible for developing and running two stock assessment workshops, one each to be held in the 2nd and 4th years of the OFMP. However a review of the stock assessment workshop in 2006 determined that for the stock assessment objectives to be met, workshops

would need to be held at least annually. Hence workshops have been held in 2006, 2007 and more recently in June/July, 2008 (using WCPFC Project funds). Further review of the 2007 Workshops led to the development of a “programme” of activities aimed at enhancing developing state capacity to interpret and use information from stock assessments. This programme included elements additional to the annual workshops, recognizing that mechanisms were required to ensure knowledge gained from the workshops was retained in the periods between workshops. This programme of OFP facilitated activities includes:

1. **Annual workshops** – two workshops to be held annually, 1 month prior to Scientific Committee. The first workshop is for new participants not previously involved in the workshops, and is aimed to provide an understanding of the basic principles of stock assessment and generalized mechanics of age structured stock assessment models, and an introduction to key stock assessment outputs used in fisheries management. The second workshop is for participants who have previously attended workshops, and focuses on assessing the “quality” of an assessment (via consideration of assumptions, model fit and sensitivity analyses) and the extraction and interpretation of information for use in decision making at both the regional and domestic levels.
2. **Online learning and revision** – In 2007, SPC sought and gained endorsement from Heads of Fisheries Departments in PICTs and other developing states for the development of an online revision facility for workshop participants, so as to ensure retention of knowledge between annual workshops. The online revision works by providing participants a revision exercise once every 1 to 2 months, which is intended to take around a half working day to complete. The success of this endeavour in the first year has been mixed, and will be discussed later.
3. **Opportunistic training during in country visits** – OFP scientists will provide 1 to 2 day in-country stock assessment workshops, when possible, during in-country visits to attend EAFM and other meetings. The first such in-country training was undertaken in Kiribati in January 2008 and another short workshop is planned for fisheries staff in Samoa in July 2008.
4. **In meeting support** – OFP scientists provide on-site support at Scientific Committee and other key regional meetings to assist fisheries officers from developing states in further understanding and interpreting stock assessment and other scientific/technical papers presented during those meetings.

With regard to the workshops, past reviews have led to the instigation of the following improvements for 2007 and 2008:

1. **Communication and nominations** – Countries have been encouraged to be far more proactive and timely in submitting their nominations. Earlier advertising of the workshops has assisted this cause.
2. **Participant eligibility** – Fairly strict criteria have now been applied to encourage countries to send participants who have an appropriate background and are in positions where they can apply their improved knowledge of stock assessment into both the domestic and regional decision making processes and forums. Consideration is given of course to those countries with limited staff options, however preference is given to nominees who have attended past workshops, have university level education in fisheries science, and/or who attend SC on behalf of their country/territory.
3. **Timing** – Holding the workshop a few weeks prior to the WCPFC Scientific Committee facilitates the participation of member countries in that forum (on the proviso that participants to the workshop also attend SC).
4. **Length** – Workshop length and/or contact hours have been reduced to one week (from two previously) to reduce meeting fatigue. However, this may be increased again but modified to include rest days.
5. **Increase confidence to “talk science”** – Greater emphasis is now given to exercises aimed at increasing participants confidence to talk in open forums about stock assessment. Discussion groups, regular question/answer sessions, and group presentations aim to provide participants the communication skills they will require to actively participate in regional and Commission meetings.
6. **Oceanographic Influences on fish and fish stocks** – Workshops now include a session that deals with the multiple impacts of oceanography on fisheries and fish populations.
7. **Reviewing** – The level of reviewing has been increased in order to reinforce key concepts of each section of the SAW. Tests of participants understanding of workshop material and concepts are used every 2-3 days to pick up on those concepts that are not being clearly understood by participants, so further explanation can be provided in a timely manner.
8. **Management implications** – Workshops now include participation of FFA Fisheries Management Advisors to help explain potential implications of stock assessment for domestic and regional fisheries management and highlight the links between scientific advice (from stock assessments) and management.

3. 2008 Workshop

3.1 Objectives

The 2008 stock assessment training was split into two workshops, the first to provide training to participants who were mostly new to stock assessment concepts and/or had not attended the previous workshop in 2007. The second workshop aimed to further build upon the understanding of those participants who were returning from the 2006 and 2007 workshops. The broad objectives relating to stock assessment capacity building (as stated in the original proposal to the WCPFC Project) were used as a guide to create more specific functional objectives for both of the workshops. The workshops are now structured around delivering understanding around 5 key questions:

1. What are stock assessment models and what are they used for? (PURPOSE)
2. How does an age-structured stock assessment model work? (MECHANICS)
3. How can we determine the quality of an assessment and where it might be improved in future (assumptions, model fit, sensitivity analyses and uncertainty)(CRITICAL APPRAISAL)
4. What is the key information for fisheries management and how to interpret it (from a biological/resource perspective)?
5. What are the potential implications of the assessment for regional and national fisheries?

3.2 Overall Design

Taking into account the objectives stated above and the recommendations flowing from the review of the 2006 and 2007 stock assessment workshop, the 2008 workshop program delivered two 5-day workshops. The first was predominantly designed for participants who were mostly new to stock assessment concepts and/or had not attended the first workshop in 2006 or 2007. The second workshop aimed to further build upon the understanding of those participants who were returning from the 2007 workshop. The workshops were each reduced to 5 days (noting that the 2006 workshop were 10 days) to reduce meeting fatigue and fit within funding restraints while still delivering appropriate training to two groups at different levels of understanding of stock assessment.

The 2007 workshops differed in their focus with the Level 1 workshop essentially a repeat of the 2007 Level 1 workshop, and focusing on Questions 1 and 2 stated in the objectives above. The Level 2 workshop opened with a participant led day of revision, in the form of question and answer sessions around key stock assessment concepts. The workshop then spent 2 days looking at the topics of assumptions, uncertainty, sensitivity analyses and model fitting, to assist

participants in looking at assessments a little more critically. The workshop finished with sessions on the extraction and interpretation of key management relevant outputs from the regional tuna assessments, culminating in a final day presentation by participants in which they had to demonstrate an understanding of all 5 questions detailed in the objectives above. Both workshops focused on tuna and other pelagic species and the assessments currently used to assess these species in the Pacific Ocean.

3.3 Facilities and materials

Both workshops were held at SPC Headquarters, Noumea, utilizing the small conference room and the new and enlarged computer laboratory. Both workshops ran over 5 days, and each day comprised 4 sessions, with the theme of each session outlined in Tables 1 and 2. The sessions were either theory based or practical/discussion sessions. Practical sessions predominantly involved computing based exercises to give participants a working understanding of how a simple age-structured stock assessment model functions, and were designed to complement and reinforce concepts learnt in the previous theory session. Each day started with a review of key points from the previous days session, including a question/answer session where participants were expected to show their understanding of the previous days content. The same method was used on the last day when reviewing the entire week.

Participants were provided with a workshop folder on the first day, which contained copies of the workshop presentations, structure and design, and more general information relating to the locations of sessions, local facilities and social functions.

4. Communication strategy

The workshops were first advertised via email to OFMP focal points and heads of fishery departments in February 2008. Follow up emails to remind potential participant countries to submit their nominations were sent out once per month for the following 3 months.

Where email communications were impeded or no response was forthcoming, countries were contacted via fax, telephone or at regional meetings. The deadline for nominations was extended on a number of occasions to accommodate those countries who were unable to commit staff to the workshop at earlier dates.

Following the workshops it is SPC's intention to provide feedback on the workshops to participating countries, territories, funding bodies and interested regional organizations. This will be done through the distribution of this workshop report (including to SC4), and communications via email to heads of fishery departments.

Table 1 – Outline of the design and content of the Level 1 Stock Assessment Workshop, held June 2008 at SPC in Noumea.

Day	Day 1 - Thursday 19th	Day 2 - Friday 20th	Day 3 - Monday 23rd	Day 4 - Tuesday 24th	Day 5 - Wednesday 25th
Theme	Background (Small Conference Room)	Parameter Estimation - Recruitment (Small Conference Room)	Parameter Estimation - Mortality (Natural and Fishing) (Small Conference Room)	Abundance indices & fitting CPUE data (Small Conference Room)	Group Presentation preparation (Computer Room)
Review 8.15am	Welcome/ Introductions/Overview/Background/Objectives	Review Of Day 1	Review Of Day 2	Review Of Day 3	Review Days 1-4: Putting it all together
Session 1 (0830 - 1000)	General Overview of Stock Assessment	Theory	Theory	Theory	Presentation Preparation
	Overview of Stock assessment and tuna fisheries in the WCPO	Theory	Theory	Theory	Presentation Preparation
	Overview of Stock assessment and tuna fisheries in the WCPO	Theory	Theory	Theory	Presentation Preparation
MORNING TEA (1000 - 1030)					
Theme	Fish populations and fished population dynamics (Small Conference Room)	Parameter Estimation - Recruitment (Computer Room)	Parameter Estimation - Mortality (Natural and Fishing) (Computer Room)	Abundance indices & fitting CPUE data (Computer Room)	Group Presentation preparation (Computer Room)
Session 2 (1030 - 1200)	Theory	Practical	Practical	Practical	Presentation Preparation
	Theory	Practical	Practical	Practical	Presentation Preparation
	Theory	Prac/Discussion	Prac/Discussion	Prac/Discussion	Presentation Preparation
LUNCH (1200 - 1300)					
Theme	Oceanographic Considerations (Small Conference Room)	Modal Progression and Growth Estimation (Small Conference Room)	Parameter Estimation - Selectivity/Catchability (Small Conference Room)	Biological reference points (Small Conference Room)	Group Presentation preparation (Computer Room)
Session 3 (1300 - 1430)	Theory	Theory	Theory	Theory	Presentation Preparation
	Theory	Theory	Theory	Theory	Presentation Preparation
	Theory	Theory	Theory	Theory	Presentation Preparation
AFTERNOON TEA (1430 - 1500)					
Theme	Stock assessment - Key principles (Small Conference Room)	Growth Estimation (Computer Room)	Parameter Estimation - Selectivity/Catchability (Computer Room)	Biological reference points (Computer Room)	Group Presentations (Computer Room)
Session 4 (1500 - 1630)	Theory	Practical	Practical	Practical	Presentations
	Theory	Practical	Practical	Practical	Presentations
	Review of Day 1	Prac/Discussion	Prac/Discussion	Practical	Presentations

Table 2 – Outline of the design and content of the Level 2 Stock Assessment Workshop, held July 2008 at SPC in Noumea.

Day	Day 1 - Monday 30th June	Day 2 - Tuesday 1st July	Day 3 - Wednesday 2nd July	Day 4 - Thursday 3rd July	Day 5 - Friday 4th July
Theme	Theme 1 - Revision: How does a stock assessment model work? (Small Conference Room)	Theme 2 - Assessing the assessment - Assumptions, Uncertainty, Sensitivity Analyses and Model fit (Small Conference Room)	Theme 3 - What is the key information for managers, and how do you interpret it? (Computer Room)	Theme 4 - Potential Implications of an assessment for your country and the region (Small Conference Room)	Group Presentation: Reviewing and Interpreting an Assessment (Computer Room)
Review 8.15am	Welcome	Revision of Day 1	Revision of Day 2	Revision of Day 3	Revision Days 1-4
Session 1 (0830 - 1000)	Revision - led by participants	Uncertainty and Sensitivity Analyses	Theory	Regional implications	Prepare Presentation
	Revision - led by participants	Uncertainty and Sensitivity Analyses	Theory	National implications	Prepare Presentation
	Revision - led by participants	Uncertainty and Sensitivity Analyses	Theory	National implications	Prepare Presentation
MORNING TEA (1000 - 1030)					
Theme	Theme 1 - Revision: How does a stock assessment model work? (Small Conference Room)	Theme 2 - Assessing the assessment - Assumptions, Uncertainty, Sensitivity Analyses and Model fit (Small Conference Room)	Theme 3 - What is the key information for managers, and how do you interpret it? (Computer Room)	Theme 4 - Potential Implications of an assessment for your country and the region (Small Conference Room)	Group Presentation: Reviewing and Interpreting an Assessment (Computer Room)
Session 2 (1030 - 1200)	Revision - led by participants	Model Fitting	Group Discussion Exercise	National implications	Prepare Presentation
	Revision - led by participants	Model Fitting	Group Discussion Exercise	National implications	Prepare Presentation
	Revision - led by participants	Model Fitting	Group Discussion Exercise	Group Discussion Exercise	Prepare Presentation
LUNCH (1200 - 1300)					
Theme	Theme 1 - Revision: How does a stock assessment model work? (Small Conference Room)	Theme 2 - Assessing the assessment - Assumptions, Uncertainty, Sensitivity Analyses and Model fit (Computer Room)	Theme 3 - What is the key information for managers, and how do you interpret it? (Computer Room)	Theme 4 - Potential Implications of an assessment for your country and the region (Small Conference Room)	Group Presentation: Reviewing and Interpreting an Assessment (Computer Room)
Session 3 (1300 - 1430)	Revision - led by participants	Group Discussion Exercise	Group Discussion Exercise	Group Discussion Exercise	Prepare Presentation
	Revision - led by participants	Group Discussion Exercise	Group Discussion Exercise	Group Discussion Exercise	Prepare Presentation
	Revision - led by participants	Group Discussion Exercise	Group Discussion Exercise	Group Discussion Exercise	Prepare Presentation
AFTERNOON TEA (1430 - 1500)					
Theme	Theme 2 - Assessing the assessment - Assumptions, Uncertainty, Sensitivity Analyses and Model fit (Small Conference Room)	Theme 3 - What is the key information for managers, and how do you interpret it? (Computer Room)	Theme 4 - Potential Implications of an assessment for your country and the region (Small Conference Room)	Theme 5 - Management Strategy Evaluation (Small Conference Room)	Group Presentation: Reviewing and Interpreting an Assessment (Computer Room)
Session 4 (1500 - 1630)	Model Assumptions	Theory	Regional implications	Introduction to MSE	Presentations
	Model Assumptions	Theory	Regional implications	Introduction to MSE	Presentations
	Revision of Day 1	Revision of Day 2	Revision of Day 3	Revision of Day 4	Presentations

5. Participation

SPC received 24 nominations for the workshops. Only one of these were unable to make it to the workshop. Dr Ziro Suzuki, the “WCPFC Project” fund manager, kindly attended the workshops and provided feedback to assist future improvements to the workshops. One fisheries management officer, Darren Cameron, from FFA was also invited to attend, and participated in both workshops. The 10 participants that attended the Level 1 workshop and 14 that attended the Level 2 workshop, along with a description of their current roles, are listed in Appendix I.

6. Additional Funding

The majority of the funding for the workshop came from the Japanese Government funded “WCPFC Project on Capacity Building in Fisheries Statistics, Regulation and Enforcement for Small Island Developing States” (The WCPFC Project) as administered by the WCPFC. For those countries and territories not eligible for funding from that source, ProcFish OCT and SPC funding was obtained.

7. Final Budget

Table 3 – Preliminary estimate of workshop (and online training) costs in US dollars.

Cost item	WCPFC Project	Other*	Total
Participant per diems	31,783	9,768	41,551
Participant travel	33,260	9,212	42,472
Materials	1000	500	1,500
Online portal/training tools	13,000	0	13,000
Total	79,043	19,480	98,523

8. Contributing Facilitators (SPC staff)

The workshop facilitators/administrators were Don Bromhead, Simon Hoyle, Kay Parry and Helene Ixeko while materials were developed by Don Bromhead, Brett Molony and Simon Hoyle. Additionally, Dr Ziro Suzuki (WCPFC) and Darren Cameron (FFA) made valuable contributions to discussions throughout the workshops. Numerous other SPC staff kindly provided logistical support to the workshop.

9. Assessment of Workshops

Three main forms of assessment were used to determine the degree to which the workshops were able to meet their objectives. These were:

1. Assessment of participant's performance;
2. Assessment of the workshop by participants; and
3. Self assessment by SPC, including:
 - a. Implementation of changes recommended from 2006 and 2007.
 - b. Additional improvements to be made for 2009

9.1 Assessment of participant's performance

Given the workshop style nature of this endeavour, participant performance was not assessed on an individual basis by formal written or oral examination. However, informal assessment methods were used, including the following.

9.1.1 Testing of knowledge or memory retention – The first day of the Level 2 workshop comprised a series of participant led revision exercises, in the form of question and answer sessions. Prior to the workshop, each participant had been assigned a specific topic (e.g. fishing mortality, recruitment, growth estimation etc) upon which they had to design 5-6 questions. They were then tasked with asking these questions to the group and facilitating the subsequent discussion of those questions amongst the group. With 14 participants at the workshop, they were able to comprehensively test their own understanding/retention of stock assessment theory as learnt at previous workshops. It also gave the facilitators a chance to assess which areas might require further revision/reinforcement during the workshop. Asking participants to lead this revision day also encouraged them to do revision prior to arriving at the workshop.

Level 1 participants received a small informal “quiz” on both the first and last days of the workshop. The quiz paper was exactly the same in both instances and served to determine the degree to which participants had absorbed information provided during the week. In nearly all cases the papers indicated very significant increases in understanding of stock assessment theory, while also indicating that one or two participants had struggled. Average scores at the start of the workshop were 11/30 (range 6-18), compared to an average score of 23/30 (range 14-28) five days later. This assessment exercise also helped highlight those concepts which participants consistently found more difficult to comprehend and will allow SPC to strengthen those components of learning in the next workshop.

9.1.2 Laboratory Exercises – Workshop facilitators were able to judge participants understanding of concepts throughout the Level 1 workshop by assessing answers and progress during the laboratory exercises. Where participants showed a lack of understanding of key concepts, short interludes in the laboratory sessions were held to go over those concepts again and ensure

uptake of key principles. However, later feedback from participants (see Table 3) indicated that greater time allocation is required for the practical component of the workshop.

9.1.3 Daily revision – Most days of the workshops started with a 15-30 minute review of the preceding days material, presented as a informal verbal exam to the group. This was aimed at encouraging them to revise material overnight, to ensure they understood the key concepts, and to provide a non-threatening opportunity to build confidence in speaking about stock assessment in front of their peers. The main workshop facilitator was impressed with the ability of participants to answer most of the questions posed to them regarding the previous days material, indicating good short term uptake. A similar exercise was run on the last day of the Level 1 workshop but revising key concepts from the entire week. Again, participants ability to respond to questioning was judged to be very good.

9.1.4 End presentation – Level 2 workshop participants understanding of stock assessment was also assessed informally on the last day of the workshop through the participants creating and presenting seminars to demonstrate their understanding of each of the five key areas of learning outlined in the objectives section of this report. In addition, the participants were required to come up with “critical peer review” style questions, which were then posed to the two attending stock assessment modelers (Simon Hoyle and Nick Davies). The overall standard of the presentations was very good and the peer review questions posed to the modelers were very well thought through and demonstrated some increasing capacity to review assessments presented at SC. The presentations were not formally graded (as this was not intended to be a university style course but rather an interactive workshop), but those participants who perhaps found some of the concepts difficult to understand or articulate were noted to allow extra attention to be provided on those specific issues at the next workshop.

9.1.5 Post workshop evaluation – Throughout both workshops the facilitator spent time with each of the participants (although, due to there only being one facilitator, not as much time as perhaps would be ideal) and, in combination with assessment of final presentations, was able to gain an understanding of the relative ability and understanding levels of each of the participants. After the workshop finished, the main facilitator ranked each participant according to their demonstrated technical ability (or for Level 2 workshop, “critical thinking ability” demonstrated during discussion groups) and theoretical understanding of the concepts.

The results of this exercise suggested that of the Level 1 Workshop group, 4 (50%) of the participants had sufficient to very good overall technical ability and theoretical grasp of concepts. In the Level 2 workshop, 11 of 13 participants (84%) demonstrated sufficient to very good theoretical grasp and critical thinking ability. It is not unexpected that a number of participants struggled to understand

the subject material, despite trying very hard. This is understandable, given that in some instances, countries are unable to nominate officers who have had prior exposure to stock assessment or any fisheries science training/education. Expecting such officers to quickly grasp what is a relatively complex subject is probably unreasonable, and they should be commended for their efforts nonetheless during the workshops. It is still probably preferable that countries send an officer, even without relevant background, than not send anyone at all, if that is the only choice.

9.2 Assessment by participants

Another workshop assessment tool took the form of a generalized feedback questionnaire in which participants were asked a range of questions relating to the design, contents, presentation, structure and other aspects of the workshop.

The results from the assessment by Level 1 participants is summarized in Table 3 and indicate that the majority of participants felt that the workshop had clear objectives, was well planned, encouraged participation, had appropriate content and was well balanced, with practical sessions that complemented the theory sessions. In addition, most participants felt that they had a better understanding of stock assessment processes and would be able to apply what they had learnt in their daily work, as well as contribute to and discuss stock assessments at regional meetings (e.g. SC, WCPFC, HoF etc). Three participants expressed uncertainty as to whether the workshop would assist them at regional meetings. It should be noted that in some cases, the participants may not be in positions whereby they would be likely to attend regional meetings in the short term, although this likelihood may increase with training such as this.

The main criticism of the Level 1 workshop was that it was not long enough and consequently did not allow enough time for absorbing information, asking questions and completing practical exercises. SPC agrees with this criticism (in hindsight) and will redesign the Level 1 workshop in 2009 to address this issue. A lack of staff resources (there was only one workshop facilitator) led in part to that situation.

Only a few reviews have been received from Level 2 workshop participants, as that workshop has only just completed (at time of writing this report). Initial reviews are very positive regarding the workshop, but include some useful suggestions for future improvement, including exercises where participants might bring and interpret their national fisheries data in the broader context of the stock assessment outputs (i.e. for consideration of national contributions to stock impacts etc). The discussion based format of this years workshop was very positively received and will probably be continued in future years.

Table 3 – Summary of responses of Level 1 workshop participants to end survey regarding the stock assessment workshop.

STOCK ASSESSMENT WORKSHOP - FINAL SURVEY - 2008.						
Participant's evaluation of the Workshop						
Name:						
Instructions						
This is the opportunity for you, the participant, to review the workshop. Simply read each question and tick the most appropriate box to the right (questions 1 - 16). In addition, questions 17 - 21 provide space for other comments. Your answers to these questions will assist OFP in refining future workshops.						
The material and its presentation						
<i>("x" the most appropriate boxes to the right)</i>						
1	The aims of the workshop were clear	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
		5	3			
2	Sessions were well planned and organized	3	4	1		
3	The objectives for each session were clear	2	5			
4	The explanations of the concepts and topics were clear	2	5			
5	The presentations stimulated interest	2	4	1		
6	There were enough opportunities to ask questions	2	5		1	
7	The examples used in the theory and practical sessions improved my understanding	2	4		1	
8	There was a good balance between theory and practical work	2	5			
9	The practical and review material reinforced what was discussed in the theory sessions	3	3	1		
10	The review exercises of previous stock assessments reinforced the theory and practical work	3	2	1		
11	After participating in this workshop, I have a better understanding of the processes involved in undertaking a stock assessment	3	4			
12	After participating in this workshop, I will be better able to contribute and discuss stock assessments domestically and at regional meetings (e.g. SC, WCPFC, HoF meetings)	2	2	3		
How would you rate the Workshop overall ?						
<i>("x" the most appropriate boxes to the right)</i>						
13	This Workshop challenged me to think critically about stock assessments	4	3			
14	I would recommend this workshop to other staff members	6	1			
15	I would consider attending further Workshops on stock assessments in the future	5	2			
16	Overall, I think this workshop was useful	6	1			
General Comments (Write your comments below each question)						
17	Which part(s) of the Workshop did you like the most? Why? Theory sessions - logical and well presented (4 comments)					
18	Which part(s) of the Workshop did you like the least? Why? Practical sessions - not enough time to comprehend and complete (5 comments)					
19	Can you suggest how future Workshops could be improved to make the outcomes more useful to participants? The workshops need to be longer, with more time to absorb concepts, think, and work on the practical exercises. Follow up revision exercises as proposed online will also be important					
20	What were the strengths and weaknesses of the OFP staff who contributed to the Workshop? Overall very positive comments but one comment reinforcing the fact that not enough time was allowed for questions.					
21	Any other comments or suggestions? Some positive comments made about the need for and importance of the workshops. Additional comments suggested a specific "Data" section be included to highlight data used in the assessments, as well as online revision exercises to follow up.					

9.3 Self Assessment by SPC

Overall, based on observations of the facilitators and from feedback received from workshop participants, both formally through the surveys and informally, the two workshops were assessed by SPC as being another significant step towards meeting the overall stock assessment related objectives of the WCPFC Project and the OFMP.

However, SPC is also very aware that such capacity building exercises do not achieve their goals overnight and are a long term and ongoing endeavor. SPC has spent significant time post-SAW in determining how future workshops might be further strengthened. The following represents a self appraisal of some key elements of the workshop.

9.3.1 Communication and nominations

The communication strategy employed to advertise the stock assessment workshop in the months leading up to it was considered to be successful with countries being far more proactive and timely in submitting their nominations (relative to 2006), which made logistical organization of the workshop much easier.

9.3.2 Participant eligibility

SPC-OFP introduced stricter eligibility criteria in 2008. It is very important that countries send participants who, firstly, have sufficient technical skills and ability to work with programs such as Microsoft Excel, and secondly, are in positions where they can contribute their improved knowledge of stock assessment into both the domestic and regional decision making processes and forums. Ideally they are officers who are actively involved in development and review of domestic tuna management plans, and who will participate in Commission processes, in particular the Scientific Committee and the Commission meetings each year.

As in 2007, a number of the assessment and review mechanisms employed during the workshop were able to identify those participants who might not yet have the required technical skills and background to benefit from workshops such as this. This particular issue will be raised in an appropriate manner with the heads of department in the countries that nominated these officers. It is important to note that capacity building will most likely be achieved if countries nominate their most qualified officers in the first instance and then continue to nominate those same officers in subsequent years to reinforce and build upon their understanding. Some countries look to alternate nominated officers to spread training opportunities across staff, however it should be noted that this strategy will ultimately result in a very low level of capacity within departments, because

staff quickly lose skills and knowledge if not involved in these endeavors over a long time period.

However, SPC does recognize that not all countries and territories would be able to send such an officer, due to resource limitations, logistical and other issues, and in 2007 and 2008 SPC did accept nominations for officers who do not fulfill those criteria fully. We will however continue to encourage appropriate nominations in the future. SPC will also try, whenever funding and resources allow, to accommodate countries who wish to send a second “untrained” officer to start their training at these workshops, recognizing this strategy protects departmental capacity against staff turnover.

9.3.3 Workshop timing, structure and design

SPC responded to and met most of the recommendations coming out of the review of the 2006 and 2007 stock assessment workshops. In particular, as recommended, the workshop was held a month prior to SC, is likely to be run on an annual basis, was split into two components to separately accommodate the differing knowledge levels of returning participants and new participants, and shortened to reduce meeting fatigue. In addition, SPC implemented three more components to the overall Stock Assessment Learning Strategy, by:

1. Providing in-meeting support to workshop participants and their delegations during SC3 (i.e. additional support to understand technical papers, outside of the other support already provided by SPC at these meetings).
2. Providing in-country stock assessment training (Kiribati, January 2008; Samoa, July 2008) on an opportunistic basis when attending other in-country meetings.
3. Developing an initial online training and revision webpage, with two revision exercises (and associated materials) posted online for participants in November 2007 and January 2008. Response to the second exercise was relatively poor and further discussion of this endeavour with participating countries is required before it is developed any further.

However, in agreement with the participants own assessments, SPC has determined that the 2008 Level 1 workshop was too short (for the content being taught) and should if possible be extended from 5 to 7 days in future, with more time for questions, discussions and practical exercises to be completed.

9.3.4 Workshop contents

Responding to recommendations from the review of the 2006 and 2007 workshops, the OFP:

1. Increased the number of opportunities where participants were actively encouraged to ask questions and speak to the group on the topic of stock assessment. This was a very strong element in the 2008 Level 2 workshop, but was probably not sufficiently addressed in the Level 1 workshop, in part due to resource and time constraints. The Level 1 workshop might be lengthened by 1-2 days in future to ease workload and allow greater discussion and questions sessions.
2. Included specific sessions on oceanographic impacts
3. Ensured significant reviewing of key concepts throughout the workshop.

9.3.5 Other issues

Two final points require mention here. Both revolve around the future of stock assessment workshops as a capacity building endeavour.

Firstly, SPC will also look to develop some indicators that will help determine if the stock assessment workshops actually result, over the long term, in increased participation by countries in the SC, and if participants are actually using their training/knowledge of stock assessment in domestic and regional decision making processes. This endeavour was intended for 2007 however a lack of resources meant a delay in looking at this area. It is intended that such indicators might be developed by the next annual workshops.

Secondly, in the original planning of the stock assessment workshops for the OFMP project, it was intended that after an initial period of development of material and running workshops, that the materials and concept would be handed over to the University of the South Pacific, who might then incorporate these into a more formal education/training framework, although with continued collaboration and participation by SPC. This possibility still requires further discussion between SPC and USP.

10. Conclusion

Based on the above assessments, SPC considers that the 2008 Stock Assessment Workshops will contribute significantly towards meeting the longterm overall stock assessment related objectives of both the WCPFC Project and the original OFMP, particularly in terms of building national capacity to meet Convention obligations and to participate effectively in the WCPF Commission.

However, it will be important that the participants get the opportunity to build upon what they have learnt through further workshops, attachments and participation at scientific meetings, as well as their participation in online/remote training and revision to ensure memory retention of key concepts in between the workshops. This latter issue is considered very important to the longterm success of the workshops against the project objectives, and also represent the greatest risk/uncertainty. SPC encourages fishery departments to encourage and provide time to staff to participate in the online revision exercises, which should only take a half day every 2 months.

SPC aims to improve the workshop further in future years based on participant's assessments and feedback. This report has highlighted where improvements are required in the stock assessment workshop program, however, the degree to which these improvements will be made will very much depend on securing the required funding and staff resources.

The workshop concept was endorsed by the Scientific Committee of the Western and Central Pacific Fisheries Commission in 2006 and 2007 and the outcomes of the workshop, as described in this report, will be presented at the SC4 and at the next OFMP Regional Steering Committee meeting.

Acknowledgements

Sincere thanks to John Hampton for logistical advice and funding sourcing. We also wish to sincerely thank all the staff from SPC who kindly provided their time and assistance in the running of the workshop, in particular Helene Ixeko, Kay Parry, Cheryl Gaudecheaux, Denise Touyada, Siosifa Fukofuka, Valerie Allain, Emmanuel Schneider, Patrick Rehman, Lodovico Albanese and Phill Hardstaff.

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