
**PREPARATORY CONFERENCE FOR THE COMMISSION FOR
THE CONSERVATION AND MANAGEMENT OF HIGHLY
MIGRATORY FISH STOCKS IN THE WESTERN AND
CENTRAL PACIFIC**

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**REPORT OF THE SECOND MEETING OF THE SCIENTIFIC COORDINATING
GROUP (SCG 2)**

1. In accordance with the terms of reference agreed by the Preparatory Conference its second session (WCPFC/PrepCon/15, Annex V), the second meeting of the Scientific Coordinating Group took place at Mooloolaba, Australia from 17 to 19 July 2003, immediately following SCTB16. The list of participants is attached as Annex I. A list of abbreviations and acronyms used in this report is attached as Annex VII. The meeting was chaired by Dr Yuji Uozumi.
2. The agenda is attached as Annex II. The matters considered by SCG 2 included:
 - (a) review of the updated stock status statements for the major target species (bigeye, yellowfin, skipjack and South Pacific albacore), including implications for sustainability;
 - (b) discussions on gaps in current data;
 - (c) discussion of the impacts of FADs on juvenile tuna stocks in the Convention Area;
 - (d) review of the working papers: *Data standards, technical capabilities and data sharing policies for the Western and Central Pacific region* (WCPFC/PrepCon/WP.15), and *An investigation of technical capabilities and data security and confidentiality policies for the Western and Central Pacific Region* (WCPFC/PrepCon/WP.16);
 - (e) development of long-term data needs for the Commission; and
 - (f) research priorities, research planning, and coordination.
3. A list of the documents referred to by SCG2 is attached as Annex III.

Stock status of major tuna species (Agenda items 2, 5a and 5d)

4. SCTB16 produced stock status statements (Annex IV) in accordance with the format established at SCG 1. SCG 2 independently considered management implications and these considerations were added to the stock status summary statements that appear below.
5. The SCG recognised that the stock assessments used to provide advice on the status of the WCPO stocks are subject to uncertainty in the inputs and model specification and structure. Quantification of the uncertainty associated with stock structure is complex, but is a high priority.

6. The SCG acknowledged the ongoing need for development, testing and review of assessment methods. Several processes are in place to ensure that these development, testing and review activities continue including the work of the methods working group of the SCTB, peer review through cooperation with other organisations involved in stock assessment and formal peer review and publication in the international scientific literature.

7. In discussing the stock assessments for yellowfin and bigeye stock in particular, the issue of uncertainty is significant in that the true status of stocks may be over-estimated or under-estimated by current assessments. Significant management implications flow from this uncertainty.

Skipjack tuna

Stock status

8. The 2003 stock assessment shows that the skipjack stock in the WCPO is not being overfished ($F_t/F_{MSY} < 1$) and the stock is not in an over-fished state ($B_t/B_{MSY} > 1$) owing to recent high levels of recruitment and modest exploitation relative to the stock's biological potential.

Management implications

9. Continued catches at the 1.2 million mt level are sustainable if high recruitment levels (principally determined by environmental factors) continue. However, any increases in purse-seine catches of skipjack may result in a corresponding increase in catches of yellowfin and bigeye tunas which recent stock assessments advise caution against – refer to discussions under Interactions section below.

Yellowfin tuna

Stock status

10. The 2003 stock assessment is consistent with the result of the 2002 assessment that the yellowfin stock in the WCPO is presently not being over-fished ($F_t/F_{MSY} < 1$) and the stock is not in an over-fished state ($B_t/B_{MSY} > 1$). However, the stock is likely to be nearing full exploitation and any future increases in fishing mortality would not result in any long-term increase in yield and may move the yellowfin stock to an over-fished state. However, the assessment also indicates that the equatorial regions are likely to be fully exploited.

Management implications

11. While spatial patterns of exploitation remain uncertain, it appears some areas may be over-fished, and in these areas management actions may be required. While recognizing continuing uncertainties with the current yellowfin stock assessment, the SCG recommends that to reduce the risk of the yellowfin stock becoming over-fished further increases in fishing mortality (particularly on juvenile yellowfin) in the WCPO should be avoided.

Bigeye tuna

Stock status

12. The 2003 stock assessment results are, for key management benchmarks, inconsistent with the 2002 assessment. In particular, the 2002 assessment concluded that over-fishing was not occurring ($F_t/F_{MSY} < 1$) while the 2003 assessment concluded that over-fishing was occurring ($F_t/F_{MSY} > 1$). Given that it is unlikely that the true status of the stock has changed as dramatically as was indicated by the parameter values seen, the SCTB16 and SCG 2 were unable to discount

last year's assessment. Consequently, the bigeye assessment results should be viewed with caution until they are confirmed.

13. The current stock assessment is more pessimistic than 2002 and indicates that over-fishing of the bigeye stock in the WCPO is occurring ($F_t/F_{MSY} > 1$), but that the stock is not yet in an over-fished state ($B_t/B_{MSY} > 1$) because of high levels of recruitment since 1990.

Management implications

14. Overall the longline fishery has had the largest impact on the bigeye stock. Significant impacts also stem from the purse seine fishery, and increases in the Philippine and Indonesian fisheries. In 2002, SCG 1 noted that any increases in fishing mortality on juvenile bigeye "are likely to move the stock to an overfished state." The 2003 stock assessment suggests that current fishing mortality on juveniles and adults is not sustainable. SCG2 recognized that uncertainty surrounding the 2003 assessment means that the true status of bigeye stocks may be overestimated or underestimated. However, given the possible worsening status of the bigeye stock, SCG recommends that the concept of the precautionary approach should be applied. The most practical immediate management recommendation in support of this approach would be to ensure there is no increase in fishing mortality on bigeye. If future stock assessments confirm the 2003 assessment results, managers would need to implement practical management actions to decrease fishing mortality to prevent further decline in the stock.

South Pacific albacore

Stock status

15. The fishery for albacore has exhibited no significant trend in catches over the period of 1960 – 1995. Assessments conducted with limited data on stocks such as South Pacific albacore that, apparently, have been subject to low exploitation rates provide little information on the biomass of the stock. The 2003 assessment gave similar results to the 2002 assessment, with a low impact of fishing on biomass, and indicated that the current biomass is at about 60% of unfished levels. It is therefore unlikely that the stock is in an over-fished state. However, in some fisheries (e.g. longline fisheries of Samoa and American Samoa) there is evidence of CPUE declines that may indicate localized depletion and/or gear competition.

Management implications

16. Current catch levels from the South Pacific albacore stock appear to be sustainable. However, there is evidence of localized depletion of albacore and this is a potentially important issue, particularly for small island developing states dependant on these resources.

Interactions

17. Stock assessments, including those conducted for the SCTB, are typically done in the context of the impact of fishing on the target stock with the potential impacts on other catch components considered qualitatively. SCG noted that for at least two gear types, longline and purse seine setting on floating objects (FADs and logs), there is a potential for considerable impacts on non-target species even if the target stock is not being adversely affected. Of particular concern at this time is the bycatch of bigeye tuna in the purse seine fishery for skipjack and yellowfin. There is scope to further increase catches of skipjack and hence fishing mortality, but this may have severe consequences for the status of the bigeye and yellowfin tuna stocks.

18. SCG agreed that any increase in purse seine fishing on floating objects would increase the fishing mortality on both bigeye and yellowfin tunas in the WCPO. In addition, there is a substantial impact of the domestic fisheries of Indonesia and the Philippines on yellowfin. In the

case of bigeye, the model indicated that the biggest impacts (*where impact is defined as the extent by which the biomass is estimated to be reduced from unexploited levels due to fishing*) are due to longline (target) fishing. The multi-species nature of the purse seine and longline fishery means that the impacts of fishing on stock status cannot be simply addressed by reference to the target species without addressing the other species caught. The SCG considered that if the assessment results for bigeye, and to a lesser extent yellowfin, are confirmed, the PrepCon will need to consider how to implement management measures to address over-fishing and alleviate over-fished stock conditions. Similar issues have faced other tuna Commissions and the approaches they have taken may serve as a starting point for PrepCon's considerations as appropriate.

Data standards, technical capabilities and data sharing (Agenda item 3)

Review of reports

19. SCG2 received two reports prepared by the Secretariat: *Data standards, technical capabilities and data sharing policies for the Western and Central Pacific region* (WCPFC/PrepCon/WP.15 - Annex III), and *An investigation of technical capabilities and data security and confidentiality policies for the Western and Central Pacific Region* (WCPFC/PrepCon/WP.16 - Annex III).

Data needs

20. The SCG referred to documents **WCPFC/SCG2/01, 02 and 03** (see Annex III) to assist discussions. The SCG recognized that accurate stock assessment depends on accurate data collected at an operational level i.e. longline and purse-seine sets, and pole and line and troll by day fished. Such data are a long-term data requirement of the Commission. The SCG therefore recommended that operational level data be collected by all fleets and be made available to the Commission for stock assessment and other scientific analyses, with appropriate arrangements for data security and confidentiality.

21. Estimates of annual catches are an essential element of fisheries data. The SCG recommends that annual catches by species, gear and fleet in the Convention area be reported by flag states and coastal states.

22. Size composition (length and/or weight frequency) data are also essential for stock assessment. The SCG recommends that size composition data should be collected, at the operational level (described above) where practical, according to a statistically sound sampling design to ensure that the data are representative of the fishery.

23. Collection and management of operational level data raises questions of data confidentiality and security. The SCG noted that the work on data security and confidentiality should be carried out by the SCG and WG.II in conjunction with WG.III, and these groups should contain an appropriate level of expertise.

24. The SCG recognizes the unique characteristics of the WCPO fisheries, that the pathways for data communication may be complex, and that coastal states play a critical role in regional data collection. The SCG recommends flexibility be maintained in establishing data reporting requirements for the Commission and that coastal states and flag states cooperate in ensuring that the Commission receive data in a timely fashion.

25. Based on WCPFC/PrepCon/WP.16, the SCG recommends that the PrepCon take account of the unique characteristics of the region and utilize the data management services of the OFP during the transitional period (i.e. the period between the Convention coming into force and a

fully functioning Commission). SCG recommends an assessment of the costs and benefits of utilizing the capabilities of OFP for providing the data management functions of the Commission during the transitional period, and in the long-term.

26. SCG2 only briefly addressed the issue of data verification. More work on this issue needs to be carried out and should be informed by the contents of Article 6 of Annex I of the UNFSA.

27. Discussions on data dissemination were deferred to a future meeting. At this time the 'Data dissemination' section in the Report for SCTB11, which presents the policy on the dissemination of data established by the SCTB Statistics WG, should be used to inform discussions.

Data gaps (Agenda item 5c)

28. The following gaps in data held by the OFP (detailed in Annex V) that can be used for stock assessment and the monitoring of catches were identified:

- (a) Catch, effort and size composition data from Indonesia and Philippines domestic fisheries;
- (b) Observer coverage;
- (c) Logsheet catch and effort data;
- (d) Annual catch estimates from Japan and Vietnam;
- (e) Size data from Chinese Taipei and Korea;
- (f) port sampling of purse-seine catches taken in the WCPO that are unloaded in Thailand or of tuna caught in the coastal fisheries of Japan.

29. SCG 2 acknowledged that the lack of data from Indonesia and the Philippines is a serious concern because they contributed substantially to the uncertainties in the stock assessments. Given that the stock status of both the yellowfin and the bigeye stocks were either approaching or possibly have exceeded, sustainable levels, the meeting urged WG.II to bring this situation to the attention of the PrepCon V. SCG 2 further requested WG.II to ask PrepCon V that it consider, as a matter of urgency, ways in which participants could assist in improving this situation. If this data gap cannot be resolved it is likely that the SCG will not be able to determine whether the stock status of these two stocks is continuing to worsen or not and, in the face of continued uncertainty, calls for a precautionary management intervention may ensue.

An assessment on the impacts of FADs on juvenile tuna stocks in the Convention Area (Agenda item 5b)

30. The SCG discussed the impacts of FADs on WCPO tuna fisheries and stocks, including juvenile age-classes. The group noted that the use of FADs can have both direct and indirect impacts on fisheries, the tuna stocks they target and other pelagic species. These impacts can be both positive and negative. In particular, the group (referring to document WCPFC/SCG2/04 - Annex III) noted six key impacts of FADs. These are described in Annex VI.

31. The use of FADs concentrate a wide range of pelagic fish species (e.g. mahi mahi, wahoo, etc) and has an unknown impact that could be significant. To better understand the scope of this issue it would be useful if the SCTB could compile any readily available information to help determine if this is an issue for future PrepCon consideration.

32. In recognition that harvests by all gears have an impact on the yellowfin and bigeye stocks, the group discussed the relative impacts of different gears, including those utilising FADs, on estimates of yield and biomass (referring to WCPFC/SCG2/05 i.e. SCTB16 documents YFT-1 Figure 21 and BET-1 Figure 21, see Annex VI). In the case of yellowfin tuna, the Philippine and Indonesian fisheries (predominantly based on FADs) appears to have had the greatest estimated impact. With the addition of other FAD-based fishing it is clear that fishing utilising FADs is the major source of impact on the yellowfin stock. In the case of bigeye, the vast majority of the bigeye catch taken by purse seine was due to sets on floating objects and it appears that the Philippine and Indonesian fisheries are predominantly based on FADs.

33. Based on Table 6 of YFT-1 and Table 6 of BET-1 (see Annex VI), the SCG considered that the use of FADs may reduce the yield per recruit and hence MSY for bigeye and possibly yellowfin tuna stocks in the WCPO relative those that would occur if the fish were taken by longline gear or purse-seine sets on unassociated schools. In order to provide better advice on this matter, yield per recruit analyses for different gear selectivities for both these species are required.

34. In summary, as in other global tuna fisheries, the use of FADs has increased fishing efficiency for skipjack tuna, but it has markedly increased fishing mortality rates of juvenile yellowfin and bigeye tuna, markedly increased purse seine bycatch rates of other pelagic species and increased uncertainty in stock assessments.

Research planning, priority setting and co-ordination (Agenda item 4)

35. The SCG discussed interim, transitional and longer term research planning, priority setting and co-ordination. SCG noted that in the transitional and longer-term the Scientific Committee, once established, would need to develop a research plan and also address co-operation issues for the Commission.

36. In the interim period, several key points were made:

- research needs for members and the PrepCon will vary
- funding streams for research include the PrepCon, Members and existing regional organisations
- the term 'research' was interpreted to include projects for implementing data collection programmes, as well as more the traditional research projects such as stock assessment
- criteria need to be developed for research priority setting
- not all criteria need to be met by every project, but all should be explicitly considered in assessing projects.

37. The following research projects were identified as priorities by the SCG:

- better estimation of current catch and catch composition from Indonesia, Philippines and Vietnam
- reconstruction of early catch history (catch, effort, size composition) for all fisheries
- further development of methods to standardise effort, including the better use of vessel operational details, environmental data and archival tagging data

- ongoing efforts to reduce uncertainty in assessments, through improved data inputs, sensitivity analysis and simulations
 - evaluation of possible regime shifts/changes in productivity and development of improved/alternative estimates of recruitment where possible
 - large scale tagging experiments for the main target tuna species in the WCPO.
38. SCG identified points 1,2 and 6 for further development as research proposals, and further consideration by WG.II and PrepCon.
39. The following draft priority criteria for evaluating proposals was developed:
- will the project address management needs/uncertainty in stock status
 - urgency
 - feasibility
 - cost-effectiveness
 - potential for capacity building
 - special requirements of developing states in the Convention Area, particularly small island developing states.
40. The SCG reviewed the Initiative to ‘Characterise Indonesia’s Tuna Catch in the Pacific Ocean’ (WCPFC/SCG2/06 - Annex III) against these criteria. SCG noted that before it could be considered for funding, a detailed proposal would need to be developed. OFP and CSIRO agreed to take on this responsibility and table a proposal at WG.II.
41. The SCG agreed to recommend the draft criteria to WG.II and to highlight the priority of the Initiative to Characterise Indonesia’s Tuna Catch in the Pacific Ocean.

Annex I

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Annex II

AGENDA

1. Introductory remarks
 - Welcome
 - Reviewing the purpose of the SCG 2 meeting; adoption of the agenda
2. Review of the updated stock status statements for the major target species
 - bigeye
 - yellowfin
 - skipjack
 - South Pacific albacore

The technical discussions related to this item will take place at SCTB. SCG 2 is expected to produce agreed statements on the current stock status of the major target species.
3. Data standards, technical capabilities and data sharing policies for the Western and Central Pacific Region
 - Review of the revised document entitled *Review of data standards for the Western and Central Pacific Region (WCPFC/PrepCon/WP.15)*
 - Review of the revised document entitled *An investigation of technical capabilities and data security and confidentiality policies for the Western and Central Pacific Region (WCPFC/PrepCon/WP.16)*

These documents are available on www.ocean-affairs.com
4. Research priorities, research planning, and coordination.
5. Response to the requests from PrepCon IV
 - Agenda items 5(a) to (d) are as listed in Appendix 1 below.

Work arising from PrepCon IV - refer to Appendix 1. Appendix item (b) SCG 2 is expected to produce a statement the impacts of FADs on juvenile stocks (the technical discussions related to this item will take place at SCTB). Appendix items (a) and (d) will be covered in agenda item 2.
6. Adoption of the report of SCG 2
7. Adjournment

APPENDIX 1 WCPFC/PREP CON/27

Statement of the chairman on the work of the Preparatory Conference during its fourth session, May 2003, Nadi, Fiji (paragraph 4)

The delegation of Japan introduced papers on fishing capacity and IUU fishing on which there was considerable discussion. The Conference agreed that the chairman of WG.II and the chairman of the Scientific Coordinating Group (SCG) would develop a report for the fifth session that would include an assessment of:

- (a) The status of the major highly migratory tuna stocks in the Convention Area;
- (b) The impact of FADs on juvenile stocks in the Convention Area;
- (c) Any gaps in current data that need to be improved; and
- (d) Implications for sustainability.

This approach should provide the basis for future management action. Notwithstanding this decision, certain delegations considered that further steps should be taken in the near term with a view to restraining any further increase in the capacity in the region.

Annex III

LIST OF DOCUMENTS USED TO ASSIST DISCUSSIONS AT SCG 2

WCPFC/SCG2/xx

- 01 Report of: Statistics Working Group, Interim Scientific Committee for tuna and tuna-like species in the North Pacific Ocean (ISC). January 28-30, 2002, Nagasaki Japan p 1-11.
- 02 An excerpt from UNFSA: Annex I and Annex II.
- 03 Data requirements of the SPC Oceanic Fisheries Programme and Status of data (Lawson et al., 2002). OFP Internal Report No 47. 51 p.
<http://www.spc.int/oceanfish/docs/internal/IntRep47.pdf>
- 04 An excerpt from: A review of the impacts of fish aggregating devices (FADs) on tuna fisheries (Bromhead et al.). A Bureau of Rural Sciences Report. pp 1-5 and 54-55.
<http://www.affa.gov.au/brs>
- 05 Figures and Tables extracted from SCTB16 report: YFT-1 (*YFT-1 Hampton, J. & Kleiber, P. Stock assessment of yellowfin tuna in the western and central Pacific Ocean* <http://www.spc.int/OceanFish/Html/SCTB/SCTB16/index.htm#WP>, and BET-1 *Hampton, J. & Kleiber, P. & Maunder & Takeuchi & Sun. Stock assessment of bigeye tuna in the western and central Pacific Ocean* <http://www.spc.int/OceanFish/Html/SCTB/SCTB16/index.htm#WP>).
- 06 Outline of a proposed initiative to characterise Indonesia's tuna catch in the Pacific Ocean. Draft 2 page proposal tabled by John Gunn (Australia).

WCPFC/PrepCon/WP.xx

- 15 An investigation of technical capabilities and data security and confidentiality policies for the Western and Central Pacific Region. MRAG Report dated June 2003. 39 p.
<http://www.ocean-affairs.com/scgrp.html>
- 16 Data standards, technical capabilities and data sharing policies for the western and central Pacific region. MRAG Report dated June 2003. 47 p. <http://www.ocean-affairs.com/scgrp.html>

Annex IV

SCTB16 STOCK STATUS SUMMARIES

Given the length of the SCTB16 Executive Summary it is not attached to this (SCG 2) report. Readers can obtain a copy of the SCTB16 Executive Summary from <http://www.spc.org.nc/oceanfish/Html/SCTB/SCTB16/Execsum.pdf>

In the summary, the relevant excerpts are:

Skipjack, pages 6 - 13

Yellowfin, pages 14- 20

Bigeye, pages 21 - 27

South Pacific albacore, pages 28 - 33.

Annex V

DATA GAPS

From paragraph 28: the following gaps in data held by the OFP that can be used for stock assessment and the monitoring of catches were identified.

- a) Data from Indonesia and the Philippines. Estimates of annual catches for the domestic fleets of Indonesia and the Philippines have been provided on a timely basis; however, annual catch estimates in recent years (1992-2002 for Indonesia and 1997-2002 for the Philippines) have not been broken down by gear type and estimates of annual bigeye and yellowfin catches for all years have been reported as a combined catch. Catch (at a higher resolution of time-area) and effort data have not been collected. Species composition and size data have been collected in the Philippines since 1997, but this programme was interrupted in 2002 due to funding constraints. No sampling is being conducted in the Pacific Ocean waters of Indonesia
- b) Observer coverage. Observer data are the primary source of data used to estimate the catches of the highly migratory species covered by the WCPFC Convention, other than the target tuna species. However, observer coverage in the WCPO is currently (2001) 0.5% for longline and 6.4% for purse seine (2.8% excluding the US purse-seine fleet). Most offshore longline fleets and purse-seine fleets fishing in tropical waters are covered by observers, although at a low level of coverage. Distant-water longline fleets, however, are not currently being covered by observers.
- c) Logsheet catch and effort data. For 2001, the most recent year for which all or most data have been compiled, the OFP holds catch and effort logsheet data covering 44.3% of the catch of target species in the WCPO. These data cover catches taken by the domestic fleets of SPC member countries and territories, catches by distant-water fleets fishing with the EEZs of SPC members, and catches of certain distant-water fleets on the high seas (such as the purse-seine fleets of Korea and Chinese Taipei, but not their distant-water longline fleets or any Japanese fleets). Excluding the domestic fisheries of Indonesia and the Philippines, for which no catch and effort data have been collected, and the coastal fisheries of Japan, the coverage by logsheet data held by the OFP is 64.3%.
- d) In recent years, estimates of the annual catches of the target tuna species have been provided within six months following the end of the calendar year for all fleets, except those covering the longline and pole-and-line fleets of Japan. No annual catch estimates, catch and effort data or sampling data have been provided covering the recently-developed Vietnamese longline fleet.
- e) Size data have been collected by port samplers in Chinese Taipei covering offshore longliners and by port samplers in Korea covering purse seiners, but these data have not been provided.
- f) There is currently no port sampling of purse-seine catches taken in the WCPO that are unloaded in Thailand or of tuna caught in the coastal fisheries of Japan.

Annex VI

FADs

The SCG discussed the impacts of FADs on WCPO tuna fisheries and stocks, including on juvenile age-classes. The group noted that the use of FADs can have both direct and indirect impacts on fisheries, the tuna stocks they target and other pelagic species. These impacts can be both positive and negative. In particular, the group noted six key impacts of FADs (paragraph 30). These are described below. Full reference information can be found in Annex III - WCPFC/SCG2/04.

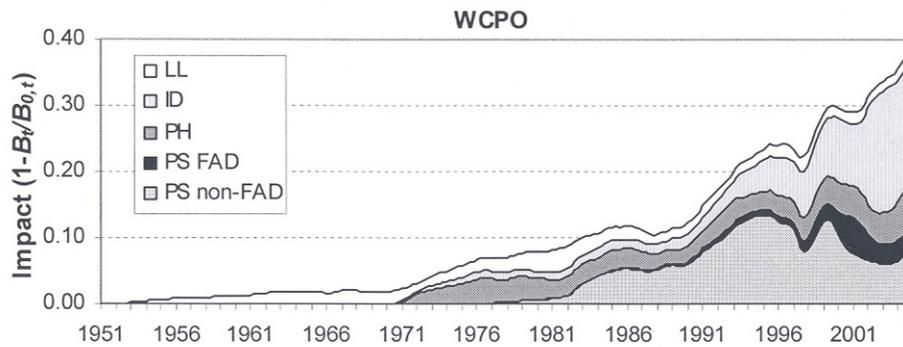
- a) FADs increase the efficiency of purse seine effort for tuna including skipjack
- b) The species composition of purse seine sets on floating objects (including FADs) is different to those on unassociated tuna schools. In particular the proportion of bigeye tuna in the catch is much higher for FAD-sets than unassociated sets
- c) Purse seine and other fishing around floating objects results in juvenile bigeye tuna being fished by multiple gears
- d) The deployment of FADs has compounded the difficulties of assessing CPUE trends for purse seine fisheries and hence undertaking stock assessment for skipjack, bigeye and yellowfin tuna
- e) Purse seine sets around floating objects have much higher catches of non-target species (both in terms of species diversity and total weight) than purse seine sets on unassociated tuna schools
- f) FADs may alter the movements, feeding and other behaviours of tuna resulting in a range of either negative impacts (e.g. tuna may become “trapped” in unproductive waters, on small and/or large spatial and temporal scales, reducing growth and possibly increasing mortality) or positive impacts (e.g. FADs may provide additional meeting points that assist in schooling and spawning). These indirect impacts include impacts drawn from both theoretical hypotheses and empirical observations.

Annex VI continued next page.....

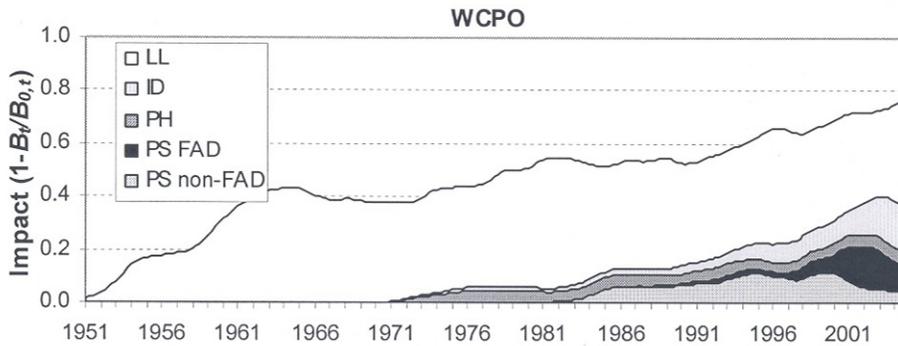
Annex VI (continued)

The SCG discussed the relative impacts of different gears, including those utilising FADs, on estimates of yield and biomass. Paragraph 32 referred to the following figures extracted from SCTB16 documents. Full reference information can be found in Annex III - WCPFC/SCG2/05.

SCTB16, YFT-1, Figure 6 (excerpt). Estimates of reduction in yellowfin total biomass due to fishing (fishery impact = $1 - B_t/B_{0,t}$) for the WCPO attributed to various fishery groups. LL = all longline fisheries; ID = Indonesian domestic fishery; PH = Philippines domestic fisheries; PS FAD = purse seine FAD sets; PS non-FAD = purse seine log and school sets.



SCTB16, BET-1, Figure 6. (excerpt). Estimates of reduction in bigeye total biomass due to fishing (fishery impact = $1 - B_t/B_{0,t}$) for the WCPO attributed to various fishery groups. LL = all longline fisheries; ID = Indonesian domestic fishery; PH = Philippines domestic fisheries; PS FAD = purse seine FAD sets; PS non-FAD = purse seine log and school sets.



Annex VI continued next page.....

Annex VI (continued)

The SCG considered that the use of FADs may reduce the yield per recruit and hence MSY for bigeye and possibly yellowfin tuna stocks in the WCPO. Paragraph 33 referred to the following tables extracted from SCTB16 documents. Full reference information can be found in Annex III - WCPFC/SCG2/05.

SCTB16, YFT-1, Table 6. Estimates (from the GLM analysis) of equilibrium yield, equilibrium total biomass and equilibrium adult biomass of yellowfin tuna under various assumptions regarding the pattern of fishing mortality-at-age (or selectivity). “Current” is the overall selectivity given by the average fishing mortality-at-age (*F*) for 1999–2001. The other selectivity scenarios are modifications of “current” obtained by doubling or halving that component of 1999–2001 average *F* attributed to the purse seine fisheries (PS), the Philippines domestic fisheries (PH), the Indonesian domestic fishery (ID) and the longline fisheries (LL). Yield and equilibrium biomass measures were obtained at both the (modified) base level of *F* and at the *F* at MSY for each selectivity scenario. Measures are scaled relative to their current values.

Selectivity scenario	At base <i>F</i>			At MSY		
	Yield	Equilibrium Biomass		Yield	Equilibrium Biomass	
		Total	Adult		Total	Adult
Current	100	100	100	100	100	100
PS x 2	113	87	80	106	99	95
PS x 0.5	91	107	112	96	98	101
PH x 2	106	89	86	100	100	101
PH x 0.5	95	106	108	100	100	100
ID x 2	100	78	74	92	96	99
ID x 0.5	98	113	116	108	102	98
LL x 2	107	98	96	104	102	101
LL x 0.5	96	101	102	98	99	100

SCTB16, BET-1, Table 6. Estimates (from the GLM analysis) of equilibrium yield, equilibrium total biomass and equilibrium adult biomass for bigeye tuna under various assumptions regarding the pattern of fishing mortality-at-age (or selectivity). See above for definitions and methods information.

Selectivity scenario	At base <i>F</i>			At MSY		
	Yield	Equilibrium Biomass		Yield	Equilibrium Biomass	
		Total	Adult		Total	Adult
Current	100	100	100	100	100	100
PS x 2	78	63	56	93	92	92
PS x 0.5	112	125	132	106	102	100
PH x 2	92	86	83	98	91	89
PH x 0.5	104	108	110	100	80	74
ID x 2	81	72	67	91	99	102
ID x 0.5	111	117	121	106	97	94
LL x 2	96	70	52	116	90	82
LL x 0.5	93	126	148	86	93	95

Annex VII

ABBREVIATIONS AND ACRONYMS USED IN THIS REPORT

B_t	Current biomass
B_{MSY}	Biomass that will support the maximum sustainable yield
CPUE	Catch Per Unit Effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
EEZ	Exclusive Economic Zone
FAD	Fish Aggregating Device
F_t	Current Fishing Mortality
F_{MSY}	Fishing Mortality that will support the maximum sustainable yield
mt	Metric tonnes
OPF	Oceanic Fisheries Programme Fishing Programme (run by SPC)
PrepCon	Preparatory Conference
SCTB	Standing Committee on Tuna and Billfish
SCG	Scientific Coordinating Group
SPC	Secretariat of the Pacific Community
WG	Working Group
WG.II	Working Group II of the PrepCon
WCPFC	Western Central Pacific Fisheries Convention
WCPO	Western Central Pacific Ocean
MSY	Maximum Sustainable Yield
UNFSA	United Nation Fish Stocks Agreement