



**NORTHERN COMMITTEE
ELEVENTH REGULAR SESSION**

31 August - 3 September 2015
Sapporo, Hokkaido, Japan

SC11 Executive Summary Report

WCPFC-NC11-2015/IP-07

Secretariat



**Commission for the Conservation and Management of
Highly Migratory Fish Stocks in the Western and Central Pacific Ocean**

**Scientific Committee
Eleventh Regular Session**

**Pohnpei, Federated States of Micronesia
5-13 August 2015**

EXECUTIVE SUMMARY

**The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the
Western and Central Pacific Ocean**

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EXECUTIVE SUMMARY

AGENDA ITEM 1 - OPENING OF THE MEETING

Welcome address

1. The Eleventh Regular Session of the Scientific Committee (SC11) was held in Pohnpei, Federated States of Micronesia from 5–13 August 2015. Ludwig Kumoru (Papua New Guinea) chaired the meeting. The Commission Chair Rhea Moss-Christian delivered opening remarks, emphasising the value of science and knowledge and its critical place in decision making for the Commission. The new Executive Director Feleti Teo made a welcoming speech (**Attachment A**). Participants are listed in **Attachment B**.

2. The theme conveners and their assigned themes are:

Data and Statistics theme	L. Kumoru (PNG)
Stock Assessment theme	J. Brodziak (USA) and H. Nishida (Japan)
Management Issues theme	R. Campbell (Australia)
Ecosystem and Bycatch Mitigation theme	J. Annala (NZ) and A. Batibasaga (Fiji)

Adoption of agenda

3. The SC11 Provisional Agenda SC11-2015-02_rev1 was adopted without change (**Attachment C**).

AGENDA ITEM 2 REVIEW OF FISHERIES

2.1 Overview of Western and Central Pacific Ocean (WCPO) fisheries

4. The provisional total WCPFC Statistical Area tuna catch for 2014 was estimated at 2,860,648 mt, clearly the highest ever at 170,000 mt above the previous record catch in 2013 (2,690,881 mt); this catch represented 83% of the total Pacific Ocean catch of 3,486,124 mt, and 60% of the global tuna catch (the provisional estimate for 2014 is 4,783,629 mt, and when estimates are finalised is expected to be the highest on record mainly due to increased WCPFC Statistical Area catches).

5. The 2014 WCPFC Statistical Area catch of skipjack (1,957,693 mt – 68% of the total catch) was the highest recorded, eclipsing the previous record of catch in 2013 by 115,000 mt (1,842,485 mt). The WCPFC Statistical Area yellowfin catch for 2014 (608,807 mt – 21%) was also the highest recorded (5,000 mt higher than the record catch of 2008 – 603,244 mt) mainly due to increased catches in several longline fisheries. The WCPFC Statistical Area bigeye catch for 2014 (161,299 mt – 6%) was slightly higher than in 2013, but relatively stable compared to the average over the past ten years. The 2014 WCPFC Statistical Area albacore catch (132,849 mt - 5%) was slightly lower than in 2013 and about 15,000 mt lower than the record catch in 2002 at 147,793 mt. The WCPFC Statistical Area albacore catch includes catches of north and south Pacific albacore in the WCPFC Statistical Area, which comprised 76% of the total Pacific Ocean albacore catch of 173,702 mt in 2014. The south Pacific albacore catch in 2014 (83,033 mt) was the fourth highest on record (about 6,000 mt lower than the record catch in 2010 of 88,942 mt).

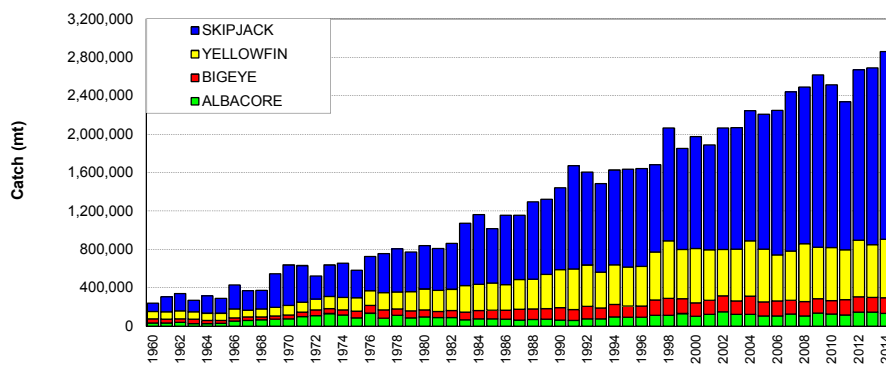


Figure 1. Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCPFC Statistical Area.

6. The provisional 2014 purse-seine catch of 2,020,627 mt was the highest catch on record and more than 120,000 mt higher than the previous record in 2013 (1,899,627 mt). The 2014 pole-and-line catch (203,736 mt) was the lowest annual catch since the late-1960s, continuing the trend in declining catches for three decades. The provisional WCPFC Statistical Area longline catch (268,795 mt) for 2014 was slightly above the average for the past five years. The 2014 South Pacific troll albacore catch (2,221 mt) was the lowest since 2010. In line with the prevailing ENSO conditions, fishing activity during 2014 (El Niño-type conditions) expanded into the eastern tropical areas compared to 2013 (La Niña conditions). For the first time in many years, purse seine effort during 2014 in the area to the east of longitude 160°E was more pronounced than in the area to the west of that longitude (i.e. PNG, FSM and Solomon Islands).

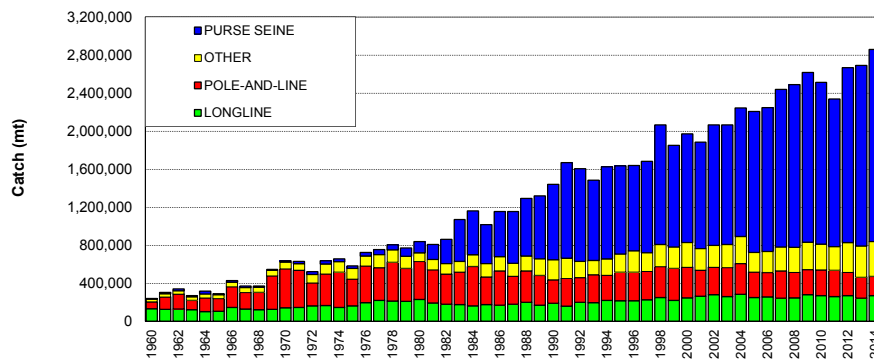


Figure 2. Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCPFC Statistical Area, by longline, pole-and-line, purse seine and other gear types

7. **SC11 recommends that the WCPFC scientific services provider investigate the possibility of presenting trends in purse seine fishery capacity using additional metrics (e.g. gross tonnage, carrying capacity) that are used in other t-RFMOs.**

AGENDA ITEM 3 DATA AND STATISTICS THEME

3.1 Data gaps

3.1.1 Data gaps of the Commission

8. The main data gaps listed in working paper ST11-ST-WP-01 (Scientific data available to the Western and Central Pacific Fisheries Commission) are:

- The non-submission of operational data for several key fleets (Section 2.3);
- The non-submission of number of vessels in the aggregate data for two key fleets (Section 2.4);
- The need for improvement in the submission of catch estimates for the key shark species (Section 2.5) and reporting of discard estimates.

9. **SC11 recommends that:**

- a. **The SC11-ST-WP-01 paper is revised to remove specific reference to the word “compliance” since, while it feeds into the compliance processes of the WCPFC, it is not intended to be the compliance evaluation, *per se*.**
- b. **Clarification is sought from TCC11 on whether the significant amount of purse-seine size data provided to the WCPFC through the 100% observer-coverage requirement under the ROP should be considered as satisfying the flag-state scientific purse-seine size data provision.**
- c. **The tier scoring system developed by the scientific services provider (SC11-ST-WP-01_rev1) for the evaluation of the provision of scientific data is used in the work of the TCC and the Commission, with the understanding that the respective ratings included in this paper are not necessarily agreed by each WCPFC CCM.**

3.1.2 Species composition of purse-seine catches

Review of Project 60 outputs

10. **SC11 recommends that:**

- a. **The WCPFC science/data service provider produce an update to Table 1 in ST-WP-02 annually (until an agreement on methodology can be reached) as it provides a very useful summary of the purse-seine catch estimates derived using the four different methods to ascertain catch composition.**
- b. **In regards to the implementation of observer spill sampling in the tropical purse seine fishery,**
 - i. **The WCPFC Secretariat and the WCPFC scientific services provider investigate operational aspects including alternatives for spill sampling on purse seine vessels**

where the current spill sampling protocol is difficult to implement and report back to SC12.

- ii. The WCPFC scientific services provider will undertake additional data collection and analyses to evaluate the benefits of spill sampling compared to corrected grab-sampling.

3.2 Regional Observer Programme (ROP)

11. SC11 recommends that:

- a. WCPFC12 notes that a number of CCMs did not achieve the 5% observer coverage of their longline fleets according to the requirements in CMM 2007-01 and this is impacting on the SC's ability to address a number of scientific issues. Coverage of observer data submitted to the WCPFC (that is, Table 5 in SC11-ST-IP-02) be forwarded to TCC11 for consideration.
- b. The WCPFC Scientific services provider include an additional table in future versions of their paper on ROP Data Management (starting with SC12) which compares the coverage of longline observer trips, as provided by CCMs (Table 4 in SC11-ST-IP-02) with the coverage of data submitted for longline observer trips (Table 5 in SC11-ST-IP-02).

Marine pollution data collected by observers

12. SC11 agreed that the SC11-ST-IP-05 (Marine pollution originating from purse seine fishing vessel operations in the Western and Central Pacific region, 2004-2014), revised if necessary, should be presented at TCC11 where it is more suited for discussion and consideration.

3.3 Electronic monitoring and electronic reporting

13. SC11 noted and supported the recommendations in SC11-ST-WP-04 (Summary Report: First E-Reporting and E-Monitoring Intersessional Working Group Meeting).

3.4 WCPFC-funded Port Coordinators

14. No recommendations were made.

3.5 Fiji's membership of the Northern Committee

15. SC11 recommends that Fiji be admitted as a member of the Northern Committee.

AGENDA ITEM 4 STOCK ASSESSMENT THEME

4.1 WCPO tunas

4.1.1 WCPO bigeye tuna (*Thunnus obesus*)

Progress report on Project 35 (Refinement of bigeye parameters Pacific-wide)

16. SC11 recommends that funding be continued to maintain the Project 35: Bigeye Biology and WCPFC Tuna Tissue Bank, with particular emphasis on WCPO bigeye, yellowfin, and skipjack tunas. SC11 also recommends that the Commission adopt the “WCPFC Tissue Bank Access Protocols” developed within Project 35 and modified by ISG-2 at SC11 (Attachment D).

17. SC11 recommends that funding be provided for the analysis of Project 35 Tissue Bank samples, with a short-term focus on characterizing spatial and temporal variation in the growth of bigeye tuna.

Update of WCPO bigeye stock assessment

18. SC11 requests scientific services provider to evaluate the accuracy of short-term projections for the provision of stock status advice in the years for which there is no assessment via a retrospective analysis.

Pacific-wide bigeye tuna stock assessment

19. After the discussion among the involved CCMs, it was reported that the CCMs needed domestic clearance before finally agreeing to a new arrangement. However, as a way of cooperation in response to the SC’s appreciation and request, those CCMs agreed not to require SPC to delete their operational data provided to SPC and the products thereof under the condition that they will not be used in any way until a new agreement is reached with SPC. Those CCMs will discuss the new arrangement intersessionally with SPC based on the draft text for the agreement for provision of operational-level data to SPC to support WCPFC stock assessments shown in **Attachment E**, with the intention of finalizing the arrangement prior to WCPFC12.

20. SC11 strongly recommends that the multi-fleet operational level data be retained by SPC for the purpose of conducting stock assessments, with particular emphasis on WCPO bigeye tuna.

21. SC11 recommends that collaborative research on the use of multi-fleet operational-level data for CPUE standardization be continued if the data are available, with particular emphasis on application to WCPO bigeye tuna. SC11 noted that the treatment of spatial variation in CPUE, the effects of species targeting, the analyses of specific fleets, the effects of environmental variation, the investigation of the performance of alternative standardization models, e.g., random effects and GAMs, and robustness testing through cross-validation were important topics for further consideration.

Provision of scientific information

a. Status and trends

22. SC11 noted that no stock assessment was conducted for WCPO bigeye tuna in 2015. Therefore, the stock status description from SC10 is still current.

23. SC11 noted that the total bigeye catch in 2014 was 161,229 mt, which was a 5% increase over 2013 and a 5% increase over the average for 2010–2013. SC11 also noted that the bigeye catch in 2014 was 48% above the estimated maximum sustainable yield (108,520 mt), although those two numbers are not directly comparable because MSY is calculated based on the historical average recruitment.

24. SC11 also noted the analysis of the sensitivity of the WCPO bigeye tuna stock assessment to the inclusion of EPO data and dynamics within a Pacific-wide model. SC11 concluded that the dynamics of bigeye tuna in the WCPO estimated using the Pacific-wide model are not substantially different from those estimated using the WCPO-only model, especially with respect to the main stock status indicators used by WCPFC. Therefore, SC11 recommends that it is reasonable to continue to provide management recommendations to WCPFC on the basis of WCPO-only regional stock assessment models.

25. SC11 did not consider the Pacific-wide sensitivity analysis to be a new stock assessment for the purpose of formulating management advice.

b. Management advice and implications

26. SC11 noted that no management advice has been provided since SC10. Therefore, the advice from SC10 should be maintained, pending a new assessment or other new information.

4.1.2 WCPO yellowfin tuna (*Thunnus albacares*)

Provision of scientific information

a. Status and trends

27. SC11 noted that no stock assessment was conducted for WCPO yellowfin tuna in 2015. Therefore, the stock status description from SC10 is still current.

28. SC11 noted that the total yellowfin catch in 2014 was the highest ever recorded at 608,807 mt, which was a 10% increase over 2013 and a 9% increase over the average for 2010–2013.

b. Management advice and implications

29. SC11 noted that no management advice has been provided since SC10. Therefore, the advice from SC10 should be maintained, pending a new assessment or other new information.

4.1.3 WCPO skipjack tuna (*Katsuwonus pelamis*)

Provision of scientific information

a. Status and trends

30. SC11 noted that no stock assessment was conducted for WCPO skipjack tuna in 2015. Therefore, the stock status description from SC10 is still current.

31. SC11 noted that the total skipjack catch in 2014 is provisionally estimated to be 1,957,693 mt, which is the highest catch recorded, a 6% increase over 2013 and a 14% increase over the average for 2010–2013.

32. The SC noted that skipjack tuna catch in 2014 was 20% above the estimated MSY (1,618,800 mt) although those two numbers are not directly comparable because MSY is calculated based on the historical average recruitment.

33. SC11 reviewed information related to identifying changes in the spatial distribution of skipjack (including range contraction) in response to increase in fishing pressure. Project 67 on the impacts of recent catches of skipjack tuna on fisheries on the margins of the WCPFC Convention Area demonstrated no statistical evidence for skipjack range contraction (SA-WP-05). SC11 recommends that WCPFC12 take note of the analyses completed to date and that further work on this issue be undertaken, including:

- more extensive skipjack tagging activities, including in sub-tropical and temperate regions to provide better information on stock connectivity and movement; and
- analysis of operational longline data including skipjack catch to improve the estimation of relative abundance trends by latitude.

b. Management advice and implications

34. SC11 noted that no management advice has been provided since SC10. Therefore, taking note of the current catch status pointed above, the advice from SC10 should be maintained.

4.1.4 South Pacific albacore tuna (*Thunnus alalunga*)

Review of South Pacific albacore tuna stock assessment

35. SC11 recommends that the following be undertaken to support the next south Pacific albacore assessment:

- i. More extensive retrospective analyses examining a longer period of time and including the key management quantities;
- ii. Compare the observed and predicted sample sizes for size composition data as one aspect of a more detailed examination of how size data are modelled and weighted within the stock assessment;
- iii. Collaborate with albacore assessment scientists in other RFMOs and research organizations around data upon which to base a plausible range of values for natural mortality – including consideration of the sensitivity of the assessment results to higher natural mortality for younger ages; and
- iv. Further examination of seasonal selectivity – especially for longline fisheries in southern regions of the assessment.

36. SC11 recommends that the following be undertaken prior to MOW4 and WCPFC-12 to support the Commission consideration of south Pacific albacore:

- i. Update the bio-economic model described in (MI-WP-04); and
- ii. Conduct medium-term projections (2014-2034) under current fishing conditions to determine the predicted impact of these levels on the abundance of albacore vulnerable to the longline fishery.

Provision of scientific information

a. Status and trends

37. There have been significant improvements to the 2015 stock assessment including: improvements to the MULTIFAN-CL modelling framework, a regional disaggregated framework, access to operational data for construction of CPUE indices and regional weights, age-length data to improve growth estimation, and additional tagging data. Further, the regional structure of the

model was changed to cover the southern Convention area and be better aligned with the other tuna assessments. This will enable better consideration of the multispecies impacts of management measures. Natural mortality was set at 0.3 in the reference case for consistency with the value used in the assessments performed in other RFMOs.

38. SC11 selected the reference case model as the base case to represent the stock status of south Pacific albacore tuna. To characterize uncertainty SC11 chose all the grid model runs except for those relating to the alternative regional weight hypothesis. This gave a total of 18 model runs and we report the 5%, median and 95% values on the base case estimate in this stock status summary. Details of the base case and axes of uncertainty for the grid are provided in Table SP-ALB1.

Table SP-ALB1: Description of the structural sensitivity grid used to characterize uncertainty in the assessment. The base case option is denoted in bold face.

Name	Description	One-off change model name(s)
Natural mortality	0.25, 0.30 , and 0.40 per year	Low_M and High_M
Length data weighting	Standard weighting or down-weighted	SZ_dwnwht
Steepness	0.65, 0.80 , and 0.95	h_0.65 and h_0.95

39. Time trends in estimated recruitment, spawning biomass, fishing mortality and fishery impacts are shown in Figures SP-ALB 1–5.

40. The estimated maximum sustainable yield (MSY) of 76,800 mt is lower than in the 2012 assessment (2012 MSY = 99,085 mt). Aside from general improvements to the stock assessment this was also influenced by 1) exclusion of catches from outside the southern part of the WCPFC Convention area; and 2) a reduction in the assumed value of natural mortality. Based on the range of MSY estimates (range: 62,260-129,814 mt), current catch is likely at or slightly less than the MSY.

41. Fishing mortality has generally been increasing through time, with F_{current} (2009-12 average) is estimated to be 0.39 times the fishing mortality that will support the MSY. Across the grid $F_{\text{current}}/F_{\text{MSY}}$ ranged from 0.13-0.62. This indicates that overfishing is not occurring, but fishing mortality on adults is approaching the assumed level of natural mortality (Table SP-ALB2 and Figure SP-ALB5).

42. The fishery impact by sub-tropical longline fisheries has increased continuously since 2000 (Figure SP-ALB6).

43. The latest (2013) estimates of spawning biomass are above both the level that will support the MSY ($SB_{\text{latest}}/SB_{\text{MSY}} = 2.86$ for the base case and range 1.74—7.03 across the grid) and the adopted LRP of $0.2SB_{F=0}$ ($SB_{\text{latest}}/SB_{F=0} = 0.40$ for the base case and range 0.30-0.60 across the grid). It is important to note that SB_{MSY} is lower than the limit reference point ($0.14 SB_{F=0}$) due to the combination of the selectivity of the fisheries and maturity of the species.

44. For the first time SC considered an index of economic conditions in the south Pacific albacore fishery (MI-WP-03). This index, which integrates fish prices, catch rates, and fishing prices, estimates a strong declining trend in economic conditions, reaching an historical low in 2013. While there was a slight recovery in 2014, conditions are still well below the average primarily due

to high fishing costs and continued low catch rates. Domestic vessels from some longline fleets have reduced their fishing effort (i.e., tied up for periods of time) in response to these conditions.

Table SP-ALB2: Estimates of management quantities for base case and grid of 18 models (see Table SP-ALB1 for details). For the purpose of this assessment, “current” is the average over the period 2009–2012 and “latest” is 2013.

	Base case	5%	Grid Median	95%
M_{SY} (mt)	76,800	62,260	84,980	129,814
C_{latest} / M_{SY}	1.00	0.60	0.91	1.23
$F_{current} / F_{MSY}$	0.39	0.13	0.34	0.62
B_0	711,400	638,465	806,900	1,024,500
$B_{current}$	456,984	365,962	509,653	783,308
SB_0	396,500	368,925	438,700	502,275
SB_{MSY}	57,430	35,762	59,180	90,778
$SB_{F=0}$	408,361	392,358	442,163	486,146
SB_{latest}	164,451	131,456	190,467	272,696
SB_{latest} / SB_{MSY}	2.86	1.74	3.20	7.03
$SB_{latest} / SB_{F=0}$	0.40	0.30	0.44	0.60

Table SP-ALB3: Comparison¹ of selected south Pacific albacore tuna reference points from the 2009, 2011, 2012, and 2015 assessments. These represent the value used to provide management advice. Note that the time window for assessment and reference point calculation changes for $F_{current}/F_{MSY}$ and $SB_{latest}/SB_{F=0}$ and that prior to the 2015 assessment, the south Pacific albacore assessments covered the entire south Pacific Ocean rather than the convention area south of the equator used in 2015.

Management quantity	2015	2012 ²	2011	2009 ³
MSY(mt)	76,800	99,085	85,130	97,610
$F_{current}/F_{MSY}$	0.39	0.21	0.26	0.25
$SB_{latest}/SB_{F=0}$	0.40	0.58	0.60	0.68

¹ 2015 assessment was conducted for WCPF CA and 2011/2012 stock assessment was for the whole South Pacific.

² The median of the grid was used to provide management advice instead of a single model run

³ Only $SB_{current}$ is available

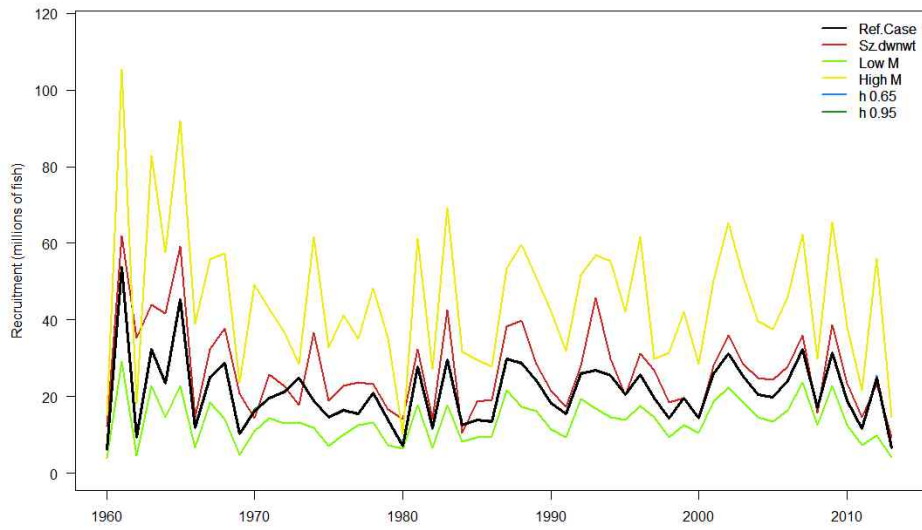


Figure SP-ALB1: Estimated annual recruitment (millions of fish) for the base case model and one-change sensitivity analyses (a subset of runs from the grid). See Table SP-ALB1 for a description of these sensitivity analyses. The model runs with alternative steepness values give the same recruitment estimates.

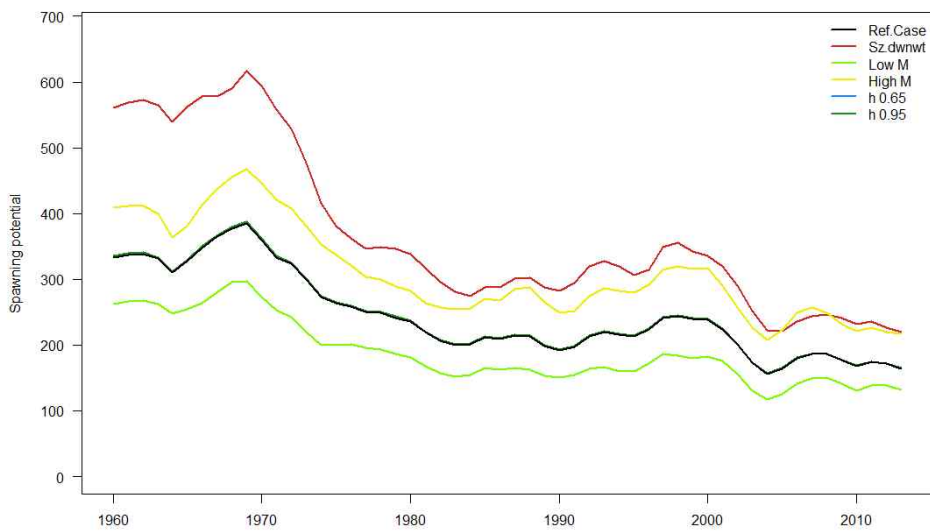


Figure SP-ALB2: Estimated annual average spawning potential for the base case model and one-change sensitivity analyses (a subset of runs from the grid). The model runs with alternative steepness values give the same spawning potential estimates.

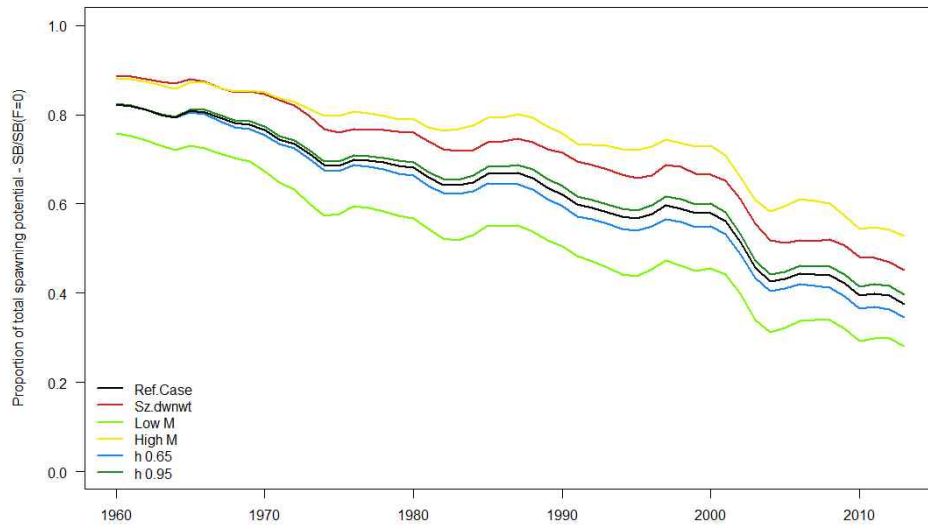


Figure SP-ALB3: Estimated annual average spawning depletion for the base case model and one-change sensitivity analyses (a subset of runs from the grid).

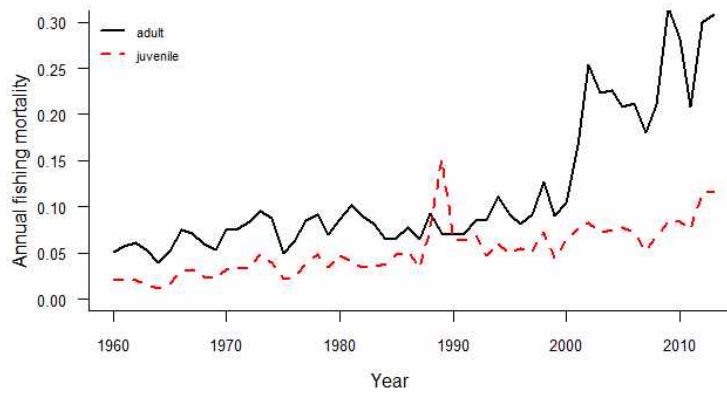


Figure SP-ALB4: Estimated annual average juvenile and adult fishing mortality for the base case model.

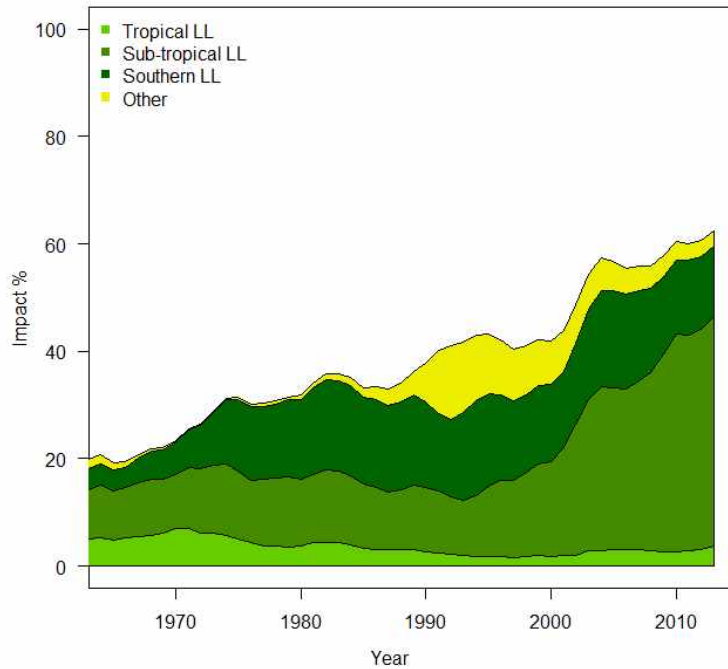


Figure SP-ALB5: Estimates of reduction in spawning potential due to fishing (fishery impact = $1 - SB_t/SB_{t,F=0}$) to different fishery groups for the base case model.

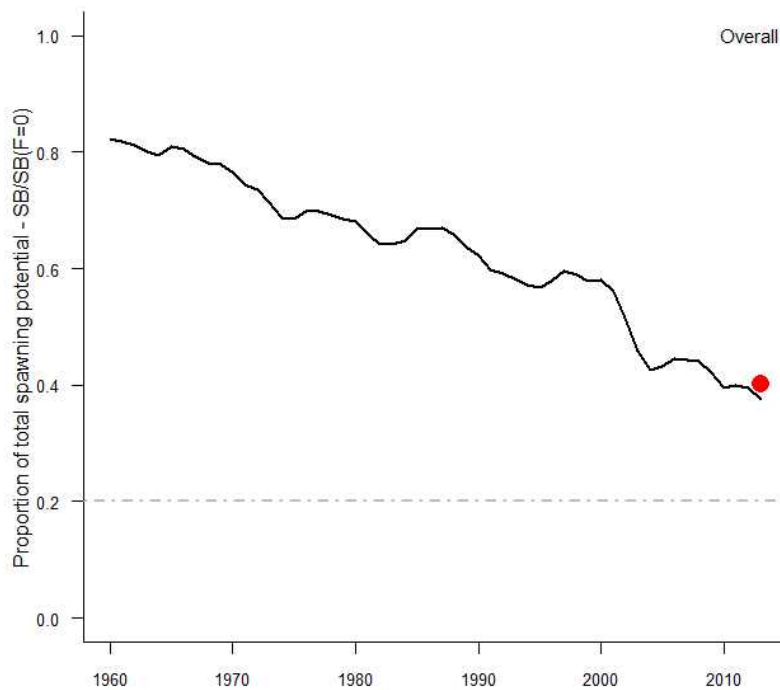


Figure SP-ALB6: Ratio of exploited to unexploited spawning potential, $SB_{latest}/SB_{F=0}$, for the reference case. The current WCPFC limit reference point of $20\%SB_{F=0}$ is provided for reference as the grey dashed line and the red circle represents the level of spawning potential depletion based on the agreed method of calculating $SB_{F=0}$ over the last ten years of the model (excluding the last year).

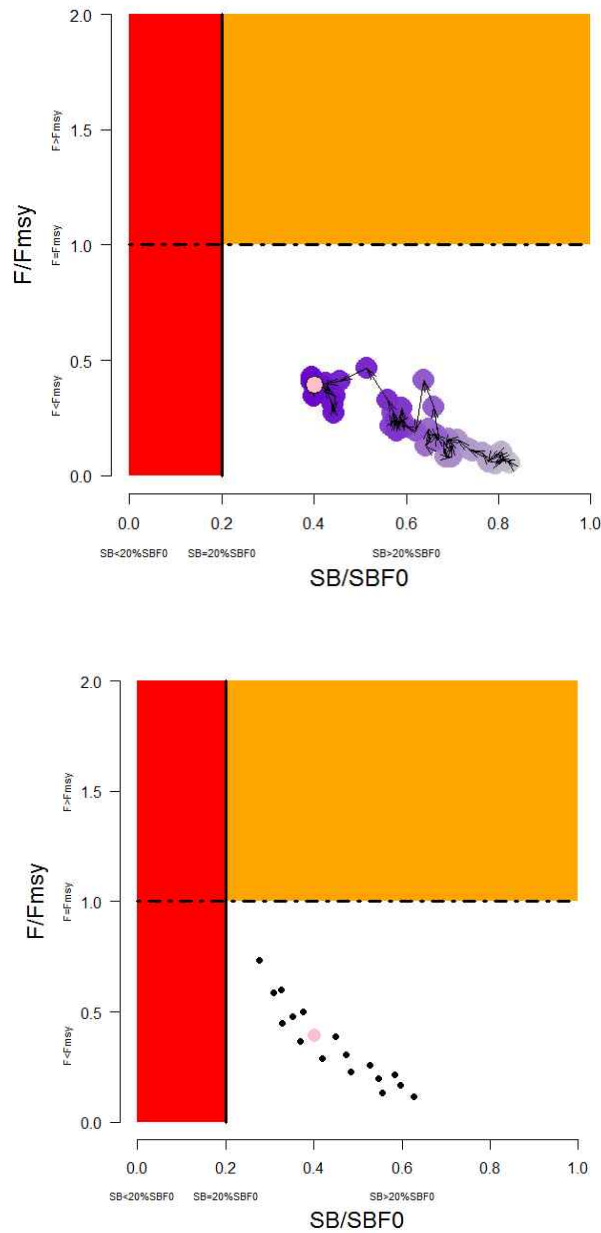


Figure SP-ALB7: Temporal trend for the base case model (top) and terminal condition for the base case and other sensitivity runs (bottom) in stock status relative to $SB_{F=0}$ (x-axis) and F_{MSY} (y-axis). The red zone represents spawning potential levels lower than the agreed LRP which is marked with the solid black line ($0.2SB_{F=0}$). The orange region is for fishing mortality greater than F_{MSY} ($F=F_{MSY}$; marked with the black dashed line). The pink circle (top panel) is $SB_{2012}/SB_{F=0}$ (where $SB_{F=0}$ was the average over the period 2002-2011). The bottom panel includes the base case (pink circle) and 18 models from the grid.

b. Management advice and implications

45. The South Pacific albacore spawning stock is currently above both the level that will support the MSY and the adopted spawning biomass limit reference point, and overfishing is not occurring (F less than F_{msy}).

46. While overfishing is not occurring, further increases in effort will yield little or no increase in long-term catches and result in further reduced catch rates.

47. Decline in abundance of albacore is a key driver in the reduced economic conditions experienced by many PICT domestic longline fleets. Further, reductions in prices are also impacting some distant water fleets.

48. For several years, SC has noted that any increases in catch or effort in sub-tropical longline fisheries are likely to lead to declines in catch rates in some regions (10oS-30oS), especially for longline catches of adult albacore, with associated impacts on vessel profitability.

49. Despite the fact that the stock is not overfished and overfishing is not occurring, SC11 reiterates the advice of SC10 recommending that longline fishing mortality and longline catch be reduced to avoid further decline in the vulnerable biomass so that economically viable catch rates can be maintained.

4.2 Northern stocks

4.2.1 – 4.2.3 North Pacific albacore (*Thunnus alalunga*), North Pacific bluefin tuna (*Thunnus orientalis*) and North Pacific swordfish (*Xiphias gladius*)

Provision of scientific information

a. Status and trends

50. SC11 noted that no stock assessments were conducted for these species in 2015. Therefore, the stock status descriptions from SC10 are still current.

b. Management advice and implications

51. SC11 noted that no management advice has been provided since SC10. Therefore, the advice from SC10 should be maintained, pending a new assessment or other new information.

4.3 WCPO sharks

4.3.1 – 4.3.3. Oceanic whitetip shark (*Carcharhinus longimanus*), Silky shark (*Carcharhinus falciformis*) and South Pacific blue shark (*Prionace glauca*)

Provision of scientific information

a. Status and trends

52. SC11 noted that no stock assessments were conducted for these shark species in 2015. Therefore, the stock status descriptions from SC8 and SC9 are still current for oceanic whitetip shark and silky shark, respectively.

53. SC11 noted that no stock assessment has been conducted for South Pacific blue shark.

b. Management advice and implications

54. SC11 noted that no management advice has been provided since SC8 and SC9 for oceanic whitetip shark and silky shark, respectively. Therefore, previous advice should be maintained, pending a new assessment or other new information.

55. SC11 noted that no management advice has been provided for South Pacific blue shark.

4.3.4 North Pacific blue shark (*Prionace glauca*)

Evaluation of North Pacific blue shark as a northern stock

56. SC11 noted that ISC provided a bibliography of studies undertaken on North Pacific blue sharks. SC11 also noted that it is important for ISC, in collaboration with SPC, to continue to work to provide information regarding the stock distribution north and south of 20°N in order to enable the SC to provide a recommendation to the Commission about whether this should be considered a northern stock.

Provision of scientific information

a. Status and trends

57. SC11 noted that no stock assessment was conducted for North Pacific blue shark in 2015. Therefore, the stock status description from SC10 is still current.

b. Management advice and implications

58. SC11 noted that no management advice has been provided since SC10. Therefore, the advice from SC10 should be maintained, pending a new assessment or other new information.

4.3.5 North Pacific shortfin mako (*Isurus oxyrinchus*)

Provision of scientific information

a. Status and trends

59. SC11 noted that ISC provided the following conclusions on the stock status of North Pacific shortfin mako shark:

“Shortfin mako is a data poor species. Recognizing that information on important fisheries is missing, the untested validity of indicators for determining stock status, and conflicts in the available data, stock status (overfishing and overfished) could not be determined. Managers

should consider the undetermined stock status of shortfin mako shark in the North Pacific when developing and implementing management measures.

The ISC SHARKWG reviewed a suite of information to determine the stock status of shortfin mako shark in the North Pacific. Of the three indices considered to have the greatest value in providing stock status information, abundance trends in two of the series appear to be stable or increasing, while the abundance trend in the third series appears to be declining.”

b. Management advice and implications

60. SC11 recommends that the Commission consider the undetermined stock status of shortfin mako shark in the North Pacific when developing and implementing management measures.

61. SC11 noted the following conservation advice from ISC:

“It is recommended that data for missing fleets be developed for use in the next stock assessment scheduled for 2018 and that available catch and CPUE data be monitored for changes in trends. It is further recommended that data collection programs be implemented or improved to provide species-specific shark catch data for fisheries in the North Pacific.”

62. SC11 noted that the quality of fisheries data for shortfin mako shark, varied for the fleets in the indicator analysis. SC11 recommends that changes in fishing practices of all fleets fishing in the WCPO be documented through time and noted that this information would be important for assessing fishery impacts on all species including shortfin mako shark.

4.4 WCPO billfishes

4.4.1 South Pacific swordfish (*Xiphias gladius*)

Provision of scientific information

a. Status and trends

63. SC11 noted that no stock assessment was conducted for South Pacific swordfish in 2015. Therefore, the stock status description from SC9 is still current.

b. Management advice and implications

64. SC11 noted that no management advice had been provided since SC10. Therefore, the advice from SC9 should be maintained.

4.4.2 Southwest Pacific striped marlin (*Kajikia audax*)

Provision of scientific information

a. Status and trends

65. SC11 noted that no stock assessment was conducted for southwest Pacific striped marlin in 2015. Therefore, the stock status description from SC8 is still current.

b. Management advice and implications

66. SC11 noted that no management advice had been provided since SC10. Therefore, the advice from SC8 should be maintained.

4.4.3 North Pacific striped marlin (*Kajikia audax*)

Provision of scientific information

a. Status and trends

67. SC11 noted the stock status and conclusions for North Pacific striped marlin provided by ISC in SC11-SA-WP-10:

*“Estimates of population biomass of the Western and Central North Pacific (WCNPO) striped marlin stock (*Kajikia audax*) exhibit a long-term decline (Table S1 and Figure S2). Population biomass (age-1 and older) averaged roughly 20,513 mt, or 46% of unfished biomass during 1975-1979, the first 5 years of the assessment time frame, and declined to 6,819 mt, or 15% of unfished biomass in 2013. Spawning stock biomass is estimated to be 1,094 mt in 2013 (39% of SSBMSY, the spawning stock biomass to produce MSY, Figure S3). Fishing mortality on the stock (average F on ages 3 and older) is currently high (Figure S4) and averaged roughly $F = 0.94$ during 2010-2012, or 49% above FMSY. The predicted value of the spawning potential ratio (SPR, the predicted spawning output at current F as a fraction of unfished spawning output) is currently $SPR_{2010-2012} = 12\%$ which is 33% below the level of SPR required to produce MSY. Recruitment averaged about 308 thousand recruits during 1994-2011, which was 25% below the 1975-2013 average. No target or limit reference points have been established for the WCNPO striped marlin stock under the auspices of the WCPFC.*

The WCNPO striped marlin stock is expected to be highly productive due to its rapid growth and high resilience to reductions in spawning potential. The status of the stock is highly dependent on the magnitude of recruitment, which has been below its long-term average since 2007, with the exception of 2010 (Table S1). Changes in recent size composition data in comparison to the previous assessment resulted in changes in fishery selectivity estimates and also affected recruitment estimates. This, in turn, affected the scaling of biomass and fishing mortality to reference levels (Figure S6).

When the status of striped marlin is evaluated relative to MSY-based reference points, the 2013 spawning stock biomass is 61% below SSBMSY (2819 t) and the 2010-2012 fishing mortality exceeds FMSY by 49% (Figures S3, S4, and S5). Therefore, overfishing is occurring relative to MSY-based reference points and the WCNPO striped marlin stock is overfished.”

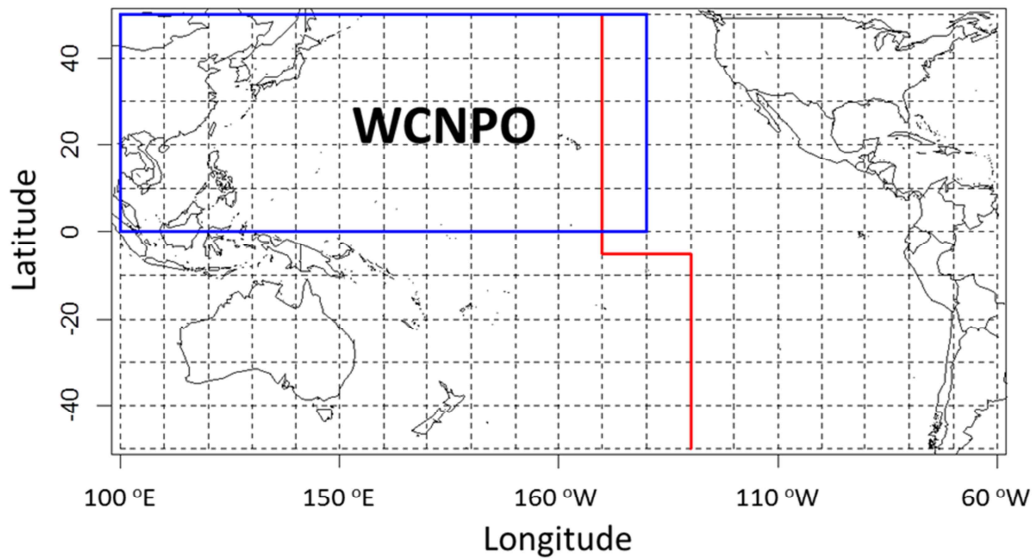


Figure S1: Stock boundary for the stock assessment update of Western and Central North Pacific Ocean striped marlin (WCNPO) as indicated by the blue lines. Red lines indicate the WCPFC convention area.

Table S1: Reported annual values of catch (mt) and posterior mean values of exploitable biomass (B, mt), relative biomass (B/B_{MSY}), harvest rate (percent of exploitable biomass), relative harvest rate (H/H_{MSY}), and probability of annual harvest rate exceeding H_{MSY} for the EPO swordfish stock.

Year	2007	2008	2009	2010	2011	2012	2013	Mean ¹	Min ¹	Max ¹
Reported Catch	3084	3503	2468	2852	3125	3521	2984	5822	2468	10594
Population Biomass	6915	6773	6409	5156	7823	7349	6819	12758	5156	28440
Spawning Stock Biomass	1192	1171	970	984	873	1013	1094	2025	815	6946
Relative Spawning Biomass	0.42	0.42	0.34	0.35	0.31	0.36	0.39	0.75	0.29	2.46
Recruitment (age 0)	240	242	63	496	155	224	352	410	63	1369
Fishing Mortality	0.82	0.99	0.80	0.96	0.89	0.97	0.76	0.95	0.47	1.54
Relative Fishing Mortality	1.29	1.57	1.27	1.51	1.41	1.53	1.20	1.50	0.74	2.44
Exploitation Rate	45%	52%	39%	55%	40%	48%	44%	48%	32%	65%
Spawning Potential Ratio	15%	12%	16%	13%	12%	12%	14%	13%	7%	24%

¹During 1975-2013

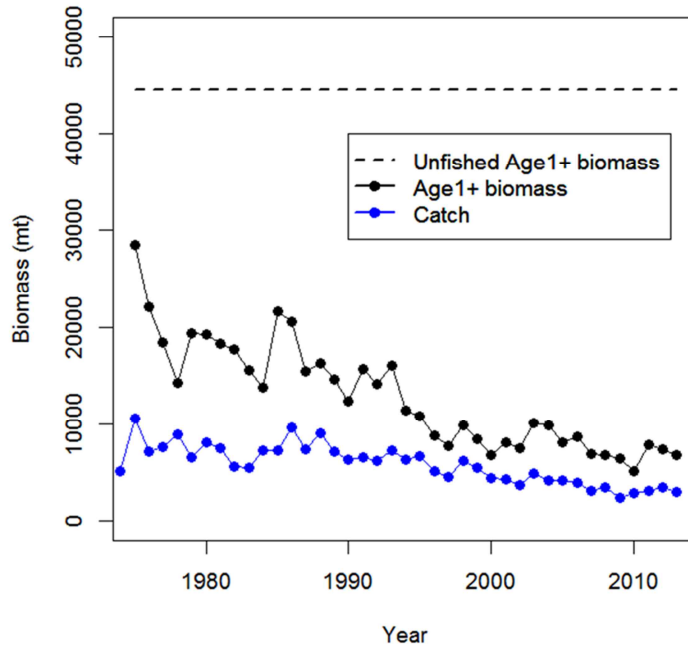


Figure S2. Trend in population biomass and reported catch biomass of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2013.

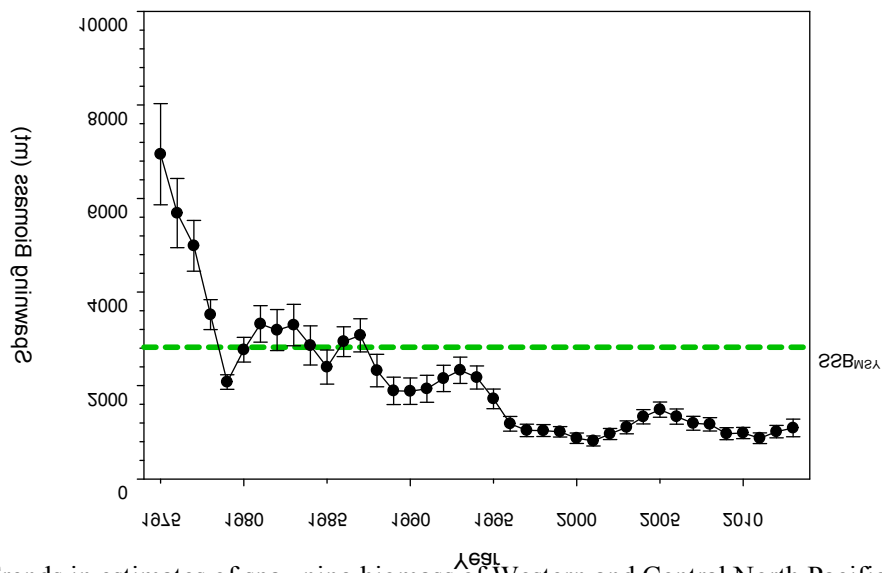


Figure S3. Trends in estimates of spawning biomass of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2013 along with 80% confidence intervals.

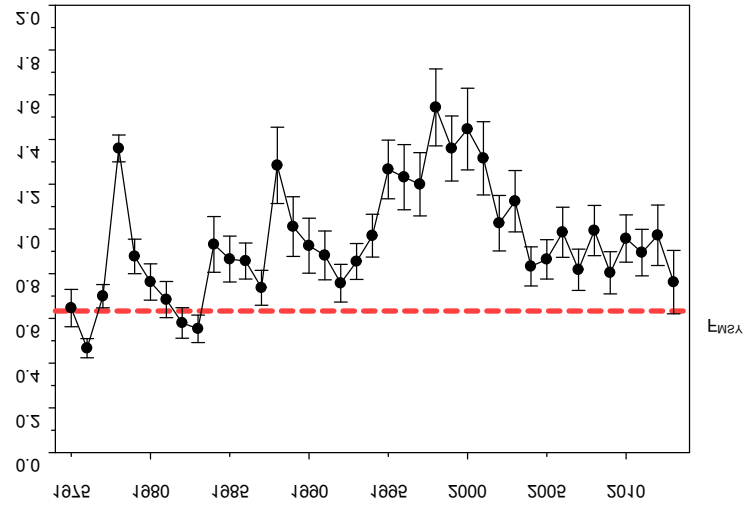


Figure S4. Trends in estimates of fishing mortality of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2013 along with 80% confidence intervals.

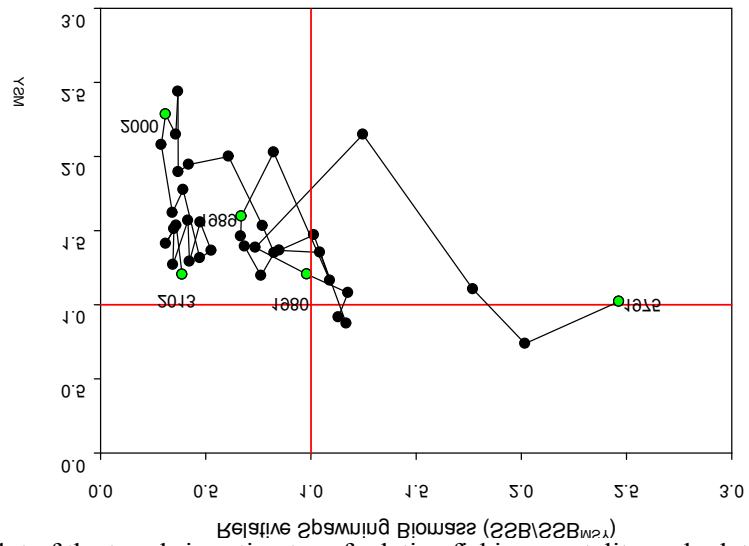


Figure S5. Kobe plot of the trends in estimates of relative fishing mortality and relative spawning biomass of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2013.

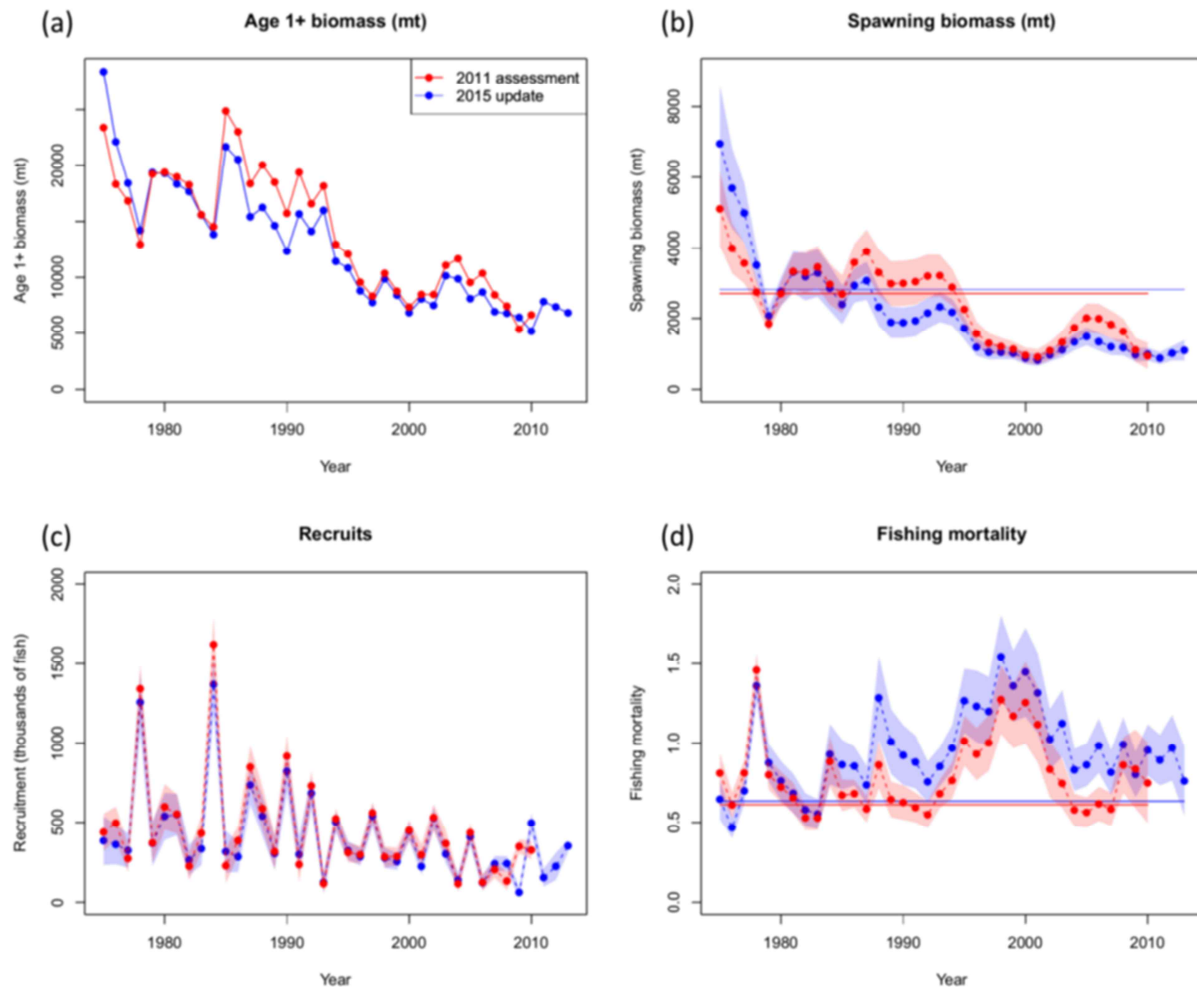


Figure S6. Comparison of time series of total biomass (age 1 and older) (a), spawning biomass (b), age-0 recruitment (c), and instantaneous fishing mortality (year-1) (d) for the WCNPO striped marlin between the 2011 stock assessment (red) and the 2015 update (blue). The solid line with circles represents the maximum likelihood estimates for each quantity and the shadowed area represents the 95% asymptotic intervals of the estimates (± 1.96 standard deviations). The solid horizontal lines indicated the MSY-based reference points for 2011 (red) and 2015 (blue).

b. Management advice and implications

68. SC11 noted the following conservation advice from ISC.

“The stock has been in an overfished condition since 1977, with the exception of 1982 and 1983, and fishing appears to be impeding rebuilding especially if recent low recruitment levels persist.

Projection results show that fishing at FMSY could lead to median spawning biomass increases of 25%, 55%, and 95% from 2015 to 2020 under the recent recruitment, medium-term recruitment, and stock recruitment-curve scenarios.

Fishing at a constant catch of 2,850 t could lead to potential increases in spawning biomass of 19% to over 191% by 2020, depending upon the recruitment scenario.

In comparison, fishing at the 2010-2012 fishing mortality rate, which is 49% above FMSY, could lead to changes in spawning stock biomass of -18% to +18% by 2020, while fishing at the average 2001-2003 fishing mortality rate ($F_{2001-2003}=1.15$), which is 82% above FMSY, could lead to spawning stock biomass decreases of -32% to -9% by 2020, depending upon the recruitment scenario.”

69. SC11 expressed concerns about the updated stock status of WCNPO striped marlin, noting that the stock was overfished (SSB_{2013} at 61% below SSB_{MSY}) and that overfishing was occurring ($F_{2010-2012}$ exceeds F_{MSY} by 49%). Although a LRP for billfish species has not been adopted by the WCPFC, SC11 noted that $SSB_{current}/SSB_{current,F=0} = 0.12$ and is below the LRP adopted for tunas. SC11 also noted that projections indicate that $Prob(SSB_{2020} > SSB_{2015}) < 50\%$ for all constant catch scenarios over 2,850 mt (under the three recruitment hypotheses modelled), which means that in order to allow the spawning biomass to rebuild then catches need to be reduced to less than 2,850mt.

70. SC11 recommends that the Commission develop a rebuilding plan for North Pacific striped marlin with subsequent revision of CMM 2010-01 in order to improve stock status.

4.4.4 Pacific blue marlin (*Makaira nigricans*)

Provision of scientific information

a. Status and trends

71. SC11 noted that no stock assessment was conducted for Pacific blue marlin in 2015. Therefore, the stock status description from SC9 is still current.

b. Management advice and implications

72. SC11 noted that no management advice had been provided since SC9. Therefore, the advice from SC9 should be maintained, pending a new assessment or other new information.

4.5 Independent review of stock assessments

73. SC11 recommends that the Secretariat develops a proposal to establish a formal process and its cost implication to independently review stock assessments. This proposal will be presented to SC12.

AGENDA ITEM 5 MANAGEMENT ISSUES THEME

5.1 Limit reference points for the WCPFC

5.1.1 Implications of alternative levels of acceptable risk

74. Noting that SC10 had considered levels of risk associated with breaching the LRP within the range 5-20%, that the identification of acceptable risk is a management issue, SC11 reaffirmed the recommendation made by SC10 that WCPFC12 identify the level of acceptable risk which

should be applied to breaching a LRP for the key target species, noting that the UN Fish Stocks Agreement states that the risk of exceeding LRPs should be very low.

5.1.2 Identifying appropriate LRPs for elasmobranchs within the WCPFC

75. SC11 noted the work undertaken in support of identifying appropriate LRPs for elasmobranchs within the WCPFC, in particular the report of the Pacific shark life history Expert Panel Workshop (SC11-EB-IP-13) and that other work necessary to identify and support the development of LRPs for sharks has been included in the updated shark research plan. SC11 recommends that the WCPFC12 continues to support this work.

5.2 Development of target reference points (TRPs) and harvest control rules (HCRs) for the WCPFC

5.2.1 Development of WCPFC harvest strategies

76. SC11 considered the draft work-plan (WCPFC-SC11-2015/MI-WP-01) provided by Australia to progress the harvest strategy approach, which is required under CMM 2014-06. SC11 strongly supported the initiative by Australia to develop this plan. SC11 recommends that Australia continue to develop this work-plan, noting the comments provided by SC11, and in consultation with other CCMs intersessionally, and that the updated plan be presented to TCC11 and WCPFC12, including an estimation of budget and resources required.

5.2.2 Skipjack target reference point

77. SC11 considered the scientific aspects of the draft CMM on a target reference point for WCPO skipjack tuna (WCPFC-SC11-2015/MI-WP-02) provided by PNA. SC11 recommends that PNA take into consideration comments provided by SC11 in further developing this draft CMM.

5.2.3 Albacore tuna target reference point

78. SC11 reviewed information related to the identification of an appropriate TRP for south Pacific albacore tuna, noting in particular a decline in the economic performance of this fishery (WCPFC-SC11-2015/MI-WP-03) and the consequences for the stock and the fishery of a range of candidate target reference points (WCPFC-SC11-2015/MI-WP-04). SC11 noted these analyses and recommended that the latter be updated based on the 2015 stock assessment of south Pacific albacore tuna and presented to both MOW4 and WCPFC12 for consideration of TRPs.

5.3 Implementation of CMM 2014-01

5.3.1 Evaluation of impacts of the purse-seine fishery

79. SC11 reviewed information related to tropical tunas (WCPFC-SC11-2015/GN-WP-01). Noting the longline bigeye catch and the total number of FAD sets in 2014 was still higher than in 2010 (taken as a reference year for the current CMM), and the number of FAD sets was 5% above the mean total number for the 2005-2014 period, SC11 recommends the need for additional or alternative targeted measures to reduce the fishing mortality on bigeye tuna, as seen as appropriate by the Commission.

80. SC11 also reviewed evaluation of CMM-2013-01 (WCPFC-SC11-WCPFC11-03). Noting revised tropical tuna measure adopted at WCPFC 11 (CMM-2014-01) is slightly different from the

assumption used in the analysis, SC11 requests the Science Service Provider consider the implementation of updated projections, including evaluation of the potential impact of CMM 2014-01, for the consideration of tropical tuna measures at WCPFC12.

Skipjack tuna purse-seine associated and unassociated set effort

81. Noting the request in paragraph 584 of the SC10 report, SC11 reviewed working paper SC11-MI-WP-05 which analysed the relative impact of associated and unassociated set types on skipjack tuna stock status. Results indicated that skipjack stock status is relatively insensitive to the proportions of associated or unassociated sets of purse seine effort, with slight benefits to stock status with a higher proportion of unassociated sets. In addition, SC11 noted that the analyses had assumed a linear relationship between CPUE and stock abundance (potentially unrealistic in purse seine fisheries) and had not taken account of effort creep in purse-seine effort, for both associated and unassociated sets. SC11 also noted that a decrease in days searching and an increase of days in transit in logbooks might partially explain the increased CPUE observed. SC11 recommends that WCPFC12 take note of this paper and that further analyses be undertaken taking into account the issues identified above.

Productivity changes within the tropical WCPO purse-seine fishery

82. SC11 reviewed information related to changes in catchability within the tropical WCPO purse seine fishery (SC11-MI-WP-06) and noted that results based on several sources indicate significant increases in catchability over the past 20 years (e.g. a 3-5% average annual increase (2005-2011) in purse-seine vessel efficiency based on the 2014 skipjack stock assessment). SC11 noted these analyses, and recognized the need for further analyses and additional information to help identify the causes of these increases, and recommends that WCPFC12 takes note of this paper.

Purse-seine catches of bigeye tuna

83. SC11 reviewed information related to understanding bigeye tuna interactions in the purse seine fishery through characterisation of catches in space and between sets with the aim of identifying management options that reduce impacts on bigeye with minimal losses to the purse seine fishery (WCPFC-SC11-2015/MI-WP-07). SC11 noted that while bigeye tuna catches are common in both the central and western Pacific, around one-third of the purse-seine catch of bigeye is taken by a small component (~10%) of the fleet. SC11 recommends that further research on the various issues identified by the paper be undertaken, for example time of the purse seine sets relative to nautical dawn and the effects on species composition, and that WCPFC12 takes note of this paper.

5.3.2 WCPFC FAD Management Options Intersessional Working Group

84. No recommendations were made.

5.3.3 Yellowfin tuna catch limit

85. SC11 reviewed working paper SC11-MI-WP-09 which analysed the relative impact of associated and unassociated set types on yellowfin tuna stock status. SC11 advises WCPFC12 that based on the results of the analyses described in this paper yellowfin tuna stock status in the WCPO is relatively insensitive to whether purse seine effort is comprised of mainly associated sets or unassociated sets and these results are consistent with working paper SC10-MI-WP-05. SC11 also

noted that a slightly better stock status (higher spawning biomass) for yellowfin tuna and slightly lower average catch of yellowfin tuna occurred when purse seine effort compositions favoured unassociated sets. SC11 recommends that WCPFC12 take note of these conclusions and that further analyses be undertaken taking into account alternative relationships between CPUE and abundance.

5.3.4 Other issues related to CMM 2014-01

86. SC11 reviewed analyses undertaken to estimate potential tropical purse seine fleet sizes given existing effort limits and candidate target stock levels (WCPFC-SC11-2015/MI-WP-10). SC11 noted that these analyses are an important contribution to the development of a purse seine capacity management scheme for the WCPFC and supported further work to identify patterns of participation by full-time and part-time vessels within the fishery, the need to relate both participation and effort creep to vessel characteristics, and the expansion of similar analyses to the longline fleets. SC11 recommends that WCPFC12 take note of these preliminary analyses and requests the Commission identify any specific analyses which may assist the Commission's consideration of fleet capacity.

AGENDA ITEM 6 ECOSYSTEM AND BYCATCH MITIGATION THEME

6.1 Ecosystem effects of fishing

Spatial Ecosystem and Population Dynamics Model (SEAPODYM)

87. SC11 recommends that:

- a. the Commission/WCPFC12 acknowledge the funding received from ISSF for an external review of the SEAPODYM project and further notes the outcomes from that review will assist the Commission in evaluating potential applications and future directions.
- b. the Commission/WCPFC12 provide guidance to the SC on whether they would like the SC to move forward with the further development of ecosystem indicators for possible incorporation in the MOW process, building on the work of other international fisheries bodies, e.g. ISC and ICAAT.

6.2 Sharks

6.2.1 Review of potential mitigation measures to reduce fishing-related mortality on silky and oceanic whitetip sharks

88. SC11 recommends that the Commission consider:

- a. Considering the Monte Carlo analysis of longline shark mitigation methods (e.g. hook type, leader material, non-deployment of shallow hooks, and a prohibition on shark lines) presented in SC11-EB-WP-02, in order to inform WCPFC12's further consideration of revising shark CMMs to incorporate shark mitigation requirements that reduce catch rates and at-vessel mortality.

- b. Noting the Monte Carlo simulations run presented in EB-WP-02, which showed that given the model assumptions, banning wire trace and shark lines would further reduce fishing mortality of oceanic whitetip and silky sharks by longline compared to the current choice between the two mitigation measures.
- c. Noting that the Monte Carlo mitigation model and its inputs can be improved through an increase in available observer data and more studies on post-release survival rates for key shark species.
- d. Requesting that the Monte Carlo simulation work be expanded to a) account for flag-state choice between prohibition of shark lines and/or of wire leader with respect to CMM 2014-05, b) additional modeling of combinations of available mitigation options, and c) inclusion of purse seine fisheries to assess the effects on fishing mortality of sharks when effort on FAD sets was re-distributed to unassociated sets.
- e. Requesting that CCMs quantify and describe longline gear configuration inputs and provide these to SPC to inform the Monte Carlo simulation work.

6.2.2 Review of conservation and management measures for sharks

a. *CMM 2010-07 (CMM for Sharks)*

89. SC11 recommends that the Commission:

- a) SC11 was able to review the ratio of fin weight to shark carcass weight from one study (SC11-EB-IP-03). This study demonstrated that shark fin weight data suffered from some serious limitations, potential biases and errors. SC11 was unable to confirm the validity of using a 5% fin to carcass ratio in CMM 2010-07 and forwards these concerns to TCC, noting that an evaluation of the 5% ratio is not currently possible due to insufficient information for all but one of the major fleets implementing these ratios.
- b) Notes that according to the most recent information provided by SPC, finning still occurs in the Convention Area.
- c) Notes that information which can be used to evaluate the effectiveness of the WCPFC ban on shark finning (CMM 2010-07) is currently very limited.
- d) Encourages CCMs to gather and submit information on the implementation of CMM 2010-07, including data on fin to carcass ratios where CCMs apply that approach, to the Secretariat, in their AR-Part 2 reports or other formats, in order to support future evaluation.

b. *CMM 2011-04 (CMM for oceanic whitetip shark)*

90. No recommendations were made.

c. *CMM 2012-04 (CMM for protection of whale sharks from purse seine fishing operations)*

91. SC11 recommends that WCPFC12 adopt the guidelines for safe release of encircled animals including whale sharks as contained in the ISG-4 report (Attachment F) and recommends that TCC11 provide any additional considerations for the Commission's decision.

d. CMM 2013-08 (CMM for silky sharks)

92. SC11 recommends that the Commission:

- a) Notes that the SC endorses the post-release mortality study being proposed by USA and other similar studies proposed under the WCPFC Shark Research Plan.

e. CMM 2014-05 (CMM for sharks)

93. After considering the shark management plans submitted by Japan and Chinese Taipei - in accordance with paragraph 2 of CMM 2014-05, review by SC11 was made difficult due to the lack of guidance on what should be incorporated into the shark management plans, what is considered a target fishery, and how the review should be performed. SC11 recommends that the Commission:

- a) Consider development of a list of minimum requirements that such a plan should include, guidelines to evaluate such a plan, and the definition of a target shark fishery for future review by SC, TCC and the Commission;
- b) Notes the need for plans to contain species specific information and a rationale for how catch, effort or capacity limits are derived, amongst other minimum requirements.

f. Safe release guidelines

94. Guidelines pertaining to the safe release of non-encircled sharks and rays were not finalized by ISG-4 and are retained in draft form for future discussion by SC (**Attachment G**). It was noted that further information is necessary to advance the development of these guidelines.

6.2.3 Shark Research Plan (SRP)

Indicators for key shark species

95. Recognizing that the analysis on north Pacific blue shark and north Pacific shortfin mako shark did not cover some data used in the ISC analysis on these stocks, SC11 recommends that the Commission:

- a) Notes the results of analysis described in paper EB-WP-04 are useful for prioritizing the stock assessment of the various shark stocks.
- b) Take note of the following recommendations from the SC:
 - Increase observer monitoring (at least to CMM requirements) in order to:
 - Support to develop stock assessments
 - Monitor the impact of CMMs
 - Reconcile differences in logbook and observer reporting
 - Develop a stock assessment schedule
 - Develop catch histories for unassessed stocks
 - Collect information on post release mortality rates, especially for silky, oceanic whitetip and whale sharks
 - Develop a time series of whale shark interactions and mortalities.
 - Repeat the indicator analysis in 2-3 years.

- c) **Requests that SPC be tasked with reviewing available information on mobulid species (mantas and devil rays) and their interactions with fisheries managed by the WCPFC and prepare a paper for SC12 for consideration of these species for designation as WCPFC key sharks.**
- d) **Notes that there are limitations imposed on shark analyses due to low levels of observer coverage and lack of representativeness in the observer data.**

Shark Research Plan 2016-2020 and stock assessment schedule

96. **SC11 adopts the Shark Research Plan and Stock Assessment Schedule (Attachment H) and recommends that WCPFC12 endorses it.**

Changes to longline observer data collection standards for bycatch (ISG-5)

97. SC11 endorses the “Changes to longline observer data collection standards for bycatch” as in **Attachment I**, and forwards them to TCC11 for technical consideration.

6.3 Seabirds

Risk of seabird bycatch

98. **SC11 recommends that the Commission take note of SC11-EB-WP-09 (The overlap of threatened seabirds with reported bycatch areas between 25° and 30° South in the WCPFC area).**

Small longline vessels in the western North Pacific

99. There was no consensus on the recommendations presented in the SC11-EB-WP-09; two different views were expressed:

- A minority view was provided by Japan for the report: A number of CCMs considered that the information contained in SC11-EB-WP-09 (The overlap of threatened seabirds with reported bycatch areas between 25° and 30°S in the WCPFC Area) was not conclusive to necessitate the expansion of the area of application of CMM 2012-07 further north from 30°S. Thus, they did not support a recommendation for the Commission to consider moving the mitigation measure boundary.
- A majority view was provided by FFA members for the report: that the Commission note potential interactions of threatened seabird species with longline fisheries between 25-30°S. In order to reduce the probability of seabird interactions, that the Commission considers extending seabird mitigation within CMM 2012-07 to encompass 26°S-30°S within the WCPFC-CA or alternatively to 25°S-30°S but pertaining to only to the high seas (within 25°-30°S) within the WCPFC-CA.

6.4 Sea turtles

100. SC11 noted that when more detailed information regarding the organization of the project is available, CCMs are requested to consider if:

- a) they are interested in contributing data to ABNJ Tuna Project sea turtle bycatch mitigation project; and

b) they are interested in participating in the workshops proposed for this project.

6.5 Bycatch mitigation for other species

101. SC11 requests that SPC, with help from ABNJ Tuna Project:
- develop a process to populate the template; and
 - provide the first BDEP template (for 2013-2015) to SC12 for review with ROP data subject to the WCPFC data rules..

AGENDA ITEM 7 OTHER RESEARCH PROJECTS

7.1 West Pacific East Asia Project

102. A new GEF-funded project (Sustainable Management of Highly Migratory Fish Stocks in the West Pacific and East Asian Seas) was introduced, including the development process, key activities, budget scope, and key outcomes from the previous projects (SC11-RP-WPEA-01).

7.2 Pacific Tuna Tagging Project

103. A steering committee meeting was held during SC11 and the steering committee summary report (SC11-RP-PTTP-01) was made available to SC11 participants.

7.3 GEF ABNJ Shark and BMIS project

104. A brief overview of progress with the ABNJ (Common Oceans) Tuna Project activities was presented, including i) shark data improvement and harmonization; ii) shark stock assessment and management; and iii) global bycatch management and information.

AGENDA ITEM 8 COOPERATION WITH OTHER ORGANISATIONS

105. The Secretariat paper SC11-GN-IP-01 was presented. There are two new arrangements for 1) the GEF-funded WPEA project and 2) the FAO's GEF-funded ABNJ Tuna Project.

AGENDA ITEM 9 SPECIAL REQUIREMENTS OF DEVELOPING STATES AND PARTICIPATING TERRITORIES

106. There was a brief description on how the JTF fund was distributed in 2015, the fourth year of the second phase of the JTF Project. The Secretariat informed plenary that the 2016 JTF funding would be announced during TCC, and urged participants to be ready for the call for next year's funding, which would likely have a closing date of 31 December 2015.

AGENDA ITEM 10 FUTURE WORK PROGRAM AND BUDGET

Development of the 2016 Work Programme and budget, and projection of 2017-2018 provisional Work Programme and indicative budget

107. SC11 adopted the SC work programme and budget as shown in Table 1.

Table 1: List of SC work programme titles and budget for 2016, and indicative budget for 2017–2018, which require funding from the Commission’s core budget (in USD).

Project	Essential	Priority	2016		2017		2018	
			Core	Other	Core	Other	Core	Other
SPC Oceanic Fisheries Programme Budget	x		1,031,200	400,000	1,031,200	400,000	1,031,200	400,000
Project 14. West Pacific East Asia (WPEA) Project	x		25,000	693,400	25,000	693,400	25,000	
Project 35. Refinement of bigeye tuna parameters		3	50,000					
Project 42. Pacific-wide tagging project		3	10,000	570,000	10,000		10,000	
Project 57. Limit reference points (LRPs) Develop proposed limit reference points for elasmobranchs (requires scope of work to progress)		3	25,000					
Project 67 – Review of impacts of recent high catches of skipjack on fisheries on the margins of the WCPFC Convention Area		2	40,000		40,000			
Project 60: Further paired sampling and unloading data comparisons. - Budget would cover at-sea data collection (2nd observer), associated travel, some analytical support. \$50,000 in each of 2016 and 2017.		2	50,000		50,000			
New Projects identified by SC11								
Maintenance and enhancement of the WCPFC Tissue Bank		3	80,000		80,000		80,000	
Review of Shark Length-weight conversion factor for all key shark species		1	10,000					
Sharks Monte Carlo mitigation analysis for purse seine, and extension of longline analysis		3	25,000					
EU funded projects that require 20% matching funds								
Technical support for the MOW4/HSW1 Project 63. Harvest control rules Project 66. Target reference points (TBC, max. EU contribution: 100,000 euro)	x		190,000	110,000	160,000			

Project	Essential	Priority	2016		2017		2018	
			Core	Other	Core	Other	Core	Other
Purse seine bigeye catch mitigation analysis. - Co-funding for expected EU contribution of Euro 200,000 (USD220,000) total.	x		25,000	110,000	25,000	110,000		
New mitigation trials or project for juvenile bigeye and yellowfin by purse seine (TBC, max. EU contribution: 400,000 euro)		3	44,000	440,000	44,000			
Post release of sharks and rays from longline and purse seine vessels (TBC, max. EU contribution: 400,000 euro)		3	44,000	440,000	44,000			
New projects Identified by SC10 as High Priority but not funded								
Further development of methods and analysis to account for changes in targeting practices on the catch of non-target species in particular shark species (alternative funding to be identified)		1	-					
Unobligated (Contingency) Budget related with any science-related projects requested by the Commission with no budget allocation			83,000		83,000		83,000	
TOTAL BUDGET			1,732,200		1,592,200		1,229,200	

AGENDA ITEM 11 ADMINISTRATIVE MATTERS

Election of Officers of the Scientific Committee

108. A. Batibasaga (Fiji) was nominated and accepted by SC11 as the SC Vice-Chair.

11.3 Next meeting

109. Indonesia confirmed to host SC12 in Bali, Indonesia, scheduled to take place from 3-11 August 2016.

AGENDA ITEM 12 OTHER MATTERS

110. There was no discussion against this agenda item.

**AGENDA ITEM 13 ADOPTION OF THE SUMMARY REPORT OF THE ELEVENTH
REGULAR SESSION OF THE SCIENTIFIC COMMITTEE**

111. According to the Rule 33 of the Commission's Rules of Procedure, the following procedure for the development of SC11 Summary Report was agreed by the SC11 plenary.

Due by	Activity
18 August	Theme convenors receive SC11 draft report for review from the Secretariat
24 August	The Secretariat posts the provisional Executive Summary on SC11 website
24 August	The Secretariat receives theme convenors' comment
28 August	The Secretariat distributes draft summary report to all CCMs and Observers by email
2 October	The Secretariat receives comments from CCMs and Observers

AGENDA ITEM 14 CLOSE OF MEETING

112. Fiji stated that they would volunteer to host the 2016 Commission meeting.

113. The SC Chair closed the meeting at 3:10pm on 13 August 2015.

LIST OF ATTACHMENTS

- Attachment A. Executive Director's Remarks
- Attachment B. List of Participants
- Attachment C. Agenda
- Attachment D. WCPFC tissue bank access protocols
- Attachment E. Agreement for provision of operational-level data to SPC to support WCPFC stock assessments
- Attachment F. Guidelines for the safe release of encircled animals including whale sharks
- Attachment G. Development of new guidelines for the survival of sharks (other than whale sharks) to be released from longline and purse seine gear
- Attachment H. Shark research plan and stock assessment schedule
- Attachment I. Proposed amendments to the WCPFC Minimum Data Standards and Fields for bycatch data collected by longline observer programmes

**The Commission for the Conservation and Management of
Highly Migratory Fish Stocks in the Western and Central Pacific Ocean**

**Scientific Committee
Eleventh Regular Session**

Pohnpei, Federated States of Micronesia
5–13 August 2015

REMARKS BY THE WCPFC EXECUTIVE DIRECTOR

Feleti P. Teo

Chairman; thank you for allowing me to make some remarks at this opening session of the Scientific Committee at its eleventh regular session.

As you know Chairman, this is my first appearance at the Scientific Committee as your new Executive Director after assuming office in March of this year. In fact this is my first major Commission meeting as the Executive Director. So I am grateful for this opportunity to share with the Committee and members and observers of the Commission some of my perspectives and key objectives as your new Executive Director.

But before I do that, let me acknowledge the presence of the Commission Chair; Madam Rhea Moss-Christian. I have been somewhat fortunate to have the Chair also residing in Pohnpei. This has allowed me regular access to consult and confer with the Chair. I think I am reasonably clear on my marching orders from the Chair and as to what her vision for the Commission for this year and onward. As head of the Secretariat, it is my primary and entrusted responsibility to render fullest support to the Chair and the Commission, to pursue the Commission's ultimate objective of ensuring the long term conservation and sustainable use of the highly migratory fish stocks in the WCPO, through effective management.

I also acknowledge the distinguished heads of delegation and delegates from member governments and observers. I wish make specific mention of our science services provider, the oceanic fisheries programme of the Secretariat to the Pacific Community. Dr John Hampton and his team have worked tirelessly in contributing material and documentation for the Scientific Committee meetings over the years. I also wish to recognize my Secretariat staff and to thank them in your presence for the enormous assistance and support they rendered me when I assumed office. I also pay my respect to our host government, the government of FSM and to NORMA for being hospitable host and for their continued support.

As you know, we have arrived at the meetings season for the Commission. The Scientific Committee meeting this week and next week will be followed by the Northern Committee and the Technical and Compliance Committee both in September and ultimately the annual Commission meeting in December. So it will be quite a congested second half of the year for the Secretariat and I am sure the same for some of you who also participate at these other Commission meetings.

As your new Executive Director, I have made it one of my first priorities to lift the profile of the Commission and its Secretariat through deeper engagement with, between, and amongst members and stakeholders. In the next week or so we will roll out a new Communication Plan that sets out a framework

for the Secretariat to deepen its engagement with Commission members and stakeholders. The Communication Plan will entail several communication activities that will make the Secretariat more connected, on a regular basis, to important stakeholders like Commission members and observers, NGO, fishing industries, the media and the local Pohnpei community. Some of you may have already received emails from me on Monday evening or yesterday introducing the inaugural edition of the new Secretariat Quarterly e-newsletter. The quarterly newsletter will keep members and stakeholders updated on Commission news and the work of the Secretariat team.

As head of the Secretariat, I will be active in publicizing the achievements of the Commission in a wider range of media coverage. Despite the critics of the Commission, I firmly believe that the Commission has a great story to tell and as the Executive Director I need to be out there on behalf of the Commission letting people know about progress and current issues at the Commission. At the community level we plan to hold Commission open days and to enhance our community outreach. These actions will send an important message to the local community and the local media that we value being part of Pohnpei and we want to involve them more in the work we do, because Pohnpei is also our home. I believe that good communication is critical for any organization, so we at the Secretariat are starting to build a framework that will ensure we communicate in the best way possible with external groups and with each other.

In my first few months in office, I have been out and about meeting representatives of member countries and Commission observers, representative of NGO and fishing industries in non-Commission settings. I am a strong advocate that Commission work does not necessarily have to wait for a Commission meeting or a Commission sanctioned event for it to be transacted. I firmly believe that the kind of conversations that take place at the Scientific Committee or the annual Commission session should start well in advance of those meetings. I believe the sooner those conversations start, on whatever issues, the higher the chances of the Commission arriving at some meaningful decision on those issues. And I see it as my role to facilitate, support and provide a conducive environment for members to dialogue informally and frankly away from the constraints of the formalities of Commission meeting processes.

I am glad to observe here that there are ongoing non-Commission processes that have taken onboard the responsibility to continue the dialogue / conversation on critical management issues that remain unresolved at the Apia Commission meeting last year. An example of this is the work that is being done by the series of workshop on bigeye management options. The Secretariat, with the support of the Commission Chair, has supported that process on the condition that it is inclusive and transparent, and ultimately its outcomes will be brought back to the Commission.

Chairman, I am tempted to go on but I am mindful of your extensive agenda. So I should close here. As a non-science person, I have always observed the work of the Scientific Committee from a distance. But in the last month or so I have immersed myself in a mountain of scientific briefing and material and persevering long hours of listening to SungKown. But I am grateful for the experience and to SK and Tony.

Chairman in closing, I wish you and the Committee members most successful deliberations. I and the rest of my staff and members of our science service provider stand ready to support your work over the next two weeks.

Thank you.

**The Commission for the Conservation and Management of
Highly Migratory Fish Stocks in the Western and Central Pacific Ocean**

**Scientific Committee
Eleventh Regular Session**

Pohnpei, Federated States of Micronesia
5–13 August 2015

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**The Commission for the Conservation and Management of
Highly Migratory Fish Stocks in the Western and Central Pacific Ocean**

**Scientific Committee
Eleventh Regular Session**

Pohnpei, Federated States of Micronesia
5–13 August 2015

AGENDA

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- 1.1 Welcome address**
- 1.2 Meeting arrangements**
- 1.3 Issues arising from the Commission**
- 1.4 Adoption of agenda**
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- 1.6 Intersessional activities of the Scientific Committee**

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- 2.1 Overview of Western and Central Pacific Ocean (WCPO) fisheries**
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- 3.1 Data gaps**
 - 3.1.1 Data gaps of the Commission
 - 3.1.2 Species composition of purse-seine catches
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 - 3.2.2 Submission of ROP-defined observer data
 - 3.2.3 ROP longline coverage
 - 3.2.4 Marine pollution data collected by observers
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 - a. Progress report on Project 35 (Refinement of bigeye parameters Pacific-wide)
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- 4.1.4 South Pacific albacore tuna (*Thunnus alalunga*)**
 - 4.1.4.1 Review of research and information
 - a. Review of South Pacific albacore tuna stock assessment
 - 4.1.4.2 Provision of scientific information
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 - b. Management advice and implications
- 4.2 Northern stocks**
- 4.2.1 North Pacific albacore (*Thunnus alalunga*)**
 - 4.2.1.1 Review of research and information
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- 4.2.2 Pacific bluefin tuna (*Thunnus orientalis*)**
 - 4.2.2.1 Review of research and information
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 - a. Status and trends
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- 4.2.3 North Pacific swordfish (*Xiphias gladius*)**
 - 4.2.3.1 Review of research and information
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- 4.3 WCPO sharks**
- 4.3.0 Stock status indicators for key shark species**
- 4.3.1 Oceanic whitetip shark (*Carcharhinus longimanus*)**
 - 4.3.1.1 Review of research and information
 - 4.3.1.2 Provision of scientific information
 - a. Status and trends

- b. Management advice and implications
- 4.3.2 Silky shark (*Carcharhinus falciformis*)**
 - 4.3.2.1 Review of research and information
 - 4.3.2.2 Provision of scientific information
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 - b. Management advice and implications
- 4.3.3 South Pacific blue shark (*Prionace glauca*)**
 - 4.3.3.1 Review of research and information
 - 4.3.3.2 Provision of scientific information
 - a. Status and trends
 - b. Management advice and implications
- 4.3.4 North Pacific blue shark (*Prionace glauca*)**
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 - a. Evaluation of North Pacific blue shark as a northern stock
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 - a. Status and trends
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 - 4.3.5.1 **North Pacific shortfin mako (*Isurus oxyrinchus*)**
- 4.4 WCPO billfishes**
 - 4.4.1 South Pacific swordfish (*Xiphias gladius*)**
 - 4.4.1.1 Review of research and information
 - 4.4.1.2 Provision of scientific information
 - a. Status and trends
 - b. Management advice and implications
 - 4.4.2 Southwest Pacific striped marlin (*Kajikia audax*)**
 - 4.4.2.1 Review of research and information
 - 4.4.2.2 Provision of scientific information
 - a. Status and trends
 - b. Management advice and implications
 - 4.4.3 North Pacific striped marlin (*Kajikia audax*)**
 - 4.4.3.1 Review of research and information
 - 4.4.3.2 Provision of scientific information
 - a. Status and trends
 - b. Management advice and implications
 - 4.4.4 Pacific blue marlin (*Makaira nigricans*)**
 - 4.4.4.1 Review of research and information
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- 5.1 Limit reference points for the WCPFC**
 - 5.1.1 Implications of alternative levels of acceptable risk
 - 5.1.2 Identifying appropriate LRPs for elasmobranchs within the WCPFC
- 5.2 Development of target reference points (TRPs) and harvest control rules (HCRs) for the WCPFC**
 - 5.2.1 Development of WCPFC Harvest Strategies
 - 5.2.2 Skipjack target reference point

5.2.3 Albacore tuna target reference point

5.3 Implementation of CMM 2014-01

5.3.1 Evaluation of impacts of the purse-seine fishery

5.3.2 WCPFC FAD Management Options Intersessional Working Group

5.3.3 Yellowfin tuna catch limit

5.3.4 Other issues related to CMM 2014-01

AGENDA ITEM 6 ECOSYSTEM AND BYCATCH MITIGATION THEME

6.1 Ecosystem effects of fishing

6.1.1 Review of research and information

6.1.1.1 SEAPODYM

6.2 Sharks

6.2.1 Review of potential mitigation measures to reduce fishing-related mortality on silky and oceanic whitetip sharks

6.2.2 Review of conservation and management measures for sharks

a. CMM 2010-07 (CMM for Sharks)

b. CMM 2011-04 (CMM for oceanic whitetip shark)

c. CMM 2012-04 (CMM for protection of whale sharks from purse seine fishing operations)

d. CMM 2013-08 (CMM for silky sharks)

e. CMM 2014-05 (CMM for sharks)

f. Safe release guidelines

6.2.3 Shark Research Plan

6.3 Seabirds

6.4 Sea turtles

6.5 Bycatch mitigation for other species

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7.1 West Pacific East Asia Project

7.2 Pacific Tuna Tagging Project

7.3 GEF ABNJ Shark and BMIS project

AGENDA ITEM 8 COOPERATION WITH OTHER ORGANISATIONS

AGENDA ITEM 9 SPECIAL REQUIREMENTS OF DEVELOPING STATES AND PARTICIPATING TERRITORIES

AGENDA ITEM 10 FUTURE WORK PROGRAM AND BUDGET

10.1 Review of the Scientific Committee Work Programme

10.2 Development of the 2016 Work Programme and budget, and projection of 2017-2018 provisional Work Programme and indicative budget

AGENDA ITEM 11 ADMINISTRATIVE MATTERS

11.1 Future operation of the Scientific Committee

11.2 Election of Officers of the Scientific Committee

11.3 Next meeting

AGENDA ITEM 12 OTHER MATTERS

**AGENDA ITEM 13 ADOPTION OF THE SUMMARY REPORT OF THE ELEVENTH
REGULAR SESSION OF THE SCIENTIFIC COMMITTEE**

AGENDA ITEM 14 CLOSE OF MEETING

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WCPFC TISSUE BANK ACCESS PROTOCOLS

Background

1. The WCPFC has established a tissue bank of biological samples collected from pelagic species in the WCPO for the purposes of life history studies to advance fisheries management in the WCPO. The bank contains otoliths, spines, gonads, liver, muscle, stomach and blood from tuna, billfish and other pelagic species.
2. The purpose of this document is to specify the rules for scientific researchers to access these samples for the purpose of scientific study.

Rules and Procedures

3. Applications to access samples from the tissue bank must include:
 - a. Applications should be addressed to the Executive Director, WCPFC Secretariat
 - b. Project Name and Objectives
 - c. WCPFC Scientific Committee Project Number or recommendation if these exist
 - d. Specification of the samples to be withdrawn from the bank (number, type, species, any location/sex/date limits, etc.)
 - e. The methods for processing and analyses
 - f. Past contributions to the tissue bank by researcher or CCM
 - g. Intended collaborations
 - h. Timelines and intended outcomes and reporting

Additional information may be requested from the researcher by the WCPFC Research Sub-Committee to assist with application approval.

4. It will be a requirement of the researcher or CCM to provide an annual report to the Executive Director, WCPFC Secretariat. This must include documentation of raw and analysed results, however this does not imply a requirement for this data to be publicly available. When data can be made publicly available a report to WCPFC's Scientific Committee is required on progress of the study. The reports must follow WCPFC standards and must include method description and meta data. All data will become publicly available 5 years after WCPFC Secretariat determines the project analyses are complete or at WCPFC's discretion.

5. The WCPFC Research Sub-Committee will give consideration to the sequencing of analyses such that those which involve the samples being destroyed or modified are undertaken last when approving

applications. For example otolith weight and morphometric analyses may be prioritised before sectioning, which may be prioritised before chemical analyses.

6. Where the analyses involves the preparation of secondary products such as sectioned otoliths and histological slides these products are to be provided to the WCPFC at the completion of the study for future comparative reference and study.

7. Researchers or CCM's must acknowledge the WCPFC tissue bank in any publication of results from the study undertaken.

8. The selection and approval of projects will be determined by the WCPFC Research Sub-Committee. This committee may meet within the margins of WCPFC meetings or electronically. This sub-committee will prepare and submit a summary of their decision on each project proposal to the WCPFC Executive Director for final approval. The project approval process will consider, inter alia, the following:

- a. Preferential access to the tissue bank will be given to researchers or WCPFC CCM's who have contributed samples to the collection.
- b. Preferential access to the tissue bank will be given to collaborative projects with priority to those where the collaboration includes several WCPFC CCMs.
- c. Priority will be given to request that are part of the WCPFC Scientific Committee's research and work plan and those projects whose spatial scale is regional in preference to local.
- d. Past participation with those who acknowledge the source of the samples and provide interim products as required above given priority.

9. Once approval for access to samples from the tissue bank has been provided by the WCPFC Research Sub-Committee the researcher/CCM will enter into a formal agreement with the Secretariat of the WCPFC that will specify access requirements, reporting and any data confidentiality that the WCPFC may require.

10. A reasonable fee may be charged for the cost associated with preparing the samples for shipping and cost recovery for freight or transport agent fees and freight (loss and damage) insurance. An additional fee will be charged to applications from organizations who are not associated with WCPFC CCMs. This fee will be based on the full cost recovery of the collection of samples requested (estimated at USD10 per sample in 2015). The total amount of this second fee that is collected in each year will be used to offset WCPFC's costs of running the tissue bank in the following year.

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**[DRAFT] AGREEMENT FOR PROVISION OF OPERATIONAL-LEVEL DATA TO SPC TO
SUPPORT WCPFC STOCK ASSESSMENTS**

Representatives from China, Japan, Korea, Chinese Taipei, United States and the Secretariat of the Pacific Community (SPC) (hereafter referred to as the Parties) have agreed that operational-level longline data will be provided to an integrated database maintained by SPC for the purpose of conducting collaborative research to support relevant WCPFC-mandated stock assessments. The following procedures and conditions shall be followed in the implementation of this work:

1. This agreement comes into effect on 1 January 2016 and shall remain in effect thereafter. Should any Party wish to withdraw from the agreement, they shall notify all other Parties in writing.
2. The format of the data to be provided shall include:
 - a. Set-by-set data for individual vessels, with vessel identity coded consistently through the time series;
 - b. Effort in number of hooks;
 - c. Number of hooks between floats;
 - d. Catch in number of bigeye, yellowfin, albacore and swordfish;
 - e. Date of set;
 - f. Start time of set in local time;
 - g. Position specified to the nearest 1 degree square.
3. The scope of the data will be from 1952 to the present, and for the entire Pacific Ocean.
4. Data for the 2014 calendar year shall be provided as soon as possible after this agreement comes into effect. Thereafter, updates shall be provided annually by 30 April, and shall include (i) new data for the most recent calendar year and (ii) any revisions of data from earlier years resulting from new data becoming available, or from the new availability of certain data fields that were not previously available in earlier data provisions.
5. Data files shall be transmitted to SPC using secure File Transfer Protocol (FTP), or as otherwise agreed between SPC and individual Parties.
6. If operational longline data in a form consistent with the specifications in point 2 above are already provided to WCPFC by any Party, separate provision to SPC is not necessary.

7. SPC shall maintain the data in a secure fashion. The security arrangements include the following:
 - a. The data shall be held in a secure server location at SPC headquarters in Noumea, New Caledonia that is accessible via login credentials only to the SPC Oceanic Fisheries Programme staff who are directly involved in the management and/or analysis of the data.
 - b. A list of staff members with access rights to the data shall be provided to the Parties upon request. It is noted that all SPC staff have strict contractual obligations in their terms of employment to maintain the confidentiality of information. Severe disciplinary action is taken for any breaches of these contractual obligations.
 - c. A backup copy of the data will be made to another identically-restricted server location. The purpose of this backup copy is limited to allow the data to be restored in the event of data loss or corruption (e.g. through computer hardware failure).
 - d. Apart from this single backup, the data shall not be copied or backed up to any other server location or to any portable file storage media.
 - e. The data shall not be disseminated or uploaded to any internet or email address.
8. The usage of the data is limited to collaborative research to support relevant WCPFC stock assessments being conducted by SPC, as agreed by the Scientific Committee and the Commission. Collaborative research may include the estimation of indices of abundance, the estimation of spatial weighting factors relevant to particular stock assessments, the estimation of spatial dynamics relevant to the understanding of spatial exploitation patterns, or other research topics that may be agreed by the Parties. In addition, the identification of missing data, and where possible the improvement of data, shall be an important aspect of the collaboration. Data reconciliation shall include the provision of data for the fleets of Parties that are held by SPC where those data are not currently available to the Parties.
9. Collaboration will be fostered by regular workshops to review the results of analyses, data improvement activities and plan additional work. These workshops may be stand-alone, or held in conjunction with SPC's regular Preparatory Assessment Workshops. Participation in such workshops shall be open to all Parties and at the cost of individual Parties.
10. Any report or presentation that documents the results of this collaborative work shall be provided to the Fishery Agency of each Party prior to release, allowing reasonable time for comments.

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**GUIDELINES FOR THE SAFE RELEASE OF ENCIRCLED ANIMALS,
INCLUDING WHALE SHARKS**

General principles

- Safety of the crew is a paramount consideration.
- When releasing encircled whale sharks, the stress the animal receives should be minimized to the extent possible.
- The following possible release methods should be used as general guidelines.
- The effectiveness of the following possible release methods has not been fully evaluated. Further scientific research is necessary in order to investigate survival after the release by various release methods. Therefore, CCMs are encouraged to conduct analysis on methods used by their purse seine vessels. In addition, several agencies have initiated a program of satellite tag deployments by experienced observers to assess survival of encircled animals associated with various release techniques.
- The appropriate release method should be chosen in a flexible manner depending on the circumstances and condition of the particular purse seine set, e.g. the size and orientation of the encircled animal, amount of fish in the purse seine set, weather conditions and brailing operation style.

As noted in the TCC9 Summary Report, Para 318, the PNA requires that when a whale shark is encountered in a purse seine net in PNA waters the net roll must be immediately stopped and the whale shark released.

In the WCPFC Convention Area the following actions are not recommended when releasing encircled whale sharks (see WCPFC-SC11-2015/EB-WP-03 Rev.1).

- Vertically lifting sharks by tail
- Pulling sharks by a loop hooked around its gill or holes bored into a fin
- Gaffing
- Leaving attached any towing ropes
- Brailing whale sharks larger than 2 meters
- Brailing whale sharks onto the deck

Noting that there is not sufficient scientific evidence to adopt the following possible safe release methods, these methods should be considered for possible use but are not adopted as part of these guidelines until such scientific evidence becomes available and is reviewed and agreed by the Scientific Committee.

Possible safe release methods ~~need to be evaluated by scientific evidences~~



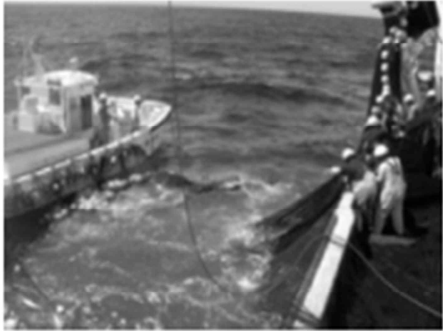

1. Cutting net
 - Experience indicates that cutting the net vertically (about 3-5 meters) is quick and efficient.
 - Caveat: Possible uncontrolled ripping of the net if under load from catch or currents, loss of entire catches and time to repair the net.

2. Passive removal or letting sharks go over corkline (ref. Japan proposal in WCPFC8-2011-DP-17, see Appendix 1)
 - Would be easy particularly for vessels sacking up with a skiff.
 - The manipulation of cork line is possible only if the vessel concentrates and loads catch using a brailing boom.
 - Very situation dependent and based on size and orientation of the animal.
 - Caveat: If it takes a long time to roll a shark out of the net which may expose the sharks to excessive stress, Some loss of catch is possible during the operation.

3. Horizontally pulling sharks by the tail or a Sling Method (see Appendix 2)
 - Encircling the caudal peduncle of the shark with a smooth sling (non-abrasive material) that is attached to a heavy line and towboat. A second line is run from the skiff through the sling and back to the skiff. The skiff slowly moves the shark's tail/body next to the cork line and is gently led over the cork line. Lowering corks from brailing boom or releasing some corks from attachment to net skiff. Slowly towing shark horizontally by the tail until clear of corks when rope is released and sling falls away.
 - Caveat: This procedure could be traumatic although likely less traumatic for small and medium sharks (5-6 m maximum). Probably inappropriate for fish >6 m.

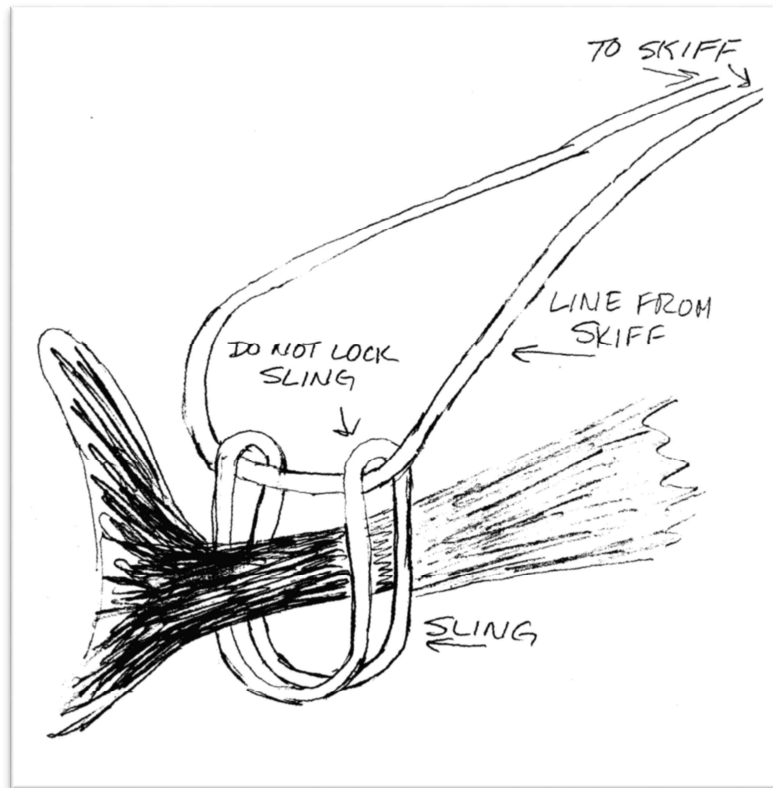
Note, animals should be kept in water at all times when using release methods 1-3.

[Appendix 1] Proposed by Japan at SC7 (Guidelines for safe and live release of encircled non-target animals during purse-seine fishing operations)

<p>a). lead the head to approach nearest cork rope by rolling up the net under the ventral and tail side.</p>	
<p>b). Release cork rope from their head side.</p> <p>c). Roll up the net of the tail side to run the head on the cork line</p> <p>d). Control the net carefully to keep whale shark calm down because if they wriggle, their body could be entangled in the net</p>	 
<p>e). Wait for escaping from the net themselves (whale shark swim away from the net)</p>	

[Appendix 2]

Design and deployment of a release mechanism for mid- to small-sized whale sharks



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**DEVELOPMENT OF NEW GUIDELINES FOR THE SURVIVAL OF SHARKS¹ (OTHER THAN
WHALE SHARKS) TO BE RELEASED FROM LONGLINE AND PURSE SEINE GEAR**

SC10 (2014) developed a summary table for possible harm minimizing release techniques to be avoided (Table 1). There was no updated information provided at SC11. Informal small group participants are requested to investigate reliable methods for releasing sharks during longline and purse seine operations, and to report on any information at SC12.

Table 1. Possible harm minimizing techniques and release techniques to be avoided.

Harm minimizing techniques:	Release techniques to be avoided:
1. Minimize time spent handling sharks and rays to prevent stress	1. Do not attempt to dislodge a deeply hooked hook by de-hooking or pulling on the branch line
2. Have a lifting device, bolt cutters, dehooker and line-cutter readily available	2. Don't wrap your fingers, hands or arms in the line when bringing a shark or ray to the boat
3. Try lightly flicking the branchline to dislodge the hook	3. Don't lift sharks using the branchline, especially if hooked
4. Try to remove the hook using a de-hooker while the shark is still in the water (if sluggish)	4. Don't use a gaff or other pointed object other than in the underside of the jaw
5. Use a long-handled line cutter to cut the line as close to the fish as safely possible; remove as much line as possible	5. Don't lift sharks by the head or tail when out of the water, gravity can damage internal organs and the spine;
6. Bring small sharks onboard using a dipnet; if gaffing is necessary only gaff in the mouth (underside of jaw)	6. Don't lift or draft them by inserting your fingers into its gills
7. Immobilize the shark's mouth with a small object; insert a hose with flowing water if the shark is on deck more than 5 min; place a dark, wet cloth over its eyes	7. Don't lift or drag a manta ray only by its cephalic lobes or tail or gill slits
8. If the hook is visible use a bolt cutter to remove the barb, then remove the hook	8. Don't tie or insert a rope or wire around them to lift or drag them
9. Release the shark with both hands (or use two people: one at pectoral fins, one at caudal fin); carry small rays by the spiracles, and large rays by the wings--avoid the tail in all rays	9. Don't restrain them for a long time alongside the vessel (some species can suffocate if they can't freely move in the water).

¹ The term shark refers to sharks, skates and rays

10. When releasing the shark slow or stop the vessel and gently drop head first, do not throw the shark (if releasing through a belt or chute, ensure the flow of water is strong enough for the shark to reach the sea)	10. Don't use a 'lazy line' and tow the shark or ray astern
11. Very large sharks and rays can be directly released from a purse seine brailer	11. Don't put a lot of pressure on their body – don't push or squeeze when carrying and don't throw, kick or hit
12. Remove entangled animals before they reach the net block or de-hooking machines; use clippers to cut the net if necessary.	12. Don't put them on deck where there is direct sun exposure
	13. Don't bring large sharks or rays on deck.
	14. Don't bring stingrays on deck
	15. Don't put them on deck where they could physically contact hard objects, including hard parts of other fish.
	16. Don't keep them out of the water too long.
	17. Don't de-hook through forced pulling as this could dislocate the jaw

References

1. Methods for longline fishers to safely release unwanted sharks and rays. (Gilman, E., 2014; http://fishing-living.org/wp-content/uploads/2014/04/Elasmobranch_LL_Handle-release_english1.pdf)
2. Good Practices to Reduce the Mortality of Sharks and Rays Caught Incidentally by Tropical Tuna Purse Seiners (Poisson et al. WCPFC-SC8-2012/ EB-IP-12; <http://www.wcpfc.int/system/files/EB-IP-12-Good-practices-reduce-mortality-sharks-and-rays-caught-incidentally-tropical-tuna-purse-sei.pdf> and Poisson, F., Séret, B., Vernet, A. L., Goujon, M., & Dagorn, L. (2014). Collaborative research: Development of a manual on elasmobranch handling and release best practices in tropical tuna purse-seine fisheries. *Marine Policy*, 44, 312-320.
3. Shark and Ray Handling Practices: A guide for commercial fishers in southern Australia (draft document received from Australia, not for circulation)

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SHARK RESEARCH PLAN AND STOCK ASSESSMENT SCHEDULE

1. Principles for determining stock assessment timing and scheduling

An informal small group (ISG) proposed the following set of principles for determining the schedule of stock assessments:

- Responsive to the requirements and expectations of the Commission.
- Feasible and practical from a technical and data availability perspective (for the estimation of management quantities).
- Gives consideration to current status, trends in indicators of status or other indicators of vulnerability.
- Efficient in terms of time and resources as well as from a technical perspective (synergies where possible).
- Within the expected budget allocation for assessments and the capacity of the science service provider (or other agency).

2. Stock Assessment Schedule for Tuna, Billfish and Sharks

With reference to the above principles, the ISG proposed the schedule of stock assessment contained in Table 1. The ISG proposed that the schedule should again be reviewed in 2017 with consideration of the years 2018 onwards.

3. Shark Research Plan – overall

The ISG considered the research plan for shark species of special interest (“key shark species”) to the Western and Central Pacific Fisheries Commission (the “shark research plan”). This plan is intended to be regional in scope and include all research deemed necessary to support management of sharks as WCPFC fulfils its obligations under its convention. The ISG did not propose any additions or amendments to the elements of the overall plan.

4. Shark Research Plan – priorities for 2016

The ISG considered which elements of the shark research plan to progress in 2016. The ISG proposal is contained in Table 2 and it is recommended that the draft shark research plan (SC11-EB-WP-01) be revised to reflect this and re-issued.

Table 1: SC11 ISG1 Proposed Assessment Schedule.

Species	Stock	Last assessment	2013	2014	2015	2016	2017	2018	2019	2020	Rationale/Comments**
Bigeye tuna	WCPO	2014		X			X			X	BET, YFT and SKJ will all use data to 2015 for next assessments (2016 for SKJ, 2017 for BET & YFT) (common baseline for management statistics). Operational data required (may become available from start of 2016). BET CPUE indices presented at SC12 (2016) Maintain 3 year schedule from 2017 onwards.
Skipjack tuna	WCPO	2014		X		X			X		SKJ tagging ceased in 2013 and the impact of tagging data in the assessment will become less current with delay. Separate SKJ to manage SPC workload. Maintain 3 year schedule from 2016 onwards.
Yellowfin tuna	WCPO	2014		X			X			X	Maintain 3 year schedule from 2017 onwards. Operational data required (may become available from start of 2016). YFT CPUE indices presented at SC12 (2016).
Albacore	South Pacific	2012			X			X			Maintain 3 year schedule from 2015 onwards.
Striped marlin	Southwest Pacific	2012						X			
	Northwest Pacific	2012			X			?			Pending ISC confirmation.
Swordfish	Southwest Pacific	2013	X				X				Efficiencies and synergies with SP blue shark. Growth/maturity review complete Jan 2016. Operational data may become available from start of 2016. SWO CPUE indices presented at SC12 (2016).
Silky shark	WCPO	2013	X					?			
	Pacific-wide	-									
Oceanic whitetip	WCPO	2012							?		
Blue shark	Southwest Pacific	-				X					Efficiencies and synergies with SP swordfish and ISC north Pacific blue shark. All shark assessments have high reliance on observer data for catch and CPUE trends – need full submission of observer data from fishing nations.
	Northwest Pacific	2014		X			X				ISC confirmed 2017
Mako shark (shortfin)	Southwest Pacific	-						?			Synergy with north Pacific Mako
	Northwest Pacific	-						X			ISC confirmed 2018, if data supports
Porbeagle	Southern Ocean	-			X*						

Thresher	Pacific-wide					X*					Prioritised after consideration of trends and vulnerability. Propose indicators analysis with the potential to proceed to full assessment depending on data and outcomes of indicators. ABNJ support.
Hammerhead	WCPO	-	No assessment scheduled but other work proposed in Table 6								
	Pacific-wide	-	No assessment scheduled								
Whaleshark	WCPO	-	No assessment scheduled but other work proposed in Table 6								
	Pacific-wide	-	No assessment scheduled								

* co-ordinated through the ABNJ

** SC8 (2012) also considered the schedule of stock assessments: “467. SC8 discussed the regularity of stock assessments from both biological and funding perspectives. SC8 considered that the stock assessments for the major tuna species should be conducted every three years, swordfish should be conducted every four years (i.e. next assessed in 2017), and other billfish species should be conducted every five years. An ongoing programme of shark assessments should be implemented once a decision is taken regarding whether to extend the Shark Research Programme.”

Table 2: Projects identified by SC11 ISG1 to be carried out in 2016.

Project title	Start date	Completion date	Organisation	WCPFC Budget (US\$)	Other Sources Budget (US\$)	ISG1 Notes
Blue shark stock assessment in the south Pacific	Jan 2016	August 2016	SPC-OFP	‡		SPC core shark funding.
Thresher shark indicators/assessment Pacific-wide.	Jan 2016	December 2016	ABNJ-Sharks		?	
Length-weight conversion factor review	Jan 2016	August 2016		10,000		
Develop proposed limit reference points for elasmobranchs [‡]	Jan 2016	December 2016		25,000		Budget amended to \$25k.
Monte Carlo analysis of mitigation approaches: extension of longline analysis and develop model for purse seine	Jan 2016	August 2016	SPC-OFP	25,000		
Maternal length and litter size in shortfin mako sharks	Jan 2016	December 2016	? (ISC)		30,000 (?)	May be undertaken by ISC. Required for stock assessment (Table 6).
Post-release survival of silky and oceanic whitetip sharks from longline sets	Jan 2016	December 2017	SPC-OFP + collaborators		250,000+	ABNJ sharks \$ identified. Further external \$ and/or opportunities for collaboration exist.
Post release mortality of sharks and rays from longline <u>and</u> purse seine vessels (EU)	Jan 2016	December 2017	?	44,000 (+ 44,000 in 2017)	440,000	EU funding to be confirmed. Involves 20% matching from Commission.
Experimental assessment of hook type and branchline leader material on shark catch	Jan 2016	December 2017	SPC-OFP + collaborators		150,000+	External \$ and/or opportunities for collaboration exist.
Observer form re-development to collect data on handling and release of sharks	Jan 2016	December 2016	SPC-OFP+FFA	‡		SPC core shark funding.
Review data for non-key sharks elasmobranchs	Jan 2016	December 2016	SPC-OFP	‡		SPC core shark funding
TOTAL				104,000		

‡ SPC core shark funding.

‡ Note the scope of this work is to be determined by the MI theme.

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**PROPOSED AMENDMENTS TO THE WCPFC MINIMUM DATA STANDARDS AND FIELDS
FOR BYCATCH DATA COLLECTED BY LONGLINE OBSERVER PROGRAMMES**

Table 1. Proposed amendments to the WCPFC Minimum Data Standards and Fields for bycatch data collected by longline observer programmes.

Suggestion if SC add priority to the research items of minimum standard. It will be useful for the observer training.

Notes:

1. For fields requiring recording at the set level, observer programmes can choose between requiring their observers to record gear fields for each set or instead allow observers to record gear information as a default/basic practice for the first set, and then record any deviations from that default/basic practice. .
2. Observer programmes should ensure that there is a clear distinction between situations in which gear are not used and situations in which fields are left blank.
3. Observer programmes should include the following information in coded fields rather than text-based comment fields as much as possible.

Field		Current WCPFC Minimum Data Standards and Fields Text	Proposed WCPFC Minimum Data Standards and Fields Text (new text in bold)
1	Hook Type	Hook type: What type of hook or hooks is used? Examples are J hooks-Circle hooks-offset circle etc, the vessel usually uses one type, but may use a couple of types. Hook size: Size of the hooks used, if not sure ask the Bosun.	Hook type: Record at the set level what type of hook or hooks is used? Examples are J hooks-Circle hooks-offset circle etc, the vessel usually uses one type, but may use a couple of types. Hook size: Size of the hooks used, if not sure ask the Bosun or refer to a hook catalogue.
2	Bait species	Name the bait species used Pilchards, Sardine, Squid, etc.	At the set level , name the bait species used Pilchards, Sardine, Squid, artificial bait , etc. Record the estimated weight of each; e.g. using package weight of boxed set.
3	Leader (trace) material	Indicate Y or N -if the vessel uses wire traces on all their lines or only on certain lines i.e. lines close to the buoys etc if no traces are used at all then record N.	indicate Y or N -if the vessel uses wire traces on all their lines (Y) or if no wire traces are used then record N. If only used on certain lines i.e. lines close to the buoys etc. record which lines. . If the proportion of leaders that are wire varies within a trip, record the average based on a sample of ten baskets in different sets.
4	Branchline Weighting	Do the branch lines have weighted attachments usually lead on the hook, or near the end of the leader of the branch lines? Record the mass of the weight attached to the branch line.	do the branch lines have weighted attachments usually lead on the hook, or near the end of the leader of the branch lines? Record the mass of the weight attached to the branch line. If more than one type of weighting is used during a trip, describe each type and indicate the proportion based on a sample of ten baskets in different sets.
5	Shark Lines	NA	At the set level, record the number of shark lines (branch lines running directly off the longline floats or drop lines) observed.
6	Number of Lightsticks	Does the vessel use light sticks on its line, record the number it may use, and where along the mainline they attach them to the branch lines.	At the set level indicate whether the vessel uses light sticks on its line, record the number it may use, and where along the mainline they attach them to the branch lines.

Field	Current WCPFC Minimum Data Standards and Fields Text	Proposed WCPFC Minimum Data Standards and Fields Text (new text in bold)
7 Seabird mitigation measures	<p><i>Tori pole</i> Indicate Y or No - whether the vessel uses a Tori pole when setting, this is mandatory in some areas. A Tori pole can have a number of different designs but is basically a pole with lines ribbons and other attachments to scare birds away from the branch line baits.</p> <p><i>Blue dyed bait</i> Bait that has been dyed especially to look blue. This has shown to reduce bird strikes in some trials.</p> <p><i>Underwater setting shoot</i> Some vessels may have special shutes or arms that protect the bait and take the line down to a depth before releasing the branch-line this makes it harder for birds to attack the bait.</p> <p><i>Disposal method for offal management</i> Most vessels discard their offal from processed fish by different methods, describe what the vessel does- example the vessel may just throw it over the side as they process the fish, they may accumulate offal in baskets and throw it over in one go, they may have machines that blends the offal and it is sprayed over the side.</p>	<p><i>Tori lines</i> Indicate Yes or No at the set level - whether the vessel uses a single or double Tori lines when setting, this is mandatory in some areas. A Tori line can have a number of different designs but is basically a pole with a line with ribbons and other attachments to scare birds away from the branch line baits.</p> <p><i>Blue dyed bait</i> Indicate Yes or No at the set level– whether the vessel used bait that has been dyed especially to look blue and whether this bait was thawed before dyeing.</p> <p><i>Underwater or side setting</i> Indicate Yes or No at the set level– whether the vessel used i) special chutes or arms that protect the bait and take the line down to a depth before releasing the branch-line, or ii) side-setting.</p> <p><i>Disposal method for offal management</i> Describe what the vessel does at the set level- for example the vessel may just throw it over the side as they process the fish, they may accumulate offal in baskets and throw it over in one go, they may have machines that blend the offal and it is sprayed over the side. Bis- Record if strategic offal disposal (dumping offal to attract seabirds away from hooks, or not dumping offal) is used.</p>
8 Hooking Location and Entanglement	NA	<p>For the each observed silky and oceanic white tip shark, sea turtle, seabird or marine mammal , add three new codes to the existing ‘condition when caught’ fields: ‘hooked in mouth’, hooked deeply (throat/stomach)’, and for ‘condition when released’ fields: ‘hook and/or line removed’.</p>

Field		Current WCPFC Minimum Data Standards and Fields Text	Proposed WCPFC Minimum Data Standards and Fields Text (new text in bold)
9	Branchline characteristics	NA	Notes on rational for deletion - In this proposal, these data (hook type, bait type, leader material, line weighting, and light-stick) will be required to collect at SET LEVEL, not "LINE LEVEL". Thus there are some difficulty to estimate the branchline characteristics by "cross referencing".