

Western and Central Pacific Fisheries Commission  
**Ninth Regular Session of the Science Committee (SC9)**  
*Pohnpei, Federated States of Micronesia, 6–14 August 2013*

Greenpeace would like to thank the Western and Central Pacific Fisheries Commission (WCPFC) for the opportunity to participate as an observer in the Ninth Regular Session of the Science Committee (SC9).

The wide range of research papers being presented for review and discussion at the SC9 demonstrate the valuable work and high level of commitment that scientists have made in this region. Greenpeace is particularly grateful for the work of the Oceanic Fisheries Programme of the Secretariat of the Pacific Community (SPC-OFP) and the continuing effort made to produce good quality informative reports.

Unfortunately, many of the papers continue to highlight the fact that more attention must be paid to the requests by the SPC-OFP for the timely provision of more and better quality fisheries data for stock assessments, as agreed in the *Resolution on Best Available Science* (Resolution-2012-01<sup>1</sup>), and the urgent need for WCPFC to adopt precautionary ecosystem-based management reference points and harvest control rules for all key target and bycatch species.

Greenpeace especially looks forward to further detailed discussions and, in particular, hopes to see strong scientific recommendations on:

- Strong action that must be taken to ensure that conservation goals outlined in CMM-2008-01 and CMM 2012-01 will be met and further strengthened in a new tropical tuna CMM and bigeye recovery plan in the upcoming WCPFC meeting in December.
- The final complete set of limit reference points and the further development of target reference points.
- The urgent action required to conserve Pacific Bluefin tuna following the publication of the Pacific bluefin stock assessment report in 2012.
- Urgent precautionary advice for the conservation of silky, oceanic whitetip, and blue sharks.

## Current fisheries status and conservation measures

This year, there are no new assessments of the skipjack, yellowfin, bigeye or South Pacific albacore stocks, rather the SFP-OFP have continued to focus on reviewing the implementation and effectiveness of key management measures for tropical tuna; and improving and updating assessments of key billfish and sharks caught in the tuna or mixed fisheries. New tuna assessments are expected in 2014.

Although there have been no stock assessments it is clear from the range of fisheries indicators provided for 2012 that the situation for tuna in the Western and Central Pacific continues to decline in the face of expanding fisheries and poor management actions taken by the WCPFC to control this.<sup>2, 3</sup>

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<sup>1</sup> Resolution on the Best Available Science (Resolution 2012-01). <http://www.wcpfc.int/doc/Resolution-2012-01/Resolution-best-available-science>

<sup>2</sup> Harley S, Williams P (2013). A compendium of fisheries indicators for bigeye, skipjack, yellowfin, and south Pacific albacore tunas. Ninth Regular Session of the Science Committee, WCPFC, 6–14 August 2012, Pohnpei, Federated States of Micronesia. WCPFC-SC9-2013/SA-WP-06. <http://www.wcpfc.int/node/7487>

<sup>3</sup> Williams P, Terawasi P (2013). Overview of tuna fisheries in the western and central Pacific Ocean, including economic conditions. Ninth Regular Session of the Science Committee, WCPFC, 6–14 August 2012, Pohnpei, Federated States of Micronesia. WCPFC-SC9-2013/GN-WP-01. <http://www.wcpfc.int/node/7199>

Total reported tuna catches for 2012 (provisional estimate) were the highest on record at 2,613,528 t, eclipsing the previous record in 2009 by 12,000 t (2,603,346 t). In addition:

- Yellowfin catch (655,668 t) was the record – a massive 70,000 t over the previous 2008 record.
- Bigeye catch (161,679 t) was the highest since 2004 (183,355 t).
- Skipjack catch (1,664,309 t) was the 3<sup>rd</sup> highest.
- South Pacific albacore catch (87,012 t) was the 3<sup>rd</sup> highest.
- Total albacore catches (includes both north and south stocks) was at the 2<sup>nd</sup> highest (168,537 t).

This total catch record was partly driven by the record catches in the purse seine fleet of 1,816,503 t which was 30,000 t higher than the previous record in 2009. The number of purse seine vessels in the tropical tuna fisheries reached an all-time high (294 vessels) in 2012 and effort was the 2<sup>nd</sup> highest after 2011, both in terms of days fishing and number of sets.

### Assessing conservation action on bigeye and yellowfin tuna

The Conservation and Management Measure 2008-01 (CMM-2008-01) adopted in 2008 (with amendments in CMM-2012-01), aimed to reduce the high fishing mortality on bigeye tuna by 30% from the 2001–2004 average level and limit yellowfin tuna fishing mortality to its 2001–2004 level, in order to prevent stocks from falling below  $B_{MSY}$ . A combination of measures were agreed including longline catch limits, purse seine effort limits, a partial ban on purse seine fishing using fish aggregation devices (FADs), and a closure of two high-seas pockets to purse seine fishing. Most of these measures have various exemptions or alternatives built in and were to be phased in over the period 2009–2011.

Data presented at SC7 and SC8 have made it clear that the CMM-2008-01 was unlikely to achieve its goals.<sup>4</sup> The updates for SC9 show that this problem persists.<sup>5</sup> Key points raised are:

- Rather than a reduction in purse seine effort, there has been an increase since the introduction of CMM-2008-01. Effort peaked in 2011. VMS data shows that effort in 2012 was 8% higher than 2010 levels, and similar to 2011 effort levels. In addition, the effectiveness of the effort has increased. Furthermore, there appears to have been a change in how days are reported – i.e. days that were previously reported as ‘searching days’ (counted as fishing days) are now reported as ‘transit days’ (counted as non-fishing days).
- The FAD closures did result in moderately reduced yellowfin and skipjack catches and strongly reduced bigeye catches during the closure periods for 2009, 2010, and 2012. However skipjack catches dropped by half during the 2011 closure compared to previous months, and although they recovered to some extent upon reopening, relatively low catches continued that year. For all years the average size of fish in the catches were higher for all species during the closures because of the larger fish caught by unassociated sets. However, despite the closures, the total estimated number of FAD sets made in 2011 was a record high, mainly due to increased purse seine effort overall, with a slight decline in set numbers for 2012.
- The closure of two high seas pockets (HSPs) to purse seine fishing since 1 January 2010 has largely been respected, and until 2012 the effort has remained concentrated in EEZ, without transferring to eastern high seas. In 2012 there was a relatively small increase in the amount of effort in the HSPs, which has been attributed to transit activity and/or to effort by the Philippines catcher vessels permitted to fish in the HSP1 from October 2012 by the CMM 2011-01. Historically, the proportion of total effort occurring in HSPs has been about 10–20% each year,

<sup>4</sup> Hampton J, Harley S, Williams P (2012). Review of the implementation and effectiveness of key management measures for tropical tuna. Eighth Regular Session of the Science Committee, WCPFC. 7–15 August 2012, Busan, Republic of Korea. WCPFC-SC8-2012/MI-WP-06. <http://www.wcpfc.int/node/5395>

<sup>5</sup> Pilling G, Williams P, Hampton J, Harley S. Analysis of the implementation and effectiveness of key management measures for tropical tunas. Ninth Regular Session of the Science Committee, WCPFC, 6–14 August 2012, Pohnpei, Federated States of Micronesia. WCPFC-SC9-2013/MI-WP-01. <http://www.wcpfc.int/doc/MI-WP-01/Analysis-implementation-and-effectiveness-key-management-measures-tropical-tunas>

but this was just 0.9% in 2012 according to logsheet data. In 2012 there was an increase in purse seine effort in more easterly waters, consistent with the change to more ENSO-neutral conditions.

- Longline catches of bigeye have been reduced from 2001-2004 levels, although they have increased slightly in recent years. The total average bigeye longline catch for 2001-2004 was 83,923 t (including recent revisions). The catch was 66,441 t in 2010 (79%), 67,557 t in 2011 (81%) and 71,148 t in 2012. However, in the core area of the tropical longline fishery, catch reductions have occurred alongside a decline in catch-per-unit-effort (CPUE), and therefore recent catch declines may be, at least in part, due to a further decline in the adult bigeye abundance.
- Longline catches of yellowfin for 2010 and 2011 are close to the 2001–2004 average (75,712 t), but fell below this to 65,582 t in 2012.

**Given the continuing failure of the WCPFC to address the urgent issue of bigeye overfishing, especially with regard to associated purse seine catches of juvenile bigeye, the SC should recommend:**

- 1. A reduction in fishing mortality of bigeye by 50% from 2011 assessment levels to reflect both the uncertainty in assessments and the need to avoid  $B_{MSY}$  and  $F_{MSY}$  stock indicators with a high degree of probability.**
- 2. An extension to the current high seas pocket closures to include all types of fishing.**
- 3. Closure of the additional two high seas pockets further east to all fishing in order to strengthen the benefits derived from the existing high seas pockets closures and to prevent any transfer of high seas effort, in particular IUU fishing effort, from the closed pockets into new areas.**
- 4. A complete year-round ban on the use of FADs in association with purse seine fishing in order to help address overcapacity, reduce catches of juvenile bigeye and yellowfin tuna, and reduce bycatch of oceanic whitetip and silky sharks.**

## **Pacific bluefin tuna**

This year SC9 will have the opportunity to review the 2012 Pacific bluefin tuna assessment<sup>6</sup> presented by the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), and to provide strong scientific advice on appropriate reference points and a co-ordinated Pacific-wide recovery plan for the next Northern Committee meeting in September.

The report suggests a catastrophic depletion of Pacific bluefin down to 4% of the unfished biomass, with continued overfishing of all age-classes including an extremely high mortality rate for juveniles of 90%.

The Inter-American tropical Tuna Commission (IATTC) has adopted a catch limit for the eastern Pacific; however, there have been no limits set by the WCPFC for the western Pacific, where the vast majority of catches are taken.

**Given the dire state of the Pacific bluefin tuna population, the SC should recommend:**

- 1. A moratorium on all directed Pacific bluefin tuna fishing until such time that a management plan is agreed and implemented, and the stock has shown conclusive evidence of recovery to levels above an agreed biomass limit reference point.**
- 2. Appropriate limit, recovery and target reference points and a co-ordinated Pacific-wide recovery plan.**

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<sup>6</sup> ISC Pacific Bluefin Tuna Working Group (2013). Stock assessment of Pacific bluefin tuna in 2012 (Rev 1). Ninth Regular Session of the Science Committee, WCPFC, 6–14 August 2012, Pohnpei, Federated States of Micronesia. WCPFC-SC9-2013/SA-WP-10. <http://www.wcpfc.int/doc/SA-WP-10/Stock-assessment-Pacific-bluefin-tuna-2012>

## Sharks

A wide variety of papers on sharks will be presented at SC9, including further attempts at providing stock assessments for key species, as well as a range of bycatch and mitigation papers.

In general, the greatest impact on sharks in the Pacific is attributed to longline fisheries; however, for some species, like silky sharks, there are also significant impacts from the associated purse seine fishery. Although sharks are often described as 'bycatch' in longline fisheries, it is clear from the common use of practices that deliberately increase sharks catches, such as the use of wire tracers and bait that attracts sharks<sup>7</sup>, and crew payment structures that incentivize shark finning<sup>8</sup>, that more longline fisheries should be described as 'mixed fisheries' targeting tuna, sharks, and billfish.

The first assessments for oceanic whitetip sharks and silky sharks were presented at SC8. Despite having to work with poor data, the SPC showed that Pacific populations of these species are likely to be in a very poor state, with fishing rates well in excess of the  $F_{MSY}$  and with stocks declines well below  $SB_{MSY}$ <sup>9, 10</sup>.

An updated assessment for silky sharks will be presented at SC9, as requested by SC8. While data is still poor, all data show a decline in spawning and total biomass, and recruitment. It is highly likely that the stock is overfished, and the current fishing rate is about 4.5 times  $F_{MSY}$ . The greatest impact on the stock is attributed to bycatch from the longline fishery, but there are also significant impacts from the associated purse seine fishery which catches predominantly juveniles. The fishing mortality from the associated purse seine fishery is itself above  $F_{MSY}$ .

However, the situation for silky sharks in the Pacific is likely to be worse than indicated in these assessments. Recent research in the Indian Ocean showed that there are hidden impacts on silky sharks that have not been considered in stock assessments. Silky sharks are entangled and killed in the netting that typically hangs below FADs in numbers that may be as much as 5–10 times higher than the known bycatch.<sup>11</sup> It is highly likely that significant mortality from FAD entanglement also occurs in the Pacific Ocean.

Initial attempts to provide stock assessments for blue sharks this year have again highlighted extremely poor data available on shark catches. There was not enough data available to provide an adequate assessment for the South Pacific stock in time for SC9 and results from one assessment on North Pacific population shows such high uncertainty it is not possible to draw conclusions on stock status. However, several models do indicate that this heavily exploited North Pacific stock may be in an overfished state.<sup>12</sup>

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<sup>7</sup> Bromhead D, Rice J, Harley S (2013). Analyses of the potential influence of four gear factors (leader type, hook type, "shark" lines and bait type) on shark catch rates in WCPO tuna longline fisheries. Ninth Regular Session of the Science Committee, WCPFC, 6–14 August 2012, Pohnpei, Federated States of Micronesia. WCPFC-SC9-2013/EB-WP-02 rev 1. <http://www.wcpfc.int/node/7581>

<sup>8</sup> Turagabeci I (2013). Sharks are target fisheries. The Fiji Times Online. 24 June 2013. <http://www.fijitimes.com/story.aspx?id=237762>

<sup>9</sup> Rice J, Harley S (2012). Stock assessment of oceanic whitetip sharks in the western and central Pacific Ocean. Eighth Regular Session of the Science Committee, WCPFC, 7-15 August 2012, Busan, Republic of Korea. WCPFC-WCPFC-SC8-2012/SA-WP-06. <http://www.wcpfc.int/doc/SA-WP-06/Stock-Assessment-Oceanic-Whitetip-Sharks-Western-and-Central-Pacific-Ocean>

<sup>10</sup> Rice J, Harley S (2012). Stock assessment of silky sharks in the western and central Pacific Ocean. Eighth Regular Session of the Science Committee, WCPFC, 7-15 August 2012, Busan, Republic of Korea. WCPFC-SC8-2012/SA-WP-07. <http://www.wcpfc.int/doc/SA-WP-07/Stock-Assessment-Silky-Sharks-Western-and-Central-Pacific-Ocean>

<sup>11</sup> Filmlalter JD, Capello M, Deneubourg JL, Cowley PD, Dagorn L (2013). Looking behind the curtain: Quantifying massive shark mortality in fish aggregating devices. *Frontiers in Ecology and the Environment*; (electronic version). <http://dx.doi.org/10.1890/130045>

<sup>12</sup> Rice J, Harley S, Maunder M, Da-Silva AA (2013). Stock assessment of blue shark in the north Pacific Ocean using Stock Synthesis. Ninth Regular Session of the Science Committee, WCPFC, 6–14 August 2012, Pohnpei, Federated States of Micronesia. WCPFC-SC9-2013/SA-WP-02. <http://www.wcpfc.int/node/7483>

Given the importance of sharks in the Pacific ecosystem, and the continuing poor availability of data, SC should recommend:

1. A total prohibition of the retention, transshipment, storage, on-board sale and landing of silky sharks, oceanic whitetip sharks, and blue sharks until such time that stock assessments are of sufficient quality to demonstrate healthy stock levels ( $>B_{MSY}$  or equivalent).
2. The prompt and careful release of any captured silky sharks, oceanic whitetip sharks, and blue sharks.
3. A total ban on the use of FADs in association with purse seine fishing in order to help address bycatch of silky sharks and oceanic whitetip sharks.
4. A ban on the use of wire tracers on longlines.
5. The urgent improvement to the quality and quantity of data for all sharks, including animal condition on release (dead, injured, alive).
6. The development of reference points, best practice bycatch mitigation measures, and management goals for all non-target species, especially sharks.
7. The strengthening of the current sharks measure<sup>13</sup> from the requirement of “CCMs shall require their vessels to have on board fins that total no more than 5% of the weight of sharks on board up to the first point of landing” to a requirement to land all sharks with fins naturally attached. This will enable better data collection and enforcement of prohibitions on the retention of at-risk species, and is the approach recommended by the Memorandum of Understanding on the Conservation of Migratory Sharks.<sup>14</sup>

## The development of Limit Reference Points for WCPFC

Scientists from CSIRO, Australia, and the Oceanic Fisheries Programme of the Secretariat of the Pacific Community (SPC-OFP) have presented a comprehensive set of papers in 2011 and 2012 that explore the options available to the Western and Central Pacific Fisheries Commission (WCPFC) for choosing and setting limit reference points<sup>15, 16</sup> (that correspond to the state of a stock that must be avoided), target reference points<sup>17</sup> (that indicate the ideal state in which a stock should be maintained according to a set of biological, ecological, economic and social goals) and the harvest control rules<sup>18</sup> that define in advance what actions must be taken to ensure that there is a very low risk that the fishery will exceed the limit reference points.

As well as reviewing current best practice for fisheries management and the best options available for tuna fisheries, the papers highlight two key issues:

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<sup>13</sup> Conservation and management of sharks. Conservation and Management Measure 2009-04. <http://www.wcpfc.int/doc/cmm-2008-06/conservation-and-management-sharks-replaced-cmm-2009-04>

<sup>14</sup> <http://sharksmou.org>

<sup>15</sup> Preece A, Hillary R, Davies C (2011). Identification of candidate limit reference points for the key target species in the WCPFC. Seventh Regular Session of the Science Committee, WCPFC, 9-17 August 2011, Pohnpei, Federated States of Micronesia WCPFC-SC7-2011/MI-WP-03. <http://www.wcpfc.int/node/3522>

<sup>16</sup> Harley SJ, Berger AM, Pilling GM, Davies N, Hampton J (2012). Evaluation of stock status of south Pacific albacore, bigeye, skipjack, and yellowfin tunas and southwest Pacific striped marlin against potential limit reference points. Eighth Regular Session of the Science Committee, WCPFC, 7–15 August 2012, Busan, Republic of Korea. WCPFC-SC8-2012/MI-WP-01\_rev1. <http://www.wcpfc.int/node/5390>

<sup>17</sup> Pilling GM, Harley SJ, Berger AM, Hampton J (2012). Consideration of target reference points for WCPO stocks with an emphasis on skipjack tuna. Eighth Regular Session of the Science Committee, WCPFC, 7–15 August 2012, Busan, Republic of Korea. WCPFC-SC8-2012/MI-WP-02. <http://www.wcpfc.int/node/5391>

<sup>18</sup> Berger AM, Harley SJ, Pilling GM, Davies N, Hampton J (2012). Introduction to harvest control rules for WCPO tuna. Eighth Regular Session of the Science Committee, WCPFC, 7–15 August 2012, Busan, Republic of Korea. WCPFC-SC8-2012/MI-WP-03. <http://www.wcpfc.int/node/5392>

1. Setting strong fisheries reference points and strict harvest control rules is a key part of implementing the FAO Code of Conduct for Responsible Fisheries<sup>19</sup> and the UN Fish Stocks Agreement.<sup>20</sup>
2. The current reference points used by the WCPFC for determining the ‘relative health’ of tuna fisheries – the maximum sustainable yield (MSY) and the corresponding biomass ( $B_{MSY}$ ) and fishing mortality rate ( $F_{MSY}$ ) – should be, at best, treated as limit reference points (to be avoided) according to the FAO Code and UN Fish Stocks Agreement. The SPC-OFP notes that: “given the uncertainties in assessing stock status and natural stock variability, practical experience and scientific analysis has shown that treating  $F_{MSY}$  as a target often results in depletion of fish stocks, and that recovery from over-depletion is difficult. The use of MSY as a target is also often sub-optimal economically.”<sup>21</sup>

### What has been agreed to date?

In 2011, the SC7 agreed to follow the recommendations<sup>22</sup> to use a 3-level framework for choosing limit reference points based on the level of information available for the species and the fisheries (see Table 1). SC7 also agreed the nature of biomass limits for each level –  $B_{MSY}$  for level 1, and two possible depletion-based biomass limit reference points for levels 2 and 3:

- $20\%SB_0$  (unfished adult biomass based on historical average recruitment estimates); OR
- $20\%SB_{current, F=0}$  (unfished biomass based on recent average recruitment).

With regard to fishing mortality,  $F_{MSY}$  was agreed for level 1. For level 2, an F-limit known as  $F_{X\%SPR_0}$  was agreed but choosing the value for X was postponed until SC8. This represents a fishing rate that would reduce the stock to a level that has X% of the spawning-potential-per-recruit of the unfished stock (calculated from the lifetime expectation of a single recruit’s contribution to quantities such as yield, the spawning biomass, egg production or the number of spawning seasons an individual can expect to participate in). It was agreed that no F-based limit should be set for level 3. The WCPFC endorsed this approach.

In 2012, the SC8 agreed which tuna species should be allocated to each level and that the biomass limit reference point  $20\%SB_{current, F=0}$  should be used for levels 2 and 3, i.e. 20% of the adult biomass that could exist under recent current conditions if no fishing was occurring. This is consistent with the ‘recent recruitment’ approach currently used by SPC-OFP for bigeye stock assessments that takes into account the impacts of changing ocean regimes on stock productivity. The SC8 asked the SPC-OFP to define the appropriate ‘current’ timeframe to use for estimating current unfished biomass for each species.

There was some debate about the selection of a value of X for  $F_{X\%SPR_0}$  reference points and this decision was postponed to SC9 following further clarification from SPC-OFP on appropriate values for each species.

<sup>19</sup> See Article 7.5.3 of FAO (1995). *Code of conduct for responsible fisheries*. Rome, Italy: Food and Agriculture Organisation of the United Nations. [www.fao.org/fi/agreem/codecond/codecon.asp](http://www.fao.org/fi/agreem/codecond/codecon.asp)

<sup>20</sup> Anon. (1995). Agreement for the implementation of the provisions of The United Nations Convention on the Law of the Sea of 10 December 1982 relating to the conservation and management of straddling fish stocks and highly migratory fish stocks.

<sup>21</sup> Pilling GM, Harley SJ, Berger AM, Hampton J (2012). Consideration of target reference points for WCPO stocks with an emphasis on skipjack tuna. Eighth Regular Session of the Science Committee, WCPFC. 7–15 August 2012, Busan, Republic of Korea. WCPFC-SC8-2012/MI-WP-02. <http://www.wcpfc.int/node/5391>

<sup>22</sup> Preece A, Hillary R, Davies C (2011). Identification of candidate limit reference points for the key target species in the WCPFC. Seventh Regular Session of the Science Committee, WCPFC, 9-17 August 2011, Pohnpei, Federated States of Micronesia WCPFC-SC7-2011/MI-WP-03. <http://www.wcpfc.int/node/3522>

Table 1. Hierarchical approach to choosing limit reference points (LRPs) for target species in the WCPFC.

Level	LRPs	Data requirements	Species
Level 1	B: $B_{MSY}$ F: $F_{MSY}$	A reliable estimate of steepness is available (i.e. the relationship between adult biomass and corresponding recruitment at low levels of biomass, and the point at which recruitment overfishing would occur)	No species at present
Level 2	B: $20\%SB_{current, F=0}$ F: $F_{X\%SPR_0}$	Steepness is not well-known, if at all, but key biological (natural mortality, maturity) and fishery (selectivity) variables are reasonably well estimated.	Yellowfin Bigeye Albacore Striped marlin
Level 3	B: $20\%SB_{current, F=0}$ F: no F limit	The key biological and fishery variables are not well known.	Skipjack

### Acceptable risk levels

Stock assessments result in a range of possible biomass and fishing rate values, any of which could be the correct values. Setting 'acceptable risk' levels is essentially a way to define whether a limit reference point has been breached when a part of a range is close to or overlapping the reference point. Although there was considerable support for the SC8 to also make recommendations on the 'acceptable risk' levels for failing to maintain the stock above these limits – 10% for yellowfin and bigeye, and 5% for albacore and skipjack – this did not reach consensus. The final recommendations<sup>23</sup> were that:

- the probability of breaching a limit reference point should be very low;
- the allowable risk of breaching a limit reference point may be applied on a species-specific basis, e.g. higher risk for yellowfin and bigeye tunas but a more precautionary lower risk to skipjack and South Pacific albacore tuna;
- a range of risk levels of breaching the LRP were suggested with a majority recommending a 10% level and that a lower more precautionary value could be considered in some cases;
- the Management Objectives Workshop should review appropriate values for specifying the level of risk for individual species.

### What must be agreed at SC9?

As mentioned above, the SC8 requested two further pieces of work to assist with finalizing recommendations for the fishing mortality reference points. The SPC-OFP has provided two papers for presentation at SC9 with the aim of:

1. Defining the appropriate timeframe to use for defining 'current' when determining the current unfished biomass and hence the value of the depletion-based reference points of  $20\%SB_{current, F=0}$  for each species. That is, the time-window that would provide a good 'average' unfished biomass that allows for natural stock variations in response to a variety of changing environmental conditions.<sup>24</sup>
2. Providing further analysis of appropriate values of X for defining  $F_{X\%SPR_0}$  reference points for each level 2 species (bigeye, yellowfin and southern albacore).<sup>25</sup>

SC9 has been tasked with agreeing the final recommendations on the fishing mortality reference points for presentation to the WCPFC this year.

<sup>23</sup> WCPFC (2012). Summary Report. Scientific Committee Eighth Regular Session, 7–15 August 2012, Busan, Korea. Western and Central Pacific Fisheries Commission (WCPFC), Kolonia, Pohnpei. <http://www.wcpfc.int/node/5751>

<sup>24</sup> Berger AM, Pilling GM, Kirchner C, Harley SJ (2013). Determination of appropriate time-windows for calculation of depletion-based limit reference points. Ninth Regular Session of the Science Committee, WCPFC, 6–14 August 2012, Pohnpei, Federated States of Micronesia. WCPFC-SC9-2013/MI-WP-02. <http://www.wcpfc.int/doc/MI-WP-02/Determination-appropriate-time-windows-calculation-depletion-based-limit-reference-poin>

<sup>25</sup> Berger AM, Pilling GM, Kirchner C, Harley SJ (2013). Proposed F-based limit reference points for bigeye, yellowfin, and south Pacific albacore tuna. Ninth Regular Session of the Science Committee, WCPFC, 6–14 August 2012, Pohnpei, Federated States of Micronesia. WCPFC-SC9-2013/MI-WP-03. <http://www.wcpfc.int/doc/MI-WP-03/Proposed-F-based-limit-reference-points-bigeye-yellowfin-and-south-Pacific-albacore-tun>

Greenpeace would like to acknowledge the important work by SPC-OFP in this area, and urges the SC9 to finalize these important recommendations this year. While Greenpeace accepts that ultimately the assurance that limit reference points are not breached by fisheries depends on choosing good target reference points and harvest control rules, and on swift action by management; however, Greenpeace also believes that a 'sea change' in how managers (and industry) perceive and understand limit reference points is key to gaining agreement for significantly improving management of Pacific fisheries.

**The SC9 should recommend:**

- **The use the 10-year fixed time window for depletion reference points, as recommended by the SPC-OFP.**
- **A set of precautionary values of X for selecting  $F_{X\%SPRO}$  for each species based on discussions of the data presented by SPC-OFP. In the absence of consensus, SC should select an interim value of 40% across all level 2 species, as recommended in the paper by Preece et al<sup>26</sup>.**
- **That the probability of breaching limit reference points should be set at 5% for all species.**
- **Precautionary limit reference points for all fish stocks managed by the WCPFC.**
- **Interim precautionary Target Reference Points for consideration by the MOW2 and WCPFC this year.**

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<sup>26</sup> Preece A, Hillary R, Davies C (2011). Identification of candidate limit reference points for the key target species in the WCPFC. Seventh Regular Session of the Science Committee, WCPFC, 9-17 August 2011, Pohnpei, Federated States of Micronesia WCPFC-SC7-2011/MI-WP-03 [.http://www.wcpfc.int/node/3522](http://www.wcpfc.int/node/3522)