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PROPOSAL BY THE UNITED STATES TO ADOPT INTERIM ACCEPTABLE LEVELS OF RISK FOR BREACHING LIMIT REFERENCE POINTS

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Proposal from United States of America

Proposal by the United States to Adopt Interim Acceptable Levels of Risk for Breaching Limit Reference Points

Explanatory note:

The United States has developed a proposal on interim acceptable levels of risk for breaching limit reference points (LRP). At the 12th regular session of the WCPFC Scientific Committee, Australia presented a proposal for adopting interim acceptable levels of risk for breaching LRPs of four key tuna species in the WCPO (SC12-WP-MI-03). Australia's proposed risk levels are lower than those in the United States proposal and as encouraged in SC12-WP-MI-03, the United States has put forward an alternative proposal for the risk levels for the key tuna stocks under CMM 2014-06. These risk levels reflect reasonable preferences for achieving sustained yield from these tuna resources while maintaining a risk-averse approach to breaching limit reference points. In particular, this choice of risk levels sets an equal chance of breaching LRPs across the four key tuna stocks while ensuring that the relative odds of not breaching an LRP to breaching an LRP are 80% to 20%.The following constitutes the rationale for the risk levels proposed by the United States.

Rationale #1 – Specifying the acceptable level of risk is a two dimensional issue as it is not simply one numerical value that constitutes "very low". In other words, the risk level that constitutes a "very low" risk level depends on the context, and particularly on the magnitude of associated LRP; that is, the acceptable level of risk is coupled with the corresponding conservative or liberal aspect of the LRP.

SC12 recommended "that WCPFC13 notes that levels of risk for breaching LRP should be considered coupled with the corresponding conservative or liberal nature of the LRP. For example, the bigeye tuna LRP (20% of unfished spawning biomass) is very close to the depletion expected to occur (21%) if the fishery attained the spawning biomass at MSY. Therefore the bigeye tuna LRP is viewed as conservative and could have associated higher levels of risk for breaching the LRP."

The term risk can best be framed for decision analysis as the expected loss associated with a decision under uncertainty. This differs from the simpler and less practical usage of risk as "the probability that something bad will happen." The distinction is important as noted in rationale 1, namely that if one chooses an LRP of 20% of unfished spawning biomass SSB_0 and the bigeye tuna spawning stock biomass at MSY is SSB_{MSY}=0.21*SSB then there is a high chance of breaching the LRP at spawning stock biomasses at the MSY level. This implies that a relatively healthy bigeye tuna stock with spawning stock biomass near SSB_{MSY} would be deemed to be overfished on a frequent basis. In the absence of detailed information regarding the tradeoffs in conserving spawning potential versus the losses in expected yield and its variability with a range of choices of the risk level for breaching an LRP, the U.S. recommends a balanced and conservative approach to setting interim risk levels.

As a comparative example, the IATTC Resolution C-16-02 established a Harvest Control Rule for tropical tuna (yellowfin, bigeye and skipjack) in the eastern Pacific Ocean.

Language from C-16-02 includes:

> A limit reference point is a conservation reference point based on a level of spawning biomass (S_{LIMIT}) or fishing mortality (F_{LIMIT}) that should be avoided because going beyond it could

endanger the sustainability of the stock; $F_{0.5R0}$ and $S_{0.5R0}$ assuming steepness $h = 0.75$ were adopted by the 87th meeting of the IATTC as interim limit reference points for tropical tunas in the EPO.

B. A target reference point is a management objective based on a level of spawning biomass (S_{TARGET}) or a fishing mortality rate (F_{TARGET}) that should be achieved and maintained. S_{MSY} and F_{MSY} were adopted by the 87th meeting of the IATTC as interim target reference points for tropical tunas in the EPO.

The IATTC's adopted interim LRPs as described above correspond to the Spawning Stock Biomass (SSB) size that would be expected to result in a 50% reduction from virgin recruitment. To determine that size, the IATTC has chosen what is generally considered to be a conservative steepness value (0.75) for the Beverton-Holt stock-recruitment relationship. A practical implementation for biomass and fishing mortality LRPs was developed using steepness values for the Beverton-Holt stock-recruitment relationship assuming a conservative value (0.2) of recruitment per spawner. The IATTC's interim LRP corresponds to a depletion LRP of 7.7%. Depletion levels corresponding to alternative steepness assumptions are illustrated in Table 1. The IATTC has not adopted an acceptable level of risk for breaching the LRP of 7.7%, but the LRP is much lower than the WCPFC adopted LRP of 20% of unfished spawning biomass. The WCPFC LRPs clearly can be considered highly conservative, and it follows that the WCPFC can consider accepting a relatively higher risk of breaching them compared to the IATTC, which has less conservative LRPs.

Table 1. The IATTC approach in determining depletion Limit Reference Points (LRPs) for yellowfin, bigeye and skipjack in the eastern Pacific Ocean. Values in bold reflect the adopted IATTC approach for determining interim LRPs.

Steepness in Stock Recruitment Relationship	Depletion level ($S/S0$)
0.9	2.7%
0.75	**7.7%**
0.6	14.2%
0.5	20.0%
0.2	50.0%

Rationale #2 – Annex II of the UN Fish Stocks Agreement indicates that: "Limit reference points set boundaries which are intended to constrain harvesting within safe biological limits within which the stocks can produce maximum sustainable yield." Therefore, the adopted LRPs should provide a buffer between the level of spawning stock biomass at MSY level of spawning stock biomass that will produce recruitment overfishing.

WCPFC stock assessments produce depletion levels of spawning biomass which correspond to MSY under specific assumptions about the stock-recruitment relationship (Table 2). For example, the skipjack tuna basecase run in the 2014 assessment has a depletion of 27% at MSY assuming a steepness of 0.8. The adopted skipjack target reference points (TRPs) of 50% unfished spawning biomass represents a substantial buffer with regard to the LRP (20%) and if the fishery were operating at MSY (27%).

In contrast, the bigeye tuna LRP (20%) is very close to a depletion level of unfished spawning biomass (21%) if the fishery were operating at MSY (Table 2). The south Pacific albacore LRP (20%) is above the depletion if the fishery were operating at MSY. The adopted LRPs of 20% unfished spawning biomass appear rather conservative in relation to biological concerns with regard to reproductive risk and recruitment failure and to fishery concerns with regard to maintaining yields with steady production.

Additionally, the IATTC has adopted TRPs and management objectives based on maintaining a level of spawning biomass at MSY and fishing mortality at MSY. The adopted LRPs by WCPFC again appear conservative with regard to IATTC, as for several species the WCPFC has LRPs that have less depleted stocks than IATTC TRPs.

Table 2. Median levels of spawning biomass depletion (SB/SBF=0) associated with a given risk of exceeding the limit reference point of 0.2SBF=0 for skipjack, yellowfin, bigeye tuna (MOW3 WP-02) and south Pacific albacore (HSW-WP-05). The stock depletion level corresponding to fishing at MSY (steepness assumed at 0.8) is illustrated for comparison with the risk of exceeding the limit reference points (personal communication, Graham Pilling, SPC, August 2016). Values in bold reflect the U.S.A. proposed risk level.

Acceptable risk	Spawning Biomass Depletion			
	WCPO skipjack tuna	WCPO yellowfin tuna	WCPO bigeye tuna	South Pacific albacore
5%	29%	31%	28%	37%
10%	27%	28%	26%	34%
15%	26%	27%	25%	33%
20%	**25%**	**25%**	**24%**	**32%**
Depletion level corresponding to MSY	27%	31%	21%	14%

Proposal by the United States to Adopt Interim Acceptable Levels of Risk for Breaching Limit Reference Points

The Western and Central Pacific Fisheries Commission (WCPFC):

Noting Article 6.1, by reference to Annex II of the UN Fish Stock Agreement, requires that fishery management strategies ensure that the risk of exceeding the limit reference point be "very low";

Noting that Annex II of the UN Fish Stocks Agreement indicates that "Limit reference points set boundaries which are intended to constrain harvesting within safe biological limits within which the stocks can produce maximum sustainable yield";

Adopts, in accordance with Article 10 of the Convention, that

the interim acceptable levels of risk for breaching limit reference points is 20% for WCPO skipjack, WCPO yellowfin, WCPO bigeye and south Pacific albacore.