

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON
BIENNIAL HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES –
PRELIMINARY

The Scientific and Statistical Committee (SSC) discussed the suitability of proxies proposed as status determination criteria for Eastern Pacific skipjack tuna and North Pacific bluefin tuna as presented in the [2021 HMS SAFE Report](#), the September 2022 NMFS Supplemental Report on Biennial Harvest Specifications and Management Measures, and an additional document (appended to this report) describing the rationale for the selection of proxies prepared for the SSC by Dr. Steve Teo (Southwest Fisheries Science Center), who was available for the discussion.

The SSC supports the choice of the maximum sustainable yield (MSY) proxy of 30 percent of unfished spawning biomass recommended for skipjack tuna. This value was developed from the bigeye and yellowfin assessments, from which relative B_{MSY} could be calculated directly, and the rationale provided is appropriate. However, skipjack is an important prey species for other tunas in the Eastern Pacific and it might also be reasonable to consider a more precautionary reference point to account for their trophic role.

For bluefin tuna, the SSC agrees that the new rebuilding target should be at least 20 percent of unfished spawning biomass and supports using this value for management in this biennial cycle. Although this proxy value is consistent with the B_{MSY} value extracted from the assessment model output, the SSC has reservations about adopting this B_{MSY} proxy for future cycles without further investigation. Compared to the shorter-lived and faster-growing skipjack tuna, bluefin life history suggests it is likely to be less productive, and thus B_{MSY} relative to unfished spawning biomass for bluefin is likely higher than the ratio adopted for skipjack and most other tunas. The B_{MSY} from the bluefin assessment is based on the optimistic assumption that recruitment is independent of spawning biomass. Future analyses should explore the sensitivity of the target to the assumed steepness value in the assessment along the lines of previous work completed for bigeye and yellowfin tunas in the Eastern Tropical Pacific. The management strategy evaluation being undertaken by the Pacific Bluefin Working Group will include evaluation of alternative reference points, which will also help inform the choice of an updated rebuilding target in future management cycles.

PFMC
11/03/22

Appendix:

October 19, 2022

This document is being provided by the NMFS SWFSC in response to an informal request for information about reference point selection for EPO skipjack tuna and Pacific Bluefin tuna. The SWFSC has provided background as requested but notes that the selection of reference points for HMS by RFMOs is not a NMFS decision. Rather, both NMFS scientists and managers participate in RFMO and RFO meetings and reference points are chosen through the RFMO process. As such, much of the information provided below on selection of reference points is also found in RFMO reports.

MSY proxy for EPO Skipjack Tuna (SKJ)

Based on the analysis of the SKJ assessment in the EPO by IATTC scientific staff, it was considered inappropriate to use MSY-based reference points for SKJ (SAC-13-07). Given the fast growth and high natural mortality of SKJ, previous assessments of SKJ in the EPO have found estimation of MSY reference points to be problematic because recruitment is assumed to be independent of stock-size and maximum YPR is obtained by catching fish at ages younger than the age at entry into the fishery. For the 2022 assessment, the IATTC scientific staff found that “optimal yield occurs by capturing the fish as young as possible. There is only a narrow range of ages where the growth is higher than survival (3-5 quarters) and where the biomass of the cohort increases. Within this short age range the cohort’s biomass is maximized at 6 quarters. However, since the overall selectivity of all fisheries combined includes ages older than age 6, the yield calculations estimate that increasing mortality always increases yield”. Therefore, it was considered inappropriate to use MSY-based reference points for SKJ stock status. Instead, MSY proxies for SKJ were developed from the bigeye and yellowfin assessments.

For a steepness of $h = 1$, which is the assumption made in the SKJ assessment, SSB_{MSY} for bigeye ranges from 20 – 24% of SSB_0 and the range for yellowfin is 23 - 32% of SSB_0 . Other ranges are available in Table 2 of SAC-13-07 (reproduced below). The range for bigeye tuna is most sensitive to the steepness of the Beverton-Holt stock-recruitment relationship and the range for yellowfin is sensitive to a variety of factors. Based on this analysis, the IATTC scientific staff proposed and the IATTC Scientific Advisory Committee (SAC) agreed that a proxy for SSB_{MSY} of 30% SSB_0 be used for determining SKJ stock status.

Following that, the NMFS agrees that 30% SSB_0 is a reasonable B_{MSY} proxy for SKJ in the EPO and therefore the proxy for F_{MSY} would be the level of fishing mortality corresponding with the biomass target (i.e., $F_{Btarget}$ where B_{target} is equal to 30% SSB_0). Applying these proxies to domestic status determination criteria results in an $MFMT = F_{Btarget}$ and $MSST = 0.5 \times 30\%SSB_0$ because M is assumed to be $>0.5 \text{ y}^{-1}$ for the SKJ assessment.

Modified from Table 2 of SAC-13-07. Ranges of SSB_{MSY}/SSB_0 estimated in the bigeye (SAC-11-06) and yellowfin (SAC-11-07) stock assessments.

Steepness (h)	Bigeye	Yellowfin
1.0	0.20 – 0.24	0.23 – 0.32
0.9	0.25 – 0.27	0.28 – 0.35
0.8	0.28 – 0.30	0.32 – 0.37
0.7	0.31 – 0.32	0.35 – 0.40

Pacific Bluefin Tuna Management / Rebuilding Target

Pacific Bluefin Tuna (PBF) are co-managed by an RFMO Joint Working Group (JWG) composed of members from the WCPFC’s Northern Committee and the IATTC. U.S. managers and scientists are included in the JWG and are included in deliberations and drafting of recommendations. When the PBF stock was first declared overfished, the JWG established an initial target of rebuilding SSB to the historical median by 2024 with at least 60% probability – a goal that was recently met. At a meeting of the JWG in 2017, a second rebuilding target was established to inform management once the first target had been met. The second management objective was to rebuild the SSB to 20%SSB₀ within 10 years of reaching the historical median or by 2034, whichever is earlier, with at least 60% probability. That goal is anticipated to be met in the very near future. The WCPFC identified PBF as level 2 stock under the Commission's hierarchical approach for setting biological limit reference points (link [here](#); steepness is not known well, so the Limit Reference Points are specified in terms of %SPR₀, %SB₀, or %SB_{current}, F=0). The stock is now in the second rebuilding phase under the rebuilding plan with 20%SSB_{F=0} (link [here](#)). Once the stock is rebuilt, the Northern Committee will develop more refined management objectives as well as limit reference point(s) and target reference point(s).

It is important to note that no biological reference points (BRPs) or status determination criteria (SDCs) have been officially adopted for PBF by the RFMOs. The choice of 20%SSB₀ as a second rebuilding target was not based on any analyses specific to PBF, but instead is based on the WCPFC’s general review of candidate reference points for HMS stocks in the North Pacific Ocean (WCPFC 2010), as well as general consensus reached by the JWG at subsequent meetings to establish rebuilding strategies for PBF. The choice of 20%SSB₀ was not made solely by NMFS scientists, but rather by NMFS scientists and managers as part of the JWG in their consensus building process. Moreover, the PBF assessment model estimates of SSB/SSB₀ at MSY in the most recent years is roughly 20%, and thus a reasonable proxy for MSY given our current understanding. The ISC’s PBFWG is beginning an MSE process to set long-term management which will include a detailed analysis of target and limit reference points. The PBF MSE process should be completed in the next few years.

WCPFC. 2010. A review of candidate biological reference points for northern stocks of highly migratory species in the North Pacific Ocean. WCPFC-NC12-IP-06.
<https://meetings.wcpfc.int/node/9831>

WCPFC. 2017. Summary of additional PBF projections. WCPFC-NC13-IP-04.
<https://meetings.wcpfc.int/node/10333>

WCPFC. 2021. Harvest strategy for Pacific Bluefin Tuna fisheries. HS-2021-01.
<https://www.wcpfc.int/doc/hs-2021-01/harvest-strategy-pacific-bluefin-tuna-fisheries>

ISC. 2022. Stock assessment of Pacific bluefin tuna in the Pacific Ocean in 2022. ISC/22/Annex/13.
https://isc.fra.go.jp/pdf/ISC22/ISC22_ANNEX13_Stock_Assessment_for_Pacific_Bluefin_Tuna.pdf