

NATIONAL MARINE FISHERIES SERVICE (NMFS) REPORT ON BIENNIAL HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES

In support of the Council’s biennial management cycle as described in Chapter 5 of the HMS FMP, this report provides an overview of completed or pending status determinations for stocks of HMS management unit species, based on stock assessments completed in 2023 and 2024. A list of these assessments is included in this report.

Additionally, this report provides estimates of maximum sustainable yield (MSY) reference points for fishing mortality and biomass (i.e., F_{MSY} and B_{MSY}), or proxies for those reference points, for completing stock status determinations based on status determination criteria (SDCs). These SDCs include maximum fishing mortality threshold (MFMT), and minimum stock size threshold (MSST). Specifically, $MFMT = F_{MSY}$, and $MSST = (1-M)B_{MSY}$ when natural mortality (M) ≤ 0.5 , or $= 0.5B_{MSY}$ when $M > 0.5$. See Chapter 4, Section 4.4.1 of the Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species ([HMS FMP](#)) for more details.

The HMS FMP states that proxies from internationally-produced assessments may be used for SDCs. The Council, with input from its Scientific and Statistical Committee (SCC), has recommended suitable proxies for HMS stocks based on stock assessments completed through 2022. In this report, NMFS conveys the suitable proxies from recent assessments or recommends new proxies where necessary. In general, a stock is considered *subject to overfishing* if the assessed fishing mortality (F) is greater than MFMT, and is considered *overfished* if its assessed biomass (B) is lower than MSST.

International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean (ISC) Assessments

In 2023, ISC working groups assessed North Pacific albacore (*Thunnus alalunga*), striped marlin (*Kajikia audax*), and swordfish (*Xiphias gladius*). Additionally, in 2024, the ISC working groups assessed Pacific bluefin tuna (*Thunnus orientalis*) and shortfin mako shark (*Isurus oxyrinchus*).

North Pacific Swordfish

This assessment, completed in 2023, indicates that the spawning stock biomass at MSY (SSB_{MSY}) is 16,388 metric tons (mt) and F_{MSY} is 0.18.

To evaluate whether fishing mortality exceeded the MFMT, NMFS evaluated a ratio of fishing mortality for swordfish aged between 1 and 10 years, from the time period 2019-2021. If $F_{ages1-10 \text{ in } 2019-2021}/F_{MSY} > 1.0$, the stock would be considered subject to overfishing. The recent fishing mortality (as an average for ages 1-10 in 2019-2021) was 0.09, so $F_{ages1-10 \text{ in } 2019-2021}/F_{MSY}$ is 0.49, which indicates that the stock is not subject to overfishing (Table 1).

To evaluate whether current biomass is above the MSST, NMFS considered that $SSB_{current(2021)}$ is assessed at 35,788 mt, and assumed natural mortality (M) to be equal to 0.5 (though, M varies with age). Therefore MSST is 8,194 mt. The resulting ratio of $SSB_{current(2021)}/MSST$ is 4.37, which indicates the stock is not overfished (Table 2). The 2023 assessment results showed SSB estimates have been relatively stable, and began increasing above historic levels in 2015.

North Pacific Albacore

The ISC assessed albacore in the North Pacific Ocean (NPO) through 2020. The assessment refers to fishing mortality based on the spawning potential ratio (SPR), and conveys $F_{\%SPR, MSY}$ is 16.4%SPR. The estimate of SSB_{MSY} for the stock is 23,154 mt.

To evaluate whether fishing mortality exceeded MFMT, NMFS evaluated the ratio of fishing mortality for the assessment years of 2018-2020 ($F_{\%SPR, 2018-20}$) relative to $F_{\%SPR, MSY}$ (see Table 1). This ratio equals 3.6. It should be noted that, in this case, higher %SPR values indicate lower fishing intensity levels, and values greater than 1.0 for ratios of $F_{\%SPR}$ to $F_{\%SPR}$ -based reference points indicate fishing intensity levels lower than the reference point. Therefore, the ratio of 3.6 indicates that current fishing mortality is lower than the MFMT and the stock is not subject to overfishing.

To evaluate whether current biomass is above the MSST, NMFS compared SSB during the most recent assessment year (2021), which was estimated as 70,229 mt, to MSST. The assessment indicates M for females age 3+ is 0.48. Therefore, NMFS estimates that SSB_{2021} relative to MSST equals 5.83, which indicates that the stock is not overfished (see Table 2).

Pacific bluefin tuna (PBF)

The ISC assessed PBF in the NPO through 2022. As with the 2022 status determinations, NMFS proposes continuing to use 1-SPR_{20%} and 20%SSB_{F=0} as proxy F_{MSY} and B_{MSY} reference points, respectively (see [Agenda Item I.4, NMFS Report 1](#), from the September 2022 Briefing Book).

To evaluate whether fishing mortality exceeds MFMT, NMFS evaluated the $F_{\%SPR}$ for the assessment years (2020-2022) relative to the proxy F_{MSY} reference point, 1-SPR_{20%}. The resulting ratio is 0.89, indicating that fishing mortality is below MFMT (Table 1) and that the stock is not subject to overfishing.

To evaluate whether current biomass is above the MSST, NMFS evaluated SSB in 2022 as 144,483 mt relative to MSST. With 20%SSB_{F=0} reported as 124,554, and M for fish age 2+ equal to 0.25, MSST is 93,416.¹ This results in a ratio of 1.55, indicating that biomass is above MSST (Table 2) and that the stock is not overfished.

Shortfin mako shark

The ISC assessed shortfin mako shark in the NPO through 2021. The MSY-based proxies used for determining the status of this stock based on the 2018 assessment are not reported in the 2024 assessment (see [Agenda Item E.3.a, Supplemental NMFS Report 1](#), from the September 2020 Briefing Book). The F_{MSY} and B_{MSY} reference points utilized in the 2024 assessment are based on exploitation (U) and depletion (D) relative to carrying capacity, respectively.

U_{MSY} is the exploitation rate which produces MSY, and is assessed at a median value of 0.055. To evaluate whether fishing mortality exceeds MFMT, NMFS recommends using U_{MSY} as a proxy for F_{MSY} . U for 2018-2021 is 0.018, so the ratio of $U_{2018-2021}$ to U_{MSY} is 0.34. This indicates that the exploitation rate (i.e., fishing mortality) is below MFMT and the stock is not subject to

¹ MSST = (1-0.25)*124,554 = 93,416.

overfishing.

Total depletion (D) is the total number of shortfin mako sharks divided by the unfished carrying capacity. D_{MSY} is the depletion rate at MSY, and is assessed at a median value of 0.51. $D_{2019-2022}$ is assessed as 0.60. NMFS recommends using the D_{MSY} as a B_{MSY} proxy by which to evaluate whether the current biomass is above the MSST. Using this approach, NMFS calculates MSST as equal to 0.435, where M is 0.147.² This results in a ratio of 1.38, indicating that the current biomass is above MSST and the stock is not overfished.

Striped marlin

The ISC assessed striped marlin in the Western and Central North Pacific Ocean (WCNPO) through 2020. Note that the U.S. West Coast exclusive economic zone (EEZ) does not overlap with the assessment area for this stock, and West Coast-based fisheries do not target this stock.

To evaluate whether fishing mortality exceeds MFMT, NMFS calculated the ratio of fishing mortality from 2018-2020 ($F_{2018-2020}$, assessed at 0.68) to F_{MSY} , assessed at 0.63. $F_{2018-2020}/F_{MSY} = 1.079$, indicating that current fishing mortality is above MFMT and the stock is subject to overfishing (Table 1).

To evaluate whether current biomass is above the MSST, NMFS used the current biomass for the most recent assessment year (2020). SSB_{MSY} is assessed at 2,920 mt; therefore, MSST, calculated as $0.5(SSB_{MSY})$, is 1,460 mt. The SSB in 2020 was 1,696 mt. This results in a ratio of 1.16, indicating that biomass is above MSST and the stock is not overfished (Table 2).

IATTC Assessments

In 2024, the IATTC published benchmark stock assessments for bigeye tuna (*Thunnus obesus*) and skipjack tuna (*Katsuwonus pelamis*) in the eastern Pacific Ocean (EPO).

Bigeye tuna

Similar to the 2020 assessment, the 2024 benchmark assessment for bigeye tuna in the EPO is based on a ‘risk analysis’ methodology, which uses several reference models to represent various plausible assumptions about the biology of the fish, the productivity of the stocks, and/or the operation of the fisheries. During the 2020 biennial management cycle, the Council and its advisory bodies reviewed and made recommendations on suitable proxies and approaches to determining stock status for these assessments (see, [Agenda Item H.5.a, NMFS Report 1](#) and [Agenda Item H.5.a, Supplemental SSC Report](#), from the March 2021 Briefing Book). Using a similar approach to that used in 2020, NMFS computed a median F/F_{MSY} ratio of 0.79 for the terminal years of the assessment (2021-2023). This indicates that current fishing mortality is below MFMT and the stock is not subject to overfishing (Table 1). NMFS also computed a median $B/0.5B_{MSY}$ ratio of 2.1, again using the approach reviewed by the SSC in 2020. This indicates that current stock size is above MSST and the stock is not overfished (Table 2).

Skipjack tuna

The IATTC scientific staff completed a benchmark assessment for skipjack tuna in the EPO in

² We calculated natural female mortality to be 0.147, based on an average of three assessed estimates (0.133, 0.139, and 0.169).

2024. Consistent with the Council’s recommendation, NMFS used conservative proxies for F_{MSY} and B_{MSY} , based on the fishing mortality associated with 30% of the unfished level ($30\%SSB_{F=0}$). Using the results of this assessment, NMFS calculated a median $F_{2021-2023}/F_{0.3SSB_0}$ ratio of 0.42, indicating that current fishing mortality is below MFMT and the stock is not subject to overfishing (Table 1). NMFS also calculated a median $SSB_{current}/(0.5*30\%SSB_{F=0})$ ratio of 3.13, indicating that current stock size is above MSST and the stock is not overfished (Table 2).

List of 2023-2024 HMS Stock Assessments

- [Stock Assessment for Swordfish \(*Xiphias gladius*\) in the North Pacific through 2021](#) (ISC, 2023)
- [Stock Assessment of Albacore Tuna in the North Pacific Ocean in 2023](#) (ISC, 2023)
- [Stock Assessment of Pacific Bluefin Tuna in the Pacific Ocean in 2023](#) (ISC, 2024)

- [Stock Assessment of Shortfin Mako Shark in the North Pacific Ocean through 2022](#) (ISC, 2024)
- [Stock Assessment Report for Striped Marlin \(*Kajikia audax*\) in the Western and Central North Pacific Ocean through 2020](#) (ISC, 2023)
- [Stock Assessment of Bigeye Tuna in the Eastern Pacific Ocean: 2024 Benchmark Assessment](#) (IATTC, 2024)
- [Stock Assessment of Skipjack Tuna in the Eastern Pacific Ocean: 2024 Benchmark Assessment](#) (IATTC, 2024)

Table 1. Stock assessment information from 2023 and 2024 for determining whether HMS stocks are subject to overfishing.

Stock	Assessment Year	Assessment Lead	MFMT (F _{MSY} or Proxy)	Current F _{MSY} or proxy estimate	Current F quantity estimate	RFMO reference point	F/F _{MSY} ratio	Subject to Overfishing?
NPO Swordfish	2023	ISC	F _{MSY}	0.18	0.09	N/A	0.5	No (Pending)
NPO Albacore	2023	ISC	F%SPR, MSY*	16.4 %SPR	F%SPR ₂₀₁₈₋₂₀ = 59.0 %SPR	F45%SPR	3.6 [†]	No
NPO Pacific bluefin tuna	2024	ISC	1-20%SPR	0.95	1-SPR ₂₀₂₀₋₂₂ = 0.84	N/A	0.88	No (Pending)
NPO Shortfin mako shark	2024	ISC	U _{MSY}	0.055	U ₂₀₁₈₋₂₀₂₁ = 0.018	N/A	0.34	No (Pending)
WCNPO Striped marlin	2023	ISC	F _{MSY}	0.63	0.68	N/A	1.08	Yes
EPO Bigeye tuna	2024	IATTC	F _{MSY}	N/A	N/A	F _{MSY}	0.79	No (Pending)
EPO Skipjack tuna	2024	IATTC	F _{MSY} proxy = 0.3B ₀	N/A	N/A	F _{MSY}	0.42	No (Pending)

[†] Note that for these SPR-based reference points, higher ratios indicate lower fishing mortality, so values greater than 1.0 indicate fishing mortality lower than MFMT.

^{††} For comparison to previous assessments, see Table 1 at the end of [Agenda Item I.4, NMFS Report 1](#), from the September 2022 Briefing Book.

Table 2. Stock assessment information from 2023 and 2024 for the purposes of determining whether HMS stocks are overfished.

Stock	Assessment Year	Assessment Lead	B _{MSY} or proxy	Current B _{MSY} or proxy estimate	Current B quantity estimate	MSST (1-M*B _{MSY} or 0.5B _{MSY})	Current B/MSST	RFMO reference point	Overfished?
NPO Swordfish	2023	ISC	SSB _{MSY}	16,388 mt	SSB ₂₀₂₁ = 35,778 mt	0.5*SSB _{MSY} = 8,194 mt	4.37	N/A	No
NPO Albacore	2023	ISC	SSB _{MSY}	23,154 mt	SSB ₂₀₂₁ = 70,229 mt	(1-M)*SSB _{MSY} = 12,040 mt [†]	5.83	30%SSB _{current, F=0} (threshold) 14%SSB _{current, F=0} (limit)	No
NPO Pacific bluefin tuna	2024	ISC	20%SSB _{F=0}	124,554 mt	SSB ₂₀₂₂ = 144,483 mt, or 23.2%SSB _{F=0}	93,416 mt	1.55	N/A	No (Pending)
NPO Shortfin mako shark	2024	ISC	D _{MSY}	0.51	D ₂₀₁₉₋₂₀₂₂ = 0.60	(1-0.147)*D _{MSY} = 0.435	1.38	N/A	No
WCNPO Striped marlin	2023	ISC	SSB _{MSY}	2,920 mt	SSB ₂₀₂₀ = 1,696 mt	1,460 mt	1.16	N/A	No (Pending)
EPO Bigeye tuna	2024	IATTC	B _{MSY}	N/A	N/A	0.5B _{MSY}	median B/0.5B _{MSY} = 2.1	B _{MSY}	No
EPO Skipjack tuna	2024	IATTC	30%SSB _{F=0}	11,367 mt	17,809 mt	5,684 mt	median B/0.5B _{MSY} = 3.13	B _{MSY} proxy = 0.3B _{F=0}	No

[†] Natural female mortality for North Pacific albacore is estimated at 0.48.

^{††} For comparison to previous assessments, see Table 2 at the end of [Agenda Item I.4, NMFS Report 1](#), from the September 2022 Briefing Book.