

JOINT REPORT BETWEEN THE NATIONAL MARINE FISHERIES SERVICE (NMFS)  
WEST COAST REGION AND SOUTHWEST FISHERIES SCIENCE CENTER (SWFSC)  
REPORT ON BIENNIAL MANAGEMENT MEASURES: SDCS AND REFERENCE POINTS

At the March 2017 Council meeting, NMFS reported status determinations for highly migratory species (HMS) stocks that were assessed in 2015 and 2016 in [J.4, Supplemental NMFS Report](#). This report provides an overview of completed or pending status determinations for HMS stocks based on stock assessments that were peer reviewed in 2017 and 2018. A list of these assessments is included in this report. Additionally, in Table 1 and Table 2, NMFS provides estimates of the maximum sustainable yield (MSY), maximum fishing mortality threshold (MFMT), and minimum stock size threshold (MSST), as well as updates on reference points adopted by Regional Fishery Management Organizations (RFMOs) for the stocks discussed below.

***International Scientific Committee (ISC) Assessments***

In 2017, ISC Working Groups assessed stocks of albacore (*Thunnus alalunga*) and blue shark (*Prionace glauca*) in the North Pacific Ocean (NPO). NMFS determined that neither stock was overfished nor subject to overfishing based on the best scientific information available (BSIA), which is reflected in Table 1 and Table 2.

In 2018, ISC Working Groups assessed Pacific bluefin tuna (*T. orientalis*) and shortfin mako shark (*Isurus oxyrinchus*) in the NPO, and the swordfish stock (*Xiphias gladius*) in the Western Central North Pacific Ocean (WCNPO). The results from these stock assessments are provided in Table 1 and Table 2, and NMFS' BSIA and status determinations are pending. The 2018 assessments will be considered by the Western and Central Pacific Fisheries Commission (WCPFC) Northern Committee (NC) when it meets in September 2018.

***Inter-American Tropical Tuna Commission (IATTC) Assessments***

In 2017, the IATTC Scientific Staff assessed stocks of bigeye tuna (*T. obesus*) and yellowfin tuna (*T. albacares*) in the eastern Pacific Ocean (EPO), and completed an indicator analysis for the EPO stock of skipjack tuna (*Katsuwonus pelamis*). NMFS determined that the EPO bigeye and yellowfin stocks were not subject to overfishing and not overfished based on BSIA, which is included in Table 1 and Table 2. The last status determination for skipjack was in 2011, and it was not subject to overfishing and not overfished.

In 2018, IATTC Scientific Staff assessed the EPO stock of yellowfin tuna and completed another indicator analysis for the EPO stock of skipjack tuna. The results from these stock analyses are provided in Table 1 and Table 2, and NMFS' BSIA and status determinations are pending.

The IATTC Scientific Staff also assessed and conducted an indicator analysis for the stock of bigeye tuna in the EPO in 2018. However, the IATTC Scientific Staff determined, and their Scientific Advisory Committee agreed, that uncertainties identified in the assessment raise questions about its use for management purposes. Therefore, the IATTC Scientific Staff completed an indicator analysis, which suggests that the stock is under increasing fishing pressure. NMFS' BSIA and status determinations are pending. The 2018 analyses will be considered by the IATTC when it meets in August 2018.

In an effort to improve the models used in assessments of bigeye tuna, the Western Pacific Regional Fishery Management Council (WPRFMC) requested that NMFS support a joint workshop with the IATTC and WCPFC to compare techniques used by the labs in the WCPO and EPO to read bigeye tuna otoliths (see Attachment 2). Currently, the IATTC scientific staff intends to send samples of EPO bigeye tuna otoliths for processing to the lab that reads the otoliths of WCPO bigeye tuna, such that they can compare the daily age estimates derived by both labs. Once the estimates are compared, they will evaluate the necessity of a workshop. NMFS intends to follow the progress of this initiative and support it as appropriate.

#### ***NMFS Assessments***

In 2016, SWFSC scientists, in collaboration with scientists from Mexico, assessed the status of the stock of common thresher shark (*Alopias vulpinus*) along the West Coast of North America. This is the first assessment completed for this stock. This assessment was peer reviewed in 2017 and revised in 2018. NMFS has determined that the information presented in Table 1 and Table 2 reflects BSIA for this stock, and a status determination is pending.

#### ***Secretariat of the Pacific Community (SPC) Assessments***

In 2017, SPC staff assessed the WCPO stocks of bigeye tuna and yellowfin tuna. Both stocks were determined to not to be overfished and not subject to overfishing based on the BSIA presented in Table 1 and Table 2. SPC staff also conducted an assessment of the southwest Pacific swordfish stock; however, NMFS does not make status determinations for this stock.

In 2018, SPC staff assessed the South Pacific stock of albacore. This assessment is now under review by the WCPFC Scientific Committee. NMFS does not make status determinations for this stock. The 2018 assessment will be considered by the WCPFC when it meets in December 2018.

**Table 1.** Stock assessment information for the purposes of determining whether HMS stocks are subject to overfishing

Management Unit Species	Assessment Overview				Overfishing					
Stock	Assessment or Indicator Analysis	Assessment Year	Assessment Lead	Lead NMFS Science Center	MFMT (F <sub>MSY</sub> or Proxy)	Current F <sub>msy</sub> or proxy quantity estimate	Current F quantity estimate	RFMO Ref. point (if adopted)	F/ F <sub>MSY</sub> ratio	Subject to Overfishing?
North Pacific albacore tuna	Assessment	2017	ISC	SWFSC	1-SPR <sub>MSY</sub>	0.84	1-SPR <sub>2012-14</sub> = 0.51	NA	0.61	No
Blue shark in the NPO	Assessment	2017	ISC	PIFSC/ SWFSC	F <sub>MSY</sub>	0.35	F <sub>2002-14</sub> = 0.13	NA	0.37	No
Pacific bluefin tuna in the NPO	Assessment	2018	ISC	SWFSC	1-SPR <sub>MSY</sub>	0.788	1-SPR <sub>2015-16</sub> = 0.921	NA	1.17	Determination pending
Shortfin mako shark in the NPO	Assessment	2018	ISC	PIFSC/ SWFSC	1-SPR <sub>MSY</sub>	0.26	1-SPR <sub>2013-15</sub> = 0.16	NA	0.62	Determination pending
WCNPO swordfish	Assessment	2018	ISC	PIFSC	F <sub>MSY</sub>	0.68	F <sub>2013-15</sub> = 0.32	NA	0.47	Determination pending
Bigeye tuna in the EPO	Assessment	2017	IATTC	SWFSC	F <sub>MSY</sub>	NA	F <sub>2014-16</sub> = NA	NA	F <sub>2014-16</sub> / F <sub>MSY</sub> = 0.87	No
Bigeye tuna in the EPO	Indicator Analysis	2018	IATTC	SWFSC	NA	NA	NA	NA	NA	Determination pending
Yellowfin tuna in the EPO	Assessment	2017	IATTC	SWFSC	F <sub>MSY</sub>	NA	F <sub>2014-16</sub> = NA	NA	F <sub>2014-16</sub> / F <sub>MSY</sub> = 0.97	No
Yellowfin tuna in the EPO	Assessment	2018	IATTC	SWFSC	F <sub>MSY</sub>	NA	F <sub>2015-17</sub> = NA	NA	F <sub>2015-17</sub> / F <sub>MSY</sub> = 1.01	Determination pending
Skipjack tuna in the EPO	Indicator Analysis	2018	IATTC	SWFSC	NA	NA	NA	NA	NA	Determination pending
Skipjack tuna in the EPO	Indicator Analysis	2017	IATTC	SWFSC	NA	NA	NA	NA	NA	No*
Common thresher shark	Assessment	2018	NMFS	SWFSC	1-SPR <sub>MSY</sub>	0.45	1-SPR <sub>2012-14</sub> = 0.097	NA	0.21	Determination pending
Bigeye tuna in the WCPO	Assessment	2017	SPC	PIFSC	F <sub>MSY</sub>	0.5	F <sub>2015</sub> = NA**	NA	0.83	No
Yellowfin tuna in the WCPO	Assessment	2017	SPC	PIFSC	F <sub>MSY</sub>	0.12	NA	NA	0.74	No***

\*Last status determination was in 2011.

\*\*For the 2017 WCPO bigeye tuna assessment, the ratios of F/Fmsy and B/Bmsy were calculated, but the separate F, Fmsy, B, and Bmsy estimates were not available. No minimum stock size threshold (MSST)/overfished threshold could be calculated, but because the stock was above Bmsy, it had to be above MSST.

\*\*\*Last status determination was in 2014.

**Table 2.** Stock assessment information for the purposes of determining whether HMS stocks are overfished

Management Unit Species	Assessment Overview				Overfished						
Stock	Assessment or Indicator Analysis	Assessment Year	Assessment Lead	Lead NMFS Science Center	B <sub>MSY</sub> or proxy	Current B <sub>MSY</sub> or proxy quantity estimate	Current B quantity estimate	MSST (1-M* B <sub>MSY</sub> or 0.5 B <sub>MSY</sub> )	Current B/MSST	RFMO Ref. point (if adopted)	Overfished?
North Pacific albacore tuna	Assessment	2017	ISC	SWFSC	SSB <sub>MSY</sub>	32,638 mt	SSB <sub>2015</sub> = 80,618 mt	16,972 mt	4.75	20%SSB <sub>current</sub> , F=0=32, 614 mt	No
Blue shark in the NPO	Assessment	2017	ISC	PIFSC/SWFSC	SSB <sub>MSY</sub>	179,539 mt	SSB <sub>2015</sub> = 308,286	136,450-154,608 mt*	2.0 - 2.3	NA	No
Pacific bluefin tuna in the NPO	Assessment	2018	ISC	SWFSC	SSB <sub>MSY</sub>	135,874 mt	SSB <sub>2016</sub> = 21,331 mt	101,905.5 mt	0.21	NA	Determination pending
Shortfin mako shark in the NPO	Assessment	2018	ISC	PIFSC/SWFSC	S <sub>MSY</sub>	633,700 female sharks	S <sub>A2016</sub> = 860,200 female sharks	(1-0.128) * 633700 = 552,586 female sharks	1.6	NA	Determination pending
WCNPO swordfish	Assessment	2018	ISC	PIFSC	SSB <sub>MSY</sub>	15,702 mt	SSB <sub>2016</sub> = 29,403 mt	(1-0.22) *15702 = 12,248 mt	2.4	NA	Determination pending
Bigeye tuna in the EPO	Assessment	2017	IATTC	SWFSC	B <sub>MSY</sub> (biomass of age 3+ quarters old fish at MSY)	96,360 mt	B (biomass of age 3+ quarters old fish at beginning of 2017) = 118,523	48,130 mt	2.9	NA	No
Bigeye tuna in the EPO	Indicator Analysis	2018	IATTC	SWFSC	NA	NA	NA	NA	NA	NA	Determination pending
Yellowfin tuna in the EPO	Assessment	2017	IATTC	SWFSC	S <sub>MSY</sub> (unitless index of spawning biomass at MSY)	3,624	S = 3,117	1,812	1.72	NA	No

Yellowfin tuna in the EPO	Assessment	2018	IATTC	SWFSC	S <sub>MSY</sub> (unitless index of spawning biomass at MSY)	3,634	S = 3,925 (S is an unitless index of spawning biomass)	1,817	2.1	NA	Determination pending
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\*B<sub>limit</sub> = 136,450-154-608 b/c mortality changes w/ age and ranges from 0.24-0.14 for mature fish; females are 50% mature at age 5-6.

**Table 2 continued.** Stock assessment information for the purposes of determining whether HMS stocks are overfished

Management Unit Species	Assessment Overview				Overfished						
	Assessment or Indicator Analysis	Assessment Year	Assessment Lead	Lead NMFS Science Center	B <sub>MSY</sub> or proxy	Current Bmsy or proxy quantity estimate	Current B quantity estimate	MSST (1-M*B <sub>MSY</sub> or 0.5B <sub>MSY</sub> )	Current B/MSST	RFMO Ref. point (if adopted)	Overfished?
Skipjack tuna in the EPO	Indicator Analysis	2018	IATTC	SWFSC	NA	NA	NA	NA	NA	NA	Determination pending
Skipjack tuna in the EPO	Indicator Analysis	2017	IATTC	SWFSC	NA	NA	NA	NA	NA	NA	No**
Common thresher shark	Assessment	2018	NMFS	SWFSC	SSB <sub>MSY</sub>	101,500 mature females	SSB = 136,800 mature females	97,500 mature females	1.4	NA	Determination pending
Bigeye tuna in the WCPO	Assessment	2017	SPC	PIFSC	SSB <sub>MSY</sub>	454,100 mt	558,543 mt	NA	NA***	NA	No
Yellowfin tuna in the WCPO	Assessment	2017	SPC	PIFSC	SBF=0	2,178,220 mt	NA	NA	NA	20% SBF=0 where SBF=0 is average over 2005–2014	No****

\*\*Last status determination was in 2011.

\*\*\*For the 2017 WCPO bigeye tuna assessment, the ratios of F/F<sub>msy</sub> and B/B<sub>msy</sub> were calculated, but the separate F, F<sub>msy</sub>, B, and B<sub>msy</sub> estimates were not available. No minimum stock size threshold (MSST)/overfished threshold could be calculated, but because the stock was above B<sub>msy</sub>, it had to be above MSST.

\*\*\*\*Last status determination was in 2014.



***List of HMS Stock Assessments***

[Alexandre Aires-da-Silva, Carolina Minte-Vera, and Mark Maunder. 2017. Status of Bigeye Tuna in the Eastern Pacific Ocean in 2016 and Outlook for the Future. Prepared for the Eighth Meeting of the Inter-American Tropical Tuna Commission \(IATTC\) Scientific Advisory Committee \(SAC\), May 8-12, 2017, La Jolla, California, USA. Doc SAC-08-04a](#)

[Carolina Minte-Vera, Alexandre Aires-da-Silva and Mark Maunder. 2017. Status of Yellowfin tuna in the EPO in 2016 and outlook for the future. Prepared for the Eighth Meeting of the IATTC SAC, May 8-12, 2017, La Jolla, California USA. Doc SAC-08-04b](#)

[Carolina Minte-Vera, Mark Maunder, and Alexandre Aires-da-Silva. 2018. Status of Yellowfin Tuna in the Eastern Pacific Ocean in 2017 and Outlook for the Future. Prepared for the Ninth Meeting of the Inter-American Tropical Tuna Commission \(IATTC\) Scientific Advisory Committee, May 14-18, 2018, La Jolla, California, USA. Doc SAC-09-06](#)

[Haikun Xu, Carolina Minte-Vera, Mark N. Maunder, and Alexandre Aires-da-Silva. 2018. Status of Bigeye Tuna in the Eastern Pacific Ocean in 2017 and Outlook for the Future. Prepared for the Ninth Meeting of the Inter-American Tropical Tuna Commission \(IATTC\) Scientific Advisory Committee, May 14-18, 2018, La Jolla, California, USA. Doc SAC-09-05](#)

[International Scientific Committee for Tuna and Tuna like Species in the North Pacific Ocean \(ISC\) Albacore Working Group. 2017. Stock Assessment of Albacore Tuna in the North Pacific Ocean in 2017. Prepared for the Seventeenth Meeting of the ISC, July 12-17, 2017, Vancouver, British Columbia, Canada.](#)

[ISC Pacific Bluefin Tuna Working Group. 2018. Stock Assessment of Pacific Bluefin Tuna in the Pacific Ocean in 2018. Prepared for the Eighteenth Meeting of the ISC, July 11-16, 2017, Yeosu, Republic of Korea.](#)

[ISC Shark Working Group \(SWG\). 2017. Stock Assessment and Future Projections of Blue Shark in the North Pacific Ocean Through 2015. Prepared for the Seventeenth Meeting of the ISC, July 12-17, 2017, Vancouver, British Columbia, Canada.](#)

[ISC SWG. 2018. Stock Assessment of Shortfin Mako Shark in the North Pacific Ocean Through 2016. Prepared for the Eighteenth Meeting of the ISC, July 11-16, 2017, Yeosu, Republic of Korea.](#)

[ISC Billfish Working Group. 2018. Stock Assessment of Swordfish \(\*Xiphias gladius\*\) in the Western and Central North Pacific Ocean Through 2016. Prepared for the Eighteenth Meeting of the ISC, July 11-16, 2017, Yeosu, Republic of Korea.](#)

[Maunder, M. 2017. Updated indicators of stock status for skipjack tuna in the Eastern Pacific Ocean. Prepared for the Eighth Meeting of the IATTC SAC, May 8-12, 2017, La Jolla, California USA. Doc SAC-08-04](#)

[Maunder, M. 2018. Updated Indicators of Stock Status for Skipjack Tuna in the Eastern Pacific Ocean. Prepared for the Ninth Meeting of the IATTC SAC, May 14-18, 2018, La Jolla, California USA. Doc SAC-09-07](#)

[Maunder M., Cleridy E. Lennert-Cody, and Marlon Román. Stock Status Indicators for Bigeye Tuna. Prepared for the Ninth Meeting of the IATTC SAC, May 14-18, 2018, La Jolla, California USA. Doc SAC-09-16](#)

[McKechnie S., G. Pilling, and J. Hampton. 2017. Stock Assessment of Bigeye Tuna in the Western and Central Pacific Ocean. Doc SPC-WP-05](#)

[Takeuchi Y., G. Pilling and J. Hampton. 2017. Stock assessment of swordfish in the SW Pacific. Doc SA-WP-13](#)

[Teo, S., Garcia Rodriguez, E. and Sosa-Nishizaki. O. 2018. Status of Common Thresher Sharks, \*Alopias vulpinus\*, Along the West Coast of North America: Updated Stock Assessment Based on Alternative Life History. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-595. <https://doi.org/10.7289/V5/TM-SWFSC-595>](#)

[Tremblay-Boyer L., S. McKechnie, G. Pilling and J. Hampton 2017. Stock assessment of yellowfin tuna in the western and central Pacific Ocean. Doc SPC-WP-06](#)

[Tremblay-Boyer L., J. Hampton, S. McKechnie and G. Pilling. 2018. Stock assessment of South Pacific albacore tuna. Doc SPC-WP-05](#)