Agenda Item I.3
Attachment 1
November 2020

DRAFT

STATUS OF THE U.S. WEST COAST FISHERIES FOR HIGHLY MIGRATORY SPECIES

STOCK ASSESSMENT AND FISHERY EVALUATION

The Highly Migratory Species Stock Assessment and Fishery Evaluation document is maintained online on the Pacific Council website with an archive copy of web page content created each January. The status of stocks web page will be updated with the results of the biennial harvest specifications process.

Status of stocks

Under the Magnuson-Stevens Act, Councils must identify status determination criteria which can be used to decide whether overfishing is occurring (fishing mortality is above a maximum fishing mortality threshold) or the stock is overfished (biomass is less than a minimum stock size threshold). Chapter 4 in the HMS FMP describes how these status determination criteria may be determined. They are derived from an estimate of maximum sustainable yield (MSY), "the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological, environmental conditions and fishery technological characteristics (e.g., gear selectivity), and the distribution of catch among fleets." Frequently MSY is difficult to estimate for HMS stocks, either due to stock dynamics or the lack of sufficient information to conduct a stock assessment. In those cases, proxy values may be determined for MSY and related status determination criteria. In general, the Council considers the biological reference points, or proxies approved by regional fishery management organizations to be the best available science.

In the case of HMS in the Pacific, most stock assessments are conducted by several international organizations, established through conventions that function akin to treaties among sovereign governments. This makes it difficult, if not impossible, for the U.S., or any participating country, to unilaterally peer review the assessments sponsored by these organizations. Therefore, NMFS employs "other peer review processes" to determine whether the assessments constitute the best scientific information available for these transboundary stocks (81 FR 54561; August 16, 2016), including through participation by the U.S. government in these organizations. Once NMFS makes a best scientific information available (BSIA) determination on the outputs of an assessment produced by an international organization, the agency uses this information to determine the status of stocks relative to status determination criteria (SDC) identified in the FMP for the purposes of domestic management.

Organizations that conduct HMS stock assessments

Stock status is most reliably determined from stock assessments that integrate fishery and life history information across the range of the stock. A list of current stock assessments is provided at the end of this document. This section summarizes assessments completed in 2019 and 2020 by RFMOs and other entities.

Inter-American Tropical Tuna Commission (IATTC)

In the Eastern Pacific Ocean (EPO) scientific staff employed by the Inter-American Tropical Tuna Commission (IATTC) conduct stock assessments mainly for tropical tunas (bigeye, yellowfin, and skipjack) and some billfish (striped marlin, swordfish). The Fishery Status Reports summarize fisheries and stock status and the most recent stock assessment reports may be accessed on their 2020 Scientific Advisory Committee meeting page. All IATTC staff assessments and analyses are reviewed by the Scientific Advisory Committee.

In 2019, IATTC Scientific Staff determined, and the IATTC Scientific Advisory Committee (SAC) concurred, that the stock assessments for bigeye tuna (*T. obesus*) and yellowfin tuna (*T. albacares*) in the eastern Pacific Ocean (EPO) were not suitable for management. IATTC staff, NMFS, and the SSC considered several issues with the longline index that needed to be addressed. In 2019, the IATTC completed indicator analyses for the EPO stocks of bigeye, yellowfin, and skipjack tuna (*Katsuwonus pelamis*) for management purposes, and planned a rigorous update to the models for benchmark assessments of both EPO bigeye and yellowfin stocks in 2020. NMFS last determined EPO yellowfin to be subject to overfishing, but not overfished, based on a 2018 assessment (see Tables 1 and 2); and the Council made recommendations in 2019 pursuant to MSA 304(i). This was despite concerns regarding the effect of the longline index on the F-multiplier in the 2018 assessment since these issues were not as apparent until IATTC staff produced the results of the 2019 assessment. Most recently, EPO bigeye tuna was determined to be neither overfished nor subject to overfishing, based on BSIA from a 2017 assessment, as reflected in Table 1 and Table 2. The last status determination for skipjack was in 2011, and it was neither overfished nor subject to overfishing.

In 2020, IATTC scientific staff used a new approach for assessing bigeye and yellowfin tuna in the eastern Pacific Ocean. IATTC scientific staff presented risk assessments for both stocks instead of base case assessments. The risk assessments show the probability of exceeding F_{MSY} or SSB_{MSY} as opposed to providing a base case model estimate for $F_{current}$ and $SSB_{current}$. This change may have implications for evaluating the results of these assessments relative to status determination criteria specified in the HMS Fishery Management Plan. The SAC will review these assessments during its meeting. Once these assessments are final, NMFS can consider whether they constitute BSIA for determining the status of these stocks.

Secretariat of the Pacific Community Oceanic Fisheries Program (SPC-OFP)

In the Western and Central Pacific Ocean (WCPO), the Secretariat of the Pacific Community Oceanic Fisheries Program (SPC-OFP) conducts stock assessments as the science provider to the Western and Central Pacific Fisheries Commission (WCPFC). Like the IATTC, they tend to focus

on the tropical tunas, but have also completed stock assessments for South Pacific albacore tuna and striped marlin. Their stock assessments may be accessed by visiting the WCPFC stock assessment webpage.

In 2019 SPC assessed skipjack tuna in the western and central Pacific Ocean. SPC staff also conducted assessments of the oceanic whitetip shark stock in the Western and Central Pacific Ocean and the SW Pacific striped marlin stock in the WCPO; however, NMFS does not make status determinations for this stock.

In 2020 SPC assessed bigeye tuna and yellowfin tuna in the western and central Pacific Ocean.

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

In the North Pacific Ocean (NPO) the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) conducts stock assessments, also as a science provider for the WCPFC, and specifically that organization's Northern Committee. The ISC has formed working groups for North Pacific albacore, Pacific bluefin tuna, billfish (marlins and swordfish), and sharks. Shark species of interest include blue, shortfin, mako, bigeye thresher, pelagic thresher, silky, oceanic whitetip, and hammerhead species. The ISC Plenary reviews assessments and analyses, and ISC annual Plenary Reports provide stock status updates and conservation recommendations. ISC stock assessments can be found on its Stock Assessment webpage.

In 2019 the ISC Billfish Working Group completed an assessment for the Western and Central North Pacific stock of striped marlin (*Kajikia audax*). NMFS determined that this stock continues to be both overfished and subject to overfishing, based on the best scientific information available (BSIA), as reflected in Tables 1 and 2. In September 2016, pursuant to 304(i) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), NMFS sent notice to the Pacific Fishery Management Council (Council) regarding this stock status (see Agenda Item J.3). In July 2017, the Council recommended no new domestic regulations or additional international recommendations, citing no known impact of U.S. West Coast vessels on the WCPO stock and evidence that all Western and Central Pacific Fisheries Commission (WCPFC) members were complying with catch reductions in conservation and management measure 2010-01.

In 2020 ISC Working Groups completed benchmark stock assessments for North Pacific albacore and Pacific bluefin tuna. The results from these stock assessments, reflected in Tables 1 and 2, are considered BSIA. These results indicate that PBF is overfished and subject to overfishing, and that albacore is not overfished nor subject to overfishing. However, NMFS' status determination for Pacific bluefin tuna is pending.

The Shark Working Group presented a sensitivity analysis for North Pacific blue shark; however, the Plenary concluded this was not suitable for changing stock status and conservation information as would be the case for a full update or benchmark assessment.

Assessment of stock status

National Standard 2 requires using the best scientific information available in management. This requires periodic updating of stock status for comparing against status determination criteria. HMS FMP Chapter 4 describes the management reference points used to assess stock status and the methods for determining the values for these reference points. These reference points are:

Maximum sustainable yield (MSY): MSY is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological, environmental conditions and fishery technological characteristics (e.g., gear selectivity), and the distribution of catch among fleets. For management purposes MSY is usually expressed in terms of the following reference points:

MSY fishing mortality rate (F_{MSY}): The fishing mortality rate that, if applied over the long term, would result in MSY.

MSY stock size (B_{MSY}): The long-term average size of the stock or stock complex, measured in terms of spawning biomass or other appropriate measure of the stock's reproductive potential that would be achieved by fishing at F_{msy}.

Status determination criteria (SDC) are quantifiable thresholds (or their proxies) that are used to determine if overfishing has occurred, or if the stock or stock complex is overfished. "Overfished" relates to biomass of a stock or stock complex, and "overfishing" pertains to a rate or level of removal of fish from a stock or stock complex. SDC are:

Maximum fishing mortality threshold (MFMT): The level of fishing mortality (F), on an annual basis, above which overfishing is occurring. The MFMT or reasonable proxy may be expressed either as a single number (a fishing mortality rate or F value), or as a function of spawning biomass or other measure of reproductive potential.

Overfishing limit (OFL): The annual amount of catch that corresponds to the estimate of MFMT applied to a stock or stock complex's abundance and is expressed in terms of numbers or weight of fish. The OFL is an estimate of the catch level above which overfishing is occurring.

Minimum stock size threshold (MSST): The level of biomass below which the stock or stock complex is considered to be overfished.

Optimum yield (OY): The amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems.

HMS FMP section 4.2 describes the considerations for determining MSY. As part of the biennial process, the HMSMT will review recent stock assessments or other information as described below, and submit a draft SAFE document for review at the September Council meeting containing MSY estimates, noting if they are a change from the current value. At the request of the Council,

the Scientific and Statistical Committee (SSC) will review these estimates and make recommendations to the Council on their application in management decisions. Based on this advice, the Council may recommend revisions to MSY estimates to NMFS.

HMS FMP section 4.4 describes how SDC are computed. NMFS uses the following status determination criteria to identify stocks subject to overfishing or that have become overfished as specified at MSA section 304(e).

MFMT equals F_{MSY}. The OFL is the annual amount of catch that corresponds to the estimate of MFMT applied to a stock or stock complex's abundance and is expressed in terms of numbers or weight of fish. Overfishing occurs when fishing mortality F is greater than the MFMT mortality or catch exceeds OFL for one year or more.

MSST is calculated as the greater of:

$B_{MSST} = (1\text{-}M)B_{MSY}$ when M (natural mortality) ≤ 0.5, or

$B_{MSST} = 0.5B_{MSY}$ when $M > 0.5$

MSST or a reasonable proxy must be expressed in terms of spawning biomass or other reproductive potential. Should the estimated size of an HMS stock in a given year fall below this threshold, the stock is considered overfished.

In the case of species under international management, the Council should recommend that the appropriate RFMO consider adopting the SDCs determined pursuant to the HMS FMP as limit reference points for international management (see FMP Section 2.1).

Current status determination criteria for HMS FMP stocks

NMFS West Coast Region and Southwest Fisheries Science Center (SWFSC) make BSIA and status determinations for some but not all stocks of HMS FMP management unit species. The Pacific Islands Regional Office and Pacific Islands Fisheries Science Center (PIFISC) are the lead in making status and BSIA determinations for stocks occurring in the Western Pacific.

Table 1 shows stock assessment information used to determine whether HMS FMP stocks are subject to overfishing including estimates of current fishing mortality and MFMT and Table 2 shows the information related to determinations that a stock is overfished including estimates of current SSB and MSST. This information is compiled by NMFS West Coast Region and the Southwest Fisheries Science Center. If available, the status determinations are listed in these tables as well.

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	MFMT (F_{MSY} or Proxy)	Current F_{MSY} or proxy estimate	Current F quantity estimate	RFMO Ref. point (if adopted)	F/F_{MSY} ratio	Subject to Overfishing?
North Pacific albacore tuna	Assessment	2020	ISC	F_{MSY}	0.83	F2015-17= 0.5	NA	0.60	No
Blue shark in the NPO	Assessment	2017	ISC	F_{MSY}	0.35	F2002-14 = 0.13	NA	0.37	No
Pacific bluefin tuna in the NPO	Assessment	2020	ISC	1-SPR_{MSY}	0.79	1-SPR2016-18 = 0.86	NA	1.09	Pending
Shortfin mako shark in the NPO	Assessment	2018	ISC	1-SPR_{MSY}	0.26	1-SPR_{MSY} 2013-15 = 0.16	NA	0.62	No
WCNPO swordfish	Assessment	2018	ISC	F_{MSY}	0.68	F2013-15 = 0.32	NA	0.47	No
Bigeye tuna in the EPO	Assessment	2017	IATTC	F_{MSY}	NA	F2014-16 = NA	NA	$F2014\text{-}16/F_{MSY}$ = 0.87	No
Yellowfin tuna in the EPO	Assessment	2018	IATTC	F_{MSY}	NA	F2015-17 = NA	NA	$F2015\text{-}17/F_{MSY}$ = 1.01	Yes
Skipjack tuna in the EPO	Assessment	2004	IATTC	NA	NA	NA	NA	NA	No
Common thresher shark	Assessment	2018	NMFS	1-SPR_{MSY}	0.45	1-SPR2012-14 = 0.097	NA	0.21	No
Bigeye tuna in the WCPO	Assessment	2020	SPC	F_{MSY}	0.05	F2018 = NA	NA	0.74	Pending
Yellowfin tuna in the WCPO	Assessment	2020	SPC	F_{MSY}	0.10	F2018=NA	NA	0.366	Pending
EPO swordfish	Assessment	2014	ISC	U (exploitation rate = catch/biomass)	0.18	F2012 = 0.19	NA	1.11	Yes
EPO striped marlin	Assessment	2010	IATTC	F	NA	NA	NA	0.16	No
Dorado									Unknown
WCNPO striped marlin	Assessment	2019	ISC	F_{MSY}	0.6	F3-12 ages in 2015-2017 = 1.07	NA	1.78	Yes

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	B_{MSY} or proxy	Current B_{MSY} or proxy estimate	Current B quantity estimate	MSST (1-MxB$_{MSY}$ or 0.5B$_{MSY}$)	Current B/MSST	RFMO Ref. point (if adopted)	Overfished?
North Pacific albacore tuna	Assessment	2020	ISC	SSB_{MSY}	19,535 mt	SSB2018 = 58,858 mt	10,158 mt	5.8	20%SSBcurrent, F=0 =25,590 mt	No
Blue shark in the NPO	Assessment	2017	ISC	SSB_{MSY}	179,539 mt	SSB2015 = 308,286	136,450-154,608 mt*	2.0 - 2.3	NA	No
Pacific bluefin tuna in the NPO	Assessment	2020	ISC	SSB_{MSY}	131,363 mt	SSB2018 = 28,228 mt	98,522 mt	0.3	NA	Pending
Shortfin mako shark in the NPO	Assessment	2018	ISC	SA_{MSY}	633,700 female sharks	SA2016 = 860,200 female sharks	(1-0.128)x633700 = 552,586 female sharks	1.6	NA	No
WCNPO swordfish	Assessment	2018	ISC	SSB_{MSY}	15,702 mt	SSB2016 = 29,403 mt	(1-0.22)x15702 = 12,248 mt	2.4	NA	No
Bigeye tuna in the EPO	Assessment	2017	IATTC	B (biomass of age 3+ quarters old fish) at $_{MSY}$	96,360 mt	B (age 3+ quarters old fish at start of 2017) = 118,523	48,130 mt	2.9	NA	No
Yellowfin tuna in the EPO	Assessment	2018	IATTC	S_{MSY} (S= unitless spawning biomass index)	3,634	S = 3,925 (S= unitless spawning biomass index)	1,817	2.1	NA	No
Skipjack tuna in the EPO	Assessment	2004	IATTC	NA	NA	NA	NA	NA	NA	No**
Common thresher shark	Assessment	2018	NMFS	SSB_{MSY}	101,500 mature females	SSB = 136,800 mature females	97,500 mature females	1.4	NA	No

Table 2 (continued). 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**	**B_{MSY} or proxy**	**Current B_{MSY} or proxy estimate**	**Current B quantity estimate**	**MSST (1-MxB$_{MSY}$ or 0.5B$_{MSY}$)**	**Current B/MSST**	**RFMO Ref. point (if adopted)**	**Overfished?**
Yellowfin tuna in the WCPO	Assessment	2020	SPC	SSB_{MSY}	860,326 mt	2,090.592 mt	NA	NA	20%SBF=0 where SBF=0 is average over 2005–2014	Pending
EPO swordfish	Assessment	2014	ISC	B_{MSY}	31,200	B2012 = 58,590 mt	20,280 mt	3***	NA	No
EPO striped marlin	Assessment	2010	IATTC	SSB_{MSY}	1246 mt	SSB2009 = 1488 mt	623 mt	2.3	NA	No
Dorado										Unknown
WCNPO striped marlin	Assessment	2019	ISC	SSB_{MSY}	2604 mt	SSB2017 = 981 mt	1302 mt	0.75	NA	Yes

***For EPO swordfish, appears $B2012/B_{MSY} = 1.87$ used for the status determination instead of $B2012/B_{MSST} = 3$; status is the same, not overfished.

Catches of HMS management unit species in west coast fisheries

Table 3 compares estimates of stockwide and U.S. West Coast catch of HMS management unit species. This information can inform considerations of the "relative impact of U.S. fishing vessels on the stock" when the Council considers responses to a notification that a stock is subject to overfishing or overfished "due to excessive international fishing pressure." When notified by NMFS, Magnuson-Stevens Act section 304(i) requires the Council to develop recommendations for domestic regulations and international actions taking into account this relative impact.

Note: The HMS Management Team will update this table after assessing available data sources and estimation methods.

Table 3. Stockwide and regional catches for HMS management unit species (x1,000 mt round weight), 2012–16.

Species (stock)	Stockwide Catch	U.S. West Coast Catch		Average Annual Fractional Catch
		Commercial	Recreational[6]	
TUNAS				
Albacore (NPO)	53–83[1]	10–14	0.7-1	0.20
Bluefin (NPO)	11–15[1]	<0.4	0.1-0.3	0.05
Bigeye (EPO)	85–105[2]	<0.05-0.5	<0.01	<0.01
Skipjack (EPO)	270–338[2]	<0.1	<0.01–0.1	<0.01
Yellowfin (EPO)	231–260[2]	0.01-1	0.1–0.8	<0.01
BILLFISHES				
Striped Marlin (EPO)	1.3–2.8[2]	<0.01[3]	0.02[4]	0.01
Swordfish (EPO)	10–11[1]	0.5–0.7	<0.01	0.14
SHARKS				
Common Thresher	Unknown	<0.1	0.01-0.03	
Shortfin Mako	Unknown	<0.05	0.01-0.02	
Blue (NPO)	18-31[1]	<0.06[3]	<0.01	<0.01
OTHER				
Dorado	4.5–5.5[5]	<0.01	0.01–0.2	0.01

Notes:
Data are from updated commercial (HMS SAFE Table 3), CPFV and private recreational catches (HMS SAFE Tables R-1, R-4, R-6) with weight conversions of 8.7 kg/albacore, 8.7 kg/bluefin, 10.0 kg/bigeye tuna, 3.0 kg/skipjack, 4.9 kg/yellowfin, 57.9 kg/striped marlin, 113 kg/swordfish, 29.2 kg/common thresher, 16.8 kg/mako, 8 kg/blue shark, and 5.6 kg/dorado.

1 International Scientific Committee Eighteenth Plenary Report Catch Tables, July 2018.
2 IATTC public domain data, EPO total estimated catch by year, flag, gear, species (Oct. 2017).
3 Striped marlin and blue shark commercial catches include estimates from the drift gillnet observed catch.
4 Striped marlin recreational catch is estimated at 300 fish/year based on club records plus CPFV logbook recorded catch.
5 FAO Area 77 catch FAO global fishery production dataset. Extracted October 1, 2018
6. 2014-2016, U.S. EEZ.

Current stock assessments for species managed under the HMS FMP

The most current assessment for FMP MUS and the publication year are listed below.

Tunas

- **North Pacific Albacore (2020):** Stock Assessment of Albacore Tuna in the North Pacific Ocean in 2020. Report of the Albacore Working Group. International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean 15-20 July 2020.

- **South Pacific Albacore (2018)**: Stock Assessment of South Pacific albacore tuna. Tremblay-Boyer L., J. Hampton, S. McKechnie and G. Pilling. Oceanic Fisheries Programme, The Pacific Community (SPC). WCPFC-SC14-2018/ SA-WP-05 Rev. 2. August 2, 2018.
- **Pacific Bluefin (2020):** Stock Assessment of Pacific Bluefin Tuna in the Pacific Ocean in 2020. ISC Pacific Bluefin Tuna Working Group. International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean 15-20 July 2020.
- **Bigeye (EPO) (2020)**: Bigeye Tuna in the Eastern Pacific Ocean, 2019: Benchmark Assessment. Haikun Xu, Mark N. Maunder, Carolina Minte-Vera, Juan L. Valero, Cleridy Lennert-Cody, and Alexandre Aires-da-Silva. Prepared for the Eleventh Meeting of the Inter-American Tropical Tuna Commission (IATTC) Scientific Advisory Committee. Doc SAC-11-06.
- **Bigeye (WCPO) (2020):** Stock assessment of bigeye tuna in the western and central Pacific Ocean. N. Ducharme Barth, M. Vincent, J. Hampton, P. Hamer, P. Williams, G. Pilling. Scientific Committee Sixteenth Regular Session, August 11-20, 2020. SC16-SA-WP-03.
- **Skipjack (EPO) (2019):** Updated Indicators Of Stock Status for Skipjack Tuna in the Eastern Pacific Ocean. Maunder, M. Prepared for the Tenth Meeting of the IATTC SAC, May 13-17, 2019, La Jolla, California USA. Doc SAC-10-09.
- **Skipjack (WCPO) (2019):** Stock assessment of skipjack tuna in the western and central Pacific Ocean (25July) – Rev.02. Vincent, M., G. Pilling and J. Hampton. Scientific Committee Fifteenth Regular Session. Western and Central Pacific Fisheries Commission, August 12-19, 2019. WCPFC-SC15-2019/SA-WP-05.
- **Yellowfin (EPO) (2020):** Yellowfin Tuna in the Eastern Pacific Ocean, 2019: Benchmark Assessment. Carolina Minte-Vera, Mark N. Maunder, Haikun Xu, Juan L. Valero, Cleridy E. Lennert-Cody, and Alexandre Aires-da-Silva. Prepared for the Eleventh Meeting of the Inter-American Tropical Tuna Commission (IATTC) Scientific Advisory Committee. Doc SAC-10-07.
- **Yellowfin (WCPO) (2020):** Stock assessment of yellowfin tuna in the western and central Pacific Ocean. M. Vincent, N. Ducharme Barth, J. Hampton, P. Hamer, P. Williams, G. Pilling. Scientific Committee Sixteenth Regular Session, August 11-20, 2020. SC16-SA-WP-04.

Billfishes

- **Striped marlin (WCPO) (2019):** Stock Assessment Report for Striped Marlin *(Kajikia audax*) in the Western and Central North Pacific Ocean Through 2017. Report of the Billfish Working Group. International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean, July 11-15, 2019, Taipei, Taiwan.
- **Striped Marlin (SW Pacific – WCPO) (2019):** Stock assessment of SW Pacific striped marlin in the WCPO. Ducharme Barth, N., Pilling, G. and Hampton, J. Scientific Committee Fifteenth Regular Session. Western and Central Pacific Fisheries Commission, August 12-19, 2019. WCPFC-SC15-2019/SA-WP-07.
- **Striped marlin (EPO) (2009)**: Assessment of Striped Marlin in the Eastern Pacific Ocean In 2008 and Outlook for the Future. Michael G. Hinton. Inter-American Tropical Tuna Commission. Stock Assessment Report 10. An update with data through October 30, 2010, is reported in Fishery Status Report No. 12, Tunas and Billfishes in the Eastern Pacific Ocean in 2013.
- **Swordfish (WCNPO) (2018):** Stock Assessment of Swordfish (*Xiphias gladius*) in the Western and Central North Pacific Ocean Through 2016. ISC Billfish Working Group. Prepared for the Eighteenth Meeting of the ISC, July 11-16, 2018, Yeosu, Republic of Korea.

- **Swordfish (EPO) (2011):** Status of Swordfish in the Eastern Pacific Ocean in 2010 and Outlook for the Future. Michael G. Hinton and Mark N. Maunder. Inter-American Tropical Tuna Commission Scientific Advisory Committee 2nd Meeting. La Jolla, California (USA), 9-12 May 2011.
- **Swordfish (SWPO) (2013)**: Stock Assessment of Swordfish (*Xiphias gladius*) in the Southwest Pacific Ocean. Davies, N., G. Pilling, S. Harley, and J. Hampton Secretariat of the Pacific Community (SPC), Ocean Fisheries Programme (OFP), Noumea, New Caledonia (July 17, 2013).

Sharks

- **Blue shark (NPO) (2017):** Stock Assessment and Future Projections of Blue Shark in the North Pacific Ocean Through 2015. Report of the Shark Working Group. International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean. 12-17 July 2017, Vancouver, Canada.
- **Common Thresher Shark (EPO) (2018):** Status of Common Thresher Sharks, *Alopias Vulpinus*, along the West Coast of North America: Updated Stock Assessment Based on Alternative Life History. Teo, S., Garcia Rodriguez, E. and Sosa-Nishizaki. O. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-595. https://doi.org/10.7289/V5/TM-SWFSC-595
- **Shortfin Mako Shark (NPO) (2018):** Stock Assessment of Shortfin Mako Shark in the North Pacific Ocean through 2016. Report of the Shark Working Group. International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean. July 11-16, 2018, Yeosu, Republic of Korea.

Others

- **Dorado (SEPO) (2016):** Exploratory Stock Assessment of Dorado (*Coryphaena Hippurus*) in the Southeastern Pacific Ocean (DRAFT). Alexandre Aires-da-Silva, Juan L. Valero, Mark. N. Maunder, Carolina Minte-Vera, Cleridy Lennert-Cody, Marlon H. Román, Jimmy Martínez-Ortiz, Edgar J. Torrejón-Magallanes and Miguel N. Carranza. Inter-American Tropical Tuna Commission, Scientific Advisory Committee Sixth Meeting. May 9-13, 2016.