Agenda Item E.3
Attachment 1
September 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. For the biennial harvest specifications process the current content of the status of stocks page is reproduced below.

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, the IATTC scientific staff reported large uncertainties in the yellowfin tuna stock assessment model and concluded that the results produced by the model are not a reliable indicator of stock status. The issues with the yellowfin tuna stock assessment model are similar to those presented at the 2018 SAC meeting for bigeye tuna. In the absence of reliable stock assessment models for both yellowfin and bigeye tuna for 2019, the IATTC scientific staff presented stock status indicators for these species. The results showed that bigeye and yellowfin tuna have been under increasing fishing pressure from purse seine sets associated with floating objects, such as FADs.

In 2020 the IATTC scientific staff completed new benchmark stock assessments for EPO yellowfin tuna and EPO bigeye tuna. These assessments were conducted within a new risk analysis framework instead of the previous "best assessment" approach. The risk analysis framework employs "…a variety of reference models … to represent plausible alternative hypotheses about the biology of the fish, the productivity of the stocks, and/or the operation of the fisheries, thus effectively incorporating uncertainty into the management advice as it is formulated." (DOCUMENT SAC-11-08 REV).

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*).

In 2020 ISC Working Groups completed benchmark stock assessments for North Pacific albacore and Pacific bluefin tuna. 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.

This HMS SAFE document contains a table listing stock assessments used to make current status determinations for the management unit species. noting the organization conducting the assessment, the lead NMFS Science Center for that stock, estimates of the MSY, MFMT, MSST, any reference points adopted by RFMOs, and current status determinations. As noted above, NMFS uses these estimates as a basis for making status determinations. *NMFS is currently updating the table to incorporate information from 2020 stock assessments; it will be provided in a supplemental report.*

Catches of HMS management unit species in west coast fisheries

The table below 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: This table will be updated with 2014-2018 catch estimates.

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.