JOINT SOUTHWEST FISHERIES SCIENCE CENTER AND WEST COAST REGION NATIONAL MARINE FISHERIES SERVICE (NMFS) REPORT ON BIENNIAL HARVEST SPECIFICATIONS AND MANAGEMENT MEASURES

During its September 2020 meeting, NMFS provided an overview of 2019 and 2020 stock assessments for highly migratory species (HMS) and noted a few pending status determinations based on those assessments (Agenda Item E.3.a, Supplemental Joint NMFS-SWFSC Report 1). During Council discussion, NMFS also noted concerns for a potential lapse in Inter-American Tropical Tuna Commission (IATTC) resolutions for the conservation and management of eastern Pacific Ocean (EPO) yellowfin and bigeye tunas and Pacific bluefin tuna; the consequence being no domestic regulations in place under the Tuna Conventions Act at 50 CFR 300 Subpart C. Subsequently, the Council requested that, for its November meeting, its Science and Statistical Committee (SSC) consider recent assessment results for stocks with pending status determinations and its advisory bodies further consider rationale and authority for unilateral action under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Below, NMFS provides relevant updates on outcomes and expectations for IATTC-related meetings, summarizes key results from the 2020 assessments for EPO stocks of yellowfin and bigeye tunas, poses questions for Council input for the purpose of determining stock status, and discusses relationships between stock status and management decisions.

With respect to pending status determinations, the Council specifically requested that its SSC review certain proxy values for status determination criteria (SDC) in the Fishery Management Plan for the U.S. West Coast Fisheries for Highly Migratory Species (HMS FMP). The proxies in question were to be derived from the IATTC's scientific staff's 2020 EPO yellowfin and bigeye tuna benchmark assessments, pending completion of external review by the IATTC's Scientific Advisory Committee (SAC). However, the SAC review that had been planned for September was postponed until late October. This precluded the SSC HMS subcommittee from considering the assessments and potential proxies therein prior to the November Council meeting, as NMFS could not determine the assessments to be best scientific information available (BSIA) before review by the SAC was complete.

Following completion of the SAC's review, NMFS was able to satisfy National Standard 2 requirements and determine that the 2020 EPO yellowfin and bigeye tuna (collectively, tropical tuna) stock assessments represent BSIA. The HMS FMP provides for the use of proxies from internationally-produced assessments for SDCs (i.e., minimum stock size threshold (MSST) and maximum fishing mortality threshold (MFMT)), and in 2018 the SSC and Council reviewed and approved NMFS proxy selections from IATTC assessments for these stocks noting that future review was not necessary. However, new methods in the 2020 tropical tuna benchmark assessments, including probabilistic frameworks, present challenges in relating these assessment results to the SDCs of the HMS FMP.

EPO yellowfin tuna: The 2020 assessment indicates a 12 percent probability that spawning biomass at the beginning of 2020 (S) is below a maximum sustainable yield (MSY) level (i.e., $P(S_{CUR}<S_{MSY})= 12\%$), and a nine percent probability that 2017-19 fishing mortality exceeds the

MSY level (i.e., $P(F_{CUR}>F_{MSY}) = 9\%$). Because the IATTC's target biomass threshold (S_{MSY}) is more conservative than MSST (i.e., $1\text{-}M*B_{MSY}$, where M is natural mortality), the assessment results suggest that the EPO yellowfin tuna stock is unlikely to be overfished. Because the IATTC's target fishing mortality threshold (F_{MSY}) is the same reference level as MFMT, the assessment results suggest it is also unlikely that the stock is subject to overfishing. There is zero probability that both IATTC's S and F limit reference points have been exceeded ($P(S_{CUR}<F_{LIMIT}) = 0\%$; $P(F_{CUR}>F_{LIMIT}) = 0\%$) (See Appendix A for more detail on IATTC reference points).

EPO bigeye tuna: In addition to the added complexity of interpreting the results of the probabilistic framework used in the 2020 benchmark assessment, the results are also bimodal (i.e. one set of results exceeds the reference point while another does not). For bigeye, there is a 53 percent probability that spawning biomass at the beginning of 2020 is below the MSY level ($P(S_{CUR}<S_{MSY}) = 53\%$) and a 50 percent probability that 2017-19 fishing mortality exceeds the MSY level ($P(F_{CUR}>F_{MSY}) = 50\%$). There is a small probability that both IATTC's S and F limit reference points have been exceeded ($P(S_{CUR}<S_{LIMIT})=6\%$; $P(F_{CUR}>F_{LIMIT}) = 5\%$) (See Appendix A for more detail on IATTC reference points).

Given the new assessment methods for the tropical tuna stocks, including bimodal results for the EPO bigeye tuna stock, more work is needed to either identify suitable proxies for the SDCs that are specified in the HMS FMP or to evaluate whether SDCs in the FMP should be updated based on this new information. We believe we can identify MFMT proxies within the assessment results for the purpose of making determinations regarding whether the stocks are subject to overfishing for the HMS subcommittee to the SSC to review. However, there are currently no suitable proxies for MSST.

NMFS staff provided an update on these issues to the SSC on November 12 and 13, 2020. After discussing issues related to selecting SDC proxies from the recent tropical tuna assessments, NMFS and the SSC considered it likely that the probabilistic frameworks used in these recent IATTC assessments will continue to be used going forward, and that these frameworks could be used in other international assessments. Therefore, NMFS and the SSC also discussed potential longer-term approaches for strengthening the connection between international assessment results and determining status based on SDCs in the FMP. The discussion covered implications of amending the FMP to include a flexible approach to using these types of results for status determinations, the workload and value of producing additional analyses for translating the probabilistic results into status determinations, and whether to request additional information from the IATTC scientific staff for the purpose of NMFS selecting proxies for both MFMT and MSST.

With these issues in mind, we plan to report MFMT proxies from the 2020 tropical tuna assessments in advance of the March meeting. The Council may be interested in the SSC reviewing those prior to the March meeting, as the Council had requested that in September and that could not happen. If that is the case, it may also be useful for NMFS to continue discussions with the SSC on the pros and cons of other approaches for using probabilistic assessment frameworks for making status determinations.

Since the Council's September 2020 meeting, the IATTC scheduled an annual meeting for November 30, through December 4, 2020. Additionally, member nations have been discussing the

potential for translating the three-year measure described in C-17-01, for EPO tropical tunas, and the two-year measure described in C-18-02, for Pacific bluefin tuna, into one-year rollover measures for a potential IATTC resolution on the management of these stocks for 2021. Currently, it appears likely that the IATTC will adopt resolutions for management of EPO tropical tunas and Pacific bluefin tuna in 2021 at their annual meeting in 2020.

Interpreting these EPO yellowfin and bigeye assessment results to determine the status of the stocks is relevant to determining and specifying Council authority for taking unilateral action to impose domestic management measures in such an instance of a lapse in IATTC resolutions. For example, determining the status is key to determining whether the Council is obligated to make recommendations for the management of these stocks under Section 304(i) of the MSA. Because the Council made recommendations concerning the overfishing status of EPO yellowfin tuna in 2019, it may not need to repeat this step if the status of that stock remains unchanged (i.e., not overfished, subject to overfishing). However, without internationally agreed upon management measures under the Tuna Conventions Act as was the case when the Council made its 2019 recommendations, the Council should expect a letter from NMFS indicating a need to make additional recommendations under Section 304(i) of the MSA unless the status of the stock based on the 2020 assessments is determined to be not subject to overfishing. With respect to EPO bigeye tuna, the Council would not be obligated to make recommendations under MSA 304(i) if there is no change to the stock's status (i.e., not overfished, not subject to overfishing) which is based on the 2017 assessment results. However, the Council would be obligated to make management recommendations if the stock's status was determined to change based on the 2020 assessment results. Furthermore, under a scenario in which there may be no internationally agreed upon measures for the stock, it may be necessary for the Council to make management recommendations as soon as during its March 2021 meeting such that they could be implemented before the peak fishing season for these stocks.

The situation with Pacific bluefin tuna is somewhat more clear in that a stock status determination based on the 2020 assessment is complete. The status was determined to be overfished and subject to overfishing. However, internationally agreed upon measures appear to be effective in reducing fishing mortality and increasing stock size on schedule with rebuilding targets. As such, NMFS would likely forgo notice to the Council obligating management recommendations under MSA 304(i). However, if internationally agreed upon measures lapse or weaken substantially, the Council should expect to receive a letter from NMFS obligating management recommendations concerning the status of Pacific bluefin tuna and the relative impact of U.S. fishing vessels.

Finally, whether NMFS sends the Council a notice determining a need for management recommendations under MSA 304(i) should not preclude Council discussion of other reasons for recommending management measures for Pacific bluefin or EPO tropical tunas.

APPENDIX A: Discussion of IATTC's Target and Interim Limit Reference Points

For EPO stocks of yellowfin and bigeye tuna, the IATTC manages to target biomass and fishing mortality reference points (S_{MSY} and F_{MSY}, respectively). In stock assessments, IATTC scientific staff typically refer to stocks being subject to overfishing or overfished relative to these target reference points. The IATTC uses that information to determine management measures with the intent of maintaining biomass and fishing mortality at MSY levels.

In addition to reporting target reference points for EPO yellowfin and bigeye stocks, the IATTC scientific staff also report interim limit reference points, which were adopted by the IATTC in 2014. The interim spawning biomass limit reference point (S_{LIMIT}) is the threshold of S that should be avoided, because further depletion could endanger the sustainability of the stock. The interim S_{LIMIT} is the spawning biomass that produces 50 percent of the virgin recruitment (R_0) if the stock-recruitment relationship follows the Beverton-Holt function with a steepness (h) of 0.75. This spawning biomass is equal to 0.077 of the equilibrium virgin spawning biomass (S_0).

The interim fishing mortality limit reference point (F_{LIMIT}) is the threshold of fishing mortality that should be avoided because fishing more intensively could endanger the sustainability of the stock. The interim F_{LIMIT} is the fishing mortality rate that, under equilibrium conditions, maintains the spawning population at S_{LIMIT}.

The IATTC's harvest control rule (HCR) requires action be taken if the probability (P) of the current spawning biomass ($S_{CURRENT}$) being below S_{LIMIT} is greater than 10 percent. Thus, to provide management advice, $S_{current}/S_{LIMIT}$, and the probability of $S_{CURRENT} < S_{LIMIT}$ (or $P(S_{CURRENT}/S_{LIMIT} <1)$, which is computed by assuming the probability distribution function for the ratio is normal), are reported. The HCR also requires action to be taken if the probability of the average fishing mortality during the terminal years of the assessment period ($F_{CURRENT}$) being above F_{LIMIT} is greater than 10 percent. Therefore, $F_{CURRENT}/F_{LIMIT}$, and the probability of this ratio being > 1 (by assuming the probability distribution function for the ratio is normal), are also reported (Minte-Vera et al. 2020, Xu et al. 2020).