Updating the Acceptable Biological Catch (ABC) and Annual Catch Limits (ACLs) for the Main Hawaiian Island Deep-7 Bottomfish for Fishing Year 2021-22 to 2023-24

Introduction

At the 139th meeting of the Scientific and Statistical Committee, the SSC shall review the new stock assessment update for the main Hawaiian Islands (MHI) deep-7 bottomfish with data to 2020 for the fishery-independent survey and 2018 for catch and effort data (Syslo et al. 2021). The stock assessment update was subject to a tier-2 Western Pacific Stock Assessment Review (WPSAR) chaired by SSC member Erik Franklin. The SSC WPSAR panel found that the results in the updated assessment are scientifically sound, represent the best scientific information available, and can be used to manage the MHI deep-7 bottomfish fishery (Franklin 2021). The SSC shall review the assessment update and the WPSAR report to determine whether a change in the ABC is warranted.

At the 166th meeting of the Western Pacific Regional Fishery Management Council (Council) in June 2016, the Council took action on improving the process for risk determination and uncertainty characterization based on new information made available to the SSC and the Council. Following from this action, the SSC shall evaluate the latest information and determine if it warrants changing the risk of overfishing. The Council's Fishery Ecosystem Plan also describes the ABC Control Rule that the SSC must evaluate the information and assign a tier to apply the control rule (WPRFMC and NMFS 2011). This document will walk through the new information provided by the peer-reviewed stock assessment, the existing scientific uncertainty characterization that provides the P* value to set the ABC, and the social, economic, ecological, and management uncertainties that provide the risk level to specify the ACLs.

New Scientific Information

The 2021 stock assessment update used the same Bayesian surplus-production modeling approach as the 2018 benchmark assessment (Langseth et al. 2018). The model fit bottomfish catch and effort data from the commercial catch reports and added 2016-2018 data and the fishery-independent data from 2017-2020. The single species assessment for *Pristipomoides filamentosus* (opakapaka) was also updated with corresponding data. The stock assessment update provided additional years of catch projections with risks of overfishing for various catch levels from 2021 to 2025.

Overall, the deep-7 bottomfish stock was not overfished and not experiencing overfishing (Table 1) in 2018. The OFL was estimated to be at 556-618 thousand pounds, depending on the number of future years under consideration. Similarly, opakapaka was not overfished and not experiencing overfishing. The single species assessment was proportional to the corresponding

value in the deep-7 complex with biomass overall years scaled by 55%, intermediate between the proportion from the fishery-independent survey at 46%, and the weight ratio with the complex at 68%.

Table 1 compares reference point values from the 2018 benchmark assessment and the 2021 assessment update. The deep-7 bottomfish MSY decreased between the 2018 benchmark and 2021 update. The harvest rate in the terminal year and the harvest rate at MSY have nominally decreased. The H/H_{MSY} ratio and the probability that overfishing is occurring also decreased. The biomass for the deep-7 complex had increased by 1.85 million pounds. The biomass at MSY and B/B_{MSY} also increased. Thus the probability that the stock is overfished decreased. The OFL on the terminal year decreased slightly by mere 2,000 pounds.

Table 1. Comparative table of the reference points between the 2018 benchmark stock assessment and the 2021 assessment update

Parameter	2018	2021
MSY	509,000 (±233,000) pounds	473,000 (±225,000) pounds
H	In 2015 = 0.04%	In 2018 = 0.03%
H_{MSY}	6.9% (±2.6%)	6.8% (±2.6%)
H/H_{MSY}	In 2015 = 0.51	In 2018 = 0.37
Prob. $H/H_{MSY}>1$	0.17 (no overfishing)	0.11 (no overfishing)
B	20.03 million pounds	21.88 million pounds
B_{MSY}	15.4 million (±4.9 million) pounds	15.5 million (±5 million) pounds
Prob. B/B_{MSY}	1.31 (not overfished)	1.43 (not overfished)
$B/B_{MSY}<0.844$	0.16	0.13

Sources: Langseth et al. 2018 and Syslo et al. 2021

Table 2 shows the current P* and catch associated with the ABC and ACL. There is a slight increase in the ABC and ACL by two to four thousand pounds, respectively, at the same P* level.

Table 2. Comparative table of the harvest limits and the corresponding risk of overfishing from the P* and SEEM analyses.

Parameter	2018	2021
OFL (terminal year)	In 2022 = 558,000 pounds	In 2025 = 556,000 pounds
P* ABC	42%	42%
ABC	508,000 pounds	510,000 pounds
P* ACL	40%	40%
ACL	492,000 pounds	496,000 pounds

Sources: Langseth et al. 2018; Syslo et al 2021; WPRFMC 2018a, 2018b

Table 3 shows the deep-7 bottomfish catch in the recent five years. The catch is generally decreasing over time, with the average of the last three years at 217,846 pounds. This corresponds to 44 percent of the current ACL.

Table 3. Total pounds of deep-7 bottomfish landed from 2015 to 2019 with the three year average at 217,846 pounds

Year	Total landed (pounds)
2015	307,152
2016	260,660
2017	237,490
2018	235,341
2019	180,708
Average$_{17\text{-}19}$	217,846

Source: https://wpcouncildata.org/archipelagicsafereport/hawaii/1

Scientific and Management Uncertainties

Scientific Uncertainties

The Omnibus Amendment that established the ACL specification process requires the SSC to review the stock's scientific information and assign it a tier in the ABC control rule (WPRFMC and NMFS 2011). The deep-7 bottomfish stock is considered a tier 1 stock. Therefore a P* analysis is used to quantify the scientific uncertainty in determining the appropriate risk level to set the ABC. The SSC may recommend an ABC that differs from the result of the control rule calculation based on factors such as data uncertainty, recruitment variability, declining trends in population variables, and other factors determined relevant by the SSC, but must explain their rationale.

Table 4. Comparative table of the P* scores for the 2018 and 2021 ABC setting indicating no change in the criteria scores.

P* Dimensions and Criteria	2018	2021
Assessment Information	**-0.7**	**No change**
Reliable catch history	*0.1 : unreported catch*	*Updated to 2018*
Standardized CPUE	*0.0 : improved standardization*	*Updated to 2018*
Species specific data	*0.5 : opakapaka assessment*	*No change*
All sources of mortality accounted for	*0.5 : bycatch unaccounted for*	*No change*
Fishery independent data	*0.0 : MOUSS data included*	*Updated to 2020*
Tagging data	*1.0 : not included*	*No change*
Spatial analysis	*0.5 : improved spatial consideration*	*No change*
Uncertainty Characterization	**-1.5 : narrowed to 2 uncertainties**	**No change**
Stock Status	**-1.0 : species complex**	**No change**
Productivity/Susceptibility	**-4.35 : same P and S**	**No change**
TOTAL BUFFER	**-7.59 ≈ 8.0**	

The stock assessment update did not use new information that changes the score for the Assessment Information dimension. The update added three years of fishery-dependent and independent data. Thus, the Assessment Information dimension remains as a reduction of 0.7. The Uncertainty Characterization score also did not change with the new update. The uncertainty surrounding the lack of process error in the projection of OFL remains the same, while the uncertainty around the single point estimate of biomass in the 2018 P* analysis may have reduced due to the additional years of data. The biomass estimate in 2016 was revised upwards while the general trend is downward. Thus maintaining the score for this dimension is precautionary. The Stock Status dimension did not change and remained to be not overfished and not experiencing overfishing. The one percent reduction remains because the assessment was done on a complex. There was no new life history information incorporated in the assessment update. The level of fishery susceptibility remains the same since the catch trend was decreasing over time.

Management Uncertainty

The WPSAR panel review in 2018 on the benchmark assessment recommended a 10% buffer when setting the ACL for the deep-7 stock due to lack of process error in the projection and the uncertainties in the fishery-independent information used in the assessment. Lack of process error was accounted for in the P* working group meeting. However, uncertainty in the fishery-independent survey was not accounted for due to the scoring rubric in place. The P* analysis resulted in a reduction score of 7.59%. The remaining uncertainty was attributed to the management uncertainty. The two percent reduction was attributed to the uncertainty brought by the increase in CML fee, a new fishing method like fishing from a kayak, and selling through the social media platform that might not be accounted for in commercial reports. Data from the Hawaii Annual SAFE report showed a slight decrease in the number of licenses reporting deep-7 bottomfish over the last five years (WPRFMC 2020). No new information is available on the kayak fishing for bottomfish and internet sale of bottomfish.

Table 5. Comparative table of the SEEM scores for the 2018 and 2021 ABC setting indicating no change in the criteria scores.

SEEM Dimensions	2018	2021
Social	*0.0 : no reduction*	No change
Economic	*0.0 : no reduction*	No change
Ecological	*0.0 : related to BRFA*	*4 BRFAs opened*
Management & Monitoring	*-2.0 : increase in CML fee; new fishing method*	*Slight decrease in license reporting deep-7*
TOTAL BUFFER	**-2.0** :	

SSC and Council Direction

The stock assessment update provided new information on the reference points and stock status. However, the update did not include other information outside what is already accounted for in the benchmark. This did not warrant a change in the P* score of an eight percent reduction

from the OFL. There was no significant change in the scientific uncertainty. Therefore, the ABC can remain at a 42 percent risk of overfishing, generating an annual catch level of 510,000 pounds. This increases the catch buffer between the ABC and ACL by 18,000 pounds, which is precautionary for not reaching the ABC.

In specifying the ACL for the fishing year 2021-22 to 2023-24 (four-year specification), the Council can retain the 492,000 pound ACL. This level of ACL is conservative and precautionary than increasing it to 496,000 pounds. The risk of overfishing at 492,000 pounds is a fraction of a percent lower than the 40 percent risk, so is consistent with the risk level used to identify the previous ACL. Given the average fishery performance in the past three years is less than 50 percent of the current ACL, the fishery has not been constrained by recent catch limits. The fishery is operating at its natural capacity, which is sustainable. Considering these factors, there is no urgency to increase the ACL by 4,000 pounds. There are uncertainties on how the COVID pandemic affected the deep-7 bottomfish fishery. Maintaining the ACL at 492,000 pounds is the Council's precautionary approach to account for the unknown effects of COVID.

References

Franklin, E. C. 2021. Stock Assessment Update for the Main Hawaiian Islands Deep-7 Bottomfish Complex in 2021, with Catch Projections Through 2025. Panel Summary Report. Western Pacific Regional Fishery Management Council.

Langseth, B., J. Syslo, A. Yau, M. Kapur, and J. Brodziak. 2018.Stock Assessment for the Main Hawaiian Islands Deep-7 Bottomfish Complex in 2018, with Catch Projections Through 2022. NOAA Tech. Memo. NMFS-PIFSC 69, 222 p.

Syslo J, Brodziak J, Carvalho F. 2021. Stock Assessment Update for the Main Hawaiian Islands Deep-7 Bottomfish Complex in 2021, with Catch Projections through 2025. NOAA Tech. Memo. NMFS-PIFSC -###, ## p.

WPFMC, and NMFS. 2011. Omnibus Amendment for the Western Pacific Region to Establish a Process for Specifying Annual Catch Limits and Accountability Measures Including an Environmental Assessment. Honolulu: Western Pacific Fishery Management Council.

WPRFMC, 2020. Annual Stock Assessment and Fishery Evaluation Report for the Hawaii Archipelago Fishery Ecosystem Plan 2019. Remington, T., Sabater, M., Ishizaki, A. (Eds.) Western Pacific Regional Fishery Management Council. Honolulu, Hawaii 96813 USA. 186 pp. + Appendices.

WPFMC. 2018a. P* Working Group Report. Honolulu: Western Pacific Fishery Management Council.

WPFMC. 2018b. SEEM Working Group Report. Honolulu: Western Pacific Fishery Management Council.