WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

PRELIMINARY DRAFT

Specifying the Annual Catch Limits for the Main Hawaiian Island Uku Fishery For Fishing Year 2022-2025

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Prepared for the Western Pacific Regional Fishery Management Council

Annual Catch Limits and Accountability Measures for Main Hawaiian Islands Gray Jobfish (*Aprion virescens*)

Abstract

The Western Pacific Regional Fishery Management Council (the Council) is specifying the annual catch limits (ACL) and accountability measures (AM) for the gray jobfish, *Aprion virescens*, also known as "uku", in the US Exclusive Economic Zone around the main Hawaiian Islands (MHI), for fishing years 2022, 2023, 2024, and 2025.

Historically, uku has been managed as part of the main Hawaiian Islands non-Deep 7 bottomfish stock complex. In March of 2019, based on recommendations from the Council, NMFS designated numerous management unit species (MUS), including reef fish and non-deep 7 bottomfish, as Ecosystem Component Species (or ECS). Uku is now the only remaining MUS from the non-Deep 7 complex. Other species such as white ulua (*Caranx ignoblis*), black ulua (*C. lugubris*), yellowtail kalekale (*Pristipomoides auricilla*), and butaguchi (*Pseudocaranx dentex*) have all been designated ECS. ACLs are not required for ECS; therefore, the explored 2022-2025 ACLs and AMs discussed in this draft specification document are for uku only.

The Council will deliberate the alternatives for ACLs and AMs for uku in fishing years 2022-2025 in accordance with requirements of the Magnuson-Stevens Fishery Conservation and Management Act and with the approved processes in the Fishery Ecosystem Plan for the Hawaiian Archipelago. At its 183rd meeting in September 2020, the Council will recommend to NMFS an alternative to specify the ACLs and AMs for fishing year 2022-2025. The fishing year for uku runs from January 1 through December 31 annually.

The Council will consider the following options:

1) No Action. No harvest limits will be specified for fishing year 2022-2025

2) Specify the previous harvest limit at 127,205 lb using the 2016 assessment (Nadon 2017) for fishing year 2022-2025.

3) Specify an ACL at P*=41 percent equivalent to 134 mt (295,419 lb) based on the SEEM analysis using the 2020 benchmark stock assessment.

4) Set an ACT at P*=36 percent equivalent to 132 mt (291,010 lb) based on the SEEM analysis using the 2020 benchmark stock assessment.

5) Set an ACT 10 percent lower than the SEEM analysis at P*=26 percent equivalent to 128 mt (282,192 lb) using the 2020 benchmark stock assessment

The proposed actions also includes three alternatives for AMs for this fishery, an in-season AM applied to two sectors of the fishery (commercial and non-commercial), an in-season AM for commercial fisheries only, and a post-season AM.

1) Allocate the ACL/ACT between the commercial and non-commercial sectors and apply and in-season AM whereby catch is tracked using the FRS for the commercial fishery and HMRFS for the non-commercial fishery. The federal fisheries will close if the ACT is projected to be reached. No rules are in place to limit the catch for the state-based uku fishery.

2) Decide on an appropriate allocation level for the commercial fishery sector and apply in-season accountability measures for the commercial sector of the fishery only.

3) Do not utilize allocation and apply a post-season AM, whereby the annual commercial catch from FRS (three-year average) and the non-commercial catch from HMRFS (five-year average) would be added and compared to the ACT and ACL. No overage adjustment will be made if the total average catches exceeded the ACT and an overage adjustment will be applied based on the amount of the overage if it exceeded the ACL.

The Council and the SSC recognize that the State of Hawaii does not have a regulation allowing it to implement a coordinated closure of State waters. The State of Hawaii also intends to provide the non-commercial fishermen continued access to the uku resources despite the commercial fisheries reaching its harvest limit. This would result in a disproportionate burden on the commercial uku fishery. In order to level the management burden, the Council shall deliberate the post-season AM, after the end of each fishing year, if NMFS and the Council determine that the average catch from the most recent period exceeds the ACL, NMFS would reduce the ACL in the subsequent fishing year by the amount of the overage.

Management of uku under ACLs and AMs is intended to provide enhanced monitoring of commercial and non-commercial uku harvests to prevent overfishing and provide for continued sustainable harvest of the uku resource.

ABBREVIATIONS

ABC – Acceptable Biological Catch
ACL – Annual Catch Limit
ACT – Annual Catch Target
AM – Accountability Measure
BMUS – Bottomfish Management Unit Species
Council – Western Pacific Fishery Management Council
CFR – Code of Federal Regulations
CML – Commercial Marine License
CPUE – Catch per Unit of Effort
DLNR – Hawaii Department of Land and Natural Resources
EA – Environmental Assessment
ECS – Ecosystem Component Species
EEZ – Exclusive Economic Zone
FEP – Fishery Ecosystem Plan
FMP – Fishery Management Plan
FR – Federal Register
lb – pound or pounds
MHI – main Hawaiian Islands
MFMT – Maximum Fishing Mortality Threshold
MSST – Minimum Stock Size Threshold
MSY – Maximum Sustainable Yield
MUS – Management Unit Species
NEPA – National Environmental Policy Act
NMFS – National Marine Fisheries Service
NOAA – National Oceanic and Atmospheric Administration, U.S. Dept. Commerce
NWHI – Northwestern Hawaiian Islands
OFL – Overfishing Limit
P* – Acceptable Risk or Probability of Overfishing
PIFSC – NMFS Pacific Islands Fisheries Science Center
SEEM – Social, economic, and ecological considerations, or management uncertainty
SFD - Sustainable Fisheries Division
SPR – Spawning Potential Ratio
SSC – Scientific and Statistical Committee of the Council
UVS – Underwater Visual Survey
WPFMC – Western Pacific Fishery Management Council

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1 INTRODUCTION

The National Marine Fisheries Service (NMFS) will propose to implement annual catch limits (ACLs) and accountability measures (AMs) for uku (*Aprion virescens*) or gray jobfish in the main Hawaiian Islands (MHI) in fishing years 2022, 2023, 2024, and 2025 based on the Council recommendations at its 183rd meeting on September 2020. Section 1 of this specification document provides background to understand the fishery and the proposed alternatives and the purpose and need for action. The alternatives are described in Section 2.

1.1 Background Information

As authorized by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), NMFS and the Western Pacific Fishery Management Council (Council) manage fisheries for bottomfish in federal waters (the U.S. Exclusive Economic Zone or EEZ) around the Hawaiian Islands. They manage fisheries in accordance with the Fishery Ecosystem Plan for the Hawaii Archipelago (Hawaii FEP) and implementing regulations at Title 50 Code of Federal Regulations, Part 665 (50 CFR 665). This action pertains to management of the uku, a bottomfish species. At present, the only active fishery for uku in Hawaii is in the MHI, which includes the islands of Niihau, Kauai, Oahu, Molokai, Lanai, Kahoolawe, Maui and Hawaii.[1]

Prior to 2019, NMFS and the Council managed bottomfish management unit species (BMUS) in the MHI as two separate multi-species stock complexes:[2] the MHI Deep 7 stock complex and the MHI non-Deep 7 stock complex. On February 8, 2019, NMFS published a final rule (84 FR 2767) to reclassify certain MUS as ecosystem component species (ECS). This rule reclassified all of the non-Deep 7 bottomfish except uku as ECS (Table 1). ECS remain in the FEP, but are not subject to ACLs or AMs. Since uku is still a MUS, ACLs and AMs must be implemented for it in accordance with the Magnuson-Stevens Act and the Hawaii FEP.

Table 1. Hawaii Bottomfish Management Unit Species (BMUS) and Ecosystem Component Species (ECS)

Common Name	Scientific Name	Local Name	BMUS/ECS	Complex
Silver jaw snapper	*Aphareus rutilans*	lehi	BMUS	Deep 7
Short-tail red snapper	*Etelis carbunculus*	ehu	BMUS	Deep 7
Long-tail red snapper	*E. coruscans*	onaga	BMUS	Deep 7
Hawaiian grouper	*Hyporthodus quernus*	hapuupuu	BMUS	Deep 7
Pink snapper	*Pristipomoides filamentosus*	opakapaka	BMUS	Deep 7
Lavender snapper	*P. sieboldii*	kalekale	BMUS	Deep 7
Banded snapper	*P. zonatus*	gindai	BMUS	Deep 7

[1] Historically the fisheries for Hawaii bottomfish operated in two management subareas: the inhabited MHI, and the Northwestern Hawaiian Islands (NWHI), a 1,200 nm chain of largely uninhabited islets, reefs, and shoals. In 2009, NMFS closed the NWHI fishery in accordance with provisions of the Presidential Proclamation establishing the Papahānaumokuākea Marine National Monument and prohibiting commercial fishing (71 FR 51134, August 29, 2006).

[2] The Magnuson-Stevens Act defines the term "stock of fish" to mean a species, subspecies, geographic grouping, or other category of fish capable of management as a unit. Federal regulations at 50 CFR 660.310(c) defines "stock complex" to mean a group of stocks that are sufficiently similar in geographic distribution, life history, and vulnerabilities to the fishery such that the impact of management actions on the stocks is similar.

Common Name	Scientific Name	Local Name	BMUS/ECS	Complex
Gray jobfish	*Aprion virescens*	uku	BMUS	Non-deep 7
Giant trevally	*Caranx ignobilis*	white ulua	ECS	-
Black jack	*C. lugubris*	black ulua	ECS	-
Blue-lined snapper	*Lutjanus kasmira*	taape	ECS	-
Yellowtail snapper	*P. auricilla*	yellowtail, kalekale	ECS	-
Thick lipped trevally	*Pseudocaranx dentex*	pig ulua, butaguchi	ECS	-
Amberjack	*Seriola dumerili*	kahala	ECS	-

Uku is a snapper (Family: Lutjanidae) that is an important species in bottomfish fisheries in Hawaii. Its habitat includes open waters of deep lagoons, channels, or seaward reefs from the surface to depths of 230 m (WPFMC 2016). Fisherman catch uku using multiple methods and gear types, including vertical handline and trolling, though over 90 percent of reported commercial catch comes from handline fishing (WPFMC 2018). While most bottomfish species are caught along the steep drop-offs and slopes that surround the islands and banks, uku is different in that it is primarily caught on the tops, not the sides or slopes, of these banks.

Fishery regulations require NMFS to implement ACLs for both the MHI Deep 7 bottomfish species complex and the uku stock, and to implement AMs along with the ACLs. The specification document focuses on the ACLs and AMs for uku. The MHI Deep 7 bottomfish fishery is subject to a separate ACL and AMs, which are not part of the current specification action. For management purposes, the fishing year for uku begins on January 1 and ends on December 31 annually. See 50 CFR 665 – Subpart C for federal regulations applicable to bottomfish fishing in Hawaii. Fishermen must comply with federal requirements for vessel identification, non-commercial fishing permits, and non-commercial catch and effort logbooks, and federal fishery closures, should a closure be implemented.

The State of Hawaii also regulates bottomfish fishing and requires all commercial fishermen to annually obtain a commercial marine license (CML) and report all catch of uku and most other fish[3] in both State and Federal waters on a monthly basis. NMFS and the Council monitor commercial catches of uku through this data, and will use it to monitor catch relative to the ACL. Catch from State and Federal waters will count towards the ACL. The non-commercial fishery is monitored through the Hawaii Marine Recreational Fishing Survey. The survey is conducted through a random stratified design where catch information is taken from the Access-Point Angler Intercept Survey and the effort information through the mail-based Fishing Effort Survey. The data is expanded on a two-month wave. If NMFS closes the Deep 7 bottomfish fishery in federal waters because it attains the federal ACL, the State Department of Land Natural Resources (DLNR) has the authority to implement a complementary in-season fishery closure in State waters for the Deep 7 bottomfish fishery. However, the DLNR currently does not have this authority for the uku fishery. Authority to enact an in-season fishery closure for uku would have to be enabled through the State administrative rule making process. At this time, the State of Hawaii has not initiated their rulemaking process to enact such a rule (David Sakoda, State of Hawaii, personal communication on August 20, 2020 to Marlowe Sabater, WPRFMC). Until such time as the State does, a fishery closure for uku in Federal waters would not restrict fishing

[3] Catch of Deep 7 bottomfish must be reported within five days of the end of each fishing trip.

and harvests in State waters. However, approximately 66 percent of uku catch comes from Federal waters (Harvey and Associates 2017), so closure of a Federal waters would substantially reduce total uku catch.

State law also prohibits fishing for Deep 7 bottomfish in 8 bottomfish restricted fishing areas (BRFAs) that were established by the State for bottomfish conservation purposes (Figure 1)[4]. Legal restrictions related to fishing in the BRFAs only apply to the species in the MHI Deep 7 bottomfish stock complex and do not apply to uku. The State of Hawaii also prohibits commercial sale of uku smaller than one pound, and prohibits spearing uku smaller than one pound. See the DLNR website for all state regulations applicable to bottomfish fishing in Hawaii.

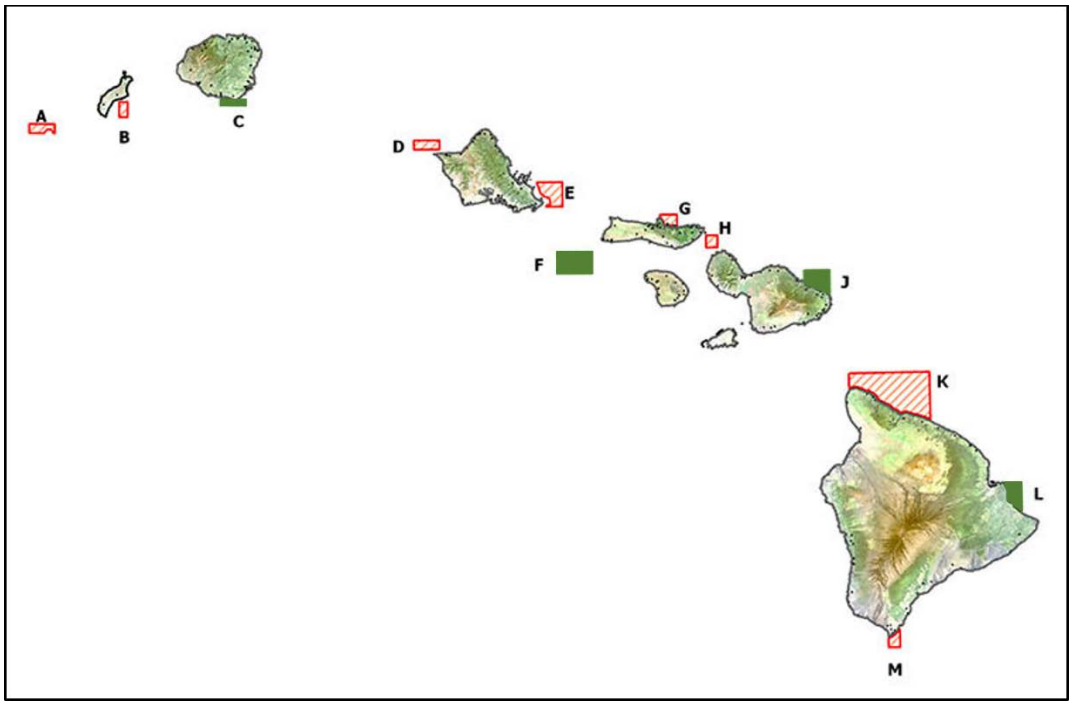

Figure 1. Location of State of Hawaii Bottomfish Restricted Fishing Areas (BRFAs). BRFAs that were reopened are solid green, BRFAs that remain closed to fishing for Deep 7 are cross-hatched red. *For more detail about locations, see the DAR bottomfishing website for more info.

1.1.1 Overview of the ACL and AM Implementation Process

Uku fishermen have been subject to ACLs and AMs since 2012, when the requirement to have an ACL and AM was first implemented for non-Deep 7 bottomfish. Federal regulations at 50 CFR 665.4 (76 FR 37285, June 27, 2011) require NMFS to implement an ACL and AM(s) for all Hawaii BMUS, as recommended by the Council, and to consider the best available scientific, commercial, and other information about the fishery for that stock or stock complex. This section

[4] On July 1, 2019, the State of Hawaii Department of Land and Natural Resources opened four of the 12 BRFAs (BRFAs C, F, J, and L) that had been closed to fishing for Deep 7 bottomfish.

provides an overview of the process the Council used to develop its ACL recommendation for uku.

In accordance with the Magnuson-Stevens Act and the FEPs, there are three required elements in the development of an ACL. The first requires the Council's SSC to calculate an acceptable biological catch (ABC) that is set at or below the stock or stock complex overfishing limit (OFL). The OFL is an estimate of the catch level above which overfishing is occurring and corresponds with the maximum fishing mortality threshold (MFMT). ABC is the level of catch that accounts for the scientific uncertainty in the estimate of OFL and other scientific uncertainty. To determine the appropriate ABC, the ACL mechanism described in the FEPs includes a five-tiered system of control rules that allows for consideration of different levels of scientific information. Tiers 1-2 involve data rich to data moderate situations and include levels of scientific uncertainty derived from model-based stock assessments. Tiers 3-5 involve data poor situations and include levels of scientific uncertainty derived from ad-hoc procedures including simulation models or expert opinion.

When calculating an ABC for a stock or stock complex, the SSC must first evaluate the information available for the stock and assign the stock or stock complex into one of the five tiers. Uku is considered a Tier 1 stock based on the 2020 stock assessment (Nadon et al. 2020). The SSC must then apply the control rule assigned to that tier to determine ABC. For stocks or stock complexes that have estimates of maximum sustainable yield (MSY) and other MSY-based reference points derived from statistically-based stock assessment models (Tier 1-3 quality data), the ABC is calculated by the SSC based on an ABC control rule that accounts for scientific uncertainty in the estimate of the OFL. In accordance with federal regulations at 50 CFR 600.310 implementing National Standard 1 of the Magnuson-Stevens Act, the probability of overfishing cannot exceed 50 percent and should be a lower value. The Hawaii FEP includes a qualitative process by which the P* value may be reduced below 50 percent by the Council based on consideration of four dimensions of information: assessment information, uncertainty characterization, stock status, and stock productivity and susceptibility. The FEP also allows the SSC to recommend an ABC that differs from the results of the ABC 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. However, the SSC must explain its rationale.

The second element requires the Council to determine an ACL that may not exceed the ABC recommended by the SSC. The process includes methods by which the ACL may be reduced from the ABC based on social, economic, and ecological considerations, or management uncertainty[5] (SEEM). An ACL set below the ABC further reduces the probability that actual catch will exceed the OFL and result in overfishing.

The third and final element in the ACL process is the inclusion of AMs. There are two categories of AMs, in-season AMs and post-season AMs. In-season AMs prevent an ACL from being exceeded and may include, but are not limited to, closing the fishery, closing specific areas, changing bag limits, or other methods to reduce catch. The Council may also use an annual catch target (ACT) in the system of AMs so that a fishery does not exceed the ACL. An ACT is the

[5] Management uncertainty occurs because of the lack of sufficient information about catch (e.g., late reporting, under reporting, and misreporting of landings).

management target of the fishery and accounts for management uncertainty in controlling the actual catch at or below the ACL.

The Council has previously recommended NMFS implement two AMs for the uku fishery in the 2019-2021 ACL specification at its171st and 174th Council meetings: an in-season fishery closure for uku if NMFS and the Council anticipate the fishery may meet the ACL before the end of the fishing year, and a post-season evaluation of whether and by how much the catch exceeded the ACL (known as an "overage"). The recommendation for in-season monitoring of catch is a new management measure for uku, and will provide additional oversight to ensure the sustainability of this fishery. The post-season AM has been used in conjunction with all previous ACLs for uku as part of the non-Deep 7 bottomfish complex. This AM is based on the average catch over three years: if the Council determines after the fishing year is over that the average catch of the most recent three years exceeded the ACL, the Council would recommend that NMFS reduce the ACL in the subsequent fishing year by the amount of the overage. As shown in Table 5, annual catch of uku is highly variable. The reason for this inter-annual variability is unknown, though it could be due to factors such as catches of alternative fishery species such as ahi or Deep 7, or due to natural cycles of uku populations. To reduce the influence of inter-annual variability in evaluating fishery performance against ACLs, NMFS and the Council have used a moving three-year average (NMFS 2015), as permitted under implementing regulations and the Hawaii FEP (WPFMC and NMFS. 2011). Additionally, if any fishery exceeds an ACL more than once in a four-year period, the Council is required to re-evaluate the ACL process for developing the ACL for that fishery, and adjust the system as necessary to improve its performance and effectiveness in ensuring sustainability of the fishery. Figure 2 illustrates the relationship between the terms used in this section.

For more details on the specific elements of the mechanism and process for establishing ACLs, see Amendment 3 to the Hawaii Archipelago FEP (WPFMC and NMFS 2011, and the final implementing regulations at 50 CFR 665.4 (76 FR 37286, June 27, 2011).

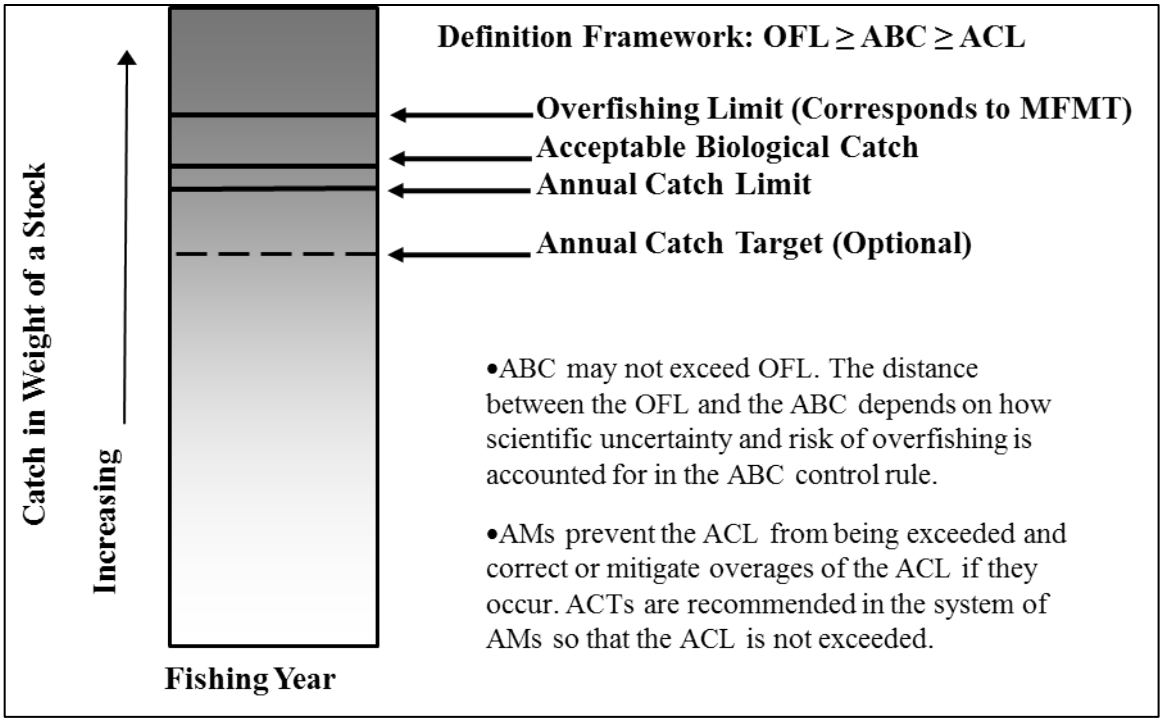

Figure 2. General relationship between OFL, ABC, ACL, and ACT

1.2 Purpose and Need for Action

The purpose of this action is to comply with the requirements of the Magnuson-Stevens Act and the Hawaii FEP and implementing regulations that require implementation of ACLs and AMs for MHI bottomfish MUS, including uku. The need for this action is to prevent overfishing and to provide for long-term sustainability of the fishery resources while allowing fishery participants to continue to benefit from their utilization. AMs are needed to reduce the potential of exceeding an ACL and are used to correct or mitigate overages of the ACL should they occur.

1.3 Action Area

The action area is where fishing for uku occurs in State and Federal waters of the MHI. Bottomfish fishing for uku occurs primarily in waters from the surface to 230 m deep from the Island of Hawaii to Niihau Island. Waters around islands northwest of Niihau are not part of the Action Area because commercial fishing is prohibited in Papahānaumokuākea Marine National Monument.

1.4 Public Involvement

The ACLs and AMs will be coordinated with the public by the Council at a number of public meetings. At its 182nd meeting held from June 23-25, 2020 hosted virtually in Honolulu, Hawaii, the Council received the report on the Western Pacific Stock Assessment Review from the WPSAR Chair. At the same meeting, the Council received the peer-reviewed 2020 benchmark stock assessment of the MHI uku fishery. These meetings were open to the public and announced in the federal register, 85 FR 34420 (June 4, 2020) for the 182nd Council meeting and 85 FR 31473 (May 26, 2020) for the 136th SSC meeting. The Council, at its 183rd meeting, we receive the report from

the P* and SEEM working group and the alternatives for specifying the ACLs and AMs for fishing years 2022, 2023, 2024, and 2025.

1.4.1 Council and SSC Meetings

The development of the Council's recommendations for uku ACLs and AMs will take place during public meetings of the SSC and the Council. The Council will advertise its intention to focus on the development of recommendations for the federal ACLs for the Hawaii non-deep 7 bottomfish stock complex at its meetings, media releases, newsletter articles, and on the Council's website at http://www.wpcouncil.org. The Council and SSC discussed matters related to the uku ACL at the following meetings:

- 136th SSC (June 9-11, 2020) and 182nd Council Meeting (June 23-25, 2020) via WebEx Conferencing hosted in Honolulu, Hawaii (85 FR 31473, May 26, 2020 and 85 FR 34420, June 4, 2020, respectively) – The SSC and the Council received the presentation from the Western Pacific Stock Assessment Review (WPSAR; 85 FR 5633, January 31, 2020) Chair, Dr. Erik Franklin on the outcome of the panel peer-review of the "Stock Assessment Uku (*Aprion virescens*) in Hawaii 2020" (Nadon et al. 2020). The Chair presented the conclusions and recommendations of the WPSAR Panel. At the same meeting, the SSC and the Council also received the presentation on the final benchmark stock assessment as revised based on the WPSAR Panel Review.

  At the conclusion of its 182nd meeting, the Council directed staff to convene the P* Working Group to quantify the scientific uncertainties; and the SEEM Working Group to quantify the social, economic, ecological, and management uncertainty.

- 137th SSC (September 9-10, 2020) and 183rd Council Meeting (September 15-17, 2020) via WebEx Conferencing hosted in Honolulu, Hawaii (XX FR XXXXX, August XX, 2020) – The SSC and the Council received the P* and SEEM Working Group reports by the P* and SEEM Working Group Chair, Jason Helyer. The P* quantified the scientific uncertainty to be a seven percent reduction thereby resulting in a P* level for ABC at 43 percent. The SEEM Working Group quantified the social, economic, and ecological uncertainties at two percent thereby resulting in a P* level for the ACL at 41 percent. The management uncertainty was quantified to be at five percent reduction resulting in a P* level for ACT at 36 percent.

  At these same meetings, the Council will deliberate on the different alternatives for specifying the ACLs for the MHI uku fishery for fishing year 2022-2025. The alternatives include: 1) do not specify ACLs; 2) Status quo that retains the current ACL of 127,205 pounds based on Nadon (2017); 3) Specify an ACL of 295,419 pounds at P*=41 percent using Nadon et al (2020); 4) Set an ACT of 291,010 pounds at P*=36 percent using Nadon et al. (2020); and 5) Set an ACT lower than the SEEM analysis at 282,192 pound at P*=26 percent.

  The Council will also deliberate on the AMs that includes: 1) sector allocation and apply an in-season AM; 2) apply in-season AM to the commercial sector only; 3) apply a post-season AM.

2 ALTERNATIVES CONSIDERED INCLUDING NO ACTION

2.1 Development of the Alternatives

This is the fourth year uku would be managed under an ACL developed for the single species stock rather than a multi-species stock complex. NMFS and the Council previously managed the uku fishery as part of the non-Deep 7 bottomfish complex using an ACL that applied to the multi-species complex since 2012. The ACL for the MHI uku will expire on December 31, 2021.

To develop its ACL recommendation for the uku fishery ACL for 2022 through 2025, the Council and its SSC used the approved process described in Chapter 1 above and in detail in WPFMC and NMFS (2011). To quickly recap, the process applied in this case started with a new stock assessment based on a variety of fisheries information and uku biology, which resulted in estimation of the overfishing limit. The stock assessment was reviewed through WPSAR and again through the SSC to evaluate whether it contained information suitable for management. The next step was for a working group to assemble and review the scientific uncertainty within the assessment in order to make a recommendation for the P* (probability of overfishing). The SSC then applied the P* to recommend the acceptable biological catch (ABC). Another working group reviewed the social, economic, ecological, and management uncertainties in the fisheries and fisheries management in order to make a recommendation for the P* for the Council to specify the ACL and perhaps set the ACT. The ACL and/or ACT were used as the basis of the action alternatives considered here. The alternatives under consideration are based upon the best available scientific, commercial, non-commercial, and other information about the uku fishery.

2.1.1 Estimation of OFL

The 2020 benchmark stock assessment (Nadon et al 2020) provided the Council and NMFS with new scientific information about uku stock status, and with tables detailing the estimated risk of overfishing at various levels of catch (Table 2). Fisheries scientists from NMFS PIFSC compiled data from various information sources (i.e. life history information, catch data for the commercial and non-commercial fisheries, length data from catch and underwater census surveys, or UVS) to produce a stock assessment that describes the current status of uku. The assessment produced the catch level associated with various levels of overfishing risk at 1 percent intervals based on analysis of catch data (Table 2). The analysis used the total catch in 2019 to be the status quo catch based on the assumption that 2019 catches would likely be similar to recent catch amounts. The maximum catch was set to give a 50 percent probability of overfishing in the final year of the projections.

The new benchmark assessment went through a WPSAR (85 FR 5633, January 31, 2020) in accordance with the requirements of National Standard 2 (78 FR 43066, July 19, 2013). Dr. Erik Franklin (chair), Dr. Yong Chen, and Dr. Yan Jiao conducted the review. Pursuant to this review, PIFSC incorporated the short-term recommendations of the WPSAR panel and produced the final assessment (Nadon et al. 2020). The SSC at its 136th meeting heard the results of the WPSAR review and the peer-reviewed stock assessment. As described in its 136th SSC meeting report, the SSC found the stock assessment to represent the best scientific information available for development of harvest limits and overfishing status determination for uku. Similarly, on August XX, 2020 PIFSC also determined that the assessment was BSIA.

The 2020 stock assessment provided estimates used by the SSC and the Council in developing their recommended OFL. Consistent with National Standard 1 guidelines, the Council sought to set the OFL for uku equal to the level of catch associated with a 50 percent probability of exceeding MSY (i.e., a 50 percent chance of overfishing). Table 2 presents a range of catches and their associated probabilities of overfishing. The Council utilized the risk of overfishing estimates on the terminal year of specification, 2025 for uku to establish an OFL of 137 mt (302,003 pounds) for the fishing years 2022–2025.

Table 2. Probability of overfishing uku for various catch levels based on analyses using commercial and non-commercial catch data from FRS and HMRFS, respectively (Nadon et al. 2020).

Probability of overfishing	2022	2023	2024	2025
0.50	144	141	139	137
0.49	144	141	139	137
0.48	144	141	138	136
0.47	143	140	138	136
0.46	143	140	13	136
0.45	142	139	137	135
0.44	142	139	137	135
0.43	142	139	136	135
0.42	141	138	136	134
0.41	141	138	136	134
0.40	140	138	135	133
0.39	140	137	135	133
0.38	140	137	135	133
0.37	139	136	134	132
0.36	139	136	134	132
0.35	138	136	134	132
0.34	138	135	133	131

Probability of overfishing	2022	2023	2024	2025
0.33	138	135	133	131
0.32	137	135	132	131
0.31	137	134	132	130
0.30	136	134	132	130
0.29	136	133	131	129
0.28	135	133	131	129
0.27	135	132	130	129
0.26	135	132	130	128
0.25	134	132	129	128
0.24	134	131	129	127
0.23	133	131	129	127
0.22	133	130	128	127
0.21	132	130	128	126
0.20	132	129	127	126
0.19	131	129	127	125
0.18	130	128	126	125
0.17	130	127	126	124
0.16	129	127	125	124
0.15	128	126	124	123
0.14	127	125	124	122
0.13	126	125	123	122
0.12	126	124	122	121
0.11	125	123	122	121

Probability of overfishing	2022	2023	2024	2025
0.10	124	122	121	120
0.09	122	121	120	119
0.08	141	120	119	118
0.07	120	119	118	117
0.06	119	118	117	116
0.05	117	116	116	115
0.04	116	115	114	114
0.03	114	113	112	112
0.02	111	111	110	110
0.01	108	107	107	107

2.1.2 Calculation of ABC

According to the established ACL process, the ABC is the acceptable level of catch that accounts for the scientific uncertainty of the information used in the assessment. In essence, the OFL is reduced to account for uncertainty, and the result is the ABC (Figure 2). The computation of the ABC used in the proposed alternatives followed the previously approved process described in the Hawaii FEP. The calculation of ABC begins with a P* working group that systematically addresses scientific uncertainty in the stock assessment. The P* process evaluates four aspects of the stock assessment: assessment information, assessment uncertainty, stock status, and stock productivity and susceptibility to fishing. The working group gives a score of 0–10 to each aspect, where a higher score indicates greater uncertainty. These scores are summed and subtracted from 50 to calculate P*.

The Council, at its 182nd meeting, directed staff to convene the P* working group to quantify the scientific uncertainties in the new assessment, and to provide their recommendations for the SSC to consider in developing the ABC. This group met online hosted at the Council Office on July 21, 2020. The working group quantified the following reduction scores for each of the four dimensions: 0.7 for assessment information, 2.5 for uncertainty characterization, 0.0 for stock status, and 4.2 for productivity and susceptibility. P* was reduced for assessment information because of uncertainties in the non-commercial data from HMRFS and the lack of tagging and spatial analysis. Uncertainty received a score of 2.5 because of uncertainties in available reproduction and environmental information. No reduction from stock status because the assessment did not indicate that uku was in a state of overfishing. The score for productivity and

susceptibility was 4.2 because uku has moderate productivity and low susceptibility. In total, the P* analysis indicated that overfishing risk should be reduced to 42.6 percent, which rounded to up to 43 percent.

The report from the P* meeting will be presented at the SSC and Council at their 137th and 183rd meetings, respectively and will enable the SSC and Council to use the information for the Council's recommendation on ABC, ACL and AMs. The P* scores will be the basis for the SSC recommending an ABC associated with a risk of overfishing levels of 43 percent or lower in fishing year 2022-2025 (rather than on the highest acceptable limit of 50 percent risk of overfishing).

The Council can specify the ACL based on the SEEM working group analysis that met on July 21, 2020 where a two percent reduction is required to account for uncertainties from the social, economic, and ecological dimension therefore the ACL can be specified at 41 percent risk. More so, the working group also quantified the monitoring and management uncertainties amounting to a reduction five percent resulting in an ACT at 36 percent of overfishing. Following the P* and SEEM results, the ACL is at 134 mt (295,419 pounds) and the ACT is at 132 mt (291,010 pounds). To account for other uncertainties not discussed, the Council may also choose to specify the ACT 10 percent lower than the SEEM analysis putting it at P*=0.26 with an associated catch level of 128 mt (282,192 pounds). The Council will also choose an alternative for accountability measures to prevent overfishing from occurring.

2.2 Description of the Alternatives

This section describes a range of ACL alternatives for the uku fishery in fishing years 2022, 2023, 2024, and 2025 and expected fishery outcomes. Table 3 summarizes the alternatives considered, including their associated probability of overfishing (P*) based on the risk table from the 2020 benchmark stock assessment (Table 2). In accordance with National Standard 1 guidelines of the Magnuson-Stevens Act, the probability of overfishing cannot exceed 50 percent and should be a lower value (74 FR 3178, January 9, 2011).

Table 3. Summary of alternatives and associated probabilities of overfishing (P*) values (in percent) for uku. The overfishing limit = 137 mt (302,003 pounds) and the acceptable biological catch = 135 mt (297,624 pounds).

Alternatives	***FY 2022 ACL (lb)***	***FY 2022 P****	***FY 2023 ACL (lb)***	***FY 2023 P****	***FY 2024 ACL (lb)***	***FY 2024 P****	***FY 2025 ACL (lb)***	***FY 2025 P****
Alternative 1: No Action (No management action status quo/ Baseline). No AMs required.	No ACL	NA	No ACL	NA	No ACL	NA	No ACL	NA

Alternatives	*FY 2022 ACL (lb)*	*FY 2022 P**	*FY 2023 ACL (lb)*	*FY 2023 P**	*FY 2024 ACL (lb)*	*FY 2024 P**	*FY 2025 ACL (lb)*	*FY 2025 P**
Alternative 2: Status quo. Use 2016 benchmark assessment and P* level from the P* Analysis.	127,205	42	127,205	42	127,205	42	127,205	42
Alternative 3: Use 2020 benchmark assessment and specify ACLs based on the P* and SEEM Analysis.	295,419	41	295,419	41	295,419	41	295,419	41
Alternative 4: Use 2020 benchmark assessment and specify ACLs and set an ACT based on the P* and SEEM Analysis.	291,010	36	291,010	36	291,010	36	291,010	36
Alternative 5: Use 2020 benchmark assessment and specify ACLs and set an ACT lower than the SEEM Analysis.	282,192	26	282,192	26	282,192	26	282,192	26

2.2.1 Alternative 1: No ACL and AM Management (No Action)

Under Alternative 1, the Council would recommend that NMFS not implement an ACL or AMs for the uku fishery for fishing year 2022, 2023, 2024, and 2025. Under this Alternative, the MHI uku fishery would not be subject to an ACL and no AMs would be necessary. The fishery would be unconstrained in terms of catch limits, but would continue to be subject to other fishery management requirements such as State size limits and license requirements to sell fish.

This Alternative would not be consistent with the Magnuson-Stevens Act requirements or the provisions of the Hawaii FEP, which require NMFS to implement an ACL and AMs for all MUS stocks and stock complexes in order to ensure that overfishing does not occur. Alternative 1 is considered to be the no management action required under NEPA similar to no ACL (nor an AM) for the MHI uku fishery in fishing years 2017 or 2018. The previously implemented ACL ended on December 31, 2016, but that ACL was for the non-Deep 7 bottomfish stock complex, which included several species in addition to uku. A new species based ACL was recently implemented on May 5, 2020 (85 FR 26622, May 5, 2020).

Expected Fishery Outcome

Under this alternative, the MHI uku fishery would fish year-round. NMFS would not implement an ACL and there would not be regulatory discards of uku due to a fishery closure.

Under Alternative 1, we expect the fishery would continue in the manner in which it was conducted in recent years. Not implementing an ACL or AMs is not expected to result in large changes to the conduct of the fishery, including gear types used, areas fished, level of catch or effort, target and non-target stocks, or protected species. This continuity is expected because catches of uku (as part of the non-Deep 7 species complex) have not been constrained by ACLs and AMs (Table 4). Since there has not been an in-season accountability measure such as a fishery closure as part of the non-Deep 7 bottomfish fishery, annual catch was a result of fishery dynamics and not due to external limitations from management. Since ACLs were first implemented for the non-Deep 7 bottomfish fishery, catch exceeded the ACL only in 2012. Non-deep 7 catch in recent years has been lower than ACLs (Table 4). Uku catch during these years would have been less than the ACL proposed.

Table 4. Harvest limit reference points (in lb) comparing non-Deep 7 bottomfish catch with the ACL and the proportion of the ACL (percent) caught over the past eight years in the MHI

Year	OFL	ABC	ACL	Non-Deep 7 Catch	Proportion of ACL	Uku catch	Proportion of total
2012	192,000	135,000	135,000	139,209	1.03	116,764	0.84
2013	192,000	140,000	140,000	135,945	0.97	121,143	0.89
2014	192,000	140,000	140,000	108,604	0.78	96,813	0.89
2015	259,200	187,100	178,000	112,355	0.63	101,954	0.90
2016	259,200	187,100	178,000	127,254	0.71	119,175	0.94
2017	259,200	-	-	142,399	0.80 of 2016 ACL	131,841	0.93
2018		-	-			69,496	
2019	132,277	127,205	127,205	NA	NA	82,760	NA

Source: Catch data from WPacFIN. Data for 2018 and 2019 accessed on August 17, 2020

Table 5 shows the yearly catch of uku since 1948. Uku catches have generally increased since catch limits were first implemented for MHI Deep 7 bottomfish in 2007, and the highest uku landings since this time were reported in 2017. Anecdotal information suggests that the increase after 2008 was likely a result of NMFS implementing an ACL system in fishing year 2007–08 for Deep 7 bottomfish. In fishing years 2007–08 through 2010–11, NMFS closed the MHI Deep 7 bottomfish fishery to prevent the fishery from exceeding its ACL. This resulted in an increased catch of uku to meet market demand as a substitute for Deep 7 bottomfish, and appears to have led to a new market for uku as annual catches of uku have generally remained higher. However, uku catch was lower in 2018 and 2019 than in recent years, and similar to catch levels from 2004–2008. Reasons for this difference are not known, though uku is often considered to be a “pulse” fishery,

and catch and effort in the uku fishery has historically varied based on weather and influences of fishing conditions in other local fisheries (e.g. ahi and Deep 7).

Since ACLs were first implemented for the non-Deep 7 stock complex in 2012, catches of uku have been below the OFL of 302,003 lb in each year (Table 5). The fishery is not expected to perform differently than recent years in part because a closure of the Deep 7 fishery is not expected. The ACL for the Deep 7 fishery for the duration of the proposed uku action is more than double the average of recent catches (NMFS 2019a), so there is very little chance the fishery will close and redirect effort to uku fishing as it did in 2007 and 2010. In fishing years 2022, 2023, 2024, and 2025, without an ACL, the total reported uku catch is expected to be within the range of catches in recent years, and is not expected to exceed the OFL.

However, uku catch did exceed the ACL for 2019 (127,205 pounds) in 2017 (catch = 131,841 pounds). This ACL takes into account scientific and management uncertainty, and provides a buffer to ensure that overfishing is not occurring. If the fishery were to perform in 2022, 2023, 2024, and/or 2025 at the same level as 2017, the lack of an ACL and AMs under Alternative 1 would not provide regulatory ability to ensure the long-term sustainability of the resource.

If we are to utilize the OFL in the 2020 benchmark stock assessment (Nadon et al 2020) of 302,003 pounds and assume that the commercial component is 50 percent of the OFL (151,001 pounds), none of the catches since the implementation of the catch limit exceeded the OFL. Therefore, the lack of an ACL and AMs under Alternative 1 would still ensure the long-term sustainability of the resource.

Table 5. Annual catch of uku (lb) from 1948 to 2019

Year	Catch	Year	Catch	Year	Catch	Year	Catch	Year	Catch
1948	101,540	1963	63,562	1978	84,252	1993	69,966	2008	92,576
1949	83,062	1964	89,858	1979	87,128	1994	71,832	2009	87,987
1950	57,880	1965	49,882	1980	74,723	1995	60,128	2010	120,764
1951	45,015	1966	57,849	1981	85,084	1996	53,306	2011	109,306
1952	64,847	1967	58,556	1982	100,929	1997	67,975	2012	116,764
1953	63,890	1968	49,677	1983	132,386	1998	61,105	2013	121,143
1954	61,937	1969	57,542	1984	138,913	1999	89,835	2014	96,813
1955	76,067	1970	47,418	1985	49,307	2000	83,341	2015	101,954
1956	70,751	1971	48,710	1986	104,061	2001	58,451	2016	119,175
1957	96,442	1972	48,077	1987	56,759	2002	56,415	2017	131,841
1958	72,517	1973	66,875	1988	344,487	2003	46,230	2018	74,614
1959	46,040	1974	77,941	1989	208,393	2004	77,044	2019	89,836
1960	45,426	1975	61,951	1990	102,881	2005	63,565		
1961	42,200	1976	62,165	1991	91,258	2006	59,585		
1962	63,700	1977	68,388	1992	88,813	2007	69,125		

Note 1: Source: WPacFin data request 112834.
Note 2: Recent 5-year average from 2015–2019 = 103,484 lb uku.

2.2.2 Alternative 2: Implement an ACL of 127,205 lb and AMs (Status quo/Baseline)

Under Alternative 2, the Council would recommend that NMFS implement an ACL of 127,205 lb of uku each year for the 2022, 2023, 2024, and 2025 fishing years. The ACL in this alternative utilizes information from Nadon (2017) and the P* working group meeting in 2016 that accounted for scientific uncertainties following the process described in the Hawaii FEP and summarized above in section 2.1.2. This would roll over the ACL used in fishing year 2019, 2020, and 2021 to fishing year 2022, 2023, 2024, and 2025.

The 2016 benchmark stock assessment estimated an OFL of 132,277 lb for uku. This was the BSIA used for the ACL specification for fishing years 2019, 2020, and 2021. As noted above, the SSC previously recommended an ABC of 127,205 lb based on a reduction from the OFL to account for scientific uncertainty. Based on the probability of overfishing projections in the 2016 stock assessment, an ACL of 127,205 lb of uku is associated with a 42 percent risk of overfishing. The Council subsequently recommended an ACL which is equal to ABC due to the lack of substantial management uncertainty.

As an in-season AM to prevent the fishery from exceeding the ACL, NMFS would close the fishery in Federal waters for the remainder of the fishing year if NMFS projects that catch will reach the ACL in fishing years 2022 to 2024. NMFS and the Council would track uku catch on a monthly basis from CML reports. NMFS will project total annual catch by adding estimates of future monthly catch to the current cumulative catch. The estimates of future catch would be based on the average catches observed for those months during the previous three years.

A second, post-season AM that would be implemented under Alternative 2 for fishing years 2022–2025 is that NMFS would implement an overage adjustment in the subsequent fishing year if it determines, based on commercial fish reports, that the average catch from the most recent three years exceeded the ACL. If this occurred, the ACL for the following year would be reduced by an amount equal to the overage.

This Alternative is more precautionary than the No action Alternative, which would not implement an ACL, an in-season fishery management measure in the form of a closure to prevent the fishery from exceeding the ACL, or call for an overage adjustment if the fishery does exceed the ACL. However, this alternative do not comply with requirements of the Magnuson-Stevens Act and the National Standards 2 on the use of the best scientific information available

Expected Fishery Outcome

Under Alternative 2, the fishery would be limited to a catch of up to 127,205 lb of uku per year. The fishery may reach this ACL if fishery performance is similar to recent years (Table 5), but this is expected to occur infrequently or near the end of the year. Since ACLs were first implemented for the non-Deep 7 fishery in 2012, uku catch reached the level once, in 2017. Uku catch would have only exceeded an ACL of 127,205 lb in December of that year (Table 6). In years prior to the use of ACLs, uku catch has not reached this level since 1989 (Table 5).

Table 6. Cumulative catch of uku (lb) by year and month.

Year	2012	2013	2014	2015	2016	2017	2018
January	12,175	11,090	6,731	13,230	12,169	11,432	11,465
February	20,137	15,520	12,033	21,879	18,080	18,510	18,976
March	24,572	24,346	18,197	29,459	23,378	28,222	25,238
April	33,497	40,536	23,610	35,036	31,870	45,602	28,183
May	44,203	66,581	39,945	47,711	57,863	58,337	34,373
June	57,287	79,505	49,222	65,116	73,895	73,380	44,984
July	68,882	85,450	52,440	73,112	83,022	85,995	53,569
August	79,645	94,476	58,165	80,753	98,763	99,204	56,935
September	92,009	102,253	71,111	87,574	104,294	111,840	62,049
October	103,043	110,556	76,921	91,733	107,526	119,784	66,393
November	108,877	115,809	84,399	95,379	113,024	122,835	71,250
December	116,764	121,143	96,813	101,954	119,175	131,841	74,614

If the fishery were to attain the ACL of 127,205 lb during the 2019 or 2020, NMFS would implement a closure of the commercial and non-commercial fisheries for uku in Federal waters as an AM. The in-season AM of a fishery closure is expected to keep total reported catch of uku below the ACL and OFL and prevent overfishing.

If the fishery were closed before the end of the fishing year, fishermen could continue to catch uku in State waters, since there would not be a corresponding closure of State waters for uku. However, approximately 66 percent of uku catch comes from Federal waters (Harvey and Associates 2017), so closure of Federal waters would significantly reduce uku catch. If the fishery is closed, NMFS estimates that under normally encountered effort and catch, it would likely be closed late in the year. NMFS expects that fishermen would continue to fish for pelagic fish and other bottomfish in the same way as they already are fishing for these MUS, and any uku caught incidental to these other fisheries within Federal waters, would be discarded. Uku catch from State waters during a Federal fishery closure could be sold, and all fish reported would be counted toward an ACL exceedance, if applicable.

After each fishing year ends, NMFS and the Council would review catch reports from State and Federal waters to determine whether the fishery had actually attained the ACL. If the three-year average catch were to exceed the ACL in any fishing year, NMFS would reduce the ACL in the

next fishing year by the amount of the overage. However, based on recent fishing performance over the last ten years and with the in-season accountability measure, it is not expected that the fishery would change such that the ACL of 127,205 lb in this Alternative would be exceeded and an overage adjustment be needed (Figure 3).

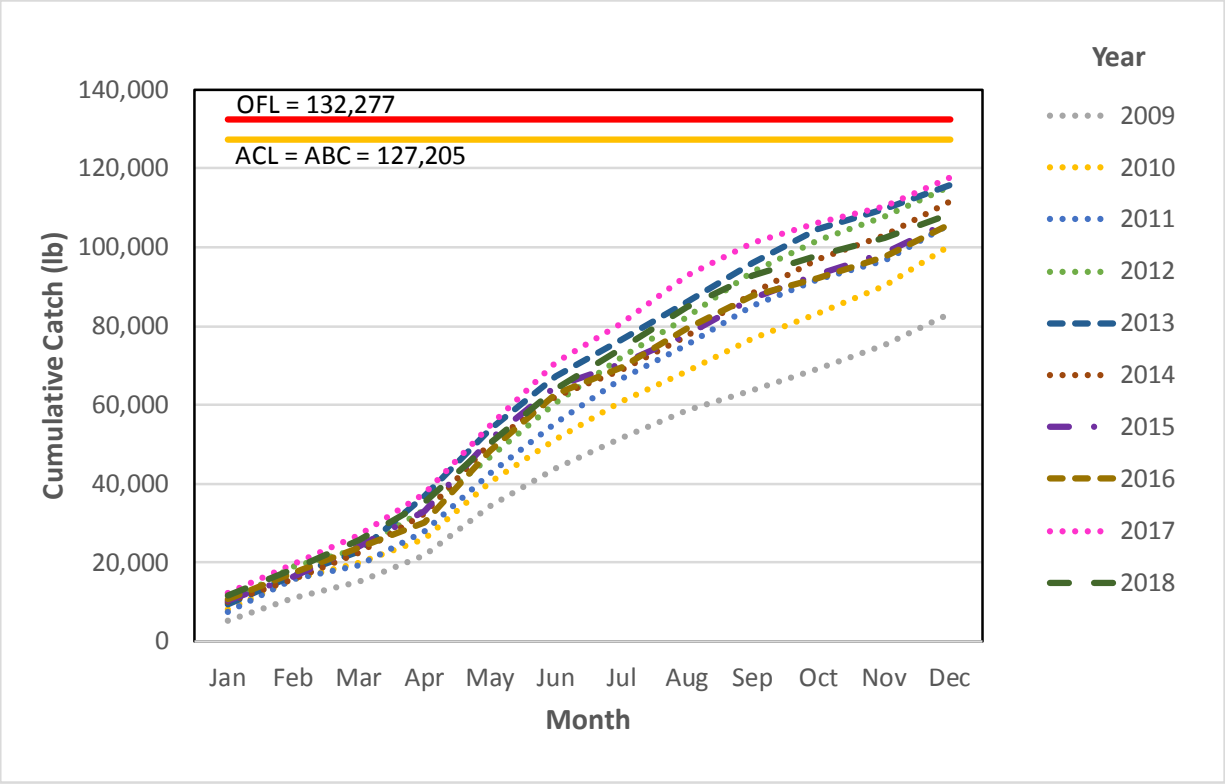

Figure 3. Cumulative monthly reported commercial landings of uku using a three-year average to track catches relative to the ACL under Alternative 2.
(Source: WPacFIN, data request 112834).

In summary, under Alternative 2, the uku fishery may be constrained by the ACL if it fishes as it did in 2017. However, the fishery reported a catch of 127,205 lb only one year out of the last seven since ACLs were first specified, so NMFS expects that in most years the fishery would not reach the proposed ACL. If the fishery did close, it would likely be near the end of the fishing year. In the absence of the in-season AM in 2021, the post-season AM would provide a management framework to ensure the fishery continues to be sustainable. The fishery is therefore not expected to change the way it fishes with respect to fishing gear, fishing effort, participation or intensity. Based on 3-year running averages, the uku fishery has not exceeded the proposed ACL in the past 10 years, so an overage adjustment under the post-season AM is unlikely. Should the fishery have a "boom" harvest year and the running 3-year average exceed the ACL, the Council and NMFS would implement an overage adjustment. Together with the in-season measure, this post-season AM would reduce the average catch to the level of the ACL.

2.2.3 Alternative 3: Specify an ACL at P*=41% equivalent to 134 mt (295,419 pounds) based on the SEEM analysis using the 2020 benchmark stock assessment

Under Alternative 3, the Council will recommend an ACL of 295,419 lb of uku in the MHI for the 2022, 2023, 2024, and 2025 fishing years. This alternative is based on the best scientific information available (Nadon et al 2020) and the evaluation by the P* and SEEM working groups (WPRFMC 2020a and 2020b) and the SSC (see SSC report). This corresponds to a risk of overfishing of 41 percent in the 2020 stock assessment.

This level of ACL is higher than Alternative 2 because it reflects both the commercial and non-commercial catches. To determine the likelihood of recent catches would reach the ACL, we have to look at the only commercial component of the ACL. Table 7 shows the commercial catch derived from the FRS and non-commercial catch from HMRFS in the past 16 years. The ratio of commercial to non-commercial is 51 percent and 49 percent respectively. Therefore, if the ACL is to be split into commercial and non-commercial it would be 150,664 lb for commercial and 144,755 lb for non-commercial.

Table 7. Commercial and non-commercial catch estimate of uku from 2003 to 2018. The percent commercial and non-commercial shows the ration per year. The avarage from 2015 to 2018 is about 51 percent commercial to 49 percent non-commercial

Year	Commercial (lb)	Non-Commercial (lb)	Percent Commercial	Percent Non-Commercial
2003	45,894	110,635	0.29	0.71
2004	77,044	145,098	0.35	0.65
2005	63,565	186,986	0.25	0.75
2006	59,585	107,400	0.36	0.64
2007	69,125	66,188	0.51	0.49
2008	92,535	43,705	0.68	0.32
2009	87,987	55,408	0.61	0.39
2010	120,764	99,731	0.55	0.45
2011	109,306	129,166	0.46	0.54
2012	116,764	206,715	0.36	0.64
2013	121,143	59,215	0.67	0.33
2014	96,813	105,659	0.48	0.52

2015	101,954	72,050	0.59	0.41
2016	119,175	59,122	0.67	0.33
2017	131,841	129,191	0.51	0.49
2018	74,614	199,905	0.27	0.73
Average$_{15\text{-}18}$			0.51	0.49

The commercial component of the ACL under Alternative 3 is 23,459 lb higher than ACL under the Alternative 2 and is associated with a probability of overfishing that is 41 percent, 1 percent lower than the P* value associated with the Alternative 2 from Nadon (2017). Comparing the 127,205 lb (57.7 mt) to the catch in Table 2 adjusting it by the 0.51 commercial ratio, this level of catch is about 3-4 percent risk of overfishing. Thus, this Alternative is less conservative than Alternatives 1 and 2 in terms of effect on the MHI uku stock but the best scientific information available supports the sustainable fishing of the stock.

Expected Fishery Outcome

Under Alternative 3, the commercial and non-commercial fishery could catch up to 295,419 lb of uku per year. The fishery will not reach this ACL if the fishery performance is similar to recent years (Table 5). Since ACLs were first implemented for the non-deep 7 fishery in 2012, uku catch did not exceed the commercial component of the proposed ACL under this Alternative at 150,664 lb (Table 6). In years prior to ACL implementation, uku catch has not received this level since 1989 (Table 5). At this level of catch, it is unlikely that the fishery will close. In case that the catch accumulation rate is higher, it is likely that the ACL will be reached on the last month of the fishing year. The Council expects that fishermen would continue to fish for pelagic fish and other bottomfish in the same way as they already are fishing for these MUS, and any uku caught incidental to these other fisheries within Federal waters, would be discarded. Uku catch from State waters during a Federal fishery closure could be sold, and all fish reported would be counted toward an ACL exceedance, if applicable.

After each fishing year ends, NMFS and the Council would review catch reports and HMRFS survey estimates from State and Federal waters to determine whether the fishery had actually attained the ACL. If the sum of the three-year average commercial catch from CML and the five-year average non-commercial catch from HMRFS were to exceed the ACL in any fishing year, NMFS would reduce the ACL in the next fishing year by the amount of the overage. However, based on recent fishing performance over the last ten years and with the in-season accountability measure, it is not expected that the fishery would change such that the ACL of 295,419 lb in this Alternative would be exceeded and an overage adjustment be needed (Figure 4).

In summary, under Alternative 3, the uku fishery will not be constrained by the ACL based on the recent fishery performance. The fishery is therefore not expected to change the way it fishes with

respect to fishing gear, fishing effort, participation or intensity. Based on 3-year running averages, the uku fishery has not exceeded the proposed ACL in the past 10 years, so an overage adjustment under the post-season AM is unlikely. Should the fishery have a "boom" harvest year and the running 3-year average exceed the ACL, the Council and NMFS would implement an overage adjustment. Together with the in-season measure, this post-season AM would reduce the average catch to the level of the ACL.

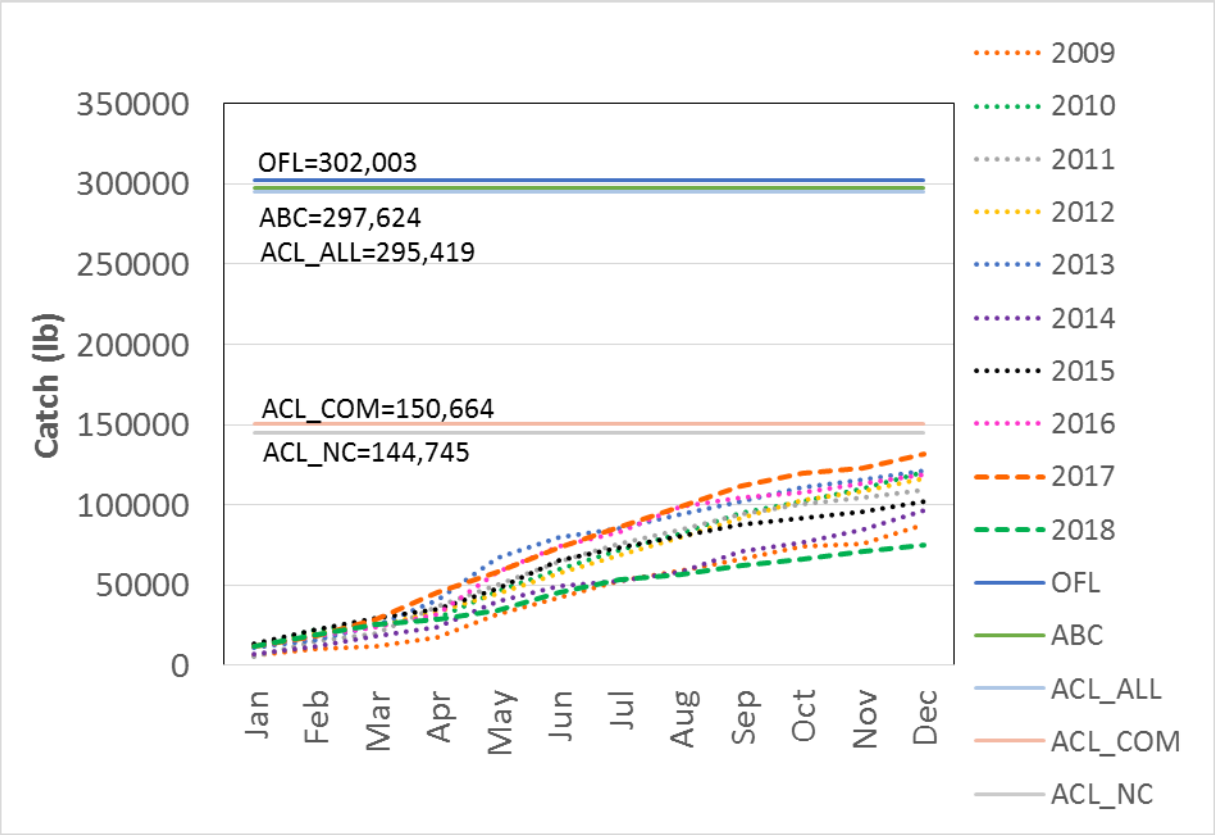

Figure 4. Cumulative monthly reported commercial landings of uku using a three-year average to track catches relative to the ACL under Alternative 3.
(Source: WPacFIN, data request 112834).

2.2.4 Alternative 4: Set an ACT at P*=36% equivalent to 132 mt (291,010 pounds) based on the SEEM analysis using the 2020 benchmark stock assessment

Under Alternative 4, the Council will recommend setting an ACT at 291,010 lb for uku in the MHI for the 2022, 2023, 2024, and 2025 fishing years. This is based on the SEEM analysis where five percent reduction is attributed to the monitoring and management uncertainty and would set the ACT. This corresponds to a risk of overfishing of 36 percent in the 2020 stock assessment. This level of catch is lower than Alternative 3 by 4,409 lb with a 5 percent reduction of overfishing risk. This Alternative is more precautionary than Alternative 3.

Expected Fishery Outcome

In evaluating whether this level of catch would likely be harvested by the fishery, we must look at only the commercial component of the ACT. Applying the same ratio of 51 percent commercial to 49 percent non-commercial, the ACT will be 148,415 lb for the commercial uku fishery and 142,595 lb for the non-commercial fishery. Since ACLs were first implemented for the non-Deep 7 fishery in 2012, uku commercial catch did not reach 148,415 lb (Table 5).

Because the ACT under Alternative 4 is 5 percent lower than the ACL in Alternative 3, the uku fishery in Federal waters is slightly more likely to close than under Alternative 3, or close slightly earlier, if the Council recommends for an in-season AMs (Table 6). As with Alternative 3, if the fishery was closed, it would likely be closed late in the year. Fishermen would continue to fish for other fish in the same way, and any uku caught incidental to these other fisheries within Federal waters would be discarded. Uku fishing in State waters would remain open, but since 66 percent of uku catch comes from Federal waters (Harvey and Associates 2017), a closure of Federal waters would significantly reduce uku catch. Uku catch from State waters during a Federal fishery closure could be sold, and all fish reported would be counted toward an ACL exceedance, if applicable. However, given the recent fishery performance, the federal closure is unlikely.

Under Alternative 4, should the fishery exceed the ACT but below the ACL, per Council's Accountability Measure in the Hawaii FEP, there will be no overage adjustment. The post-season AM would provide a management framework to ensure the fishery continues to be sustainable. The year-end total catch that is compared to the ACT is calculated by a three-year average of the commercial fishing reports and a five-year average of the annual HMRFS estimate. If the year-end total catch is above the ACT and ACL, both would be reduced by the amount of the overage. The overage adjustment is likely to be applied in the year immediately following the overage year, because the Council would have time to evaluate catch data, and NMFS would have time to implement the adjusted ACL prior to the end of the fishing year. Considering recent catch history, it is not likely that an overage adjustment would be needed (Figure 5). Any overage adjustment is expected be a small percentage of the ACL, as evaluated under this Alternative.

In summary, under Alternative 4, the uku fishery is not constrained by the ACT if it fishes as it did in the past 10 years. However, the commercial fishery reported a catch of greater than 148,415 lb only two years out of the 71 years, so the Council expects that in most years the fishery would not reach the ACT. Since the ACT under Alternative 4 is 5 percent less than the ACL under Alternative 3, the chance of the fishery reaching this level is slightly higher compared to Alternative 3. However, if the Council recommends an in-season AM, a closure in Federal waters would likely be near the end of the fishing year. The fishery is not expected to change the way it fishes with respect to fishing gear, fishing effort, participation or intensity. Based on 3-year running averages, the uku fishery has not exceeded the level of catch proposed under Alternative 4 in the past 10 years, a fishery closure and an overage adjustment are unlikely. Should the fishery have a "boom" harvest year and the running 3-year average for the commercial catch and 5-year average for the non-commercial catch exceed the ACL, the Council and NMFS would implement an overage adjustment. But if it only exceeded the ACT and not the ACL, no overage adjustment will be implemented.

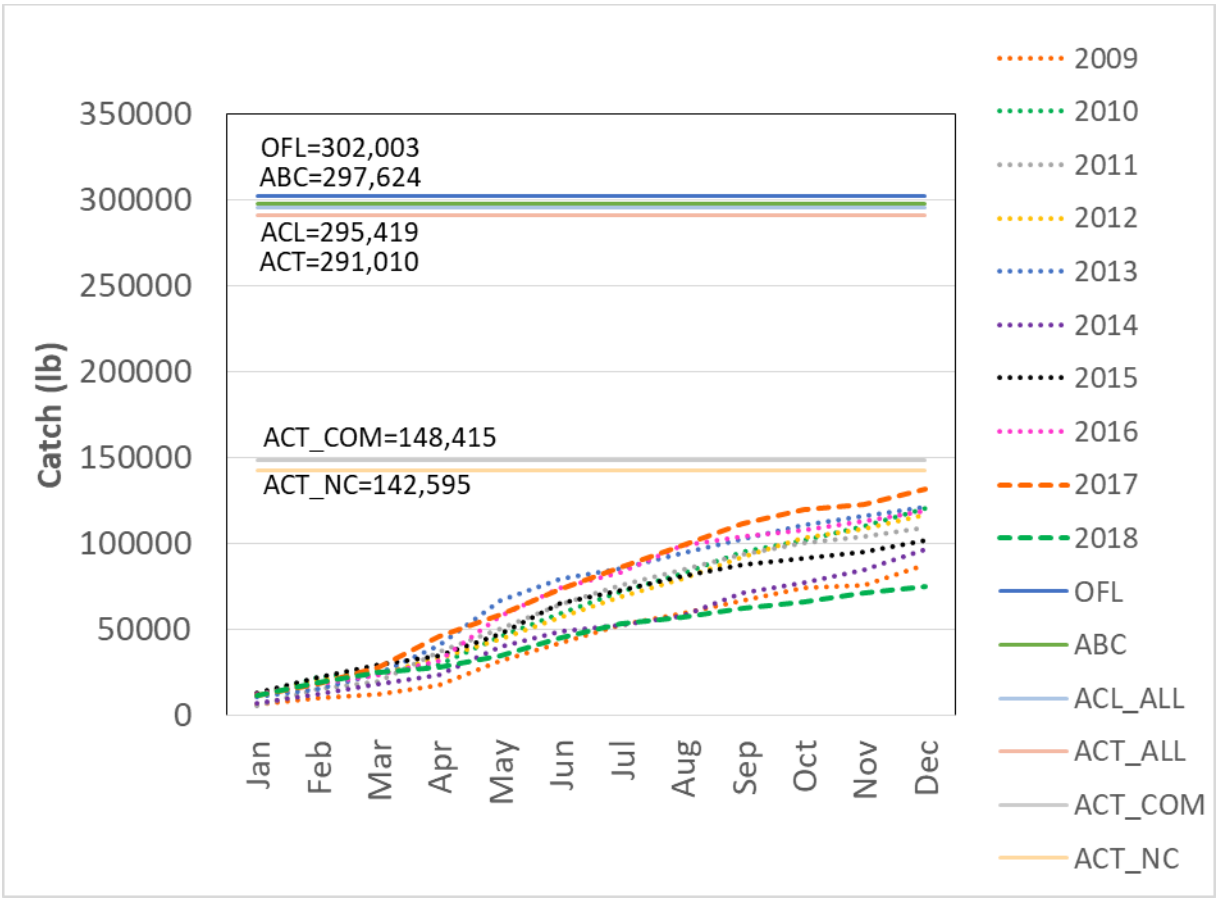

Figure 5. Cumulative monthly reported commercial landings of uku using a three-year average to track catches relative to the ACL under Alternative 4

2.2.5 Alternative 5: Set an ACT 10% lower than the SEEM analysis at P*=26% equivalent to 128 mt (282,192 pounds) using the 2020 benchmark stock assessment

Under Alternative 5, the Council will recommend setting an ACT at 282,192 lb for uku in the MHI for the 2022, 2023, 2024, and 2025 fishing years. This is Alternative is 10 percent lower than the results of the SEEM analysis. This would cover additional uncertainties due to the large variability in the non-commercial catch estimates from HMRFS which may trigger an overage of the ACT. A larger buffer between the ACT and ACL would provide additional measure that the ACL will not be exceeded. This corresponds to a risk of overfishing of 26 percent in the 2020 assessment. This level of catch is lower than Alternative 3 and 4 by 13,227 lb and 8,818 lb, respectively. Therefore, this Alternative is more precautionary than Alternative 3 and 4.

Expected Fishery Outcome

Similar to Alternative 3 and 4, in evaluating whether this level of catch would likely be harvested by the fishery, we must look at only the commercial component of the ACT. Applying the same ratio of 51 percent commercial to 49 percent non-commercial, the ACT will be 142,918 lb for the commercial uku fishery and 138,274 lb for the non-commercial fishery. Since the ACLs were first

implemented for the non-Deep 7 fishery in 2012, the commercial catch did not reach 143,918 lb (Table 5).

Because the ACT under Alternative 5 is 10 percent lower than the ACT in Alternative 4, the uku fishery in Federal waters is slightly more likely to close than under Alternative 4, or close slightly earlier, if the Council recommends for an in-season AMs (Table 6). As with Alternative 3 and 4, if the fishery was closed, it would likely be closed late in the year. Fishermen would continue to fish for other fish in the same way, and any uku caught incidental to these other fisheries within Federal waters would be discarded. Uku fishing in State waters would remain open, but since 66 percent of uku catch comes from Federal waters (Harvey and Associates 2017), a closure of Federal waters would significantly reduce uku catch. Uku catch from State waters during a Federal fishery closure could be sold, and all fish reported would be counted toward an ACL exceedance, if applicable. However, given the recent fishery performance, the federal closure is highly unlikely.

Under Alternative 5, should the fishery exceed the ACT but below the ACL, per Council's Accountability Measure in the Hawaii FEP, there will be no overage adjustment. The post-season AM would provide a management framework to ensure the fishery continues to be sustainable. The year-end total catch that is compared to the ACT is calculated by a three-year average of the commercial fishing reports and a five-year average of the annual HMRFS estimate. If the year-end total catch is above the ACT and ACL, both would be reduced by the amount of the overage. The overage adjustment is likely to be applied in the year immediately following the overage year, because the Council would have time to evaluate catch data, and NMFS would have time to implement the adjusted ACL prior to the end of the fishing year. Considering recent catch history, it is not likely that an overage adjustment would be needed (Figure 6). Any overage adjustment is expected be a small percentage of the ACL, as evaluated under this Alternative.

In summary, under Alternative 5, the uku fishery is not constrained by the ACT if it fishes as it did in the past 10 years. However, the commercial fishery reported a catch of greater than 143,918 lb only two years out of the 71 years, so the Council expects that in most years the fishery would not reach the ACT. Since the ACT under Alternative 5 is 10 percent less than the ACT under Alternative 4, the chance of the fishery reaching this level is slightly higher than Alternative 3 and 4. However, if the Council recommends an in-season AM, a closure in Federal waters would likely be near the end of the fishing year. In this case, the fishery is not expected to change the way it fishes with respect to fishing gear, fishing effort, participation or intensity. Based on 3-year running averages, the uku fishery has not exceeded the level of catch proposed under Alternative 4 in the past 10 years, a fishery closure and an overage adjustment are unlikely. Should the fishery have a "boom" harvest year and the running 3-year average for the commercial catch and 5-year average for the non-commercial catch exceed the ACL, the Council and NMFS would implement an overage adjustment. But if it only exceeded the ACT and not the ACL, no overage adjustment will be implemented.

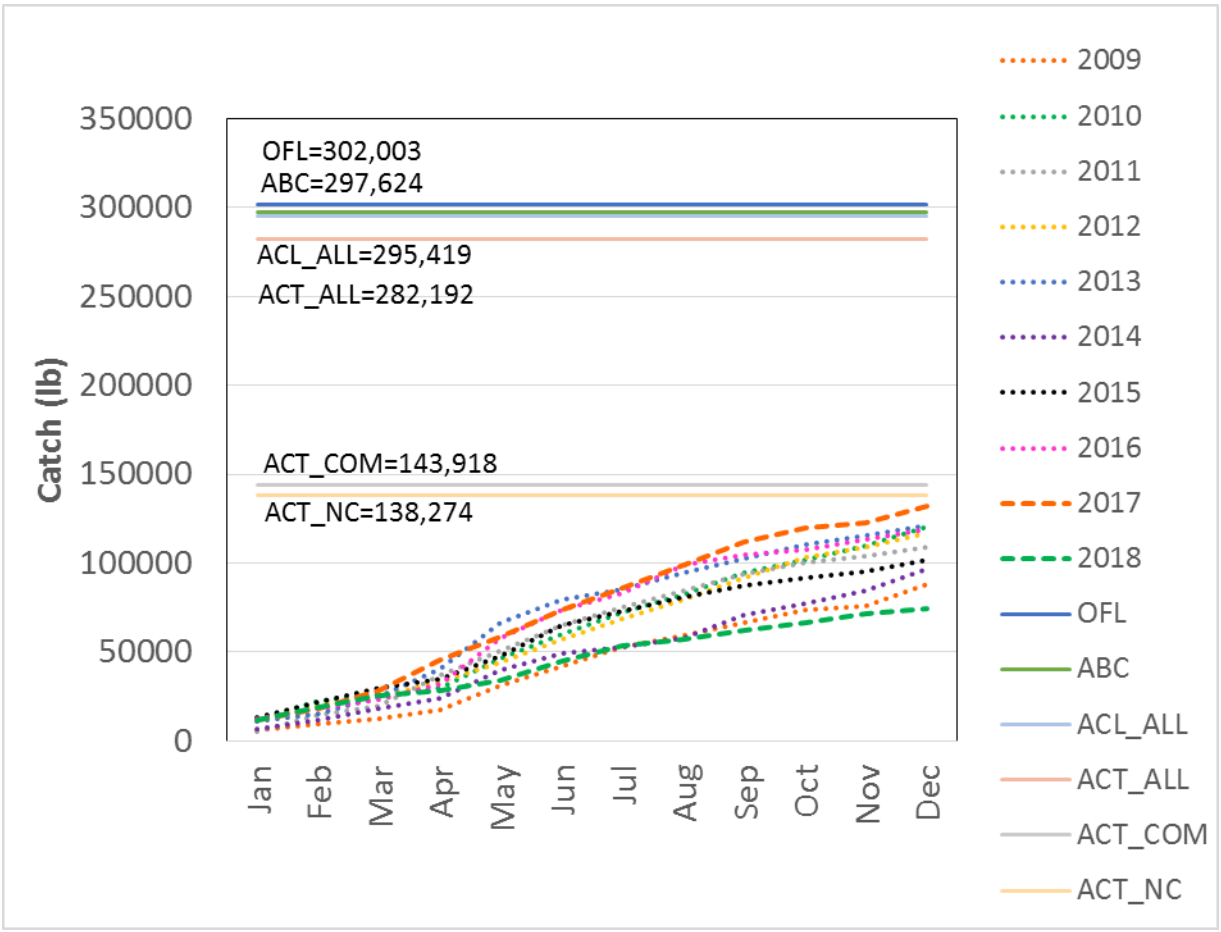

Figure 6. Cumulative monthly reported commercial landings of uku using a three-year average to track catches relative to the ACL under Alternative 5.

2.3 Considerations for Applying the Accountability Measures

2.3.1 Allocate ACLs to the Commercial and Non-Commercial Sector and Apply In-season Accountability Measures

The ACLs analyzed are based on total catch. The ACL could be allocated to the commercial and non-commercial sector of the uku fishery. In doing so, each sector will have to be monitored separately. The commercial fisheries will be monitored using the monthly fishers report by the State of Hawaii. Commercial fishermen are required to secure a commercial fishing license and the license requires fishermen to report their catch every month. There is a 10 day grace period at the end of each month for fishermen to submit their reports. If the Council and NMFS will monitor the commercial catch in-season, there is a 40-day lag in the Fisher Reporting System.

The non-commercial sector will be monitored using the HMRFS conducted by the State of Hawaii in collaboration with MRIP. HMRFS conduct mail survey to get fishing effort estimate and an Access Point Angler Intercept Survey to sample catch and CPUE information. The data is sent to MRIP and the catch estimate is generated every two months. As noted in the 2020 benchmark

assessment, there is a large variation on the annual non-commercial catch estimate for uku demonstrated by the large fluctuation in catch from 2003 to 2018. This would be exacerbated if the resolution is increased to a bi-monthly level. If the Council and NMFS will monitor the non-commercial catch in-season, there is a minimum of 60-day lag in the MRIP estimate. The Council and NMFS would also take into account the large fluctuation in non-commercial catches of uku.

The State of Hawaii currently does not have regulatory measures in place to limit the catch of uku and close the fishery in State waters should the commercial and non-commercial ACL are projected to be reached. This leaves 34 percent of the fisheries not managed that adds to the uncertainty that the ACLs will not be exceeded.

2.3.2 Apply In-Season Accountability Measures to the Commercial Fisheries Only

The Council, NMFS, and State of Hawaii have decades of experience in managing the commercial BMUS fisheries particularly the Deep 7 bottomfish. This fishery sets the standards for Federal-State parallel fisheries management. If the Council recommends applying the accountability measure to only the commercial fisheries, this creates a disproportional management burden on the uku commercial fishery sector while the non-commercial sector is not managed. Unlike the Deep-7 bottomfish, State rules are in place for the non-commercial sector once the commercial ACL is reached where possession of Deep-7 bottomfish (for both non-commercial and commercial) and commercial sales of bottomfish are prohibited. This rule does not apply to the uku fishery.

The proportion of the non-commercial catch is significant (49 percent based on Table 7) and focusing only on the commercial sector ignores the significant proportion of the non-commercial sector.

2.3.3 Utilize Post-Season Accountability Measure

Given that the monitoring and the State management structure are not up to standard for the application of an in-season AM, the Council may consider the post-season AM where at the end of the fishing year the catch from the commercial and non-commercial uku fisheries will be compared to the ACL or ACT. A three-year average will be used for the commercial catch while a five-year average will be used for the non-commercial catch. The SEEM working group discussed the utility of the five-year average applied to the non-commercial catch data from HMRFS for the post-season accountability measure. Using data from the stock assessment, the five-year moving average smooths out the large variability in the non-commercial data better than a 3 or 4-year averaging (Figure 7). The average catches will be summed and compared to the ACL/ACT. If the averaged total catch exceeded the ACT then no overage adjustment will be done in the following fishing year. If the averaged total catch exceeded the ACL then the ACL will be reduced by the amount of the overage and the associated ACT will be reduced accordingly to maintain that buffer.

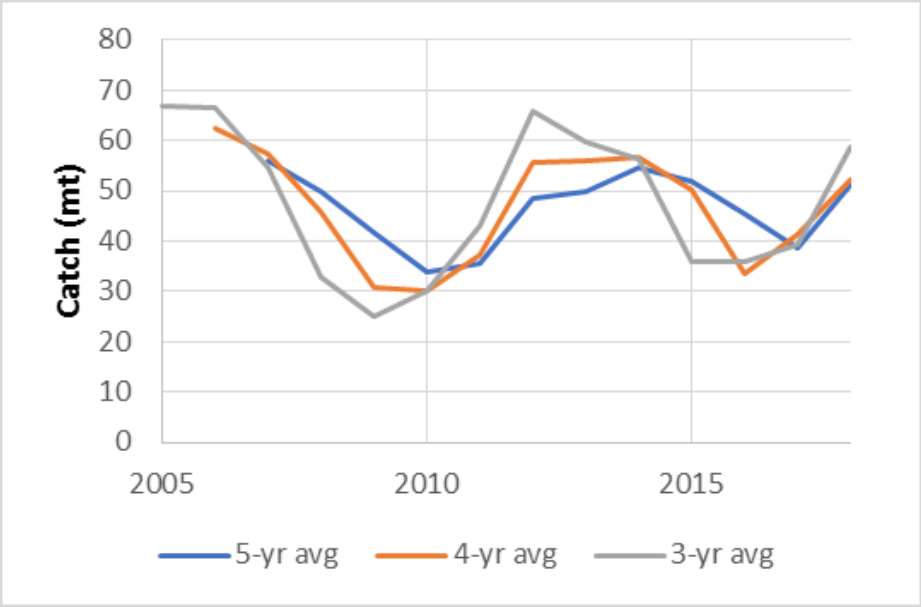

Figure 7. Comparison of the 3-year, 4-year, and 5-year moving average for the non-commercial catch data from HMRFS.

2.4 Alternatives Considered, but Rejected from Further Analysis

Under National Standard 1 of the Magnuson-Stevens Act, it is possible to implement a catch limit equivalent to the OFL (50 percent risk of overfishing). However, an ACL of 302,003 lb was not considered as an option in deliberations of the SSC and Council, because it would not be consistent with the process required under the Hawaii FEP for a Tier 1 stock that incorporates results of the P* analysis. An ACL of 302,003 lb is not analyzed as an Alternative in this document.

The Council and NMFS also did not consider ACTs that were smaller than 282,192 lb because no three-year period since 1990 exceeded the commercial component of this ACT and could be used to provide a reasonable example for considering effects of a larger overage adjustment. Instead, the catch limit in Alternative 5 was selected based on a reasonable risk level close to the mid-point of the risk of overfishing distribution. The commercial component of the lowest risk level at one percent is at 120,306 lb and the three year average of the recent commercial catch is at 98,764 lb. This is the lowest risk that can be analyzed and the catch does not even exceed that level of catch so consideration of alternatives with greater differences was not included in this document.

2.5 Comparison of Features of the Alternatives

Table 8 presents a summary of some highlights of the five Alternatives and allows a quick comparison of features of each of the Alternatives.

Table 8. Comparison of the fishery management features and expected outcomes of the Alternatives.

Fishery Management Topic	Alt. 1 - No Action: No ACL or AM	Alt. 2 - ACL 127,205 lb	Alt. 3 - ACL 295,419 lb	Alt. 4 - ACT 291,010 lb	Alt. 5 - ACT 282,192 lb
General characteristic of the Alternative	No ACL or AM.	ACL lower than Alt. 3	ACL higher than Alt. 1 – 4.	ACT higher than Alt 1 and 2 but lower than Alt 3 and higher than Alt 5	ACT higher than Alt 1 and 2 but lower than Alt 3-5
	Remarks: Alternative 2 ACL was developed based on information about uku stock status in a 2016 stock assessment which is a rollover of the existing ACL. Alternative 3 ACL was developed based on information from the 2020 benchmark stock assessment and incorporates a reduction from the OFL to account for scientific uncertainty and from the ABC for SEE uncertainty. Alternative 4 was reduced from the ACL in Alternative 3 due to monitoring and management uncertainty to set the ACT. Alternative 5 was reduced from the ACT in Alternative 4 by 10 percent to account for additional variability in the non-commercial catch				
Annual Catch Limit (ACL) / Annual Catch Target (ACT)	n/a	127,205 lb	295,419 lb	291,010 lb	282,192 lb
	Remarks: Recommended ACL for the next 4 years.				
P* associated with the proposed ACL/ACT	n/a	42 percent	41 percent	36 percent	26 percent
	Remarks: P* is the probability of overfishing occurring if the entire ACL is caught in a given year. Source of the risk probabilities for Alt 2 is Nadon 2017. Source of the risk probabilities for Alt 3 to 5 is Nadon et al. 2020.				

Fishery Management Topic	Alt. 1 - No Action: No ACL or AM	Alt. 2 - ACL 127,205 lb	Alt. 3 - ACL 295,419 lb	Alt. 4 - ACT 291,010 lb	Alt. 5 - ACT 282,192 lb
Comparison of ACL with ACL for fishing year 2019.	Same, no ACL. Uku was part of the non-Deep 7 bottomfish complex prior to 2019, though no ACL was specified for this complex in 2019.	The ACL under Alt 2 is the same as the 2019 ACL. Alt 2 is a rollover of the existing ACL	Alt 3 is higher than the ACL in 2019	Same as Alt 3	Same as Alt 3
	Remarks: The ACLs/ACTs under Alt 3 to 5 are based on total uku catches (commercial and non-commercial). Just taking the commercial portion of this ACL based on the ratio in Table 7, the ACLs/ACTs are higher than the ACL in 2019.				
Complies with Magnuson-Stevens Act, Hawaii FEP	No. ACL and AMs not implemented for uku.	Yes but does not comply with National Standard 2	Yes	Yes	Yes
	Remarks: Alt 2, although it specifies an ACL, the scientific basis for this ACL is not based on the current BSIA.				

Fishery Management Topic	Alt. 1 - No Action: No ACL or AM	Alt. 2 - ACL 127,205 lb	Alt. 3 - ACL 295,419 lb	Alt. 4 - ACT 291,010 lb	Alt. 5 - ACT 282,192 lb
Accountability Measure 1 (AM 1): Closure of fishery when ACL is reached.	Not applicable. The uku fishery would not be subject to a potential fishery closure.	For fishing years 2022, 2023, and 2024, if the fishery catches are expected to approach the ACL, NMFS would close the uku fishery in Federal waters.	If the Council recommends an in-season AM, the ACL will have to be allocated and catch tracked separately. If the fishery catches are expected to approach the ACL, NMFS would close the uku fishery in Federal waters.	Same at Alt 3, but on ACT not ACL	Same as Alt 4
	Remarks: Catch would be tracked on a monthly basis, and projections made using reported catch from the three most recent years for the commercial sector. The non-commercial sector catch will be tracked on a bi-monthly basis.				
Estimated total catch each fishing year beginning with the 2019 fishing year	104,880 lb (Average catch of recent 5-years)	127,205 lb	122,569 lb		
	Remarks:				

Fishery Management Topic	Alt. 1 - No Action: No ACL or AM	Alt. 2 - ACL 127,205 lb	Alt. 3 - ACL 295,419 lb	Alt. 4 - ACT 291,010 lb	Alt. 5 - ACT 282,192 lb
Likelihood the uku fishery would close in a given year	No potential for a closure. Fishing for uku the MHI could occur year round.	Based on recent catches in the fishery, a closure may occur infrequently. Uku catch exceeded the proposed ACL once in the seven years since NMFS first specified ACLs. Fishermen would need to discard uku caught in Federal waters if the fishery closed.	At this level of catch, it is unlikely that the uku fishery would close at a given year. The fishery would not close if a post season AM is implemented	The possibility of a closure is slightly higher than Alternative 3 because the Alternative 4 ACT is 5 percent lower, but is still expected to occur infrequently and near the end of the fishing year. The fishery would not close if a post season AM is implemented	The possibility of a closure is slightly higher than Alternative 3 and 4 because the Alternative 5 ACT is 10 percent lower, but is still expected to occur infrequently and near the end of the fishing year. The fishery would not close if a post season AM is implemented
	Remarks:				

Fishery Management Topic	Alt. 1 - No Action: No ACL or AM	Alt. 2 - ACL 127,205 lb	Alt. 3 - ACL 295,419 lb	Alt. 4 - ACT 291,010 lb	Alt. 5 - ACT 282,192 lb
AM 2: Overage adjustment if ACL exceeded	Not applicable.	If the fishery were to exceed an ACL based on a three-year average, NMFS, in consultation with the Council, would apply an overage adjustment to the ACL in the following year.	Same as Alt. 2 but would be using the sum of the average of the most recent three years for commercial and five years for non-commercial.	Same as Alt 3 but no overage adjustment if the sum is above the ACT but below the ACL	Same as Alt 4
	Remarks: In order to determine the overage in a given year, NMFS would compute the sum of the average catch for the three most recent years for the commercial catch and five most recent years for the non-commercial catch and then the resulting amount would be compared to the ACL. The amount over the ACL would be the amount by which the subsequent year's ACL would be reduced. For Alt 4 and 5, if the sum exceeds the ACT and not the ACL, the succeeding year ACL will not be reduced. This AM is the same management measure that has been in place since the 2012 fishing year for the non-Deep 7 bottomfish stock, but has not been implemented as catches have not exceeded the ACL.				

Fishery Management Topic	Alt. 1 - No Action: No ACL or AM	Alt. 2 - ACL 127,205 lb	Alt. 3 - ACL 295,419 lb	Alt. 4 - ACT 291,010 lb	Alt. 5 - ACT 282,192 lb
Likelihood that a downward reduction in ACL would occur in any given year	Not applicable.	Very unlikely, based on recent catch history. NMFS would close the fishery to prevent the fishery from exceeding the ACL if needed.	Very unlikely, based on recent catch history.	Very unlikely, based on recent catch history.	Very unlikely, based on recent catch history.
	Remarks: Monthly catch updates help fishery managers reduce the likelihood of an exceedance of the ACL in any given year. There is a large uncertainty from the non-commercial catch estimate since this is based on an expansion of the HMRFS data We note that the likelihood of a downward adjustment would be increased following any year in which the fishery is closed in Federal waters because the fishery would remain open in State waters.				
State of HI fishery closure when the ACL is expected to be reached	Not applicable (no federally-implemented ACL or AM)	No	Same as Alt. 2.	Same as Alt. 2.	Same as Alt. 2.
	Remarks: DLNR administrative rules do not provide for a closure for uku based on the fishery approaching a Federal ACL.				
Fishing Permits required	State Commercial Marine License required to fish commercially for uku around Hawaii.	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1

Fishery Management Topic	Alt. 1 - No Action: No ACL or AM	Alt. 2 - ACL 127,205 lb	Alt. 3 - ACL 295,419 lb	Alt. 4 - ACT 291,010 lb	Alt. 5 - ACT 282,192 lb
	Remarks: Fishing permit requirements would be the same for all alternatives.				
Bag Limits and Size Limits	There is no bag limit for uku. State of Hawaii size limits apply: Uku below one pound may not be speared or sold commercially.	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1
	Remarks: Size limits would continue to apply unchanged under each alternative.				
Catch Monitoring	DLNR, Division of Aquatic Resources collects commercial uku catch data from fishing vessels. Reporting is required for all commercial catches. This allows NMFS to undertake monthly monitoring of the uku fishery.	Same as Alt. 1	Same as Alt 1 but with addition of the non-commercial catch data from HMRFS	Same as Alt 3	Same as Alt 3
	Remarks: Monitoring of commercial and non-commercial catch would be the same for 3 to 5 alternatives				

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