WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

163rd Meeting of the Western Pacific Regional Fishery Management Council
Laniakea YWCA, Fuller Hall
1040 Richards St., Honolulu, HI 96813

Options for Specifying Annual Catch Limits and Accountability Measures for the Main Hawaiian Island Deep 7 Bottomfish Fishery for Fishing Year 2015-16, 2016-17, & 2017-18

Summary: The Council must specify multi-year annual catch limits for the main Hawaiian island deep 7 bottomfish for fishing year 2015-16, 2016-17, and 2017-18. The best scientific information available is the 2011 stock assessment model with updated data to 2013 (Boggs memo for the record dated March 03, 2015). Based on this updated information, the Maximum Sustainable Yield was estimated to be at 404,000 lbs and the overfishing limit at 352,000 lbs. The retrospective pattern in the model and data caused the reduction which is expected since the model is correcting the estimate of biomass as the assessment is updated with additional data. The P* working group and SSC subcommittee evaluated the scientific uncertainty and recommended a risk level for the full SSC and Council to consider.

The SSC and Council needs to evaluate the following options:
1) No Action - no ACLs will be specified for fishing year 2015-16, 2016-17, and 2017-18

2) Specify ACLs based on the old stock assessment without updating the time series and the old P* level applied to fishing year 2015-16, 2016-17, and 2017-18

3) Specify ACLs based on the updated assessment using the 2011 assessment model with three years of data and the new P* level applied to fishing year 2015-16, 2016-17, and 2017-18

4) Specify ACLs based on the updated assessment using the 2011 assessment model with three years of data and apply a phase-in approach to the new P* level over the three year period

5) Specify ACLs based on the updated assessment using the 2011 assessment model with three years of data at a level lower than the P* level applied to fishing year 2015-16, 2016-17, and 2017-18

The Council needs to specify an accountability measure that will prevent the fishery from overfishing the stock.

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Purpose and Need

The purpose of this action is to use the best available scientific information to specify an ACL and AMs for the MHI Deep 7 bottomfish fishery. An ACL and AMs are needed to comply with the Magnuson-Stevens Act and provisions of the Hawaii FEP under which NMFS specifies an ACL for all stocks or stock complexes in the MHI Deep 7 bottomfish fishery. NMFS and the Council developed the ACL and AMs in accordance with the approved FEP mechanism and process, considering the best available scientific, commercial, and other information about the fishery, and taking into account the associated risk of overfishing. Under the Hawaii FEP, AMs are implemented to ensure the ACL specification is not exceeded and to correct or mitigate overages of ACLs if they occur. The fishery management objective is to specify an ACL and AMs that will prevent overfishing from occurring, and ensure long-term sustainability of Hawaii's bottomfish stocks while allowing fishery participants to continue to benefit from the managed harvest of the fishery resources.

Description of the Alternatives Considered

The alternatives considered in this EA are limited to the ACL and AMs as they are the management measures to be applied to the fishery for the MHI Deep 7 bottomfish stock complex. Although the OFL and ABC are part of the ACL mechanism, the establishment of these reference points is not part of the proposed federal action, but are described for informational purposes.[1]

Development of the Alternatives

The alternatives considered in this EA are based upon the best available scientific, commercial, and other information about the MHI Deep 7 bottomfish fishery. NMFS Pacific Islands Fisheries Science Center (PIFSC) compiles these information sources to produce a stock assessment, which describes the past and current status of the MHI Deep 7 bottomfish stock complex, and predicts potential effects on stock status at various levels of catch. Currently, there are two recent PIFSC stock assessments that provide information relevant to the status of MHI Deep 7 bottomfish, which are briefly summarized below.

2011 MHI Deep 7 Bottomfish Stock Assessment Benchmark

In 2011, PIFSC completed a stock assessment benchmark for the MHI Deep 7 bottomfish fishery (2011 stock assessment) using data through 2010 (Brodziak et al. 2011). The 2011 stock assessment used similar commercial fishery data as in a 2008 assessment update (Brodziak et al. 2009), but includes a modified treatment of unreported catch and catch per unit effort (CPUE) standardization, as well as new research information on the likely life history characteristics of bottomfish (A. Andrews, PIFSC, unpublished 2010 research) in response to recommendations from the Western Pacific Stock Assessment Review (WPSAR) of the 2008 update (Stokes, 2009). Additionally, while the 2008 assessment considered the entire assemblage of Hawaii BMUS on an archipelagic basis (NWHI and MHI), the 2010 assessment focused solely on the Deep 7 bottomfish stock complex in the MHI.

[1] OFL is an estimate of the catch level above which overfishing is occurring. ABC accounts for scientific uncertainty in the estimate of OFL. OFL and ABC are biologically-based reference points and are not part of the federal action.

To address the unreported catch issue, the 2011 assessment included four scenarios of unreported catch developed from available information. The four scenarios are labeled in order of magnitude from the highest (Scenario 1) to the lowest (Scenario 4) estimates of unreported catch.

- **Catch Scenario 1:** Unreported catch is 2 times commercial reported catch
- **Catch Scenario 2:** Unreported catch equals the commercial reported catch
- **Catch Scenario 3:** Unreported catch is one-fifth the commercial reported catch
- **Catch Scenario 4:** There is no unreported catch

According to the 2011 assessment the Catch Scenario 2 is the baseline (i.e., most plausible scenario) because it used the best available information on unreported to reported catch ratios estimated for individual MHI Deep7 bottomfish species.
To determine the appropriate CPUE, the 2011 assessment included three scenarios to represent changes in fishing power of the fleet that targets Deep 7 bottomfish for commercial catch. CPUE is used in stock assessments as an index of relative stock abundance. Standardizing CPUE from different anglers over different areas and over many years helps to minimize the effects that could bias CPUE as an index of stock abundance.

- **CPUE Scenario 1:** Negligible change in bottomfish fishing power through time.
- **CPUE Scenario 2:** Moderate change in bottomfish fishing power through time. Specifically, this scenario assumed that: (i) there was no change in fishing power during 1949-1970; (ii) fishing power increased at a rate of 0.25 percent per year during 1971-1980; fishing power increased at a rate of 0.5 percent per year during 1981-1990; (iii) fishing power increased at a rate of 0.25 percent per year during 1991-2000; and (iv) fishing power did not change during 2001-2010.
- **CPUE Scenario 3:** Substantial change bottomfish fishing power through time. Specifically, this scenario assumed that a substantial change in fishing power scenario had occurred since the 1950s with an average increase in fishing power of roughly 1.2 percent per year.

According the 2011 assessment CPUE Scenario 1 is the baseline (i.e., most plausible scenario) because it represented the best scientific information about the efficiency of the Deep7 bottomfish fishing fleet through time, and because it did not include ad hoc assumptions about changes in fishing power for the deep handline fishery that has traditionally harvested the Deep7 bottomfish complex.

Based on the Catch 2/CPUE 1 scenario combination, the 2011 assessment estimates a maximum sustainable yield (MSY) of 417,000 lb for the MHI Deep 7 bottomfish stock complex. The 2011 stock assessment also included projection results of a range of commercial catches of Deep 7 bottomfish that would produce probabilities of overfishing ranging from 0 percent to 100 percent and at five percent intervals (Table 19.1 in Brodziak et al., 2011, and shown in Appendix A). Under the Catch 2/CPUE 1 scenario combination, the catch limit associated with a 50 percent probability of overfishing is 383,000 lb of MHI Deep 7 bottomfish. Therefore, while the long-term MSY for the fishery is 417,000 lb, the OFL for fishery is 383,000 lb.

Findings of an Independent Peer Review

In January 2011, PIFSC contracted the Center for Independent Experts (CIE) to provide three independent experts to review a draft of the 2011 stock assessment and prepare a report of their independent findings and recommendations, and whether the 2011 stock assessment is the best scientific information available for management purposes. In general, the CIE review panel found that the 2011 stock assessment was scientifically sound, applied appropriate modeling approaches and methods given data limitations. In addition, each reviewer provided recommendations on how to improve the next assessment particularly with respect to providing credible CPUE standardization. The reports of the CIE reviewers are available on the PIFSC website at http://www.pifsc.noaa.gov/do/peer_reviews/.

2014 MHI Deep 7 Bottomfish Stock Assessment Update

In 2014, the PIFSC completed a draft 2014 stock assessment update for the MHI Deep 7 bottomfish fishery (2014 stock assessment), using data through fishing year the 2013 (Brodziak et al. 2014). The 2014 stock assessment update uses the previous 2011 stock assessment's methods for data analysis, modeling, and stock projections, with one improvement--it included the State of Hawaii's CML data as a variable to standardize CPUE over time. The State began issuing CMLs uniquely and consistently to individuals through time starting in 1994. Therefore, beginning in 1994 the CML number assigned to an individual has remained the same. The 2014 stock assessment included individual CMLs in the CPUE standardization for that year onward. This improvement is highly significant, resulting in a two-fold increase in the explanatory power (R-squared) of the CPUE standardization and a substantial decrease in the Akaike information criterion value of the CPUE standardization, which now explains over 50% of the variation in observed CPUE over time. Additionally, in the three additional years (2011-13) covered by the 2014 assessment, the biomass of the Deep 7 species and the exploitation rate were about the same as in the preceding three years. Therefore, the updated estimates of the values for management (i.e., MSY, OFL, probability of overfishing etc.) are not a result of any significant change in biomass or exploitation rate, but are due to better estimation of the values provided by the previous assessment.

Based on the revised CPUE standardization method and three years of additional catch data, the 2014 stock assessment update re-estimates MSY to be 415,000 lb, which is similar to the previous MSY estimate of 417,000 lb reported in the 2011 stock assessment. The 2014 stock assessment also included projection results of a range of commercial catches of Deep 7 bottomfish that would produce probabilities of overfishing ranging from 0 percent to 100 percent and at five percent intervals (Table 15 in Brodziak et al., 2014). Based on a maximum potential harvest of 325,000 lb of MHI Deep 7 bottomfish in the then-ongoing 2013-14 fishing year, the 2014 stock assessment estimated an OFL of 316,000 lb, which is 67,000 lb less than the OFL estimate in the 2011 stock assessment. These updated estimates of MSY and OFL are not the result of any significant change in biomass or exploitation rate, but are due to better estimations resulting from the revised CPUE standardization method.

Findings of an Independent Peer Review

In December 2014, PIFSC again contracted the CIE to provide three independent experts to review the 2014 stock assessment and prepare a report of their independent findings and recommendations, and to assist NMFS in determining whether the 2014 stock assessment is the

best scientific information available for management purposes. In summary, the CIE panel found that including individual CML data as a variable to standardize CPUE over time was an improvement over the method used in the 2011 stock assessment. However, the CIE panel had strong reservations regarding the quality of input catch data and CPUE index of abundance used in both the 2011 and 2014 stock assessments. Specifically, the panel raised concern about the historical pre-1990 data for CPUE calculation and estimates of unreported catch. Given the concerns with the incomplete effort information, the CIE panel concluded that the 2014 stock assessment had serious flaws that compromised its utility for management. In particular, the CIE panel noted that because the 2014 stock assessment was an update only, and required improvements in the index and the population model, the science reviewed in the 2014 stock assessment is not considered the best available. The reports of the CIE reviewers are available on NMFS website at http://www.st.nmfs.noaa.gov/science-quality-assurance/cie-peer-reviews/cie-review-2015.

Best Scientific Information Available

National Standard 2 requires that conservation and management measures be based on the best scientific information available, and be founded on comprehensive analyses. National Standard 2 guidelines (78 FR 43087, July 19, 2013) state that scientific information that is used to inform decision making should include an evaluation of its uncertainty and identify gaps in the information (50 CFR 600.315(a)(1). The guidelines also recommend scientific information used to support conservation and management be peer reviewed (50 CFR 600.315(a)(6)(vii)). However, the guidelines also state that mandatory management actions should not be delayed due to limitations in the scientific information or the promise of future data collection or analysis (50 CFR 600.315(a)(6)(v)).

On March 3, 2015, PIFSC outlined reasons why the fisheries data in the 2014 assessment produced results that the CIE panel advised were not ready for management application, and identified two ways in which the fisheries data can be improved for future application in the new CPUE standardization method.

1. Although catch per day fished is the best available CPUE that is available continuously over the whole time series, it may not be the best available over the most recent time series. If the time series is to be split with CPUE issues addressed differently before and after the split, one could also analyze and include detailed effort data that has been collected only for the last dozen years. This data could strongly influence recent trends. This was not seen by PIFSC as work that could be done as a simple update in 2014, because it is a complex undertaking.

   The use of CPUE defined as catch per day fished is subject to great criticism, and one way to address this is by using details on hours and numbers of lines and hooks used by fishermen over the last dozen years. Only inexplicit, undescribed differences among fishermen linked through time were applied to the recent stanza in the 2014 CPUE standardization. Using the recent effort detail would still allow differences between individual fishermen to be standardized, and also allow changes in effort details through time, to be addressed. Both were factors of great concern to the reviewers. Differences among areas and seasons and other such factors that can be applied throughout the whole time series have remained part of the CPUE standardization in both 2011 and 2014.

2. Further efforts could be made to apply the CPUE standardization to account for differences among fishermen to more data using various exploratory methods and other data sets. The 2014 assessment overlooked a compilation of confidential non-electronic records held by the State of Hawaii that may help to link fisher's identities back through an earlier stanza of time.

Although the CIE panel noted the improvement in catch rate standardization in the 2014 stock assessment compared to 2011, it had strong reservations regarding the input catch data in both stock assessments, However, PIFSC cannot improve the assessment for MHI Deep 7 bottomfish in the ways described above in short order because it is a complex undertaking. Although catch per day fished may not be the best available CPUE data that can be used in the superior split-stanza CPUE standardization (i.e. after 1994), it is the best available CPUE data that is available over the entire time series, and thus appropriate for use in the 2011 assessment approach, which does not utilize a split-stanza CPUE standardization approach. Therefore, NMFS believes that a much more simple update of the 2011 assessment using data from the three most recent years available (i.e., 2011, 2012 and 2013) provides the best scientific information available for management. Applying this updated data, NMFS revised the MSY for MHI Deep 7 bottomfish from 417,000 lb to 404,000 lb and the OFL from 383,000 lb 352,000 lb. These values do not reflect a drastic change in stock status from the information considered by the Council, and the proposed ACL of 346,000 lb remains below the revised OFL of 352,000 lb. **This is the basis for the development of Alternatives under this action.**

Estimation of OFL

OFL is an estimate of the annual amount of catch that corresponds with the maximum fishing mortality threshold (MFMT), and is expressed in terms of weight (pounds) of fish. In other words, if catch exceeds the OFL, there is a 50 percent probability that overfishing is occurring. OFL is a biologically-based reference point estimated by NMFS Pacific Islands Fisheries Science Center through a stock assessment. According to the 2011 stock assessment update (Brodziak et al. 2011), the Catch 2/CPUE 1 scenario combination represents the best approximation (with a 0.400 probability) of the true state of nature of the bottomfish fishery and Deep 7 bottomfish population dynamics. Under the Catch 2/CPUE 1 scenario combination with data updated to 2013, the long-term maximum sustainable yield (MSY) of the MHI Deep 7 bottomfish stock complex is estimated to be 404,000 lb. The 2011 assessment model with updated data to 2013 also included projection results of a range of commercial catches of Deep 7 bottomfish that would produce probabilities of overfishing ranging from zero percent to 50 percent, and at five percent intervals (Table 2 in Boggs memo for the record dated March 3, 2015, and shown in Appendix A). Based on these results, the 2011 stock assessment model with data to 2013 estimates that the level of catch associated with a 50 percent probability of overfishing the MHI Deep 7 bottomfish complex is 352,000 lb. Therefore, while the long-term MSY for the fishery is 404,000 lb, the OFL for the fishery is 352,000 lb.

Calculation of ABC

At its 119th meeting held June 9-11, 2015, the SSC reviewed the P* working group meeting reports. The P* working group held its first meeting on May 6, 2015. The P* working group reviewed the uncertainties in the 2011 stock assessment in light of the recent CIE review of the 2014 stock assessment update. The working group also reviewed the results 2011 stock

assessment model updated with three years of data to 2013. The working group rescored the first three dimensions: 1) assessment information; 2) uncertainty characterization; and 3) stock status. These were the basis for the change in the risk of overfishing levels for the MHI deep 7 bottomfish fishery from a risk of 41% to 38%.

The working group held its second meeting on June 4, 2014 and re-evaluated the Productivity and Susceptibility dimension of the fishery. After rescoring this dimension, the P* working group recommended a risk of overfishing level to the SSC at X%. The reports were made available to the SSC and can be requested from the Council.

At its 119th meeting, the SSC evaluated the different alternatives including the potential use of the phase-in approach described in the proposed rule for the National Standard 1, 3, and 7. The proposed revision to the National Standard 1 guidelines allows for the use of a phase-in approach in the ABC control rules that would phase in changes to the ABC over a period of time not to exceed 3 years, so long as overfishing is prevented. This has been used by the International Pacific Halibut Commission (IPHC) (Hare and Clark 2008). The Council recommends a Slow-up Fast-down phase in approach. This adjustment limits abrupt fishery ABC changes from one year to the next in the following manner. If a fishery ABC is greater than the previous year's catch limit, only 33.3% of the increase is allowed. If a fishery CEY is lower than the previous year's catch limit, only 50% of the decrease is allowed. The ability to make ACL adjustments that provide more stability to fishing participants, yet do not jeopardize the capacity of the stock or stock complex to produce MSY on a continuing basis.

Figure 1 shows the phase in approach where the limits are reduced incrementally over a three year period using a Slow up-Fast down approach. This would maintain the fishery below the OFL and at the same time maximize the catch as it transition to the new risk level on the third year.

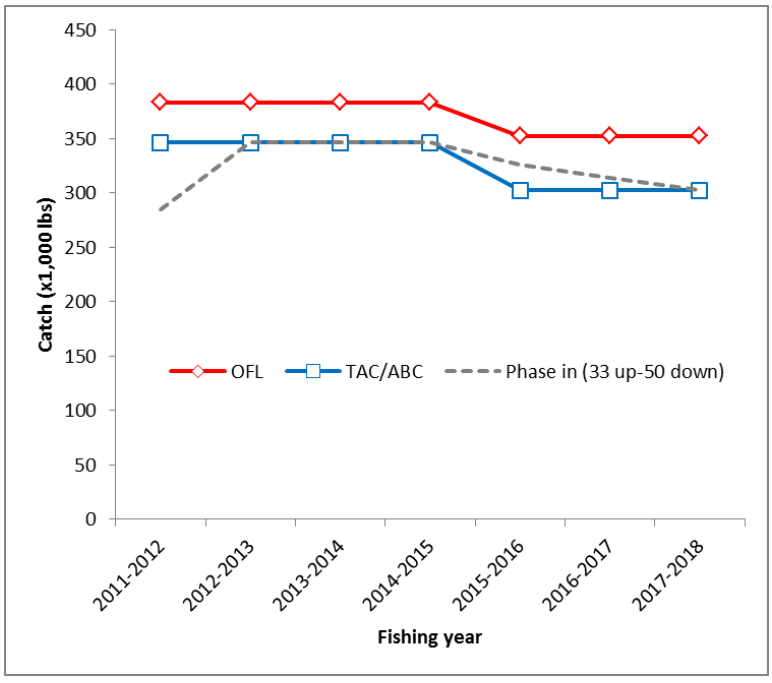


Figure 1. Phase-in approach to specifying ABCs over a three year period using SUFD.

ACL Alternatives for Deep 7 Bottomfish Fisheries in the MHI

This section describes a range of ACL alternatives for MHI Deep 7 bottomfish fisheries in fishing years 2015-16, 2016-17, 2017-18 and expected fishery outcomes. Table 2 summarizes the alternatives considered, including their associated probability of overfishing percentiles (P*) based on risk projections from the 2011 stock assessment with updated data to 2013 (Table 2 in Boggs memo for record dated March 3, 2015, and shown in Appendix A). 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 1. Summary of ACL alternatives and associated probability of overfishing (P*) percentile for MHI Deep 7 bottomfish, including MSY-based reference points.

MHI Deep 7 Bottomfish						
MSY = 404,000 lb						
OFL = 352,000 lb (P*=50%)						
$ABC_{14\text{-}15}$ = 346,000 lb (P*=41%) – Based on Brodziak et al. 2011						
$ABC_{15\text{-}16}$ To be determined. Will be based on Brodizak et al. 2011 as updated						
	FY 2015-2016		***FY 2016-2017***		***FY 2017-2018***	
	ABC (lb)	***P****	***ABC (lb)***	***P****	***ABC (lb)***	***P****
Alternative 1 (No Action)	No ABC	NA	No ABC	NA	No ABC	NA
Alternative 2 (Status Quo applied to 3 years)	346,000	48-49	346,000	48-49	346,000	48-49
Alternative 3 (P* level using updated data and apply quota to 3 years)	306,000	39	306,000	39	306,000	39
Alternative 4 (P* level using updated data and apply phase in approach to preferred P* level)	326,000	44	318,000	42	306,000	39
Alternative 5 (P* level using updated data and lower than preferred P* level)	270,000	30	270,000	30	270,000	30

Source: updated numbers are based of the Boggs memo (2015)

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

Under Alternative 1, the Council would not specify an ACL or AMs for the MHI Deep 7 bottomfish fishery for the 2015-18 fishing year. However, this alternative would not comply with the Magnuson-Stevens Act or the provisions of the Hawaii FEP, which require NMFS to specify an ACL and AMs for all stocks and stock complexes.

Expected Fishery Outcome
Under this alternative, the lack of an ACL or AM is not expected to result in large adverse effects on 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 is because based upon the best available commercial and scientific information, the MHI Deep 7 bottomfish fishery historically harvests less than the stock complex's maximum sustainable year, even without an ACL and AM. As shown in Table 6, commercial catches of MHI Deep 7 bottomfish have consistently remained below the estimated OFL of 352,000 lb and long-term MSY of 404,000 lb. In the 2013-14 fishing year, the fishery reported a total of 309,485 lb of MHI Deep 7 bottomfish. This is the highest level of catch since NMFS implemented a catch limit system in the 2007-08 fishing year. During fishing year 2013-14, the fishery remained open year round. In fishing years 2014-15 and 2015-16, total reported catch is expected to be similar to 2013-14 catch, and is not expected to result in overfishing. As of May 15, 2015, the fishery has a reported total landing of 265,619 lbs for fishing year 2014-2015. Therefore, the expected fishery outcome under Alternative 1 is expected to be identical to the expected fishery outcome described under Alternative 2 below.

Alternative 2: Specify an ACL of 346,000 lb based on the 2011 Stock Assessment with no updated data (Status Quo/NEPA Baseline)
Under Alternative 2, the Council would specify an ACL of 346,000 lb for the 2015-16, 2016-17, 2017-18 fishing years as previously recommended by the Council. Based on probability of overfishing projections contained in the 2011 stock assessment (Table 19.1 in Brodziak et al. 2011 and shown in Appendix B), an ACL of 346,000 lb is associated with a 41 percent probability of overfishing the MHI Deep 7 bottomfish stock complex should the entire ACL be caught. This ACL and AM is identical the ACL NMFS specified for the fishery in fishing year 2012-13 (77 FR 56791, September 9, 2012, and 2013-14 (78 FR 59626, September 27, 2013).

This level of catch is no longer considered based on best-available scientific information. In 2014, the PIFSC completed a draft 2014 stock assessment update for the MHI Deep 7 bottomfish fishery (2014 stock assessment), using data through fishing year the 2013 (Brodziak et al. 2014). The 2014 stock assessment update uses the previous 2011 stock assessment's methods for data analysis, modeling, and stock projections, with one improvement--it included the State of Hawaii's CML data as a variable to standardize CPUE over time. Based on the revised CPUE standardization method and three years of additional catch data, the 2014 stock assessment update re-estimates MSY to be 415,000 lb, which is similar to the previous MSY estimate of 417,000 lb reported in the 2011 stock assessment. Based on a maximum potential harvest of 325,000 lb of MHI Deep 7 bottomfish in the then-ongoing 2013-14 fishing year, the 2014 stock assessment estimated an OFL of 316,000 lb, which is 67,000 lb less than the OFL estimate in the 2011 stock assessment. This assessment was reviewed by the Center for Independent Experts in December of 2014.

The CIE panel had strong reservations regarding the quality of input catch data and CPUE index of abundance used in both the 2011 and 2014 stock assessments. Specifically, the panel raised concern about the historical pre-1990 data for CPUE calculation and estimates of unreported

catch. Given the concerns with the incomplete effort information, the CIE panel concluded that the 2014 stock assessment had serious flaws that compromised its utility for management. In particular, the CIE panel noted that because the 2014 stock assessment was an update only, and required improvements in the index and the population model, the science reviewed in the 2014 stock assessment is not considered the best available.

The SSC had determined in October 2014 that the 2011 stock assessment is the best scientific information available for the Council. The CIE rejection of the 2014 stock assessment update forced NMFS to make a determination that the 2011 stock assessment model with three years of additional data would suffice as best available science.

As an AM to prevent the fishery from exceeding the ACL, the Council recommends to close the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters on the date NMFS projects the fishery would reach ACL through the end of the fishing year. Although not part of this action, during a federal fishery closure, the State of Hawaii implements a complementary closure in State waters, and prohibit any person from fishing for, possessing or selling MHI Deep 7 bottomfish after the closure date.

As an additional AM, if NMFS and the Council determine the fishery exceeded the 2015-16 ACL, the Council would recommend NMFS to reduce the 2016-17 ACL by the amount of the overage. Alternative 2 is the status quo alternative and the NEPA baseline to which all other alternatives are compared.

Expected Fishery Outcome

Under Alternative 2, the specification of an ACL of 346,000 lb and the associated AMs are not expected to result in changes in the conduct of the fishery, including gear types used, areas fished, level of catch or effort. This is because total reported catch in 2014-15 and 2015-16 is expected to be similar to 2013-14 catch (i.e., 309,485 lb), and remain below the ACL of 346,000 lb. Thus, the in-season AM of a fishery closure to prevent the ACL from being exceeded is not likely to be triggered and like under Alternative 1, the fishery is expected to remain open for the entire fishing year (e.g. from September 1 to August 31 the following year). However, if the fishery were to attain the ACL of 346,000 lb in 2015-16, 2016-17, and 2017-18, the Council would recommend NMFS to implement a fishery closure of the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters. When this occurs, the State of Hawaii implements a complementary fishery closure in state waters. The in-season AM of a fishery closure is expected to keep total catch of MHI Deep 7 bottomfish below the OFL of 383,000 lb and prevent overfishing from occurring.

Because state and federal laws require fishermen to report on a per-trip basis, it is unlikely that management uncertainty (i.e. late reporting) would occur and cause the fishery to exceed the ACL of 346,000 lb. Thus, an overage adjustment AM in 2015-16, 2016-17, and 2017-18 is not likely to be necessary. However, if the fishery does exceed the ACL in 2015-16, NMFS would reduce the ACL in fishing year 2016-17 by the amount of the overage.

Alternative 3: Specify an ACL of 306,000 lb based on the 2011 Stock Assessment with updated data to 2013 and no phase-in

Under Alternative 3, the Council would specify an ACL of 306,000 lb of MHI Deep 7 bottomfish for the 2015-16, 2016-17, and 2017-18 fishing year. As an AM to prevent the fishery from exceeding the ACL, the Council would recommend to close the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters on the date NMFS projects the fishery would reach ACL through the end of the fishing year. As an additional AM, if the NMFS and the Council determine the fishery exceeded the 2015-16 ACL, NMFS would reduce the 2016-17 ACL by the amount of the overage.

Based on the probability of overfishing projections contained in the update of 2011 benchmark stock assessment of Deep 7 bottomfish In the Main Hawaiian Islands using data through 2013 (Boggs memo for the record dated March 3, 2015 and the supplemental table dated May 19, 2015), an ACL of 306,000 lb is associated with a 39 percent probability of overfishing should the entire ACL be caught. The P* working group re-evaluated the scientific uncertainty around the 2011 assessment as a result of the recent CIE review that highlighted uncertainties in the model, assumption and data that went into the assessment. The P* working group met on May 6, 2015 and June 4, 2015 and recommended a risk of overfishing level of 39% for the MHI deep 7 bottomfish fishery (see Appendix C).

Based on the 2011 stock assessment model with three years of additional catch data, the 2015 stock assessment update re-estimates MSY to be 404,000 lb, which is less than the previous MSY estimate of 417,000 lb reported in the 2011 stock assessment (Boggs memo for the record dated March 3, 2015). Based on a maximum potential harvest of 346,000 lb of MHI Deep 7 bottomfish in the ongoing 2014-15 fishing year, the 2015 stock assessment update estimated an OFL of 352,000 lb, which is less than the OFL estimate in the 2011 stock assessment at 383,000 lbs.

Expected Fishery Outcome

Under Alternative 3, the fishery is not likely to reach the ACL of 306,000 lb if the fishery performance is average relative to the fishery performance over the past 4 years (Table 12). If the fishery performs closely to the 2013-14 fishing year, the fishery can potentially close around early to mid-August (Table 10). If the fishery performance peaks and trends maximum landing each month, this level of catch would result in a five month potential fishery closure starting early April to August.

However, if the fishery were to attain the ACL of 306,000 lb in 2015-16, 2016-17, and 2016-18, the Council recommend NMFS to implement a fishery closure of the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters. When this occurs, the State of Hawaii implements a complementary fishery closure in state waters. The in-season AM of a fishery closure is expected to keep total catch of MHI Deep 7 bottomfish below the OFL of 352,000 lb and prevent overfishing from occurring.

Because state and federal laws require fishermen to report on a per trip basis, it is unlikely that management uncertainty (i.e. late reporting) would occur and cause the fishery to exceed the ACL of 306,000 lb. Thus, an overage adjustment AM in 2016-17 is not likely to be necessary.

However, in the unlikely event the fishery exceeds an ACL set at 306,000 lb, NMFS would reduce the ACL in fishing year 2016-17 by the amount of the overage.

Alternative 4: Specify an ACL of 326,000 lb, 318,000 lb, and 306,000 lb for fishing year 2015-16, 2016-17, and 2017-18 using a Slow-Up Fast-Down phase-in approach

Under Alternative 4, the Council would specify an ACL of 326,000 lb, 318,000 lb, and 306,000 lb of MHI Deep 7 bottomfish for the 2015-16, 2016-17, and 2017-18 fishing year, respectively. As an AM to prevent the fishery from exceeding the ACL, the Council also proposes to close the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters on the date NMFS projects the fishery would reach ACL through the end of the fishing year. Based on the probability of overfishing projections contained in the update of 2011 benchmark stock assessment of Deep 7 bottomfish In the Main Hawaiian Islands using data through 2013 (Boggs memo for the record dated March 3, 2015 and the supplemental table dated May 19, 2015), an ACL of 326,000 lb, 316,000 lb, and 306,000 lb are associated with a 44, 42, and 39 percent probability of overfishing, respectively.

Expected Fishery Outcome

Under Alternative 4, for fishing year 2015-16 and 2016-17, the specification of an ACL of 326,000 lb and 318,000 lb and the associated AMs are not expected to result in changes in the conduct of the fishery, including gear types used, areas fished, level of catch or effort. This is because total reported catch in 2014-15 and 2015-16 is expected to be similar to 2013-14 catch (i.e., 309,485 lb), and remain below the said ACLs. Thus, the in-season AM of a fishery closure to prevent the ACL from being exceeded is not likely to be triggered and like under Alternative 1, the fishery is expected to remain open for the entire fishing year (e.g. from September 1 to August 31 the following year). However, if the fishery were to attain the ACL of 326,000 lb and 318,000 lb in 2015-16, and 2016-17, the Council would recommend NMFS to implement a fishery closure of the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters. When this occurs, the State of Hawaii implements a complementary fishery closure in state waters. The in-season AM of a fishery closure is expected to keep total catch of MHI Deep 7 bottomfish below the OFL of 352,000 lb and prevent overfishing from occurring.

For fishing year 2017-18, the fishery is not likely to reach the ACL of 306,000 lb if the fishery performance is average relative to the fishery performance over the past 3 years (Table 12). If the fishery performs closely to the 2013-14 fishing year, the fishery can potentially close around early to mid-August (Table 10). If the fishery performance peaks and trends maximum landing each month, this level of catch would result in a five month potential fishery closure starting early April to August.

If the fishery reached 306,000 lb in the 2017-18 fishing year, this would trigger the in-season closure of the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters and the complementary closure in state waters. This in-season AM closure is expected to keep total catch of MHI Deep 7 bottomfish below the OFL of 352,000 lb and prevent overfishing from occurring.

Because state and federal laws require fishermen to report on a per trip basis, it is unlikely that management uncertainty (i.e. late reporting) would occur and cause the fishery to exceed the ACL of 306,000 lb. Thus, an overage adjustment AM in the following fishing year is not likely to be necessary. However, in the unlikely event the fishery exceeds an ACL set at 306,000 lb, the Council would recommend NMFS to reduce the ACL the following in fishing year by the amount of the overage.

Alternative 5: Specify an ACL of 270,000 lb based on the 2011 Stock Assessment with updated data to 2013 and no phase-in

Under Alternative 5, The Council would specify an ACL of 270,000 lb of MHI Deep 7 bottomfish for the 2015-16, 2016-17, and 2017-18 fishing year. As an AM to prevent the fishery from exceeding the ACL, the Council also proposes to close the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters on the date NMFS projects the fishery would reach ACL through the end of the fishing year. Based on the probability of overfishing projections contained in the update of 2011 benchmark stock assessment of Deep 7 bottomfish In the Main Hawaiian Islands using data through 2013 (Boggs memo for the record dated March 3, 2015 and the supplemental table dated May 19, 2015), an ACL of 270,000 lb is associated with a 30 percent probability of overfishing.

Expected Fishery Outcome

Under Alternative 5, the fishery is expected to reach the ACL of 270,000 lb by the end of April to early May if the fishery performance is based on the monthly MHI Deep 7 bottomfish catches in the 2013-14 fishing year that attained 283,293 lb of MHI Deep 7 bottomfish in May 2014, the 9th month of the fishing year (Table 10, HDAR unpublished data). If the fishery performance is compared to an average of the last 4 fishing years (2011-12, 2012-13, 2013-14, 2014-May 2015), an ACL of 270,000 will not result in any closure (Table 12). However, if the fishery performance is compared to the maximum landing of every month, an ACL of 270,000 lb would result in a 6 month fishery closure closing at around February to March where it landed around 265,558 lb to 301,332 lbs.

If the fishery reached 270,000 lb in the fishing years 2015-16, 2016-17, and 2017-18, this would trigger the in-season closure of the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters and the complementary closure in state waters. This in-season AM closure is expected to keep total catch of MHI Deep 7 bottomfish below the OFL of 352,000 lb and prevent overfishing from occurring.

However, the state and federal laws require fishermen to report on a per trip basis, it is unlikely that management uncertainty (i.e. late reporting) would occur and cause the fishery to exceed the ACL of 270,000 lb. Thus, an overage adjustment AM in the following is not likely to be necessary. However, in the unlikely event the fishery exceeds an ACL set at 270,000 lb, NMFS would reduce the ACL in the following by the amount of the overage.

Affected Environment

This section describes the affected biological and physical resources that could be affected by MHI Deep 7 bottomfish fisheries under the proposed action.

Target and Non-Target Species
The MHI bottomfish fishery harvests an assemblage, or complex, of 14 species that include nine snappers, four jacks (trevally) and a single species of grouper (Table 1). However, the target species of the fishery, and the species of primary management concern are six deep-water snappers and the grouper. Termed the "Deep 7 bottomfish," they include onaga (*Etelis coruscans*), ehu (*Etelis carbunculus*), gindai (*Pristipomoides zonatus*), kalekale (*Pristipomoides sieboldii*), opakapaka (*Pristipomoides filamentosus*), lehi (*Aphareus rutilans*), and hapuupuu (*Epinephelus quernus*).

Deep 7 Bottomfish
There is a limited amount of quantitative information on the life history parameters of the Deep7 bottomfish, and in particular, the early life stages and juvenile characteristics are not yet well described. Adults tend to inhabit deep waters of roughly 100-400 m depth in the MHI although some species (e.g., opakapaka) may shoal to mid-water depths to feed. The paragraphs below are drawn from WPFMC (2007) and briefly summarize information regarding the Deep 7 bottomfish species.

***Onaga*:** Large specimens of onaga will reach at least three feet in length and weigh up to 30 pounds. They inhabit deep, rocky bottoms offshore and are known to occur between 80 and 250 fathoms (fm). Onaga are commonly caught off the bottom or in areas of steep drop-offs, ledges, and pinnacles. Onaga feed on small fishes, squids, and crustaceans, and are thought to reach sexual maturity at about 21 inches and five pounds, at approximately five years of age. Females with ripe ovaries have been reported during August and September. Onaga are distributed throughout the Indo-Pacific region.

***Ehu*:** Adult ehu will reach a length of at least 24 inches and a weight of up to about 12 pounds. They inhabit deeper offshore water beyond the reef, mainly occurring over rocky bottoms, usually between 80 and 218 fathoms. They feed on fishes and larger invertebrates such as squids, shrimps, and crabs, and reach sexual maturity at about 11.7 inches fork length, or one pound in weight, at approximately three years of age. Ehu, or ula ula, were determined to spawn in the NWHI from July – September in a study by Everson (1984). Ehu are distributed throughout the Indo-Pacific region.

***Kalekale*:** Large specimens of kalekale can reach up to 24 inches in length and six pounds. Commonly, they are found at around 12 inches in length. They inhabit deeper offshore water beyond the reef, occurring over rocky bottoms usually between 40 and 200 fathoms. They feed on fish, shrimps, crabs, polychaetes, cephalopods, and urochordates. Fish of 14 inches fork length are approximately two pounds in weight and five years of age. Kalekale are distributed throughout the Indo-Pacific region.

***Opakapaka*:** Large specimens will reach a length of at least three feet and weigh up to about 20 pounds. They inhabit deeper offshore water beyond the reef, occurring over rocky bottoms, usually between 40 and 120 fathoms. Fish apparently migrate into shallower depths near 40 fathoms at night. They feed on small fishes, squids, shrimps, crabs, pyrosomes, and zooplankton. Sexual maturity is reached at about 1.8 years and they generally spawn at about 2.2 years (1.5 pounds, 13 inches fork length). Their spawning season in the NWHI was determined in a 1980 study to be from June – December with peak spawning in August (Kikkawa 1980). Previous research on the age and growth of opakapaka estimated a maximum age of 18 years (Ralston and Miyamoto, 1983). However, recent ageing research based on bomb radiocarbon and lead radium decay dating of archival otolith samples indicate that this species has a life span on the order of 40 years. (A. Andrews, PIFSC, unpublished data, in Brodziak et al., 2011). Information on the expected natural mortality rate (M) of opakapaka was estimated to be 0.25, based research from the research thesis of Martinez-Andrade (2003).

***Gindai*:** Gindai will reach up to 20 inches in length and six pounds in weight. They inhabit deeper offshore water beyond the reef, occurring over rocky bottoms, usually between 60 and 130 fathoms. They feed on fishes, shrimps, crabs, cephalopods, and other invertebrates. Gindai are distributed throughout the Indo-Pacific region.

***Lehi*:** Large lehi specimens will reach a length of at least three feet and weigh up to about 30 pounds. They inhabit reefs and rocky bottom areas usually between 60 and 100 fathoms. They feed on fish, squid, and crustaceans. Lehi are distributed throughout the Indo-Pacific region.

***Hapuupuu*:** This grouper reaches lengths of up to four feet and weighs up to 60 pounds. They occur in waters 11 to 208 fathoms deep. They feed mainly on fish and crustaceans. The hapuupuu is endemic to the Hawaiian Islands and Johnston Island.

Table 2 summarizes the annual reported commercial catches of MHI Deep 7 bottomfish catch by species from 2000-2013. Note that the data in Table 2 covers the HDAR fiscal year, which begins July 1 and ends June 30 the following year. For ACL management, NMFS and the Council monitor MHI Deep 7 bottomfish catches based on the fishing year, which begins September 1 and ends August 31, the following year. See Table 5 for annual reported catches of all MHI Deep 7 bottomfish combined by fishing year.

Table 2. Reported MHI Deep 7 bottomfish catch (lb) by species (Fiscal Year 2000-May 2014 [partial])

Year	Hapuupuu	Kalekale	Opakapaka	Ehu	Onaga	Lehi	Gindai	Total
2000	13,100	15,900	165,900	26,700	72,100	11,100	3,200	308,000
2001	15,400	15,300	124,800	26,500	62,900	11,500	3,600	260,000
2002	9,000	10,300	103,500	16,900	59,600	10,800	2,400	212,400
2003	9,400	12,000	127,700	16,300	68,800	8,500	2,100	244,800
2004	7,900	8,000	87,200	19,200	75,700	4,900	2,100	205,000
2005	10,400	7,800	104,400	22,600	89,600	6,900	2,000	243,700
2006	7,200	5,200	72,100	18,700	74,100	6,300	1,600	185,300

Year	Hapuupuu	Kalekale	Opakapaka	Ehu	Onaga	Lehi	Gindai	Total
2007	7,500	6,100	92,400	19,400	85,500	8,400	2,300	221,700
2008	6,600	5,500	96,200	18,200	55,700	11,000	2,800	196,000
2009	7,900	9,600	132,900	24,500	59,200	16,700	3,600	254,500
2010	8,200	8,200	105,400	24,700	57,900	6,100	2,800	213,400
2011	8,200	9,900	148,400	24,500	67,700	11,600	3,100	273,400
2012	9,100	11,300	105,100	25,700	52,600	7,900	3,700	215,300
2013	10,500	12,300	95,700	30,100	66,900	13,000	3,400	231,900
2014	7,616	15,343	131,078	25,406	72,672	11,199	2,304	265,619

Source: Table 4 in Brodziak et al (2014). 2014 numbers from Division of Aquatic Resources weekly updates dated 05/15/2015

Stock Status for MHI Deep 7 Bottomfish

Under the Hawaii FEP (WPFMC 2009), bottomfish overfishing occurs when the fishing mortality rate (F) for one or more years is greater than the fishing mortality rate that produces MSY (F_{MSY}). This threshold is termed the maximum fishing mortality threshold (MFMT) and is expressed as a ratio, $F/F_{MSY} = 1.0$. Thus, if the F/F_{MSY} ratio is greater than 1.0 for one year or more, overfishing is occurring. A stock is considered overfished when its biomass (B) has declined below the level that jeopardizes the capacity of the stock to produce MSY on a continuing basis (B_{MSY}). This threshold is termed the minimum stock size threshold (MSST). For MHI Deep 7 bottomfish, the Hawaii FEP sets MSST at (1-M) multiplied by $B_{MSY,}$ if *M* (the natural mortality of the stock) is less than or equal to 0.5. If M is greater than 0.5, the Hawaii FEP sets MSST at a default of 0.5 multiplied $B_{MSY.}$

Because of the limited quantitative information on life history parameters of Deep 7 bottomfish, the 2011 NMFS stock assessments assumes the natural mortality rate estimate for *opakapaka (M*=0.25) to be representative of all stocks in the Deep 7 bottomfish stock complex (Brodziak et al 2011). The assessment further noted that *opakapaka* is the most numerically abundant species in the complex and has historically accounted for the highest proportions of reported landings Therefore, expressed as a ratio, the MHI stock complex is considered overfished when B/B_{MSY} <0.75.

Results of the 2011 stock assessment indicate that the MHI Deep 7 bottomfish stock complex was not experiencing overfishing in 2010 as F_{2010}/F_{MSY}=0.58. The assessment also indicated that the MHI Deep 7 bottomfish stock complex was not overfished in 2010 as $B_{2010}/B_{MSY} = 0.92$. However, the 2011 assessment indicated MHI Deep 7 bottomfish biomass declined below the biomass necessary to produce MSY (B_{MSY}) starting in 1990 and has remained below this level since (Brodziak et al 2011; Table 17.1).

Non-Deep 7 Bottomfish

In addition to the Deep 7 bottomfish, the fishery also harvests four species of jacks and three snappers. Termed the "non-Deep 7 bottomfish, they include the giant trevally or white ulua (*Caranx ignobilis),* black jack or black ulua (*Caranx lugubris*), amberjack or kahala (*Seriola dumerili*), thick lipped trevally or butaguchi (*Pseudocaranx cheilio*) gray jobfish/snapper or uku (*Aprion virescens*), blue lined snapper or taape (*Lutjanus kasmir*), and yellowtail snapper or

yellow kalekale (*Pristipomoides auricilla*). Uku is the primary non-Deep 7 bottomfish species harvested and accounts for approximately 80 percent of the total non-Deep 7 bottomfish catch annually, followed by white ulua (*Caranx ignobilis*), black ulua (*Caranx lugubris*), and butaguchi (*Pseudocaranx dentex*). Catches of yellowtail kalekale (*Pristipomoides auricilla*) are insignificant relative to other species.

Table 4 provides a summary of the annual reported commercial catch of MHI non-Deep 7 bottomfish by species (excluding taape and kahala) between the years 2000-2013. Note that the unlike MHI Deep 7 bottomfish, the fishing year for non-Deep 7 bottomfish is the calendar year. Uku (*Aprion virescens*) is the primary non-Deep 7 bottomfish species harvested and accounts for approximately 80 percent of the total non-Deep 7 bottomfish catch annually, followed by white ulua (*Caranx ignobilis*), black ulua (*Caranx lugubris*), and butaguchi (*Pseudocaranx dentex*). Catches of yellowtail kalekale (*Pristipomoides auricilla*) are insignificant relative to other species.

Since 2000, catch of non-Deep 7 bottomfish has increased culminating in a record high of 158,245 lb in 2013. Anecdotal information suggests that the increase, driven primarily by catches of *uku* was a result of NMFS implementation of a catch limit system in 2007-08. In fishing years 2007-08 to 2009-10, NMFS closed the MHI Deep 7 bottomfish fishery each year to prevent the fishery from exceeding the specified catch limit (Table 6). This resulted increased catch of *uku* to meet market demand for a substitute for Deep 7 bottomfish. With a new market for *uku*, catches have remained above 100,000 lb since 2010. The most recent catch record from HDAR showed total landing of non-deep 7 bottomfish at 116,135 lbs (WPRFMC 2015. Evaluation of 2014 catch to 2014 ACLs)

Table 3. Annual reported commercial catch of non-Deep 7 bottomfish in the MHI (2000-2013).

Fishing Year	Uku	Butaguchi	Black ulua	White ulua	Yellowtail kalekale	Total (lb)
2000	83,318	2,947	73	4,044	0	90,382
2001	58,436	1,814	122	4,199	5	64,576
2002	57,155	1,659	421	4,183	1	63,420
2003	45,704	1,635	1,180	12,873	0	61,391
2004	76,815	1,394	1,034	14,112	43	93,399
2005	63,505	1,493	453	11,213	25	76,688
2006	59,569	298	267	9,076	32	69,241
2007	68,953	880	773	26,722	0	97,328
2008	92,872	1,193	405	15,856	6	110,331
2009	87,175	1,083	549	13,794	35	102,636
2010	123,250	772	3,348	17,986	27	145,383
2011	109,497	1,385	1,554	18,904	51	131,391
2012	101,758	742	827	12,368	0	115,695
2013	138,822	1,028	1,155	17,240	0	158,245
2014	80,694	265	158	7,488	43	88,648

Source: Catch data for 2000-2013 obtained from NMFS (2013), catch data for 2012 and 2013 obtained from NMFS WPacFIN website: http://www.pifsc.noaa.gov/wpacfin/hi/dar/Pages/hi_data_3.php, accessed 11/13/2014. Data from 2014 was obtained from HDAR through a data request email dated 06/05/2015

Stock Status for MHI Non-Deep 7 Bottomfish

NMFS has not prepared any stock assessment for the MHI non-Deep 7 bottomfish stock complex. Therefore, stock status of MHI non-Deep 7 bottomfish relative to the SDC for overfishing (F/F_{MSY}) and overfished (B/B_{MSY}) reference points are unknown. However, Sabater and Kleiber (2014) recently estimated MSY and OFL for this complex based on a modeling approach that uses commercial catch data from the State of Hawaii as described above; together with a measure of population growth (r), carrying capacity (k), and biomass data from NMFS PIFSC underwater fish census surveys (Williams 2010). This model, termed the "Biomass Augmented Catch-MSY" model creates annual biomass projections from a set of r and k combinations that would not result in biomass that would exceed the carrying capacity or the stock being depleted.

Based on the Biomass Augmented Catch-MSY model, Sabater and Kleiber (2014) estimate MSY for MHI non-Deep 7 bottomfish to be 265,000 lb. However, catch projection results generated from the model estimate the level of catch associated with a 50 percent probability of exceeding MSY to be 259,200 lb. Consistent with National Standard 1 guidelines (74 FR 3178, January 9, 2011), the Council at its 160th meeting, set OFL for MHI non-Deep 7 bottomfish equal to the level of catch associated with a 50 percent probability of exceeding MSY.

Bycatch

As is the case for most fisheries, some of the catch are lost or discarded. Fish may be stripped off the lines by sharks (i.e., lost) or they may be deliberately discarded due to shark damage or because of concerns regarding ciguatoxins.

Bycatch (i.e. discards) information from the MHI commercial bottomfish fishery has been summarized from catch and effort data submitted to HDAR by MHI commercial bottomfish fishery participants during 2003 and 2004. Overall, fishing for Deep 7 bottomfish is target-specific, and the bycatch rate of non-BMUS is relatively low, with 8.5 percent of the catch reported as not retained either because it was either lost or deliberately discarded (Kawamoto and Gonzales 2005).

The majority of the BMUS bycatch is composed of jacks (kahala, butaguchi and white ulua). Kahala were released likely because the fish are known to be ciguatoxic and have little or no market value in Hawaii (WPFMC, 2007). For example, in 2013, the annual reported catch of kahala was 13,194 lb, of which 1,739 lb retained was sold (NMFS unpublished data at http://www.pifsc.noaa.gov/wpacfin/reportlanding.php, accessed December 12, 2014.Other than this data, there is no recent bycatch information for the MHI Deep 7 bottomfish fishery.

It is also believed that bycatch of sharks does not result in mortality because fishermen tend to release hooked sharks alive by cutting their hook leaders, and sharks generally do not suffer from

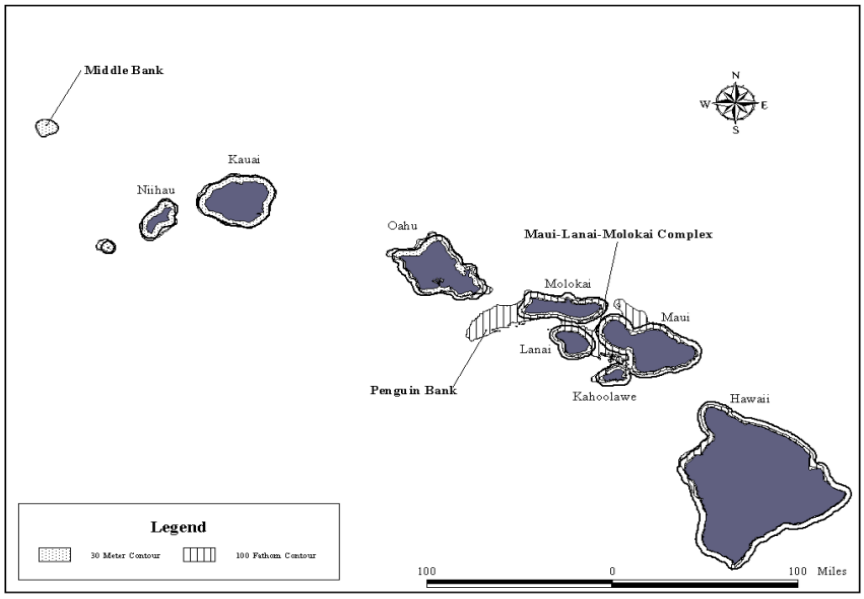
barotrauma when brought up from depth (WPFMC and NMFS 2007). Additionally, when shark depredation occurs, fishermen will move to another area to avoid losing more fish to sharks. There is no updated information on bycatch in the MHI bottomfish fishery.

Additionally, the Hawaii FEP includes five non-regulatory measures aimed at further reducing bycatch and bycatch mortality and improving bycatch reporting in MHI bottomfish fisheries. They include: (1) outreach to fishermen and engagement of fishermen in management, including research and monitoring in order to raise their awareness of bycatch issues and options to reduce bycatch and bycatch mortality; (2) research into fishing gear and method modifications to reduce bycatch and bycatch mortality; (3) research into the development of markets for discarded fish species; (4) improvement of data collection and analysis systems to better measure bycatch; and (5) training and outreach in methods to reduce the mortality of released fish due to barotrauma. These non-regulatory measures will continue in the fishery, regardless of the ACL that is specified.

MHI Bottomfish Habitat

Bottomfish Habitat

Commercially important deepwater bottomfish are found along the deep slopes of island coasts and banks at depths of 100 to 400 meters (55 to 218 fathoms). Because of the volcanic nature of the islands within the Hawaiian Islands archipelago, most bottomfish habitat occurs in steep slope areas on the margins of the islands and banks. Recent mapping of bottomfish habitat in the MHI has shown that approximately 47 percent of the bottomfish habitat lies in State waters (Parke 2007). Bottomfish fishing grounds within federal waters (3 to 200 nm offshore) around the MHI include Middle Bank located northwest of Kauai, most of Penguin Bank located between Oahu and Molokai, and habitat within the Maui–Molokai–Lanai complex (see Fig. 2).



Source: WPFMC and NMFS 2007

Figure 2. General location of bottomfish habitat in the MHI

Specific bottomfish fishing locales favored by fishermen vary seasonally according to sea conditions and the availability and price of target species. An analysis of average annual reported commercial catches of MHI Deep 7 bottom in HDAR fiscal years 2010-2013 indicate that the island group of Maui, Molokai (including Penguin bank) and Lanai account for the majority of the catch (64 percent), followed by Hawaii Island (21 percent), Kauai (9 percent) and Oahu (6 percent). (Brodziak et al., 2014).

Essential Fish Habitat and Habitat Areas of Particular Concern

Essential fish habitat (EFH) is defined as those waters and substrate as necessary for fish spawning, breeding, feeding, and growth to maturity. This includes the marine areas and their chemical and biological properties that are utilized by the organism. Substrate includes sediment, hard bottom, and other structural relief underlying the water column along with their associated biological communities. In 1999, the Council developed and NMFS approved EFH definitions for management unit species (MUS) of the Bottomfish and Seamount Groundfish FMP (Amendment 6), Crustacean FMP (Amendment 10), Pelagic FMP (Amendment 8), and Precious Corals FMP (Amendment 4) (74 FR 19067, April 19, 1999). NMFS approved additional EFH definitions for coral reef ecosystem species in 2004 as part of the implementation of the Coral Reef Ecosystem FMP (69 FR8336, February 24, 2004). NMFS approved EFH definitions were for deepwater shrimp through an amendment to the Crustaceans FMP in 2008 (73 FR 70603, November 21, 2008).

Ten years later, in 2009, the Council developed and NMFS approved five new archipelagic-based fishery ecosystem plans (FEP). The FEP incorporated and reorganized elements of the Councils' species-based FMPs into a spatially-oriented management plan (75 FR 2198, January 14, 2010). EFH definitions and related provisions for all FMP fishery resources were subsequently carried forward into the respective FEPs. In addition to and as a subset of EFH, the Council described habitat areas of particular concern (HAPC) based on the following criteria: ecological function of the habitat is important, habitat is sensitive to anthropogenic degradation, development activities are or will stress the habitat, and/or the habitat type is rare. In considering the potential impacts of a proposed fishery management action on EFH, all designated EFH must be considered. The designated areas of EFH and HAPC for all Hawaii FEP MUS by life stage are summarized in Table 5.

At its 154th meeting held June 2012, the Council recommended amending the Hawaii FEP to refine the EFH descriptions for individual species of bottomfish and seamount groundfish and modify the extent of HAPC designations for these management units. The recommended revisions would not change the overall designation of EFH shown in Table 4 below. While the Council recommended additional HAPC be added, such designations are a subset of EFH and do not result in any changes to management or administrative requirements.

Table 4. EFH and HAPC for Hawaii FEP MUS

MUS	Species Complex	EFH	HAPC
Bottomfish MUS	**Deep 7 bottomfish species:** ehu (*Etelis carbunculus*), onaga (*Etelis coruscans*), opakapaka (*Pristipomoides filamentosus*), , kalekale (*P. sieboldii*), gindai (*P. zonatus*), hapuupuu (*Epinephelus quernus*), lehi (*Aphareus rutilans*) **Non-Deep 7 bottomfish species:** uku (*Aprion virescens*), thicklip trevally (*Pseudocaranx dentex*), giant trevally (*Caranx ignoblis*), black trevally (*Caranx lugubris*), amberjack (*Seriola dumerili*), taape (*Lutjanus kasmira*), yellowtail kalekale (*P. auricilla*)	**Eggs and larvae:** the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 400 m (200 fathoms) **Juvenile/adults:** the water column and all bottom habitat extending from the shoreline to a depth of 400 meters (200 fm)	All slopes and escarpments between 40–280 m (20 and 140 fm) Three known areas of juvenile opakapaka habitat: two off Oahu and one off Molokai
Seamount Groundfish MUS	**Hawaii Seamount groundfish species (50–200 fm):** armorhead (*Pseudopentaceros wheeleri*), raftfish/butterfish (*Hyperoglyphe japonica*), alfonsin (*Beryx splendens*)	**Eggs and larvae:** the (epipelagic zone) water column down to a depth of 200 m (100 fm) of all EEZ waters bounded by latitude 29°–35° N **Juvenile/adults:** all EEZ waters and bottom habitat bounded by latitude 29°–35° N and longitude 171° E–179° W between 200 and 600 m (100 and 300 fm)	No HAPC designated for seamount groundfish
Crustaceans MUS	**Spiny and slipper lobster complex:** spiny lobster (*Panulirus marginatus*), spiny lobster (*P. penicillatus, P.* spp.), ridgeback slipper lobster (*Scyllarides haanii*), Chinese slipper lobster (*Parribacus antarcticus*) **Kona crab:** Kona crab (*Ranina ranina*)	**Eggs and larvae:** the water column from the shoreline to the outer limit of the EEZ down to a depth of 150 m (75 fm) **Juvenile/adults:** all of the bottom habitat from the shoreline to a depth of 100 m (50 fm)	All banks in the NWHI with summits less than or equal to 30 m (15 fathoms) from the surface

MUS	Species Complex	EFH	HAPC
Crustaceans MUS	**Deepwater:** (*Heterocarpus* spp.)	**Eggs and larvae:** the water column and associated outer reef slopes between 550 and 700 m **Juvenile/adults:** the outer reef slopes at depths between 300-700 m	No HAPC designated for deepwater shrimp.
Precious Corals MUS	**Shallow-water precious corals (10-50 fm):** black coral (*Antipathes dichotoma*), black coral (*Antipathis grandis*), black coral (*Antipathes ulex*) **Deep-water precious corals (150–750 fm):** Pink coral (*Corallium secundum*), red coral (*C. regale*), pink coral (*C. laauense*), midway deepsea coral (*C.* sp nov.), gold coral (*Gerardia* spp.), gold coral (*Callogorgia gilberti*), gold coral (*Narella* spp.), gold coral (*Calyptrophora* spp.), bamboo coral (*Lepidisis olapa*), bamboo coral (*Acanella* spp.)	EFH for Precious Corals is confined to six known precious coral beds located off Keahole Point, Makapuu, Kaena Point, Wespac bed, Brooks Bank, and 180 Fathom Bank EFH has also been designated for three beds known for black corals in the Main Hawaiian Islands between Milolii and South Point on the Big Island, the Auau Channel, and the southern border of Kauai	Includes the Makapuu bed, Wespac bed, Brooks Banks bed For Black Corals, the Auau Channel has been identified as a HAPC
Coral Reef Ecosystem MUS	**Coral Reef Ecosystem MUS (all FEP areas)**	EFH for the Coral Reef Ecosystem MUS includes the water column and all benthic substrate to a depth of 50 fm from the shoreline to the outer limit of the EEZ	Includes all no-take MPAs identified in the CREFMP, all Pacific remote islands, as well as numerous existing MPAs, research sites, and coral reef habitats throughout the western Pacific

Source: WPFMC 2009.

Description of MHI Bottomfish Fisheries

Participation, Effort and Catch

Commercial Fishing Sector

The number of fishermen engaged in commercial bottomfish fishing in the MHI increased dramatically in the 1970s peaking in 1980s with over 500 active vessels annually. However, participation in the fishery then declined in the early 1990s, rebounded somewhat in the late 1990s, but in 2003 reached its lowest level since 1977, with 325 vessels (WPFMC, 2007). The decline in vessels and fishing effort during this period may have been due to the long-term decrease in catch rates in the bottomfish fishery and a shift of fishing effort towards tuna and other pelagic species.

In the 2007-08 fishing year, NMFS and the Council implemented suite of measures to reduce fishing mortality on MHI bottomfish, including a total allowable catch (TAC) limit system (WPFMC and NMFS 2007). Since that time, participation in the commercial fishery sector (measured by the number of fishermen reporting catch of MHI Deep 7 bottomfish) initially increased, but now appears to be decreasing. In the 2007-08 fishing year, 351 fishermen actively engaged in the fishery, increasing to 468 fishermen in fishing year 2008-09. Fishing year 2009-10 saw a slight decline to 451 fishermen, but rebounded again to 475 in the 2010-11 fishing year. In next three fishing years, participation in the fishery declined from 468 fishermen in 2011-12, to 457 in 2012-13 and 419 in 2013-14. Partial tally of fishermen to the month of May in fishing year 2014-15 showed 386 fishermen participated in the fishery. Over the course of these seven years, fishing effort (measured by the number of fishing trips) generally mirrored participation, initially increasing then declining (Table 12).

Table 5 provides a summary of characteristics of the MHI Deep 7 commercial bottomfish fishing sector for fishing years 2007-08 through May 2014-15, including number of vessels, total trips, catch limit and reported catch.

Table 5. Characteristics of the MHI Deep 7 bottomfish commercial fishing sector (2007-May 2015)

Fishing Year	Number of Active Fishermen	Total Trips	Catch Limit (lb)	Total Reported Catch (lb)	Date Fishery Closed	Overage (+)/ Underage (-)
2007-2008	351	2,345	178,000	196,147	Apr. 16, 2008	+18,147 lb (+10.2%)
2008-2009	468	3,275	241,000	259,194	Jul. 6, 2009	+18,194 lb (+7.5%)
2009-2010	451	2,791	254,050	208,412	Apr. 20, 2010	-45,638 lb (-17.9%)
2010-2011	475	3,331	254,050	268,089	Mar. 12, 2011	+14,039 lb (+5.5%)
2011-2012[1]	468	3,075	346,000	228,388	Fishery	-117,612 lb

Fishing Year	Number of Active Fishermen	Total Trips	Catch Limit (lb)	Total Reported Catch (lb)	Date Fishery Closed	Overage (+)/ Underage (-)
					did not close	(-34%)
2012-2013[1]	457	2,980	346,000	238,705	Fishery did not close	-108,566 lb (-31%)
2013-2014	419	3,162	346,000	309,485	Fishery did not close	-36,515 (-11%)
2014-2015[2]	386	2,367	346,000	265,619	Fishing year still ongoing	NA

Source: HDAR unpublished data

[1] Fishery managed using annual catch target set at 325,000 lb

[2] Based on weekly updates from DAR as of 05/15/2015

Non-Commercial Fishing Sector

There is very limited data on the MHI non-commercial bottomfish fishing sector. In the 2007-08 fishing year, NMFS and the Council implemented suite of measures to reduce fishing mortality on MHI bottomfish, including mandatory permit and reporting requirement for the non-commercial bottomfish sector to complement the State of Hawaii's commercial license reporting requirement (WPFMC and NMFS 2007). Initially, NMFS issued 80 permits in 2008. However, since then, the number permits issued have has declined precipitously. Because federal regulations limit non-commercial fishermen to five Deep 7 bottomfish fish per trip bag limit, anecdotal information suggests non-commercial bottomfish fishermen have opted to obtain a State CML, instead of the federal non-commercial permit because both are comparable in cost, but the CML does not limit fishermen to five Deep 7 bottomfish per trip. Cost-earning surveys conducted by Hospital and Beavers (2012) report that over 20 percent of CML holders do not sell bottomfish indicating that a substantial number of CML holders are non-commercial. Similarly, State of Hawaii records for the 2013-14 fishing year report that 343 of 419 CML holders who caught bottomfish (82 percent) sold their catch (HDAR unpublished data). Therefore, it is possible that non-commercial catch of both Deep 7 and non-Deep 7 bottomfish is being reported through the CML system rather than through federal non-commercial logbooks.

Table 6 summarizes the number of federal non-commercial bottomfish permits issued by NMFS between 2008 and 2014, the number of federal permit holders reporting catch of any BMUS, including the number of trips and estimated non-commercial catch of Deep 7 and non-Deep 7 bottomfish. During the most recent three-year period (2011-2013), there was no non-commercial bottomfishing activity reported by the federal permit holders.

Table 6. Number of MHI non-commercial fishers, trips and reported BMUS catch (2008-2014)

Year	No. of Federal Permits Issued	No. of Permits Reporting Catch of BMUS	No. of Trips in the MHI EEZ	Total Reported Logbook Catch (lb)	
				Deep 7 Bottomfish (from Sept 1-Aug. 31 the following year)	*Non-Deep 7 Bottomfish (from Jan. 1 to Dec. 31)*
2008	80	4	9	182	32
2009	59	4	17	309	10
2010	22	confidential	confidential	confidential	confidential
2011	18	0	0	0	0
2012	10	0	0	0	0
2013	3	0	0	0	0
2014	2	0	0	0	0

Source: Kawamoto and Sender (2015)

Ex-Vessel Value and Revenue

In the 2013-14 fishing year, 419 commercial fishermen reported catching 309,485 lb of Deep 7 bottomfish. However, State of Hawaii records report 343 of the 419 fishermen sold MHI Deep 7 bottomfish. These 343 individuals sold a combined total of 269,571 lb at a value of $1,798,713. Thus, in 2013-14, commercial fishermen sold approximately 87 percent their MHI Deep 7 bottomfish catch.

In 2014-May 2015 fishing year, 386 commercial fishermen reported catching 265,619 lb of Deep 7 bottomfish. State of Hawaii records report 327 of the 386 fishermen sold MHI Deep 7 bottomfish totaling to 236,642 lb with a value of $1,584,841. Thus in 2014-May 2015, commercial fishermen sold approximately 89 percent of their deep 7 catch.

NMFS does not have individual catch and revenue data for individual CML holder. Therefore, based on a strict averaging approach, each of the 327 commercial fishermen would have sold 723.68 lb of MHI Deep 7 bottomfish in 2014-May 2015 valued at $4,846.61 per individual. Based on these revenues, the average price for MHI Deep 7 bottomfish in 2014-May 2015 was approximately $6.70/lb. NMFS assumes the remaining 59 commercial fishermen either sold no fish, or the State of Hawaii reporting program did not capture their sales.

Fishing Communities

The Magnuson-Stevens Act defines a fishing community as "...a community that is substantially dependent upon or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew, and fish processors that are based in such communities" (16 U.S.C. § 1802(16)). NMFS further specifies in the National Standard guidelines that a fishing community is "...a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing or on directly related fisheries dependent services and industries (for example, boatyards, ice suppliers, tackle shops)". National Standard 8 of the Magnuson-Stevens Act requires that conservation and management measures shall, consistent

with the conservation requirements of this Act (including the prevention of overfishing and the rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (a) provide for the sustained participation of such communities and (b) to the extent practicable, minimize adverse economic impacts on such communities.

In 2002, the Council identified each of the islands of Kauai, Niihau, Oahu, Maui, Molokai, Lanai and Hawaii as a fishing community for the purposes of assessing the effects of fishery conservation and management measures on fishing communities, providing for the sustained participation of such communities, minimizing adverse economic impacts on such communities, and for other purposes under the Magnuson-Stevens Act. The Secretary of Commerce subsequently approved these definitions on August 5, 2003 (68 FR 46112). Sustainable management of the Hawaii's lobster fishery will allow continued harvest of a resource that is important to fishermen, their families, community networks, markets, and visitors for personal consumption (sustenance), and supplemental income.

Fishery Administration and Enforcement

Fishing for BMUS in federal waters around the MHI is managed by regulations implemented by both the State of Hawaii and NMFS. In general, commercial bottomfishing in federal waters is managed almost exclusively though measures implemented by the State of Hawaii, which include a CML and reporting requirements and 12 bottomfish restricted fishing areas (BRFA) where all fishing, including non-commercial fishing is prohibited.

Federal requirements in 50 Code of Federal Regulations (CFR) 665 generally pertain to non-commercial fishing and require non-commercial bottomfish fishermen in Hawaii to obtain a federal permit and report all catch, and adhere to a bag limit of no more than 5 Deep 7 bottomfish per trip. Federal law also prohibits the use of bottom trawls and bottom set gillnets.

Although both Deep 7 and non-Deep 7 bottomfish are typically harvested together during a bottomfishing trip, NMFS and the Council manage the Deep 7 bottomfish and non-Deep 7 bottomfish as two separate stock complexes with separate ACLs and AMs. For the MHI Deep 7 bottomfish stock complex, the fishing year begins on September 1 and ends August 31 the following year. For the non-Deep 7 bottomfish stock complex, the fishing year begins January 1 and ends December 31 annually. Federal regulations also require NMFS to specify ACLs and AMs for each stock or stock complex of MUS identified in an FEP, as recommended by the Council, and in consideration of the best available scientific, commercial, and other information about the fishery for that stock or stock complex. NMFS and the Council conduct monitoring of catch against a specified ACL and implementation of AMs.

Federal law also requires the Council-appointed Hawaii FEP plan team to prepare an annual report on the performance of all federal fisheries, including MHI bottomfish fisheries by June 30 of each year. The report must contain, among other things, recommendations for Council action and an assessment of the urgency and effects of such actions.

Protected Species

Species Protected under the Endangered Species Act (ESA)

A number of protected species are documented as occurring in the waters around the Hawaiian Islands. Table 8 lists endangered or threatened species occurring in the waters around Hawaii. They include five whales, the Hawaiian monk seal, five listed sea turtles, and three seabirds. Although there is currently no critical habitat designated for ESA-listed marine species around the main Hawaiian Islands, NMFS has proposed to revise designated critical habitat for endangered Hawaiian monk seals to include areas in the MHI (76 FR 32026, June 2, 2011). However, NMFS has not yet made a determination on whether to designate critical habitat in the MHI.

On March 23, 2015, NMFS and the USFWS (Services) published a proposed rule finding that the green sea turtle is composed of 11 distinct population segments (DPSs) that qualify as a "species" for listing (80 FR 15272). The Hawaii population of green turtles was identified as the Central North Pacific DPS and is proposed to be listed as threatened.

On April 21, 2015, NMFS published a proposed rule to divide the globally listed endangered species into 14 DPSs, remove the current species-level listing, and in its place list 2 DPSs as endangered and 2 DPSs as threatened (80 FR 22304). The Hawaii DPS, consisting of the breeding population around Hawaii, is not proposed for listing.

Table 7. Endangered and threatened marine species and seabirds occurring in the waters of the MHI.

Endangered and threatened marine species and seabirds known to occur or reasonably expected to occur in waters of the Hawaiian Archipelago			
Common name	**Scientific Name**	**ESA listing status in Hawaii**	**Occurrence in Hawaii**
Listed Sea Turtles			
Green sea turtle	*Chelonia mydas*	Threatened	Most common turtle in the Hawaiian Islands. Most nesting occurs in the northwestern Hawaiian Islands. Foraging and basking in the MHI.
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	Small population foraging around Hawaii and low level nesting on Maui and Hawaii Islands.
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Not common in Hawaii.
Olive ridley sea turtle	*Lepidochelys olivacea*	Threatened	Range across Pacific:
North Pacific	*Caretta caretta*	Endangered	Not common in Hawaii.

Endangered and threatened marine species and seabirds known to occur or reasonably expected to occur in waters of the Hawaiian Archipelago			
Common name	**Scientific Name**	**ESA listing status in Hawaii**	**Occurrence in Hawaii**
loggerhead sea turtle DPS			
Listed Marine Mammals			
Hawaiian Monk seal	*Neomonachus schauinslandi*	Endangered	Endemic tropical seal. Occurs throughout the archipelago. Overall population in decline; MHI population increasing
Blue whale	*Balaenoptera musculus*	Endangered	No sightings or strandings reported in Hawaii but acoustically recorded off of Oahu and Midway Atoll.
Fin whale	*Balaenoptera physalus*	Endangered	Infrequent sightings in Hawaii waters.
Humpback whale	*Megaptera novaeangliae*	Endangered	Migrate through the archipelago and breed during the winter. Est. 6,000-10,000 individuals.
Sei whale	*Balaenoptera borealis*	Endangered	Worldwide distribution. Primarily found in cold temperate to subpolar latitudes. Rare in Hawaii.
Sperm whale	*Physeter macrocephalus*	Endangered	Found in tropical to polar waters worldwide, most abundant cetaceans in the region. Sighted off the NWHI and the MHI.
MHI insular false killer whale DPS	*Pseudorca crassidens*	Endangered	Found in waters within 140 km (60 nm) of the MHI.
Listed Sea Birds			
Newell's Shearwater	*Puffinus auricularis newelli*	Threatened	Rare. Breeds only in colonies on the MHI where it is threatened by predators and urban development.
Hawaiian petrel	*Pterodroma phaeopygia*	Endangered	Rare.
Short-tailed Albatross	*Phoebastria albatrus*	Endangered	Nest in small numbers on Midway in the NWHI.

Source: http://www.nmfs.noaa.gov/pr/species/esa/listed.htm, accessed October 31, 2014.

Applicable ESA Consultations – Hawaii Bottomfish fisheries

To date, there have been no observed or reported interactions between MHI bottomfish fisheries and ESA-listed species. In a biological opinion (BiOp) covering MHI bottomfish fishery, dated March 18, 2008, NMFS determined that except for the Hawaiian green sea turtle, bottomfish fishing activities are not likely to adversely affect any other ESA-listed marine species that may be found in federal waters of the MHI, or result in the destruction or adverse modification of critical habitat.

For green sea turtles, NMFS determined that there is a potential for them to be killed by vessel transiting State waters en route to and from federal waters around the MHI and authorized an incidental take of up to two green sea turtles per year. However, this analysis was based on an estimated 71,800 bottomfish fishing trips per year. As shown in Tables 6 and 7, the total annual number of commercial and non-commercial bottomfishing trips since the 2008 has been less than 3,500 per year. Therefore, the potential for collisions with bottomfish vessels is substantially lower than was estimated in the 2008 BiOp and is expected to be negligible.

In 2013, NMFS re-initiated consultation under ESA in response to listing of MHI insular false killer whale distinct population segment under the ESA. In a modification to the 2008 BiOp dated August 7, 2013, NMFS determined that determined that commercial and non-commercial bottomfish fisheries in the MHI are not likely to adversely affect MHI insular false killer whale because of the spatial separation between the species and bottomfishing activities, the low likelihood of collisions, and the lack of observed or reported fishery interactions among other reasons.

On June 2, 2011 (76 FR 32026) NMFS published a proposed rule to designate areas in the main Hawaiian Islands (MHI) as monk seal critical habitat. Specific areas proposed include terrestrial and marine habitats from 5 m inland from the shoreline extending seaward to the 500 m depth contour around Kaula Island, Niihau, Kauai, Oahu, Maui Nui (including Kahoolawe, Lanai, Maui and Molokai) and Hawaii Island. The final determinations on whether to designate monk seal critical habitat in the MHI have not yet been made. Should NMFS designate critical habitat for this species, or any other ESA-listed species in the future, NMFS will initiate consultation in accordance with Section 7 of the ESA to ensure that Hawaii FEP fisheries, including the commercial and non-commercial bottomfish fisheries in the MHI would not result in the destruction or adverse modification of critical habitat.

The critical habitat proposed rule identified the following primary constituent elements essential to the conservation of Hawaiian monk seals:

1) Areas with characteristics preferred by monk seals for pupping and nursing;
2) Shallow, sheltered aquatic areas adjacent to coastal locations preferred by monk seals for pupping and nursing;
3) Marine areas from 0 to 500 m in depth preferred by juvenile and adult monk seals for foraging;
4) Areas with low levels of anthropogenic disturbance;
5) Marine areas with adequate prey quantity and quality; and
6) Significant areas used by monk seals for hauling out, resting, or molting.

In the proposed rule, NMFS also identified fisheries as one of the activities that may affect monk seal habitat. NMFS identified adequate prey or quality of prey as the only essential feature out of the above list that could be affected from fisheries. The 2008 BiOp analyzed impacts of prey reduction on monk seals and concluded that there is no evidence that the bottomfish fishery has impacted monk seals through competition for prey. Therefore, the proposed action is not likely to have significant impacts to monk seal critical habitat, if the proposed rule is implemented without change.

The final determinations on whether to designate monk seal critical habitat in the MHI have not yet been made. Should NMFS designate critical habitat for this species, or any other ESA-listed species in the future, NMFS will initiate consultation in accordance with Section 7 of the ESA to ensure that Hawaii FEP fisheries, including the commercial and non-commercial bottomfish fisheries in the MHI would not result in the destruction or adverse modification of critical habitat.

Species Protected under the Marine Mammal Protection Act (MMPA)
Several non-ESA listed whales, dolphins and porpoises, occur in waters around Hawaii and are protected under the MMPA. Table 8 provides a list of non-ESA listed marine mammals known to occur or reasonably expected to occur in waters around the Hawaiian Archipelago that have the potential to interact with bottomfish fisheries in the MHI.

The commercial and non-commercial bottomfish fisheries in the MHI are not known to have the potential for a large and adverse effect on non-ESA listed marine mammals listed in Table 8. Although these species occur in EEZ waters where the fisheries operate and depredation of bait or catch by dolphins (primarily bottlenose dolphins) has been known to occur in the bottomfish fishery (Kobayashi and Kawamoto 1995), there have been no observed or reported interactions between the fishery and marine mammals. Similarly, there have been no observed or reported interactions between the fishery and ESA listed marine mammals listed in Table 7 above.

Table 8. Non-ESA-listed marine mammals occurring in waters around the MHI

Non-ESA-listed marine mammals known to occur or reasonably expected to occur in waters around the Hawaiian Archipelago		
Common Name	**Scientific Name**	**Interactions with MHI bottomfish fishery**
Blainville's beaked whale	*Mesoplodon densirostris*	No interactions observed or reported.
Bottlenose dolphin	*Tursiops truncatus*	No interactions observed or reported.
Bryde's whale	*Balaenoptera edeni*	No interactions observed or reported.
Common dolphin	*Delphinus delphis*	No interactions observed or reported.
Cuvier's beaked whale	*Ziphius cavirostris*	No interactions observed or reported.
Dall's porpoise	*Phocoenoides dalli*	No interactions observed or reported.

Non-ESA-listed marine mammals known to occur or reasonably expected to occur in waters around the Hawaiian Archipelago		
Common Name	**Scientific Name**	**Interactions with MHI bottomfish fishery**
Dwarf sperm whale	*Kogia sima*	No interactions observed or reported.
False killer whale (other than MHI Insular DPS)	*Pseudorca crassidens*	No interactions observed or reported.
Fraser's dolphin	*Lagenodelphis hosei*	No interactions observed or reported.
Killer whale	*Orcinus orca*	No interactions observed or reported.
Longman's beaked whale	*Indopacetus pacificus*	No interactions observed or reported.
Melon-headed whale	*Peponocephala electra*	No interactions observed or reported.
Minke whale	*Balaenoptera acutorostrata*	No interactions observed or reported.
Pantropical spotted dolphin	*Stenella attenuate*	No interactions observed or reported.
Pygmy killer whale	*Feresa attenuata*	No interactions observed or reported.
Pygmy sperm whale	*Kogia breviceps*	No interactions observed or reported.
Risso's dolphin	*Grampus griseus*	No interactions observed or reported.
Rough-toothed dolphin	*Steno bredanensis*	No interactions observed or reported.
Short-finned pilot whale	*Globicephala macrorhynchus*	No interactions observed or reported.
Spinner dolphin	*Stenella longirostris*	No interactions observed or reported.
Spotted dolphin	*Stenella attenuata*	No interactions observed or reported.
Striped dolphin	*Stenella coeruleoalba*	No interactions observed or reported.

Source: Council website: http://www.wpcouncil.org

Applicable MMPA Coordination – Hawaii Bottomfish Fisheries

The MMPA prohibits, with certain exceptions, taking of marine mammals in the U.S., and by persons aboard U.S. flagged vessels (i.e., persons and vessels subject to U.S. jurisdiction). Under section 118 of the MMPA, NMFS must publish, at least annually, a List of Fisheries (LOF) that classifies U.S. commercial fisheries into one of three categories based upon the level of serious injury and mortality of marine mammals that occurs incidental to each fishery. A Category 1 fishery is one with frequent incidental morality and serious injury of marine mammals. A Category 2 fishery is one with occasional incidental morality and serious injury of marine

mammals. A Category 3 fishery is one with a remote likelihood or no known incidental morality and serious injury of marine mammals. On December 29, 2014, (79 FR 77919), NMFS published the final LOF for 2015 which classified the Hawaii bottomfish handline fishery as a Category III fishery under Section 118 of the MMPA. Participants in Category 3 fisheries are not required to register in the Marine Mammal Authorization Program prior to engaging in commercial fishing. The proposed action does not change the conduct of the bottomfish fishery in any way and therefore will not introduce impacts not previously considered in prior MMPA determinations.

Seabirds of the Hawaiian Archipelago

Seabirds found on and around Hawaii that could potentially interact with fisheries are listed in Table 9. The short-tailed albatross, which is listed as endangered under the ESA, is a migratory seabird that has nested in the NWHI and could be present in the waters of the Hawaii Archipelago. Other listed seabirds found in the region are the endangered Hawaiian petrel (*Pterodroma phaeopygia)* and the threatened Newell's shearwater (*Puffinus auricularis newelli*). Non-listed seabirds known to be present in Hawaii include the black-footed albatross (*Phoebastria nigripes*); Laysan albatross (*P. immutabilis*); wedge-tailed (*Puffinus pacificus*), Audubon's (*P. griseus*), short-tailed (*P. tenuirostris*) and Chirstmas (*P. nativitatis*) shearwaters, as well as the masked (*Sula dactylatra*), brown (*S. leucogaster*), and red-footed *(S. sula*) boobies (or gannets), and a number of petrels and terns, frigate birds, and tropicbirds. Seabirds forage in both State and federal waters, but are not known to and are unlikely to interact with the MHI bottomfish fishery. In addition, bottomfish fishing gear is deployed close to the vessel and does not afford much opportunity for seabirds to attack the bait. When bottomfish fishing, a weighted mainline is deployed vertically over the side of the vessel and it sinks rapidly beyond the range of a diving seabird. It is retrieved rapidly with electric or hydraulic pullers. The time that bait is within the range of a diving seabird is limited, and the proximity of the vessel hull is a significant deterrent. There have been no reports of interactions between the MHI bottomfish fishery and seabirds.

Table 9. Seabirds occurring in the Hawaiian Islands

Seabirds of the Hawaiian Archipelago (R= Resident/Breeding; V= Visitor; Vr=rare visitor; Vc= Common visitor)		
	Common name	***Scientific name***
R	Hawaiian petrel	*Pterodroma phaeopygia* (ESA: Endangered)
R	Newell's shearwater	*Puffinus auricularis newelli* (ESA:Threatened)
R	Short-tailed albatross	*Phoebastria albatrus* (ESA: Endangered)
R	Black-footed albatross	*Phoebastria nigripes*
R	Laysan albatross	*Phoebastria immutabilis*
R	Wedge-tailed shearwater	*Puffinus pacificus*
V	Audubon's shearwater	*Puffinus lherminieri*
Vc	Short-tailed shearwater	*Puffinus tenuirostris* (common visitor)
R	Christmas shearwater	*Puffinus nativitatis*
V	Leach's storm-petrel	*Oceanodroma leucorhoa*
V	Matsudaira's storm-petrel	*Oceanodroma matsudairae*
R	Red-footed booby	*Sula sula*
R	Brown booby	*Sula leucogaster*

Seabirds of the Hawaiian Archipelago (R= Resident/Breeding; V= Visitor; Vr=rare visitor; Vc= Common visitor)		
	Common name	***Scientific name***
R	Masked booby	*Sula dactylatra*
R	White-tailed tropicbird	*Phaethon lepturus*
R	Red-tailed tropicbird	*Phaethon rubricauda*
R	Great frigatebird	*Fregata minor*
R	Sooty tern	*Onychoprion fuscatus, formerly Sterna fuscata*
R	Brown noddy	*Anous stolidus*
R	Black noddy	*Anous minutus*
R	White tern / Common fairy-tern	*Gygis alba*

Source: WPFMC 2009

Potential Impacts of the Alternatives

This section describes the potential impacts of the proposed ACL and AM specifications on the elements of the affected environment described in Section 3. The environmental impacts analysis evaluates the potential impacts of the proposed ACL specification and AMs in fishing years 2015-16, 2016-17 and 2017-18

Potential Impacts to Target and Non-Target Species

Alternative 1: No ACL and AM Management (No Action)
Under the no action alternative, the Council would not specify an ACL for Deep 7 bottomfish in the MHI and AMs would not be necessary. However, NMFS and the Council would continue to monitor catches based on all available sources of information. Under this alternative, the lack of an ACL or AMs in fishing year 2015-16, 2016-17 and 2017-18 is not likely to result in overfishing of MHI Deep 7 bottomfish in any year. As shown in Table 5, commercial catches of MHI Deep 7 bottomfish have consistently remained below the estimated OFL of 352,000 lb and long-term MSY of 404,000 lb. In the 2013-14 fishing year, the fishery reported a total of 309,485 lb of MHI Deep 7 bottomfish. This is the highest level of catch since NMFS implemented a catch limit system in the 2007-08 fishing year. During fishing year 2013-14, the fishery remained open year round. In fishing years 2014-15 and 2015-16, total reported catch is expected to be similar to 2013-14 catch, and would be sustainable.

Under this alternative, catch of non-target, non-Deep 7 bottomfish is expected to continue at levels similar levels in 2013-14 fishing year (Table 10) and would be sustainable. Bycatch of non-target stocks are expected to continue at low levels and consists of primarily bycatch of non-Deep 7 bottomfish that are known to be ciguatoxic, and have little or no market value (i.e. kahala, butaguchi and white ulua), and sharks which are released alive. Ongoing fisheries monitoring by the Council's FEP plan team will help fishery scientists and managers to detect any increase in non-target or bycatch and, address them in future management measures, as needed. For these reasons, even without ACL or AM management, the expected impacts to target and non-target stocks would be similar to the impacts described in Alternatives 2 and 3.

Alternative 2: Specify an ACL of 346,000 lb based on the 2011 Stock Assessment with no updated data (Status Quo/NEPA Baseline)

Under Alternative 2, the Council would specify an ACL of 346,000 lb of MHI Deep 7 bottomfish in fishing year 2015-16, 2016-17, and 2017-18, and a fishery closure as the AM to prevent the fishery from exceeding the ACL. Based on probability of overfishing projections contained in the 2011 stock assessment (Table 19.1 in Brodziak et al. 2011), an ACL of 346,000 lb is associated with a 41 percent probability of overfishing the MHI Deep 7 bottomfish stock complex should the entire ACL be caught. This ACL and AM is identical the ACL NMFS specified for the fishery in fishing year 2012-13 (77 FR 56791, September 9, 2012, and 2013-14 (78 FR 59626, September 27, 2013).

Under this alternative, NMFS and the Council would continue to monitor catches based on all available sources of information. Based on past fishery performance shown in Table 10, MHI Deep 7 bottomfish catch in 2015-16, 2016-17 and 2017-18 is expected to be similar to 2013-14 catch (i.e., 309,485 lb), and remain below the ACL of 346,000 lb. Catch of non-Deep 7 bottomfish is also expected to continue at around 2014 levels (116,135 lb) and remain below the OFL of 259,200 lb. Similarly, bycatch of non-target stocks are expected to continue at low levels and consists of primarily bycatch of non-Deep 7 bottomfish that are known to be ciguatoxic, and have little or no market value (i.e. kahala, butaguchi and white ulua), and sharks which are released alive. Like Alternative 1, Alternative 2 is not likely to result in changes in the conduct of the fishery, including gear types used, areas fished, level of catch, or have large adverse effects on target or non-target stocks. Therefore, under this alternative, harvest of Deep 7 bottomfish in the MHI would continue to be sustainable and the stock complex is not expected to become subject to overfishing or overfished.

Alternative 3: Specify an ACL of 306,000 lb based on the 2011 Stock Assessment with updated data to 2013 and no phase-in

Under Alternative 3, the Council would specify an ACL of 306,000 lb of MHI Deep 7 bottomfish in fishing year 2015-16, 2016-17 and 2017-18, and a fishery closure as the AM to prevent the fishery from exceeding the ACL. Based on the probability of overfishing projections contained in the update of 2011 benchmark stock assessment of Deep 7 bottomfish In the Main Hawaiian Islands using data through 2013 (Boggs memo for the record dated March 3, 2015 and the supplemental table dated May 19, 2015), an ACL of 306,000 lb is associated with a 39 percent probability of overfishing the MHI Deep 7 bottomfish stock complex should the entire ACL be caught. Under this alternative, NMFS and the Council would continue to monitor catches based on all available sources of information.

Under Alternative 3, based on past fishery performance shown in Table 5, MHI Deep 7 bottomfish catch in 2015-16, 2016-17 and 2017-18 is expected to be similar to 2013-14 catch (i.e., 309,485 lb), the fishery would likely reach the ACL of 306,000 lb before the end of the fishing year, thus triggering the in-season closure of the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters and the complementary closure in State waters. However, based on fishery performance shown in Table 10, the fishery is not likely to reach 306,000 lb until later in the fishing year. For example, in 2013-14 fishing year, the fishery

did not reach 306,000 lb until August, the last month of the fishing year (HDAR unpublished data).

The prohibition on fishing for MHI Deep 7 bottomfish is expected to result in beneficial impacts to the Deep 7 bottomfish stock complex as fishing mortality would effectively cease through the end of the year. Additionally, because non-Deep 7 bottomfish are usually caught on Deep 7 bottomfish trips, annual catch of non-Deep 7 bottomfish stock would be less than under Alternatives 1 (No action) and 2 (Status Quo/Preferred Alternative). Although fishermen may legally continue to catch non-Deep 7 bottomfish during a closure for Deep 7 bottomfish, catches of non-Deep 7 bottomfish in 2015-16, 2016-17 and 2017-18 would not likely to exceed the OFL proxy of 259,200 lb. Therefore, fishers would be able to fish throughout the fishing year in the same manner as under Alternative 1 and Alternative 2. Alternative 3 would likely result in greater beneficial impacts to the Deep 7 bottomfish stock complex as the lower ACL means the fishery would reach the limit sooner than under the other two action alternatives resulting in a fishery closure. For these reasons, this alternative is not expected to result in large adverse effects on target or non-target stocks.

Alternative 4: Specify an ACL of 326,000 lb, 318,000 lb, and 306,000 lb for fishing year 2015-16, 2016-17, and 2017-18 using a Slow-Up Fast-Down phase-in approach

Under Alternative 4, the Council would specify an ACL of 326,000 lb, 318,000 lb, and 306,000 lb of MHI Deep 7 bottomfish for the 2015-16, 2016-17, and 2017-18 fishing year, respectively, and a fishery closure as the AM to prevent the fishery from exceeding the ACL. Based on the probability of overfishing projections contained in the update of 2011 benchmark stock assessment of Deep 7 bottomfish In the Main Hawaiian Islands using data through 2013 (Boggs memo for the record dated March 3, 2015 and the supplemental table dated May 19, 2015), an ACL of 326,000 lb, 318,000 lb, and 306,000 lb are associated with 44, 42, and 39 percent probability of overfishing, respectively. Under this alternative, NMFS and the Council would continue to monitor catches based on all available sources of information.

Under Alternative 4, based on the past fishery performance shown in Table 10, MHI Deep 7 bottomfish catch in 2015-16, 2016-17 and 2017-18 is expected to be similar to 2013-14 catch (i.e., 309,485 lb), the fishery will not likely reach the ACL of 326,000 lb and 318,000 lb for the first two fishing years. For fishing year 2017-18, the fishery would likely reach the ACL of 306,000 lb before the end of the fishing year, thus triggering the in-season closure of the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters and the complementary closure in State waters. However, based on fishery performance shown in Table 5, the fishery is not likely to reach 306,000 lb until later in the fishing year. For example, in 2013-14 fishing year, the fishery did not reach 306,000 lb until August, the last month of the fishing year (HDAR unpublished data).

Compared to Alternative 3, Alternative 4 has a higher risk level at the first 2 years but is still much lower than the OFL at 352,000 lbs. Alternative 4 is still conservative relative to alternative 1 and 2. Alternative 2 where the ACL is at 346,000 lb this translates to 48-49 percent risk of overfishing is based on the probability of overfishing projections contained in the update of 2011 benchmark stock assessment of Deep 7 bottomfish In the Main Hawaiian Islands using data

through 2013 (Boggs memo for the record dated March 3, 2015 and the supplemental table dated May 19, 2015). This would still provide conservation benefit to the stock.

On the third year of Alternative 4, this would likely result in greater beneficial impacts to the Deep 7 bottomfish stock complex as the lower ACL means the fishery would reach the limit sooner than under the other two action alternatives resulting in a fishery closure on the third year. This may cause fishermen to shift effort to non-Deep 7 bottomfish, such as uku (*Aprion virscens*) to fill market demand. While it is possible that catch of non-Deep 7 bottomfish could surpass 2013 levels when 158,235 lb was caught, it is unlikely catch of non-Deep 7 bottomfish in 2014-15 and 2015-16 fishing year would reach the OFL of 259,200 lb. Additionally, NMFS will propose a separate ACL and AM for the non-Deep 7 bottomfish stock complex through a separate action. Therefore, like Alternatives 1, 2 and 3, Alternative 4 is not likely to result large adverse effects on target or non-target stocks.

Alternative 5: Specify an ACL of 270,000 lb based on the 2011 Stock Assessment with updated data to 2013 and no phase-in

Under Alternative 5, the Council would recommend an ACL of 270,000 lb of MHI Deep 7 bottomfish in fishing year 2015-16, 2016-17 and 2017-18, and a fishery closure as the AM to prevent the fishery from exceeding the ACL. Based on the probability of overfishing projections contained in the update of 2011 benchmark stock assessment of Deep 7 bottomfish In the Main Hawaiian Islands using data through 2013 (Boggs memo for the record dated March 3, 2015 and the supplemental table dated May 19, 2015), an ACL of 270,000 lb is associated with a 30 percent probability of overfishing the MHI Deep 7 bottomfish stock complex. Under this alternative, NMFS and the Council would continue to monitor catches based on all available sources of information.

Under Alternative 5, the fishery would likely reach the ACL of 270,000 lb before the end of the fishing year, thus triggering the in-season closure of the commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters and the complementary closure in State waters. Based on fishery performance shown in Table 10, the fishery is likely to reach 270,000 lb between April and May of the fishing year (HDAR unpublished data) resulting in 3.5 months of fishery closure.

Compared to Alternatives 2 to 4, Alternative 5 would likely result in greater beneficial impacts to the Deep 7 bottomfish stock complex as the lower ACL means the fishery would reach the limit sooner than under the other three action alternatives resulting in a fishery closure. This may cause fishermen to shift effort to non-Deep 7 bottomfish, such as uku (*Aprion virescens*) to fill market demand. While it is possible that catch of non-Deep 7 bottomfish could surpass 2014 levels when 116,135 lb was caught, it is unlikely catch of non-Deep 7 bottomfish in 2015-16, 2016-17 and 2017-18 fishing year would reach the OFL of 259,200 lb. Additionally, NMFS will propose a separate ACL and AM for the non-Deep 7 bottomfish stock complex through a separate action. Therefore, like Alternatives 1, 2, 3, 4, Alternative 5 is not likely to result large adverse effects on target or non-target stocks.

Potential Impacts to MHI Bottomfish Habitats, including EFH
To prevent and minimize adverse bottomfish fishing impacts to EFH, the Hawaii FEP prohibits the use of explosives, poisons, bottom trawl and other non-selective and destructive fishing gear. Weighted lines or baited hooks may come into contact with bottom substrates during bottomfish fishing operations, and may affect EFH and HAPC. However, research studies to date indicate that bottomfishing operations, including gear deployment and a low level of anchor loss are not known to have adverse impacts to EFH (Kelley and Moffitt, 2004; Kelley and Ikehara, 2006).

None of the alternatives, including the preferred alternative (Alternative 2) is expected to change the way in which fisheries are conducted. For this reasons, none of the alternatives considered are expected to lead to substantial physical, chemical, or biological alterations to ocean, corals or coastal habitats, or result in loss of, or injury to managed species or their prey or adverse impacts to the marine habitat, including areas designated as EFH, HAPC, or unique areas such as marine protected areas, marine sanctuaries or marine monuments.

Potential Impacts to Fishery Participants and Fishing Communities
In the 2014-15 fishing year, 419 commercial fishermen reported catching 309,485 lb of Deep 7 bottomfish. However, State of Hawaii records report 343 of the 419 fishermen sold catch. These 343 individuals sold a combined total of 269,571 lb at a value of $1,798,713. Thus, in 2013-14, commercial fishermen sold approximately 87 percent their MHI Deep 7 bottomfish catch.

In 2014-May 2015 fishing year, 386 commercial fishermen reported catching 265,619 lb of Deep 7 bottomfish. State of Hawaii records report 327 of the 386 fishermen sold MHI Deep 7 bottomfish totaling to 236,642 lb with a value of $1,584,841. Thus in 2014-May 2015, commercial fishermen sold approximately 89 percent of their deep 7 catch.

NMFS does not have individual catch and revenue data for individual CML holder. Therefore, based on a strict averaging approach, each of the 327 commercial fishermen would have sold 723.68 lb of MHI Deep 7 bottomfish in 2014-May 2015 valued at $4,846.61 per individual. Based on these revenues, the average price for MHI Deep 7 bottomfish in 2014-May 2015 was approximately $6.70/lb. However, there are approximately a dozen individuals who are full-time commercial bottomfish fishermen and whose primary income is provided through fishing.

Alternative 1: No ACL and AM Management (No Action)
Under the no action alternative, the Council would not recommend an ACL for Deep 7 bottomfish in the MHI and AMs would not be necessary. Therefore, fishing would be unconstrained in 2015-16, 2016-17 and 2017-18, and could continue throughout the duration of each fishing year. As shown in Table 5, the fishery remained open throughout the fishing year and fishermen caught 309,485 lb of MHI Deep 7 bottomfish in 2013-14. This is the highest level of catch since NMFS implemented a system of catch limits in the 2007-08 fishing year. If there were no ACL, catches could reach or surpass the 2014-15 catch levels. Assuming total catch in 2014-15 and 2015-16 will be similar to the 2013-14 record high catch of catch of 309,485 lb, and that fishermen will sell 87 percent of the catch (i.e., 269,571 lb), the expected fleet-wide revenue during 2014-15 and 2015-16 under Alternative 1 would be $1,798,713 using the 2013-14 average price of $6.67/lb. If 343 commercial fishermen sell catch in 2014-15 and 2015-16 as

done in 2013-14, each fishermen could expect sell an average of 785.92 lb of MHI Deep 7 bottomfish valued at $5,244.06 per individual.

The MHI Deep 7 bottomfish fishery provides bottomfish for sustenance, and other gifts, and allows some fish to enter local markets. This provides positive social and economic benefits to fishermen, buyers and fishing communities in Hawaii. Bottomfish fishing activities and consuming bottomfish is not known to result in public health issues. Additionally, because Alternative 1 would not result in changes in the conduct of the fishery, including gear types used, areas fished, level of catch or effort, this alternative would not result in safety issue for fishermen at sea.

Alternative 2: Specify an ACL of 346,000 lb based on the 2011 Stock Assessment with no updated data (Status Quo/NEPA Baseline)

Under Alternative 2, the Council would recommend an ACL of 346,000 lb of MHI Deep 7 bottomfish in fishing year 2015-16, 2016-17, and 2017-18, and a fishery closure as the AM to prevent the fishery from exceeding the ACL. Assuming the fishery attains the ACL of 346,000 and 89 percent of the catch is sold (307,940 lb), the potential fleet wide revenue during 2015-16, 2016-17, and 2017-18 is expected to be $2,063,198 using the 2014-May 2015 average price of $6.70. If the same number of fishermen sells catch in 2015-16, 2016-17, and 2017-18 as in 2014-May 2015, each of these 327 commercial fishermen could expect to sell an average of 941.71 lb of MHI Deep 7 bottomfish valued at $6,309.47per individual.

However, based on past fishery performance shown in Table 5, MHI Deep 7 bottomfish catch in 2015-16, 2016-17, and 2017-18 is not expected to reach the ACL and would likely be similar to 2013-14 catch of 309,485 lb. with 87 percent of this catch sold at $6.67/lb (this numbers are used because the 2014-2015 fishing year is still ongoing during the time of drafting and updating of this EA). Therefore, under Alternative 2, the impacts to fishery participants and the fishing communities of Hawaii is expect to be the same as the impacts under Alternative 1 (no action).

Under Alternative 2, the expected fleet-wide revenue ($2,063,198) is more than the fleet-wide revenue expected under Alternative 1 ($1,798,713). Similarly, the expected individual revenue ($6,309.47) is more than the individual revenue expected under Alternative 1 ($5,244.06). The MHI Deep 7 bottomfish fleet as a whole and individual fisherman would likely experience a gain in revenue of nearly $264,485 and $1,065, respectively, compared to Alternative 1.

Alternative 3: Specify an ACL of 306,000 lb based on the 2011 Stock Assessment with updated data to 2013 and no phase-in

Under Alternative 3, the Council would specify an ACL of 306,000 lb of MHI Deep 7 bottomfish in fishing year 2015-16, 2016-17, and 2017-18, and a fishery closure as the AM to prevent the fishery from exceeding the ACL. Assuming the fishery attains the ACL of 306,000 and 89 percent of the catch is sold (272,340 lb), the potential fleet wide revenue during 2015-16, 2016-17, and 2017-18 is expected to be $1,824,678 using the 2014-May 15 average price of $6.70. If the same number of fishermen sell catch in 2015-16, 2016-17, and 2017-18 as in 2014-May 2015, each of these 327 commercial fishermen could expect to sell an average of 832.84 lb of MHI Deep 7 bottomfish valued at $5,580.06 per individual.

However, based on past fishery performance shown in Table 6, MHI Deep 7 bottomfish catch in 2015-16, 2016-17, and 2017-18 is not expected to reach the ACL and would likely be similar to 2013-14 catch of 309,485 lb. with 87 percent of this catch sold at $6.67/lb (this numbers are used because the 2014-2015 fishing year is still ongoing during the time of drafting and updating of this EA). Therefore, under Alternative 3, the impacts to fishery participants and the fishing communities of Hawaii is expected to be the same as the impacts under Alternative 2 (status quo/preferred), and Alternative 1 (no action).

Under Alternative 3, the expected fleet-wide revenue ($1,824,678) is slightly less than the fleet-wide revenue expected under Alternative 2 ($2,063,198) but more than Alternative 1 ($1,798,713). Similarly, the expected individual revenue ($5,580.06) is slightly less than the individual revenue expected under Alternative 2 ($6,309.47) but more than Alternative 1 ($5,244.06). The MHI Deep 7 bottomfish fleet as a whole and individual fisherman would likely experience a drop in revenue of nearly $238,520 and $729, respectively compared to Alternative 2. At the same time, the fleet as a whole and individual fisherman would likely experience a gain in revenue of nearly $25,965 and $336, respectively when compared to Alternative 1.

Alternative 4: Specify an ACL of 326,000 lb, 314,000 lb, and 302,000 lb for fishing year 2015-16, 2016-17, and 2017-18 using a Slow-Up Fast-Down phase-in approach

Under Alternative 4, the Council would specify an ACL of 326,000 lb, 318,000 lb, and 306,000 lb of MHI Deep 7 bottomfish in fishing year 2015-16, 2016-17, and 2017-18, and a fishery closure as the AM to prevent the fishery from exceeding the ACL.

On 2015-16 fishing year, assuming 89 percent of this catch is sold (290,140 lb), the expected fleet wide revenue during 2015-16 could be $1,943,938 using the 2014-May 2015 average price of $6.70. If the same number of fishermen sells their catch in 2015-16 as in 2014-May 2015, each of these 327 commercial fishermen could expect sell an average of 887.28 lb of MHI Deep 7 bottomfish valued at $5,944.76 per individual.

On 2016-17 fishing year, assuming 89 percent of this catch is sold (283,020 lb), the expected fleet wide revenue during 2016-17 could be $1,896,234 lb using the 2014-May 2015 average price of $6.70. If the same number of fishermen sells their catch in 2015-16 as in 2014-May 2015, each of these 327 commercial fishermen could expect sell an average of 865.50 lb of MHI Deep 7 bottomfish valued at $5,798.88 per individual.

The economic impact for fishing year 2017-18 is similar to Alternative 3.

Under Alternative 4, the expected fleet-wide revenue on fishing year 2015-16 ($1,943,938) is more than the fleet-wide revenue expected under Alternatives 1 and 3 ($1,798,713 and $1,824,678) but less than Alternative 2 ($2,063,198). Similarly, the expected individual revenue ($5,944.76) is more than the individual revenue expected under Alternatives 1 and 2 ($5,244.06 and $5,507.11) but less than Alternative 2 ($6,309.47). The MHI Deep 7 bottomfish fleet as a whole and individual fisherman would likely experience a drop in revenue of nearly $119,260 and $365, respectively compared to Alternative 2.

Under Alternative 4, the expected fleet-wide revenue on fishing year 2016-17 ($1,896,234) is more than the fleet-wide revenue expected under Alternatives 1 and 3 ($1,798,713 and $1,824,678) but less than Alternative 2 ($2,063,198). Similarly, the expected individual revenue ($5,798.88) is more than the individual revenue expected under Alternatives 1 and 3 ($5,244.06 and $5,580.06) but less than Alternative 2 ($6,309.47). The MHI Deep 7 bottomfish fleet as a whole and individual fisherman would likely experience a drop in revenue of nearly $166,964 and $511, respectively compared to Alternative 2.

The economic impact for fishing year 2017-18 is similar to Alternative 3.

Alternative 5: Specify an ACL of 270,000 lb based on the 2011 Stock Assessment with updated data to 2013 and no phase-in

Under Alternative 5, the Council would specify an ACL of 270,000 lb of MHI Deep 7 bottomfish in fishing year 2015-16, 2016-17, and 2017-18, and a fishery closure as the AM to prevent the fishery from exceeding the ACL. Assuming the fishery attains the ACL of 270,000 and 89 percent of the catch is sold (240,300 lb), the potential fleet wide revenue during 2015-16, 2016-17, and 2017-18 is expected to be $1,610,010 using the 2014-May 15 average price of $6.70. If the same number of fishermen sells catch in 2015-16, 2016-17, and 2017-18 as in 2014-May 2015, each of these 327 commercial fishermen could expect to sell an average of 734.86 lb of MHI Deep 7 bottomfish valued at $4,923.58 per individual.

However, based on past fishery performance shown in Table 10, MHI Deep 7 bottomfish catch in 2015-16, 2016-17, and 2017-18 is likely to reach the ACL if the performance is similar to 2013-14 fishing year. This would close the fishery between April and May of the fishing year resulting in a 3.5 months closure.

Under Alternative 5, the expected fleet-wide revenue ($1,610,010) is less than the fleet-wide revenue expected under Alternative 1 ($1,798,713), 2 ($2,063,198), 3 ($1,824,678), and 4 (year 1 - $1,943,938; year 2 - $1,896,234; and year 3 - $1,824,678). Similarly, the expected individual revenue ($4,923.58) is less than the individual revenue expected under Alternative 1 ($5,244.06), 2 ($6,309.47), 3 ($5,580.06), and 4 (year 1 - $5,944.76 ; year 2 - $5,798.88; and year 3 - $5,580.06) but more than Alternative 1 ($5,244.06). The MHI Deep 7 bottomfish fleet as a whole would likely experience a drop in revenue ranging from $188,703 to $453,188 compared to the different Alternatives. The range of drop in revenue for individual fisherman was estimated to be at $302 to $1,386.

Table 10. MHI Deep 7 bottomfish - monthly and cumulative lb caught (Sept. 2005-May 2015)

Monthly Lb Caught Sept. 2005-May 2015										
Month	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
Sep	6,841	12,986	29	0	20,718	46,872	40,628	14,043	20,115	38,869
Oct	8,937	31,295	26,059	0	39,943	34,757	23,169	28,200	37,173	29,353
Nov	26,341	28,536	32,003	28,672	8,416	35,424	15,789	20,510	34,012	26,935
Dec	58,210	29,777	23,331	58,764	66,854	67,325	25,859	40,657	55,813	52,967
Jan	15,592	24,195	32,880	49,570	33,273	37,336	44,361	28,064	46,114	55,289

Feb	24,671	18,815	49,362	18,045	26,829	41,675	22,040	5,065	42,643	26,852
Mar	13,709	31,797	28,511	24,449	8,255	4,650	10,429	35,774	20,793	24,631
Apr*	3,817	22,417	3,999.4	28,959	4,754	0	20,144	22,834	8,001	9,604
May*	9,840	5,030	0	35,616	0	0	10,095	12,847	18,575	988
Jun*	8,141	0	0	10,840	0	0	4,891	2,651	7,721	
Jul*	7,128	0	2.5	4,283	0	0	5,367	4,929	5,670	
Aug*	9,769	0	0	0	0	0	5,617	12,990	12,815	
Total	**193,003**	**204,852**	**196,178**	**259,201**	**209,043**	**268,041**	**228,389**	**238,565**	**309,485**	
Cumulative Lb Caught Sept. 2005-May 2015										
Month	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
Sep	6,841	12,986	29	0	20,718	46,872	40,628	14,043	20,115	38,869
Oct	15,778	44,281	26,088	0	60,661	81,629	63,797	42,243	57,288	68,222
Nov	42,120	72,818	58,091	28,672	69,077	117,053	79,586	62,753	91,300	95,157
Dec	100,331	102,596	81,422	87,436	135,931	184,378	105,445	103,410	147,113	148,124
Jan	115,924	126,791	114,302	137,007	169,204	221,715	149,806	131,474	193,227	203,413
Feb	140,595	145,606	163,664	155,052	196,033	263,390	171,846	136,539	235,870	230,265
Mar	154,305	177,404	192,176	179,502	204,289	268,041	182,275	172,313	256,663	254,896
Apr*	158,122	199,821	196,176	208,461	209,043	0	202,419	195,147	264,664	264,500
May*	167,962	204,852	196,176	244,077	0	0	212,514	207,994	283,239	265,488
Jun*	176,104	0	196,176	254,917	0	0	217,405	210,645	290,960	
Jul*	183,233	0	196,178	259,201	0	0	222,772	215,574	296,630	
Aug*	193,003	0	0	259,203	0	0	228,389	228,564	309,445	

Source: Hawaii Division of Aquatic Resources, Data available through 5/15/2015
* Denotes months with closed season

Table 11. MHI Deep 7 Bottomfish - monthly mean and max lb caught (Sept. 2005-March 2011)

Hawaii Deep 7 Bottomfish - Monthly Pounds (lb) Caught Sep 2011-May 2015		
Month	*Mean lb Caught **	*Max lb Caught*
Sep	28,414	40,628 (2011-12)
Oct	29,474	37,173 (2013-14)
Nov	24,312	34,012 (2013-14)
Dec	43,824	55,813 (2013-14)
Jan	43,457	55,289 (2014-15)
Feb	24,150	42,643 (2013-14)
Mar	22,907	35,774 (2012-13)
Apr	15,146	22,834 (2012-13)
May	10,626	18,575 (2013-14)
Jun	5,088	7,721 (2013-14)
Jul	5,322	5,670 (2013-14)

Aug	10,474	12,990 (2012-13)

** Months with zero catch not included in the mean*

Table 12. Projected cumulative catch of MHI Deep 7 bottomfish based on reported monthly mean and maximum catches

Month	Based on Monthly Mean*	Based on Monthly Max
Sep	28,414	40,628
Oct	57,888	77,801
Nov	82,199	111,813
Dec	126,023	167,626
Jan	169,480	222,915
Feb	193,630	265,558
Mar	216,537	301,332
Apr	231,683	324,166
May	242,309	342,741
Jun	239,670	350,462
Jul	244,992	356,132
Aug	255,466	369,122

** Months with zero catch not included in the mean*

Potential Impacts to Fishery Administration and Enforcement

Under all alternatives considered, NMFS and the Council would continue to monitor catches of MHI Deep 7 bottomfish based on all available sources of information, and the Council-appointed FEP plan team would continue to prepare an annual report on the performance of the MHI bottomfish fisheries, including the commercial and non-commercial fishing sector by June 30 of each year. Additionally, all other regulations implemented by other federal agencies and the State of Hawaii would continue to apply to bottomfish fishing vessels operating in the U.S. EEZ. Therefore, none of the alternatives would result in commitment of additional resources or increased need for fishery enforcement as monitoring of catch is required under all alternatives, including the no action alternative.

Potential Impacts to Protected Species

To date, there have been no observed or reported interactions between MHI bottomfish fisheries and protected species described in Section 3.6. In a 2008 BiOp prepared for the fishery, NMFS determined that except for the Hawaiian green sea turtle, bottomfish fishing activities are not likely to adversely affect any other ESA-listed marine species that may be found in federal waters of the MHI, or result in the destruction or adverse modification of critical habitat. For green sea turtles, NMFS determined that there is a potential for them to be killed by vessel transiting State waters enroute to and from federal waters around the MHI and authorized an incidental take of up to two green sea turtles per year. However, this analysis was based on an estimated 71,800 bottomfish fishing trips per year.

As shown in Tables 5 and 6, the total annual number of commercial and non-commercial bottomfishing trips since the 2008 has been less than 3,500 per year. Therefore, the potential for collisions with bottomfish vessels is substantially lower than estimated in the 2008 BiOp and is unlikely to occur.

In 2013, NMFS re-initiated consultation under ESA in response to listing of MHI insular false killer whale distinct population segment under the ESA. In its biological opinion dated August 7, 2013, NMFS determined that determined that commercial and non-commercial bottomfish fisheries in the MHI are not likely to adversely affect MHI insular false killer whale because of the spatial separation between the species and bottomfishing activities, the low likelihood of collisions, and the lack of observed or reported fishery interactions among other reasons.

None of the alternatives considered in this EA, would modify operations of the Hawaii bottomfish fisheries in any way that would be expected to affect endangered or threatened species or critical habitat in any manner not previously considered in previous ESA consultations or MMPA determinations. Therefore, none of the alternatives would result in a change to distribution, abundance, reproduction, or survival of ESA-listed species or increase interactions with protected resources.

Potential Impacts to Biodiversity/Ecosystem Function

When compared against recent fishing harvests, the current ACL of 346,000 lb of MHI Deep 7 bottomfish is higher than recent harvest (Table 5), but lower than current MSY (417,000 lb) and OFL (383,000 lb). The ACL and AM specifications were developed using the best available scientific information, in a manner that accords with the fishery regulations, and after considering catches, participation trends, and estimates of the status of the fishery resources. The ACL and AMs are also not likely to cause large adverse impacts to resources because the conduct of bottomfish fishing would not change as a result of the ACL and AM. Additionally, bottomfishing is not known to be a potential vector for spreading alien species as none of vessels fish outside of Hawaiian waters. For this reason, none of the alternatives are expected to increase the potential for the spread of alien species into or within Hawaiian waters.

To date, there have been no identified impacts to marine biodiversity and/or ecosystem function from the MHI bottomfish fisheries and none of the alternatives is expected to result in impacts to these environmental features. The proposed ACLs and AMs would not result in changes to the MHI bottomfish fishery and would not have large adverse impacts to marine biodiversity and/or ecosystem function.

Potential Impacts to Scientific, Historic, Archeological or Cultural Resources

There are no known districts, sites, highways, structures or objects that are listed in or eligible for listing in the National Register of Historic Places within federal waters of the MHI where bottomfish fishing activities are conducted. Shipwrecks and other objects from the December 7, 1941 attack at Pearl Harbor could possibly occur in federal waters around Oahu. However, bottomfishing in the MHI is not known to result in adverse impacts to scientific, historic, archeological or cultural resources because fishermen fish for bottomfish on high-relief, deep slopes where such objects would not be found or come to rest. Because the proposed ACL and AM would not result in changes to MHI bottomfish fisheries, none of the alternatives is expected

to result in large adverse impacts to resources of scientific, historic, cultural, or ecological importance. Bottomfish fishing in marine protected areas would continue to be restricted by State laws, and fishing in general will continue to be subject to state commercial license and/or federal non-commercial permit and reporting, and joint state/federal monitoring to help to ensure the marine resources of these special areas are sustainable.

Cumulative Effects of the Proposed Action

Cumulative effects refer to the impact on the environment, which results from the incremental effects of a proposed action when added to other past, present, or reasonably foreseeable future actions within the geographic area of the proposed action. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Multi-Year ACL and AM for MHI Deep 7 Bottomfish

The specification of an ACL and AMs based on any of the Alternatives presented for MHI Deep 7 bottomfish fisheries in fishing year 2015-16, 2016-17, and 2017-18, is not expected to result in cumulative effects to the health of MHI Deep 7 bottomfish. This is because the proposed action would set the ACL lower than the stock's estimated MSY (404,000 lb) OFL (352,000 lb), and annual catches in each of the three years are expected to remain below the proposed ACLs. Furthermore, the proposed action would require NMFS to close the fishery to prevent the ACL from being exceeded. Together, the specification of and ACL and AM over the course of three-consecutive years is intended to prevent overfishing from occurring and ensure a sustainable fishery.

ACL and AM Specification for MHI non-Deep 7 Bottomfish

As noted in the Proposed Action section, the Council plans to specify a multi-year ACL and AM for the MHI non-Deep 7 bottomfish stock complex through a separate action. This is because the fishing year for this stock complex is on a calendar year, and not in synch with the fishing year for the Deep 7 bottomfish stock complex, which begins September 1 and ends August 31, annually.

The specification of an ACL and AMs based on the presented Alternatives for MHI Deep 7 bottomfish fisheries in fishing year 2015-16, 2016-17, and 2017-18, is not expected to result in cumulative effects to MHI non-Deep 7 bottomfish. This is because the fishery is not expected to reach the ACL and an in-season fishery closure would not be triggered, thus allowing fishermen to fish for Deep 7 bottomfish throughout the fishing year. The lack of an in-season closure for Deep 7 bottomfish means that fishermen would not need to switch to non-Deep 7 bottomfish stock complex to fill market demand for Deep 7 bottomfish.

In fishing years 2012-13 and 2013-14, the Deep 7 bottomfish fishery remained open throughout the both fishing years (Table 5). In the 2013 fishing year for non-Deep 7 bottomfish (which spans the second half of the 2012-13 Deep 7 bottomfish fishing year and the first half of the Deep 7 2013-14 fishing year), total catch of non-Deep 7 bottomfish was 158,235 lb. This level of catch is well below the MSY of 265,000 lb and the OFL proxy of 259, 200 lb. Under the proposed action, catch of non-Deep 7 bottomfish is expected to continue at around 2013 levels (158,235 lb). Therefore, under this proposed action and NMFS separate action to specify a multi-year ACL and AM for the MHI non-Deep 7 bottomfish fishery, harvest of non-Deep 7

bottomfish in 2015 are expected to continue to be below the stock's MSY and OFL and remain sustainable.

ACL and AM Specifications for other Hawaii FEP Fisheries
In addition to the ACLs and AMs for MHI Deep 7 bottomfish and MHI non-Deep 7 bottomfish, NMFS will propose to implement the Council's ACL and AM recommendations for all other MHI fisheries, including crustacean fisheries (spiny lobster, slipper lobster, Kona crab and deepwater shrimp), precious coral fisheries (black coral, pink coral, and bamboo coral), and coral reef fisheries. These fisheries have been managed using ACLs and AMs since 2012; and these specifications which will apply in calendar years 2015 through 2018 do not have unknown or uncertain impacts, and do not interact with the MHI Deep 7 bottomfish fishery in any way.

Information on the proposed ACLs and AMs for these fisheries can be obtained from NMFS or the Council by request, or at www.regulations.gov using the regulatory identification number (RIN) 0648-XD558.

The MHI Deep 7 bottomfish fishery does not overlap with these other fisheries to a large extent such that ACLs and AMs in the Deep 7 bottomfish fishery would result in more fishing in these other fisheries or in the pelagic fisheries. For this reason, the impacts of the proposed MHI Deep 7 bottomfish ACL and AM can be considered separately from the ACL and AM specifications for Hawaii crustacean, precious coral, and coral reef fisheries.

Foreseeable Management Actions Related to Hawaii FEP Fisheries
In the foreseeable future, the Council may re-evaluate the need for conservation and management for all Hawaii FEP MUS and may recommend NMFS remove certain MUS that are not harvested in EEZ waters from the Hawaii FEP and/or re-classify such species as "ecosystem component" (EC) species. To be considered for possible classification as an EC species, the species should be: 1) a non-target species; 2) a stock that is not determined to be subject to overfishing, approaching overfished, or overfished; 3) not likely to become subject to overfishing or overfished; and 4) generally not retained for sale or personal use. Various methods for categorizing species and EC components have been preliminarily discussed at Council meetings. These include, but are not limited to, species caught exclusively or predominately in state/territorial waters, species that occur infrequently in the available time series, species that are non-native to an FEP area, and species associated with ciguatera poisoning and are generally discarded.

In accordance with National Standard 1 guidelines found in 50 CFR §600.310(d), EC species are not considered to be "in the fishery" and thus, do not require specification of an ACL. EC species may, but are not required to remain in the FEP for data collection purposes, for ecosystem considerations related to the specification of optimum yield for associated MUS, for consideration in the development of conservation and management measures for a fishery; and/or to address other ecosystem issues (e.g., such as management of bycatch). However, until such time a particular MUS is classified as an EC species, it will remain in the fishery and be subject to the ACL and AM requirements.

Other Foreseeable NOAA/NMFS Management Actions
On June 2, 1011 (76 FR 32026) published a proposed rule to designate areas in the main Hawaiian Islands (MHI) as monk seal critical habitat. Specific areas proposed include terrestrial and marine habitats from 5 m inland from the shoreline extending seaward to the 500 m depth contour around Kaula Island, Niihau, Kauai, Oahu, Maui Nui (including Kahoolawe, Lanai, Maui and Molokai) and Hawaii Island. The final determinations on whether to designate monk seal critical habitat in the MHI have not been made.

At this time, there is insufficient information in the proposal to allow NMFS to evaluate the potential impact of a designation of critical habitat on the MHI bottomfish fisheries. However, a designation of critical habitat for monk seals in the MHI would not affect the NMFS requirement to specify ACLs and AMs for Hawaii FEP fisheries.

In the proposed rule, NMFS identified fisheries as one of the activities that may affect monk seal habitat, and listed adequate prey or quality of prey as an essential feature that could be affected from fisheries given that overlap between prey species and commercial fisheries may impact the amount of available prey species.

Quantitative fatty acid signature analysis results indicated that monk seals consume a wide range of species including certain species of bottomfish (Iverson et al. 2011). However, this study focused primarily on seals in the NWHI and may not be representative of the MHI population (Sprague et al. 2013). A more recent study used fecal samples from MHI monk seals to characterize diet and found that triggerfishes (*Balistidae*), moray and white eels (*Muraenidae/ Congridae*), crabs/lobsters/prawns (*Crustacean*), surgeonfishes (*Acanthuridae*), octopods/squid (*Cephalopod*), and wrasses (*Labridae*) comprised approximately 90% of the diet (Sprague et al. 2013). Furthermore, groupers/basslets/anthias (*Serranidae*) and snappers (*Lutjanidae*) comprised 1.5% and 0.08%, respectively, of the monk seal diet in the MHI (Sprague et al. 2013), indicating that Deep 7 bottomfish species targeted in this fishery are of limited importance to monk seals.

The 2008 BiOp analyzed impacts of prey reduction on monk seals and concluded that there is no evidence that the bottomfish fishery has impacted monk seals through competition for prey. The recent study of monk seal diet in the MHI further support the conclusion in the BiOp that competition for forage with the MHI bottomfish fishery does not appear to be adversely impacting monk seals in the MHI. Under current levels of fishing pressure in the MHI, the monk seal population is growing, pupping is increasing, and the pups appear to be foraging successfully. In contrast, the Hawaiian monk seal subpopulation continues to decline in the NWHI where fishing has been prohibited. Therefore, the proposed ACL specifications and AMs is not considered to be affecting monk seals through completion for prey and is not likely to significantly impact the quality of habitat being considered for designation as monk seal critical habitat because no change to the conduct of the existing MHI bottomfish fisheries is likely to occur under the proposed action.

Specifying ACLs will not have an environmental outcome that would affect the agency's decision of whether or not to revise designated critical habitat. The specification would not change the likelihood of interactions, or affect the survival, distribution or behavior of the species in any way. However, if the pending Hawaiian monk seal action is approved, NMFS will

initiate consultation in accordance with Section 7 of the ESA to ensure that Hawaii's fisheries are not likely to jeopardize the continued existence of the species, or result in the destruction or adverse modification of critical habitat.

Other Foreseeable NOAA Actions

NOAA's Office of National Marine Sanctuaries (ONMS) has initiated a review of the Hawaiian Humpback Whale National Marine Sanctuary in the main Hawaiian Islands, which may include revisions to its management plan and regulations to fulfill the purposes and policies of the National Marine Sanctuaries Act (75 FR 40579, July 14, 2010). As there are no in-season management measures proposed, the ways in which the MHI bottomfish fisheries are conducted are not expected to change and, therefore, the proposed ACL specification and AMs would not have an environmental effect that would affect future decisions about possible changes to the sanctuary management plan nor would the proposed action affect sanctuary resources.

Climate Change

Changes in the environment from global climate change have the potential to affect MHI bottomfish fisheries. Effects of climate change may include: sea level rise; increased intensity or frequency of coastal storms and storm surges; changes in rainfall (more or less) that can affect salinity nearshore or increase storm runoff and pollutant discharges into the marine environment; increased temperatures resulting in coral bleaching, and hypothermic responses in some marine species (IPCC 2007). Increased carbon dioxide uptake can increase ocean acidity, which can disrupt calcium uptake processes in corals, crustaceans, mollusk, reef-building algae, and plankton, among other organisms (Houghton et al. 2001; The Royal Society 2005; Caldeira and Wickett 2005; Doney 2006; Kleypas et al. 2006). Climate change can also lead to changes in ocean circulation patterns, which can affect the availability of prey, migration, survival, and dispersal (Buddenmeier et al. 2004). Damage to coastal areas due to storm surge or sea level rises as well as changes to catch rates, migratory patterns, or visible changes to habitats are among the most likely changes that would be noted first. Climate change has the potential to adversely affect some organisms, while others could benefit from changes in the environment to ensure that the MHI bottomfish catches are sustainable, regardless of environmental conditions.

The impacts to MHI bottomfish from climate change may be difficult to discern from other impacts; however monitoring of physical conditions and biological resources by a number of agencies will continue to occur and will allow fishery managers to continually make adjustments in fishery management regimes in response to changes in the environment for any alternative.

The efficacy of the proposed ACL and AM specifications in providing for sustainable levels of fishing for bottomfish is not expected to be adversely affected by climate change. Recent catches relative to MSY and OFL estimates helped to inform the development of the ACLs and AMs. Monitoring would continue, and, if monitoring shows overfishing is occurring, ACLs and other fishery management provisions could be adjusted in the future. The proposed specifications are not expected to result in a change to the manner in which any of the affected fisheries are conducted, so no change in greenhouse gas emissions is expected.

For these reasons, climate change, considered in addition to all other factors affecting MHI non-Deep 7 bottomfish stocks (including fishing), is not expected to result in a large and adverse a

cumulative impact on MHI non-Deep 7 bottomfish stocks. The proposed action under each alternative is not expected to change the fishery and therefore, none of the action alternatives would result in changes in climate change-promoting gas emissions.

Consistency with Other Applicable Laws

National Environmental Policy Act
NOAA Administrative Order (NAO) 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act, in accordance with NEPA, requires the consideration of effects of proposed agency actions and alternatives on the human environment and allows for involvement of interested and affected members of the public before a decision is made. The NMFS Regional Administrator will use the analysis in this draft EA to consider a range of alternatives, allow for public involvement in the agency's decision, and to determine whether the proposed action would have a significant environmental impact, which, if so, would require the preparation of an environmental impact statement.

Preparers and Reviewers
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Coordination with Others
The proposed action described in this EA was developed in coordination with various federal and local government agencies that are represented on the Western Pacific Fishery Management Council. Specifically, agencies that participated in the deliberations and development of the proposed management measures include:

- American Samoa Department of Marine and Wildlife Resources
- Guam Department of Agriculture, Division of Aquatic and Wildlife Resources
- Hawaii Department of Land and Natural Resources, Division of Aquatic Resources
- Northern Marina Island Department of Land and Natural Resources, Division of Fish and Wildlife
- U.S. Coast Guard
- U.S. Fish and Wildlife Service
- U.S. Department of State

Public Coordination
The development of the proposed ACL and AM specifications for Hawaii non-Deep 7 bottomfish has taken place in public meetings of the SSC and the Council. In addition, the Council advertised the need to focus on federal annual catch limits in media releases, newsletter articles, and on the Council's website, http://www.wpcouncil.org. Additionally, NMFS is soliciting public comment on the proposed ACL and AM specifications described in this EA. Find instructions on how to comment on the proposed specification by searching on RIN 0648-XD082 at www.regulations.gov, or by contacting the responsible official or Council listed in this EA.

Endangered Species Act
The Endangered Species Act (ESA) provides for the protection and conservation of threatened and endangered species. Section 7(a)(2) of the ESA requires federal agencies to ensure that any action authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species.

Pursuant to Section 7 of the ESA, NMFS has evaluated the MHI bottomfish fisheries managed under the Hawaii FEP for potential impacts on ESA-listed species under the jurisdiction of NMFS. Table 13 summarizes ESA Section 7 consultations for Hawaii bottomfish fisheries managed under the Hawaii FEP.

Table 13. ESA Section 7 consultations for Hawaii bottomfish fisheries.

Fishery	Consultation	NMFS Determination
MHI bottomfish fishery	March 18, 2008, Biological Opinion as modified on August 7, 2013.	Likely to adversely affect green sea turtles only; but not likely to jeopardize the continued existence of any ESA-listed species or adversely modify critical habitat

Because the proposed action is not expected to modify vessel operations or other aspects of any fishery, NMFS does not expect the bottomfish fisheries in Hawaii as conducted under the proposed action, to have an effect on ESA listed species or any designated critical habitats that was not considered in prior consultations.

Marine Mammal Protection Act
The MMPA prohibits, with certain exceptions, taking of marine mammals in the U.S., and by persons aboard U.S. flagged vessels (i.e., persons and vessels subject to U.S. jurisdiction). Under section 118 of the MMPA, NMFS must publish, at least annually, a List of Fisheries (LOF) that classifies U.S. commercial fisheries into one of three categories based upon the level of serious injury and mortality of marine mammals that occurs incidental to each fishery. A Category 1 fishery is one with frequent incidental morality and serious injury of marine mammals. A Category 2 fishery is one with occasional incidental morality and serious injury of marine mammals. A Category 3 fishery is one with a remote likelihood or no known incidental morality and serious injury of marine mammals.

On December 29, 2014, (79 FR 77919), NMFS published the final LOF for 2015 which classified the Hawaii bottomfish handline fishery as a Category III fishery under Section 118 of the MMPA. Category 3 fisheries are not required to register with the MMAP in order to engage in commercial fishing. Because the proposed action would not modify vessel operations or other aspects of any fishery, NMFS does not anticipate that the commercial and non-commercial fishery for MHI non-Deep 7 bottomfish, as conducted under the proposed action, is not expected to affect marine mammals in any manner not previously considered, or authorized under the MMPA.

Coastal Zone Management Act
The Coastal Zone Management (CZM) Act requires a determination that a recommended management measure has no effect on the land, water uses, or natural resources of the coastal zone or is consistent to the maximum extent practicable with an affected state's enforceable coastal zone management program. On July 27, 2014, NMFS sent a letter to the Hawaii CZM Program informing them of its determination that the proposed action is consistent, to the maximum extent practicable, with their respective coastal zone management programs. On July 31, 2014, the State of Hawaii responded that it considers the proposed action to be an implementing measure of the Hawaii FEP, which the Hawaii CZM Program previously reviewed and issued a consistency determination and, therefore, is not subject to the federal consistency review by the Hawaii CZM Program.

National Historic Preservation Act
The National Historic Preservation Act (NHPA) requires federal agencies undergo a review process for all federally funded and permitted projects that will impact sites listed on, or eligible for listing on, the National Register of Historic Places. Currently, there are no known sites or historic properties in EEZ waters 3 to 200 nm offshore the MHI that are listed on or eligible for listing on the National Register of Historic Places. Bottomfish fishing is not known to have a damaging impact on the marine environment, including any man-made resources or structures. None of the alternatives would change the manner in which any bottomfish fishery is conducted. Therefore, the proposed action would have no potential to effect historic places protected by the NHPA.

Paperwork Reduction Act
The purpose of the Paperwork Reduction Act is to minimize the paperwork burden on the public resulting from the collection of information by or for the Federal government. It is intended to ensure the information collected under the proposed action is needed and is collected in an efficient manner (44 U.S.C. 3501(1)). The proposed action would not establish any new permitting or reporting requirements and therefore it is not subject to the provisions of the Paperwork Reduction Act.

Regulatory Flexibility Act
The Regulatory Flexibility Act (RFA) (5 U.S.C. 601 *et seq.*) requires government agencies to assess and present the impact of their regulatory actions on small entities including small businesses, small organizations, and small governmental jurisdictions; and to determine ways to minimize adverse impacts. The assessment is done via the preparation of an Initial Regulatory Flexibility Analyses (IRFA) and Final Regulatory Flexibility Analysis (FRFA) for each proposed and final rule, respectively. Under the RFA, an agency does not need to conduct an IRFA or FRFA if a certification can be made that the proposed rule, if adopted, will not have a significant adverse economic impact on a substantial number of small entities.

On June 12, 2014, the Small Business Administration issued an interim final rule revising small business size standards, effective July 14, 2014 (79 FR 33647). The rule increased the size standard for finfish fishing from 19.0 to $20.5 million, for shellfish fishing from $5.0 million to $5.5 million, and for other marine fishing from $7.0 million to $7.5 million.

In general, the relative importance of MHI bottomfish to commercial participants as a percentage of overall fishing or household income is unknown, as the total suite of fishing and other income-generating activities by individual operations across the year has not been examined. However, Bbased on available information presented in this EA, NMFS has determined that all vessels participating in the MHI bottomfish fishery are small entities under the Small Business Administration's definition of a small entity. That is, they are engaged in the business of fish harvesting, are independently owned or operated, are not dominant in their field of operation, and have annual gross receipts not in excess of $20.5 million, the small business size standard for finfish fishing.

Even though this proposed ACL and AM would apply to a substantial number of vessels, i.e., 100 percent of the bottomfish fleet, NMFS does not expect the rule will have a significant adverse economic impact to individual vessels. This is because the catch limit does not favor any fisherman or disproportionately adversely affect a certain type of participant. Furthermore, catches in the three-previous fishing years when NMFS specified same ACL and AMs indicate that Deep 7 bottomfish landings are not likely to exceed the ACL proposed for 2014-15 and 2015-16. Therefore, there are no disproportionate economic impacts between large and small entities and the proposed action, if implemented, would not have a significant economic impact on small entities. NMFS may request that the Department of Commerce Chief Counsel for Regulation certify to the Small Business Administration that the proposed rule and specifications would not have a significant economic impact on a substantial number of small entities.

Administrative Procedures Act

All federal rulemaking is governed under the provisions of the Administrative Procedures Act (APA) (5 U.S.C. Subchapter II) which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the APA, NMFS is required to publish notification of proposed rules in the Federal Register and to solicit, consider and respond to public comment on those rules before they are finalized. The APA also establishes a 30-day wait period from the time a final rule is published until it becomes effective, with rare exceptions.

The specification of ACLs for MHI-Deep 7 bottomfish complies with the provisions of the APA through the Council's extensive use of public meetings, requests for comments, and consideration of comments in developing ACL and AM recommendations. Additionally, NMFS will publish a proposed rule announcing the proposed ACL and AM specifications described in this document, which will include requests for public comments. After considering public comments, NMFS expects to publish a final rule that would then become effective 30 days after publication unless there is good cause to waive the 30-day delay of effectiveness period.

Executive Order 12898: Environmental Justice

NMFS considered the effect of the proposed ACL specifications and AMs on Environmental Justice communities that include members of minority and low-income groups. The ACLs would apply to everyone that catches Deep 7 bottomfish in the MHI and no new monitoring is required for the ACL specification or the AM to be implemented. The environmental review in this EA indicates the proposed action is not expected to result in a change to the way MHI bottomfish fisheries are conducted.

The proposed specifications are intended to provide for long-term sustainability of MHI Deep 7 bottomfish, expected to benefit the bottomfish resources and, therefore, the human communities that rely on their harvest. The proposed specifications are also not likely to result in a large adverse impact to the environment that could have disproportionately large or adverse effects on members of Environmental Justice communities in Hawaii.

Executive Order 12866: Regulatory Impact Review
A "significant regulatory action" means any regulatory action that is likely to result in a rule that may –

1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal government or communities;
2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

The specification of an ACL and AM for MHI Deep 7 bottomfish fisheries is exempt from the procedures of E.O. 12866 because this action contains no implementing regulations.

Information Quality Act
The Information Quality Act requires federal agencies to ensure and maximize the quality, objectivity, utility, and integrity of information disseminated by federal agencies. To the extent feasible, the information in this document is current. Much of the information was made available to the public during the deliberative phases of developing the proposed specifications during meetings of the Council and its SSC. The information was also improved based on the guidance and comments from the Council's advisory groups.

NMFS staffs prepared the documents based on information provided to the Council by NMFS PIFSC and NMFS PIRO and after providing opportunities for members of the public to comment at Council meetings. Additionally, this EA will be made available to the public during the comment period for the proposed specification. The process of public review of this document provides an opportunity for comments on the information contained in this document, as well as for the provision of additional information regarding the proposed specifications and potential environmental effects.

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Appendix A

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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March 03, 2015

MEMORANDUM FOR: The Record

FROM: Christofer H. Boggs

ABOUT: Advice regarding what Deep-7 bottomfish assessment to use in 2015

Our assessment scientists did a good job on the 2014 assessment, which initiated an improvement in the approach for standardizing CPUE data. The Science Center now has additional insights to why the fisheries data used in the 2014 assessments produced results that CIE peer review advised were not ready for management application. These insights result from the intense scrutiny the assessment has received and our consideration of the peer review's conclusions. Although the 2014 assessment used a superior new approach to standardizing CPUE compared to the 2011 assessment, there are some good reasons why the fisheries data could be better used in such an approach. The 2011 assessment relied on the only data continuously available throughout the time series: catch per day fished. The new 2014 CPUE standardization approach split the time series into old (1949-1993) and new stanzas (1994-2013). It did so to account for differences among fishermen that could only be linked through time in the recent stanza. The fisheries data could be better used for this new split-stanza context in two important ways:

1) Although catch per day fished is the best available CPUE that is available continuously over the whole time series, it may not be the best available over the most recent time series. If the time series is to be split with CPUE issues addressed differently before and after the split, one could also analyze and include detailed effort data that has been collected only for the last dozen years. This data could strongly influence recent trends. This was not seen by the Center as the work for a simple update in 2014, as it is a complex undertaking.

   The use of CPUE defined as catch per day fished is subject to great criticism, and one way to address this is use of details on hours and numbers of lines and hooks used by fishermen over the last dozen years. Only inexplicit, undescribed differences among fishermen linked through time were applied to the recent stanza in the 2014 CPUE standardization. Using the recent effort detail would still allow differences between individual fishermen to be

standardized, and also allow changes in effort details through time, to be addressed. Both were factors of great concern to the reviewers. (Differences among areas and seasons and other such factors that can be applied throughout the whole time series have remained part of the CPUE standardization in both 2011 and 2014).

2) Further efforts could be made to apply the CPUE standardization for differences between fishermen to more data using various exploratory methods and other data sets. The 2014 assessment overlooked a compilation of confidential non-electronic records held by the State of Hawaii that may help to link fisher's identities back through an earlier stanza of time.

Since the CIE peer review advised that the 2014 assessment was not ready for application to management, and we cannot improve the assessment in the ways described above in short order, the Science Center believes that a much more simple update of the 2011 assessment using data from the 3 most recent years available provides the best scientific information available for management. Although catch per day fished may not be the best available CPUE data that can be used in the superior split-stanza CPUE standardization, it is the best available CPUE data that is available over the entire time series, and thus appropriate for use in the 2011 assessment approach, which does not utilize a split-stanza CPUE standardization approach.

Attachment:

Update of 2011 benchmark stock assessment of Deep 7 bottomfish in the Main Hawaiian Islands using data through 2013

Update of 2011 benchmark stock assessment of Deep 7 bottomfish in the Main Hawaiian Islands using data through 2013

This document summarizes the results of a strict update of the 2011 benchmark assessment of Deep 7 bottomfish in the Main Hawaiian Islands (Brodziak et al. 2011) using three additional years of data from 2011-2013. Both catch data and standardized CPUE from 2011-2013 are included; CPUE is standardized using the same methods as previously applied in the 2011 assessment. All other assumptions and methods are the same as those used in the 2011 stock assessment.

Table 1. Estimated parameters, reference points, and stock status values. Values indicating biomass (e.g. B, B_{MSY}, MSY) are in units of million pounds.

Parameter/Reference point/ Stock status	Mean	SD
r	0.106	0.025
K	27.36	9.378
M	1.76	1.28
P_1	0.58	0.1
Q	13	4.3
τ^2	0.05	0.01
σ^2	0.022	0.008
H_{MSY}	6.00%	2.10%
B_{MSY}	14.51	4.267
MSY for Total Catch	0.839	0.324
MSY for Reported Catch	0.404	0.156
P_{MSY}	0.54	0.08
H_{2013}	3.80%	1.40%
H_{2013}/H_{MSY}	0.627	N/A
Prob ($H_{2013} > H_{MSY}$)	14.7%	N/A
B_{2013}	13.34	5.397
B_{2013}/B_{MSY}	0.930	0.258
Prob ($B_{2013} < 0.70*B_{MSY}$)	25.1%	N/A

Table 2. Estimated acceptable biological catches (ABCs) (pounds) for commercial fishing in fishing years 2015 and 2016, corresponding 2015 probabilities of overfishing from 0% to 50% in 5% increments, as well as mean projected harvest rates, exploitable biomasses, and probable stock status conditions. Overfished is defined as $B<0.70*B_{MSY}$, and overfishing is defined as $H>H_{MSY}$. These projections assume that annual commercial catch in 2014 was 276,000 pounds, or 80% of the 2014 annual catch limit of 346,000 pounds.

Probability of Overfishing Deep7 Bottomfish in the Main Hawaiian Islands in Fishing Year 2015	Acceptable Biological Commercial Catch (pounds) in Fishing Years 2015 and 2016	Probability of Overfishing in 2016	Expected Harvest Rate in 2015	Expected Harvest Rate in 2016	Mean Exploitable Biomass (1000,000 pounds) in 2016	Probability of being overfished in 2016
0.00	14,000	0.00	0.2%	0.2%	14.80	0.15
0.05	130,000	0.05	2.3%	2.2%	14.56	0.17
0.10	174,000	0.10	3.1%	3.0%	14.47	0.18
0.15	202,000	0.14	3.6%	3.5%	14.41	0.18
0.20	228,000	0.19	4.0%	4.0%	14.35	0.18
0.25	250,000	0.24	4.4%	4.4%	14.31	0.19
0.30	270,000	0.29	4.8%	4.7%	14.27	0.19
0.35	290,000	0.34	5.1%	5.1%	14.23	0.19
0.40	310,000	0.39	5.5%	5.5%	14.18	0.20
0.41	314,000	0.40	5.6%	5.6%	14.18	0.20
0.45	330,000	0.44	5.8%	5.9%	14.14	0.20
0.50	352,000	0.50	6.2%	6.3%	14.10	0.21

References:

Brodziak, J., D. Courtney, L. Wagatsuma, J. O'Malley, H. Lee, W. Walsh, A. Andrews, R. Humphreys, and G. DiNardo. 2011. Stock assessment of the Main Hawaiian Islands Deep7 bottomfish complex through 2010. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TMNMFS-PIFSC-29, 176 p. + Appendix.

Risk table from projections of an update of the 2011 benchmark stock assessment of Deep 7 bottomfish in the Main Hawaiian Islands using data through 2013

May 26, 2015

This document provides additional detail of the projections from a strict update of the 2011 benchmark assessment of Deep 7 bottomfish in the Main Hawaiian Islands (Brodziak et al. 2011) using three additional years of data from 2011-2013. Both catch data and standardized CPUE from 2011-2013 are included as additional data; CPUE is standardized using the same methods as previously applied in the 2011 assessment. All other assumptions and methods are the same as those used in the 2011 stock assessment.

Table. Estimated acceptable biological catches (ABCs) in pounds for commercial fishing in fishing years 2015 and 2016, and corresponding 2015 and 2016 probabilities of overfishing. Overfishing is defined as H>HMSY. These projections assume that annual commercial catch in 2014 was 276,000 pounds, or 80% of the 2014 annual catch limit of 346,000 pounds.

Probability of Overfishing Deep7 Bottomfish in the Main Hawaiian Islands in Fishing Year 2015	Acceptable Biological Commercial Catch (pounds) in Fishing Years 2015 and 2016	Probability of Overfishing Deep7 Bottomfish in the Main Hawaiian Islands in Fishing Year 2016
0.01	36,000	0.01
0.05	130,000	0.05
0.10	174,000	0.10
0.15	202,000	0.14
0.20	228,000	0.19
0.25	250,000	0.24
0.26	254,000	0.25
0.27	258,000	0.26
0.28	262,000	0.27
0.29	266,000	0.28
0.30	270,000	0.29
0.31	274,000	0.30
0.32	278,000	0.31
0.33	282,000	0.32
0.34	286,000	0.33
0.35	290,000	0.34
0.36	294,000	0.35
0.37	298,000	0.36
0.38	302,000	0.37
0.39	306,000	0.38
0.40	310,000	0.39
0.41	314,000	0.40
0.42	318,000	0.41
0.43	322,000	0.42
0.44	326,000	0.43
0.45	330,000	0.44
0.46	334,000	0.45
0.47	340,000	0.47
0.48	344,000	0.48
0.49	348,000	0.49
0.50	352,000	0.50

Appendix B

Table 19.1.--Projection results showing the total allowable commercial catches (1000 pounds) of Deep7 bottomfish in fishing years 2012 and 2013 that would produce probabilities of overfishing in 2012 of 0%, 5%, 10%, …, 50% and greater under Baseline Catch Scenario II and Baseline CPUE Scenario I.

Catch Scenario II and CPUE Scenario I				
Probability of Overfishing Deep7 Bottomfish in the Main Hawaiian Islands in Fishing Year 2012	Total Allowable Commercial Catch (1000 pounds) of Deep7 Bottomfish in Fishing Years 2012 and 2013	Probability of Overfishing Deep7 Bottomfish in the Main Hawaiian Islands in Fishing Year 2013	Median Ratio of Deep7 Bottomfish Exploitable Biomass in 2013 to BMSY	Probability That Deep7 Bottomfish Biomass in 2013 Is Greater Than the Minimum Stock Size Threshold (0.7*BMSY)
0	11	0	1.05	0.92
0.05	147	0.02	1.03	0.91
0.10	197	0.09	1.02	0.90
0.15	229	0.14	1.02	0.90
0.20	255	0.19	1.01	0.89
0.25	277	0.24	1.01	0.89
0.30	299	0.29	1.01	0.89
0.35	319	0.34	1.00	0.88
0.40	341	0.39	1.00	0.88
0.45	361	0.45	1.00	0.88
0.50	383	0.50	0.99	0.88
0.55	407	0.56	0.99	0.87
0.60	429	0.60	0.99	0.87
0.65	455	0.66	0.98	0.87
0.70	481	0.71	0.98	0.86
0.75	513	0.76	0.97	0.86
0.80	549	0.81	0.97	0.85
0.85	597	0.86	0.96	0.84
0.90	665	0.91	0.95	0.83
0.95	783	0.96	0.93	0.81
0.99	1001	0.99	0.90	0.77

Appendix C

WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

P* Working Group Meeting
May 6, 2015
10:00 am to 4:00 pm
Main Conference Room
Council Office

Working group participants: Bob Skillman (SSC member), David Itano (SSC member), Annie Yau (NMFS PIFSC-Presenter), Christofer Boggs (NMFS PIFSC), Gary Beals (HI AP Chair), Layne Nakagawa (Fisherman, AP member), Roy Morioka (Fisherman, H-FACT), Ariel Jacobs (NMFS PIRO)
Council staff: Marlowe Sabater and Mark Mitsuyasu (WPRFMC)
Public: Ed Ebisui III (Fisherman-Oahu), Ed Watamura (Fisherman, AP member)
Invited but absent: Ed Ebisui (Council member), Matt Dunlap (NMFS PIRO)

DRAFT REPORT

1. **Introductions**
   The meeting started at 10:05 am. Council staff provided an overview of the meeting and the agenda. Clarifications were made on the membership of the working group. Chris Boggs replaced Bob Humphreys (in a Life History Workshop), Annie Yau is a presenter and resource person, David Itano was invited to be a working group member since he was part of the original P* working group. Ed Ebisui III and Ed Watamura are members of the public that provided additional insights regarding the fishery. Fishermen were included as working group members to incorporate their expertise and knowledge on the various uncertainties related to the fishery and how that affects the data that goes into the assessment. This also enhances the transparency of the P* process.

2. **Recommendations from previous Council meetings**
   Council staff presented on the recommendations from the 162nd Council Meeting. The first recommendation was the delivery of the updated results of the 2011 assessment adding 3 years of data in order to facilitate the P* process. Recent developments from generation of the 2014 draft stock assessment and the succeeding reviews highlighted the uncertainties related to the scientific information which affects the P* hence the need to revisit the P* analysis for this fishery. This working group meeting addresses that Council recommendation.

   The second recommendation was to organize a Data Workshop for the MHI deep 7 bottomfish fishery that would support the development of the benchmark assessment to be delivered in 2018. This will be a series of workshops to resolve the HDAR data issues for the benchmark assessment. Fishermen will be invited to participate in these workshops in order to ground-truth the data and put it to proper perspective.

3. **Overview of the P* process**
   Council staff provided an overview of the P* process. The P* analysis is a semi-quantitative process to determine the risk of overfishing associated with the scientific

uncertainty in the data and the assessment. This determines the buffer between the overfishing limit (OFL) and the acceptable biological catch (ABC). The four dimensions were described (assessment information, uncertainty characterization, stock status, productivity and susceptibility) and the criteria associated with each. The previous P* scoring process was reviewed

The deep 7 complex is assessed as a complex but can also use an indicator species within the complex. Changing the management unit species complex would require an amendment. Management is done on the complex and the overfishing determination is linked to the complex. There were concerns about exploitation of the vulnerable species when managing on a complex. However, the D7 assessment takes into consideration of the life history of the most dominant species in the catch and the vulnerable species just make up a small percent of the fishery landing. There was some discussion on whether to break apart the complex first and do the assessment to determine real status of the vulnerable species or conduct the assessment of the vulnerable species first prior to breaking the complex and manage species individually. Nonetheless, once it was determined that a species is being overfished and experiencing overfishing, the Council would need to take action.

4. State of the Science for the Main Hawaiian Island Deep 7 Bottomfish

a. Report on assessment update using 2011 model with 3 years of data

Dr. Annie Yau presented on the background of the 2011 stock assessment and the results of the assessment update with three additional years of data (catch and CPUE from 2011-2013). Dr. Yau enumerated various sources of uncertainties built into the assessment: unreported catch (± 20%), standard deviation in the standardized CPUE, observation error (assumes there are errors in the data), and process error (uncertainties due to weather, climatic, productivity change over time). The latter two errors are estimated via the input data (model has flexibility is fitting – inability to measure things, allows the model to accept noise and fluctuate) and assumed to have an average value over time.

The discussion focused on the following points:

- The model works because it was able to detect the effects of the fishery in the CPUE and the CPUE is linked to the abundance of the fish.

- Fishing skill is important to take into consideration but is currently challenging to model. Change in gear efficiency can be masked by fishing skill and change in fishery participants over time.

- CPUE may have been affected during the TAC years because people are racing to the fish. However, during the period that the fishery is closed is associated with the low CPUE. That should have been accounted for in the quarter.

b. Summary of comments from the CIE reviewers affecting uncertainties

Dr. Annie Yau summarized the various sources of uncertainties brought up by the various reviewers of the 2011 and 2014 stock assessments. First was related to life history. The reviewers felt that the M used in both assessments is too high (0.30 and 0.25 for 2011 and 2014, respectively). The reviewers recommended that M=0.10 to 0.15 would be more appropriate.

DAR trip reports – data quality of catch and effort was suspect prior to 1994 – improved data collection especially tracking individual CML; the forms changed over time; the requirements for reporting also changed

Unreported catch – pre 1990 estimates of unreported catch should be explored since the study used focused on Oahu. More analysis needs to be done on unreported catch. Directional biases over time, the 20% uncertainty may not be capturing this. The unreported catch uncertainty in earlier years may not be consistent over time. More thought on the +- 20%.

Bayesian priors may be too informative – might influence the results; changes in technology and fishing efficiency should be accounted for.

Production model is not capturing the size and age structure; Individual dynamics might not be captured since its in a complex; Magnitude the process error is assumed constant over time but this might not be true

The discussion brought up the following points:

- Fishermen brought up the suggestion to use size based estimates into the assessment. This is one alternative data set that can be explored in the data workshop. However, a size structured model may require additional parameters in order to work and still have to be tested if the size data will not conflict with other data sets and have the model converge.

- It was also brought up that total weight is heavily biased to opakapaka. Paka are dense fish while others including the onaga are lighter in weight for a given length. So when plotting weight over time, the weight composition of the complex may change. Number of fish may be one more data to consider. Length data is also harder to collect due to size selectivity of the fishery. Different bottomfishers have different size composition of their catch. Hi-liners tend to target the bigger fish due to the commercial nature of their operation while part-timers and those new to the fishery would take all sizes of fish. One idea brought up was to standardize the CPUE for species.

- The number of fishermen reporting catching bottomfish seemed to be overinflated and the catches are skewed towards a few highliners.

- In the big island palu ahi fishery, the bottomfish is considered bycatch. This may require the filtering of bycatch from the data. The trip is for tuna

but a lot of bottomfish is caught and becomes part of the record because the report does not filter bycatch. [Need to verify by reviewing Kona palu ahi reports.]

5. Review of the P* Dimensions and Criteria

a. Assessment information

i. Reliable catch history – The previous score was 0. There is now recognition that the data is not perfect hence cannot score it 0. In contract, cannot throw away the catch history otherwise it cannot be used thus cannot score it a 1. The uncertainty measure was incorporated but is this uncertainty able to compensate with the deficiency. The reliability of the earlier years is questionable. It's the data that the assessment scientist can work with. The uncertainty focuses or more concern is the unreported catch. The catch data is catching some signal on the history of the fishery. The unreported catch is questionable due to the point estimates given vary in their estimates. The most recent estimates may be more reliable. A score of 0.2 is appropriate.

ii. Standardized CPUE – The previous score was 0. It is not a perfect CPUE standardization. Although, the reviewers agreed that adding the gear efficiency and fisherman skill as a significant improvement, the standardization did not account for other sources of available data. The patterns seen in the CPUE makes analytical sense and the signal of changes in the fishery is captured in the standardization. Other factors will be controlled in the next benchmark. The group felt the assessment is halfway in terms of acceptable CPUE standardization hence a score of 0.5 was applied.

iii. Species specific data – the model is saying that everything is opakapaka; not species specific in anyway. A score of 1 still applies.

iv. All sources of mortality accounted for – The biggest source of mortality that is unknown is the unreported catch. Other sources of mortality are discards and bycatch that are known to occur in the fishery but are deemed insignificant compared to the unreported catch. There were also uncertainties associated with the true estimate of natural mortality. A score of 0.5 still applies.

v. Fishery independent survey – Although fishery independent surveys has been conducted in the Maui nui area, these has not gone operational and not incorporated in the assessment. A score of 1 still applies

vi. Tagging data – There is an existing tagging program for bottomfish that yields some results. This data has not been analyzed and applied in the assessment. The score of 1 still applies.

vii. Spatial analysis – Although reporting areas has been used as a standardization factor in the assessment, the assessment is still considered as a basic surplus production model with no specific spatial analysis. It was noted that spatial analysis might not even be a good assessment aspect at this stage because the available data cannot produce enough information for a full blown spatially explicit stock assessment. It is more appropriate

to use size/length frequency as an assessment aspect because that is the next level of assessment that can be made available. The score of 1 still applies.

Assessment Aspects (AAs)	Score
Reliable catch history	0.2
Standardized CPUE	0.5
Species-specific data	1
All sources of mortality accounted for	0.5
Fishery independent survey	1
Tagging data	1
Spatial analysis	1
SUM	5.2 scaled equivalent = -1.6

b. Uncertainty characterization

The initial score for this dimension was 0. CIE highlighted several uncertainties - +-20% might not be an accurate error; proscriptive prior; issue of uncertainty about power and skill. However, the assessment did incorporate several uncertainties as described in the above section. The group elevated the reduction score from 0 to 2.0.

Description	Score
Complete. Key determinant – uncertainty in both assessment inputs and environmental conditions included	-0.0 -2.0
High. Key determinant – reflects more than just uncertainty in future recruitment	-2.5
Medium. Uncertainties are addressed via statistical techniques and sensitivities, but full uncertainty is not carried forward in projections	-5.0
Low. Distributions of F_{MSY} and MSY are lacking	-7.5
None. Only single point estimates; no sensitivities or uncertainty evaluations	-10

c. Stock status

The initial score for this dimension is 3. This was elevated from 2 to 3 due to the multi-species nature of this fishery. Some species may be hit harder than others and it goes undetected. This rationale is duplicative of the first dimension (species specific data). The P* working group revised the rationale behind the score. Given the CIE review comment on the natural mortality being overestimated, changing the M from 0.3 or 0.25 to 0.1 will move the MSST closer to the current point estimate of biomass. This necessitates the score to be elevated from 2 to 4.

There was much discussion among the working group members on these criteria but given the inability to revise the characteristics of the four key determinants for this P* analysis, a score of 4.0 was selected. Members felt that another descriptor with a Score of -3.0 would have been more appropriate

Description	Biomass (B) and Fishing (F) Levels	Score
Neither overfished nor overfishing	B > MSST and BMSY, F < MFMT	-0.0
Neither overfished nor overfishing	B > MSST, F < MFMT	-2.0
Neither Overfished nor overfishing	B ≥ MSST, F ≤ MFMT	-4.0
Stock is not overfished, overfishing is occurring	B > MSST, F > MFMT	-6.0
Stock is overfished, overfishing is not occurring	B < MSST, F ≤ MFMT	-8.0
Stock is overfished, overfishing is occurring	B < MSST, F >MFMT	-10.0

d. Productivity and susceptibility

The initial score is 4.9. The life history team was not present in the meeting. Working group members recommended to hold-off on changing the scores on this dimension until they are available for no-one had any expertise on this dimension. Chris Boggs will consult with Bob Humphreys and Bob Moffitt on the scores and rationale behind the scores. In an email from Boggs dated May 7, 2015 1:51 pm, he confirmed that the susceptibility parameter is related to the vulnerability to capture in the fishery and not related to life history. The fishermen can provide the appropriate scores for this parameter.

It is suggested that the working group survey those MHI BF fishermen who have been engaged in the SA process to evaluate this determinant and provide their consensus score.

Description	Score
Low risk. High productivity, susceptibility low.	-0.0
Low/medium risk. Moderate productivity, low susceptibility	-2.5
Medium risk. Moderate productivity, and susceptibility	-5.0

Medium/High risk. Moderate productivity, high susceptibility	-7.5
High risk. Low productivity, high susceptibility	-10

6. Summary of scores and P* recommendations

Dimension	Score
1. Assessment Information: Quantitative assessment provides estimates of exploitation and B; includes MSY-derived benchmarks, but species specific data, fishery independent data, tagging data, spatial analysis and all sources of mortality not captured in the assessments	-1.6
2. Uncertainty characterization: Complete. Key determinant – uncertainty in both assessment inputs and environmental conditions included	-2
3. Stock status: Neither overfished nor overfishing, but status based on stock complex as opposed to individual stocks.	-4
4. PSA: Medium risk: Moderate productivity, and susceptibility	-4.9
Final Score	-12.5
P* = total score (-9.2) from ABC_{Max} of 50	**P* = 37.5 ≈ 38**

The preliminary P* score is 38%. This may change once the PSA dimension has been revisited. Another meeting will be scheduled to finalize the scores. This will be scheduled on the latter part of May and working group members will be invited to finalize the scores.

The meeting ended at 5:05 pm

WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

P* Working Group Meeting
June 4, 2015
1:00 pm to 5:00 pm
Main Conference Room
Council Office

Working group participants: Ed Ebisui, (Council member), Bob Skillman (SSC member), David Itano (SSC member), Annie Yau (NMFS PIFSC-presenter), Chris Boggs (NMFS PIFSC), Layne Nakagawa (Fisherman, AP member), Roy Morioka (H-FACT), Ariel Jacobs (NMFS – PIRO), Matt Dunlap (NMFS – PIRO)
Public: Ed Ebisui III (Fisherman); Ed Watamura (Fisherman)
Council staff: Marlowe Sabater and Mark Mitsuyasu (WPRFMC)
Invited but absent: Gary Beals (HI AP Chair)

DRAFT REPORT

7. Introductions

The meeting started at 1:10 pm. Ed Ebisui opened the meeting with introductions. Fishermen were included in the meeting to provide their fishery knowledge on scoring the susceptibility component of the Productivity-Susceptibility analysis for the main Hawaiian island deep-7 bottomfish fishery.

8. Recap of previous meeting

9. Review of the P* Dimensions and Criteria

Council staff provided a recap on the results of the previous meeting. The report was made available and working group participants provided comments and reviewed the report for accuracy and completeness. There were some changes in the scores for the assessment information which changed the score from -1.3 to -1.6. There was an increase in the uncertainty for uncertainty characterization dimension from 0 to -2. Stock status score changed from -3 to -4 due to uncertainties in M which shifts the stock status closer to MSST depending on what M estimate is used. The goal for this meeting is to revisit the scores for the Productivity and Susceptibility dimension.

10. Revisit Productivity and Susceptibility scores

Productivity: It was proposed to focus the re-scoring of the PS for susceptibility because the expertise is not available to re-score the productivity. There has been studies conducted after the Andrews 2011 report which showed similar results to the opakapaka where hapuupu and onaga are longer lived than estimated. It was estimated hapuupu is be roughly 20% longer lived than opakapaka. It was noted that a difference of 20% might not have a significant bearing on the scoring.

There were significant discussions on the definition of productivity. The fishermen reviewed their individual catch records and compared it with the scores for productivity for each species. Fishermen noted that the amount of catch for each species did not proportionally relate to the

scores. High catch means high productivity but the scores were inversely proportional. However, in the context of Productivity-Susceptibility analysis, productivity is simply associated with the biology of the species. Other factors are affecting the final status of the population abundance which is not covered by the PS analysis. Only one species (opakapaka) within the complex have sufficient information and the analysis relies heavy on expert opinion. It was noted that fishermen are involved in trying to improve the life history information by participating in cooperative research and biosampling. Chris Boggs already requested the Life History Program to come up with a way to deal with the size issue in order to attain size structures that can be used for the next benchmark assessment.

There were anecdotal and observed indicators that the stock is not under significant fishing pressure. Fishermen are still catching large fish over the years and the length does not seem to decrease over time. It was noted that the scores provided by the PIFSC Life History Program are already conservative and generous.

Susceptibility: Some of the species being scored are considered bycatch. Lehi, gindai, hapuupu, kalekale and ehu are considered bycatch to the opakapaka and onaga fishery. Sometimes kalekale can be misidentified by the inexperienced fishermen. Hapuupu is a leftover from the Northwest Hawaiian Island bottomfish fishery. It is not a preferred species in the main Hawaiian island fishery. There was two school-of-thoughts regarding the status of hapuupu in the MHI. One is it was never abundant at the mains and the other is that the abundance is low because it was already fished out long before the fishery took-off. Several discussions focused on the fish behavior and mobility. The fish also do not bite all the time and are known to migrate significant distances. The type of gear being used also contributes to the susceptibility. Hook and line fishing is inefficient in catching the fish but allows for targeting preferred species.

Table 1 shows the susceptibility scores agreed by consensus by the working group members. The rationales for each are shown below.

Table 1. Susceptibility scores for the seven species in the main Hawaiian island deep 7 bottomfish fishery

Attributes	Opakapaka	Onaga	Ehu	Hapuupu	Gindai	Kalekale	Lehi
Areal overlap	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Geographic concentration	5	5	5	2.5	2.5	5	2.5
Vertical overlap	5	2.5	2.5	2.5	5	2.5	5
Temporal availability	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Schooling/aggregation and other behavior	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Gear selectivity	5	5	2.5	0	0	2.5	2.5
Desirability/value	7.5	10	2.5	0	0	2.5	0
Management strategy	2.5	2.5	2.5	2.5	2.5	2.5	2.5
F vs M	2.5	2.5	2.5	5	2.5	2.5	2.5
Biomass of spawners	2.5	2.5	2.5	5	2.5	2.5	2.5
Survival after release	2.5	2.5	2.5	5	5	2.5	5
Fishery impact to EFH	0	0	0	0	0	0	0

Desirability/value of the fishery – The desirability of the species has some correlation to the value (price per pound) of the species. The highly sought after opakapaka and onaga has higher

value that the other species in the complex. This however varies by island. Ehu is considered as a low price fish while kalekale and ehu are bycatch species. Hapuupu may be more desirable and has more value in Oahu than in Maui. If one define the value of the species relative to the fishery as a whole, opakapaka and onaga has the highest susceptibility because they are landed more.

Seasonal migration (temporal availability) – Each species exhibit varying levels of availability to the fishery. There are periods where the fish is present but are not biting. The window of opportunity to catch the fish is short (few hours in a 24 hour period) and the fishery is also affected by weather and has a certain degree of seasonality. There are periods particularly towards the end of the fishing year where the prime target species are harder to find and fishermen are shifting to other fish that are biting and easier to catch.

Gear selectivity – This is a hook and line fishery that can target certain species. Fishermen are able to discriminate different species based on location, movement and fish behavior. The effectiveness of the gear varies by fisherman experience, knowledge and the condition to which the gear works under. There is a seasonal component to the effectiveness of the gear because the gear is affected by currents and windy conditions.

Vertical overlap – The deeper gear is set the less efficient/effective it becomes. The species has different vertical distribution. Hapupuu, gindai, and kale are in between opakapaka and onaga but can go with the deep onaga. Deeper species are harder to get and the ability to distinguish and stay at those prime areas takes a lot of fisherman skill.

Areal overlap – The existence of BRFAs already made a substantial prime fishing areas inaccessible to fishermen. There are also natural areas that are inaccessible due to weather. There are a lot of other areas unknown to most bottomfishermen. There is a substantial areas that have prime habitat features but are not being fished.

Aggregation/schooling and other behavior – The fish does not bite all the time. Fishermen attributed it to the current, temperature, and current direction. It can also be attributed to competition between individuals within the school that when the first bite goes then other fish would follow. There is also competition between the deep seven bottomfish species and kahala. Even if the line and bait is in the water, presence of kahala keeps the opakapaka and onaga from biting.

Management strategy – There is already several layers of management strategies placed for this fishery including ACL and BRFAs;

Fishing mortality vs natural mortality – this attribute is directly derived from the parameters used in the stock assessment

Biomass of spawners – There are several indicators that the stock is in good shape: 1) length remains constant over time; 2) large individuals are still being caught; 3) CPUE of some hi-liners are still increasing although it is not being reflected overall in the stock assessment due to dilution effect of the rest of the fishery participants. Hapuupuu remains a concern due to its life history characteristics.

Survival after release – There is no recreational catch and release fishery in Hawaii. The only release being made is for research. Some of the tagging studies showed low mortality rates for opakapaka, onaga, ehu and kalekale. Certain species perform poorly even with the use of drop-shots.

Fishery impact to EFH – The fishery does not have any adverse impact to EFH. It is a hook and line fishery and anchoring is governed by State rules.

11. Finalizing the P* scores

Table 2 shows the average productivity and susceptibility scores for each species comprising the deep seven bottomfish complex in the main Hawaiian islands. The new score for the Productivity and Susceptibility dimension is 3.41 which is lower than the previous score of 4.91.

Table 2. Summary of the Productivity and Susceptibility scores for each of the species that comprise the deep seven bottomfish complex.

Attributes	**Opakapaka**	**Onaga**	**Ehu**	**Hapuupu**	**Gindai**	**Kalekale**	**Lehi**
SUSCEPTIBILITY	3.33	3.33	2.50	2.50	2.29	2.50	2.50
PRODUCTIVITY	5.00	5.00	2.50	5.00	3.75	2.50	5.00
Average P-S	4.17	4.17	2.50	3.75	3.02	2.50	3.75
NEW PS Score	**-3.41**						
OLD PS Score	**-4.91**						

Table 3 summarizes the scores for all of the dimensions in the P* analysis. The total reduction from the 50% risk of overfishing is -11.01. After considering all of the scientific uncertainties from all 4 dimensions, the overall P* for the main Hawaiian island deep-7 bottomfish fishery is at 38.99% rounded up to 39% risk.

DIMENSIONS	**SCORES**
Assessment information	-1.6
Uncertainty characterization	-2
Stock status	-4
Productivity-susceptibility	-3.41
TOTAL SCORE	*-11.01*
MHI Deep 7 bottomfish risk of overfishing level (P*=50%-11.01%)	*38.99% ~* ***39%***

12. Scoping discussion on changes to the P* dimensions and criteria

Over 4 years of managing the fisheries under ACLs and undergoing the process of determining the P*, there were some noticeable areas of improvements in the process. The process needs to be general enough that it can be applied to all of the fisheries but also specific enough to accurately quantify the uncertainties. Some of the areas of improvements are in dimension 1 and 4. It is worth noting that the ABC control rules are not in synch with the tiers system of stock assessment classification. This creates some discrepancy in scoring the assessment information. A working group will be formed to discuss the potential changes to the P* analysis and discuss the potential use of management strategy evaluations instead of using the P* process.

13. General Discussion
There were no further discussions.

14. Public comment
There were no public comments.

15. Summary of scores and P* recommendations

Regarding the annual catch limit management of the main Hawaiian island deep-7 bottomfish fishery, after considering the scientific uncertainties, the P* working group recommends a risk of overfishing level of 39% be applied to the main Hawaiian island deep-7 bottomfish fishery.