



WESTERN
PACIFIC
REGIONAL
FISHERY
MANAGEMENT
COUNCIL

**Acceptable Biological Catches, Annual Catch Limits,
and Accountability Measures for
Miscellaneous Insular Species**

September 2011

Table of Contents

1.0	Introduction.....	4
1.1	Previous SSC and Council Actions.....	5
2.0	Purpose and Need	6
3.0	Description of Specification Alternatives.....	6
3.1	Deepwater Shrimp	6
3.1.1	American Samoa	6
3.1.2	CNMI.....	7
3.1.3	Guam	9
3.1.4	Hawaii	9
3.2	Spiny and Slipper Lobster.....	11
3.2.1	American Samoa	11
3.2.2	CNMI.....	13
3.2.3	Guam	15
3.2.4	Hawaii	16
3.4	Kona Crab	19
3.4.1	American Samoa	19
3.4.2	CNMI.....	20
3.4.3	Guam	21
3.4.4	Hawaii	22
3.3	Precious Corals	23
3.3.1	All Precious Corals in American Samoa.....	23
3.3.2	All Precious Corals in CNMI	24
3.3.3	All Precious Corals in Guam.....	25
3.3.4	Hawaii Black Coral	26
3.3.5	Hawaii Exploratory Areas	28
3.3.6	Hawaii Pink and Bamboo Coral.....	29
3.5	Pelagic Squid	31
3.6	Alternatives Considered but Rejected.....	32
5.0	References.....	33

List of Tables

Table 1. Species subject to specifications in this document.....	5
--	---

List of Figures

Figure 1. <i>Heterocarpus</i> shrimp landed annually in CNMI.....	8
Figure 2. Average catch of deepwater shrimp compared to MSY in Hawaii.....	11
Figure 3. Catch time series for spiny lobster in American Samoa.....	12
Figure 4. Catch time series of spiny lobster in CNMI.....	14
Figure 5. Catch times series for spiny lobster in Guam.....	16
Figure 6. Catch time series for spiny lobster in Hawaii.....	17
Figure 7. Main Hawaiian Island spiny lobster catch from 1900-2010.....	18
Figure 8. Landings of slipper lobster in Hawaii 1994-2009.....	18
Figure 9. Catch time series for Kona Crab in Hawaii.....	23
Figure 10. Catch time series of black coral in Hawaii.....	27
Figure 11. Catch time series for squid caught in Hawaii.....	32

List of Acronyms

ABC – Acceptable Biological Catch
ACL – Annual Catch Limit
AM – Accountability Measure
CNMI – Commonwealth of the Northern Mariana Islands
DAR – Department of Aquatic Resources (Hawaii)
EEZ – Exclusive Economic Zone
FEP – Fishery Ecosystem Plan
MHI – Main Hawaiian Islands
MSA – Magnuson-Stevens Fishery Conservation and Management Act
MSY – Maximum Sustainable Yield
NMFS – National Marine Fisheries Service
OY – Optimum Yield
RFMC – Regional Fishery Management Council
SSC – Scientific and Statistical Committee
TAC – Total Allowable Catch

1.0 Introduction

In 2006, the Magnuson-Stevens Fishery Conservation and Management Act (MSA) was reauthorized and included additional requirements to prevent and end overfishing, and rebuild overfished stocks. Under the MSA, Regional Fishery Management Councils (RFMC) are to amend their fishery management plans to include a mechanism for specifying annual catch limits (ACLs) for all fisheries at a level such that overfishing does not occur and to implement measures to ensure accountability (AM) for adhering to these limits. The MSA further directs that, unless otherwise provided for under an international agreement to which the U.S. participates, this mechanism must be established by 2010 for fisheries subject to overfishing, and by 2011 for all other fisheries. On January 16, 2009, the National Marine Fisheries Service (NMFS) published advisory guidelines under 50 CFR §600.310 (74 FR 3178) to assist RFMCs in implementing ACL and AM requirements.

To comply with the ACL and AM requirements, the Western Pacific Fishery Management Council (Council), in coordination with NMFS, prepared an omnibus amendment to the fishery ecosystem plans (FEP) for American Samoa, Hawaii, the Mariana Archipelago (Guam and the Commonwealth of the Northern Mariana Islands (CNMI)), Pacific Remote Island Areas, and Pacific Pelagic fisheries. The amendment was approved and became effective July 27, 2011 and described the mechanism the Council will use to specify ACLs and AMs for each FEP fishery (76 FR 37285).

The Council has been managing Main Hawaiian Islands (MHI) bottomfish under a total allowable catch (TAC) for several years and took action at the 151st Council Meeting to develop an ABC and ACL for this stock complex. Similar actions need to be taken for other species within the Council's management units. As such, alternatives for establishing ABCs and ACLs for deepwater shrimp, spiny lobster, squid, black coral, precious corals, and Kona crab are described herein.

ACLs will not be specified for any crustacean or precious coral MUS in the PRIA because commercial fishing is prohibited out to 50 nautical miles by Presidential Proclamation 8336 which established the Pacific Remote Island Marine National Monument (74 FR 1565, January 12, 2009), and there is no precious coral or crustacean ecosystem habitats beyond the monument boundaries. ACLs for non-commercial coral reef ecosystem fisheries within the boundaries of the PRIA monument may be developed in the future through a separate action in accordance with Proclamation 8336, if the Secretary of Commerce determines non-commercial fishing can be allowed, and managed as a sustainable activity.

Table 1. This document will address specifications for the following species within the following FEPs:

Species	Hawaii	American Samoa	Marianas		PRIA	Pelagics
			Guam	CNMI		
Lobster	X	X	X	X	X	
Deepwater shrimp	X	X	X	X	X	
Kona crab	X	X	X	X	X	
Squid						X
Precious Corals	X	X	X	X	X	

1.1 Previous SSC and Council Actions

The SSC reviewed the data presented at the 107th SSC meeting in Honolulu, HI (June 2011) and took action to specify acceptable biological catches (ABCs) for the species in Table 1. The Council considered the ABCs established by the SSC and any advice on setting ACLs recommended by the SSC, and then made the following recommendations (edited to remove species not included in this document):

1. Concurred with the SSC recommendation that ABC be set equal to MSY, and recommended that the ACL be set equal to ABC for species with an estimate of MSY (Hawaii deepwater shrimp and Hawaii black coral);
2. Concurred with the SSC recommendation that the ABC be set according to the Tier 4 Control Rule whereby $ABC = 0.9 MSY$ for species with an estimate of MSY, but little to no current catch (CNMI deepwater shrimp). For these species, the Council recommends their ACL be set equal to their ABC;
3. Concurred with the SSC recommendation that ABC be set to the 75th percentile of the entire catch history, and recommended ACL be set equal to ABC for all remaining invertebrate species (lobsters in all areas).

2.0 Purpose and Need

The purpose of this document is to specify ACLs for the species listed in Table 1 to prevent the overfishing of these species, as required by the reauthorized MSA.

3.0 Description of Specification Alternatives

For each species, there will first be a description of the MSY if it is available, as well as the ABC determined by the SSC at the 107th SSC meeting in June 2011. Alternatives for an ACL will then be described. Impacts of the alternative ACLs are described in Chapter 4.

3.1 Deepwater Shrimp

3.1.1 American Samoa

No fishing for deepwater shrimp has been reported around American Samoa. However, in 1987 PIFSC fishery scientists conducted sampling at 10 shrimp trapping stations at depths ranging between 200 and 510 fathoms around American Samoa. Large pyramid single set traps were used and at least some *Heterocarpus* were present in every trap haul. Unpublished results from the cruise showed that deepwater shrimp were found at every trapping station and may be more abundant in some places than others (PIFSC unpublished). A Federal permit is required to harvest crustacean MUS in Federal waters. No catch or effort information was available through 2004 (WPFMC 2009b), nor has there been any from 2005-2010 (WPacFin unpublished data). There is only one Federal permit for Permit Area 3, which covers American Samoa, Guam, and CNMI and the permitted vessel is based in the Marianas.

NMFS/Council Estimation of OFL

There is no estimate of OFL for deepwater shrimp in American Samoa.

SSC's Calculation of ABC

A proxy for ABC was developed based on the product of an equilibrium sustainable yield estimate for deepwater shrimps in the Pacific Islands of 200 kg/km² (Moffitt and Polovina 1987) and an estimate of the habitat area of the seabed between 600 and 800 m (King 1988). There is approximately 200 km² of available habitat in American Samoa, though this may be an underestimate because of the incomplete coverage in the depth range of interest and because some bank and seamounts have yet to be mapped sufficiently to provide area estimate (Michael Parke, NMFS PIFSC, *pers. comm.*; Robert O'Conner, NMFS PIRO, *pers. comm.*). This method provides an ABC of 25,682 lbs.

A different method for calculating a proxy is calculating the mean of the MSYs and areas of Hawaii and the Marianas, then multiplying that by the area of American Samoa. This yields an ABC of 25,280 lbs/yr. Hawaii 271.4 mt/yr MSY divided by 4,847 km² = 0.056. Marianas 161.5 mt/yr MSY divided by 2,747 km² = 0.059. The resulting mean is 0.057, which was multiplied by the area of deepwater shrimp habitat in American Samoa of 200 km², resulting in an MSY of 11.5 mt/yr, or 25,280 lbs/yr.

Council ACL and AM Recommendations

The AM for the shrimp fishery in American Samoa will be an in-season adjustment in the year following the overage. Data collection in American Samoa is based on creel survey programs conducted by American Samoa Department of Marine and Wildlife Resources (DMWR). In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted due to a lack of a developed fishery. Although management uncertainty may be higher because of the absence of in-season monitoring, there have been no landings to monitor since 2008 and prior to 2006, thus it is highly unlikely that the ABC and/or ACL will be reached in any year.

Alternative 1a – No Action (Status Quo)

Under this alternative, the deepwater shrimp in American Samoa would remain in the crustaceans MUS and be considered in the fishery. ACLs would need to be specified for these species.

Alternative 1b – ACL of zero for deepwater shrimp in American Samoa

In this alternative, the ACL would be zero for deepwater shrimp in American Samoa. Because the fishery does not exist in this area, an ACL of zero has a very low probability of being exceeded. AMs are not necessary in this alternative because the ACL is zero.

Alternative 1c – ACL based on 90% ABC proxy using Pacific-wide 200kg/km² estimate

Under this alternative, the ACL would be 23,1000 lbs, which is 90% of the ABC of 25,682 lbs.

Alternative 1d – ACL based on 90% ABC proxy of Hawaii and Marianas MSY comparison

Under this alternative, the ACL would be 22,750 lbs, which is 90% of the ABC of 25,280 lbs.

3.1.2 CNMI

The deepwater shrimp fishery began in CNMI in 1994. The primary target is *Heterocarpus laevis*, which is the largest of three deepwater shrimp in the area. Between 1994 and 1996, 26,880 lbs of shrimp were landed, of which 97% were *H. laevis*. The fishery is sporadic in nature due to gear loss, short shelf life and inconsistent product quality, and local depletion that is generally experienced on known fishing grounds which leads to lower catch rates. There is one currently issued Federal permit for deepwater shrimp in CNMI.

NMFS/Council Estimation of OFL

There is no OFL estimation for deepwater shrimp in CNMI.

SSC's Calculation of ABC

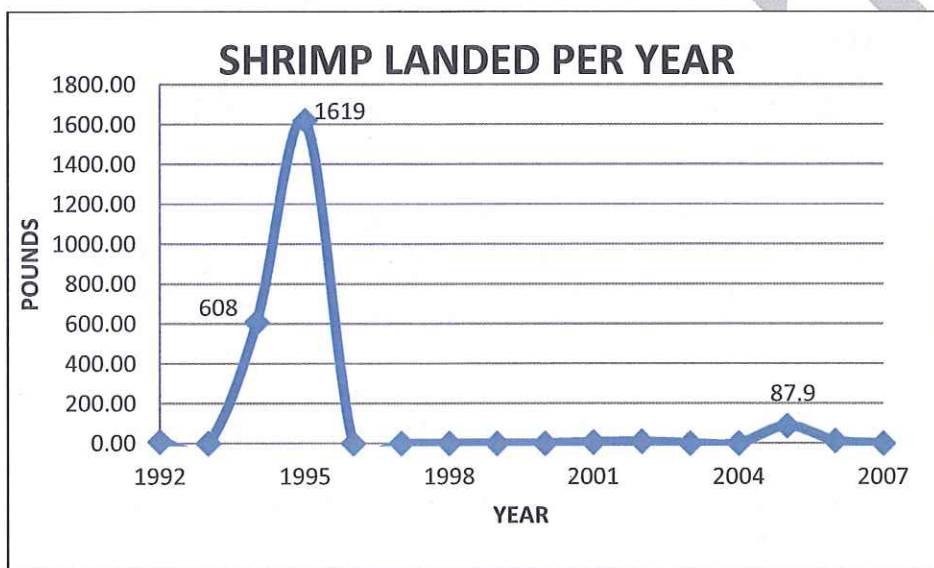
The MSY has been calculated to be 137 mt/year (302,030 lbs/yr) for the entire Mariana Archipelago, and 133.8 mt/year (294,975 lbs/yr) for CNMI (Moffitt and Polovina 1987; pg. 473). The SSC at the 107th SSC meeting set the ABC at 91% MSY, or 122 mt/yr (268,427 lbs/yr) for CNMI.

Council ACL and AM Recommendations

The AM for the shrimp fishery in CNMI will be an in-season adjustment in the year following the overage. Data collection in CNMI is based on creel survey programs conducted by CNMI Division of Fish and Wildlife (DFW). In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted due to the sporadic nature of the fishery. Although management uncertainty may be higher because of the absence of in-season monitoring, the landings are low enough that it is highly unlikely that the ABC and/or ACL will be reached in any year.

Figure 1. *Heterocarpus* shrimp landed annually in CNMI



Source: DFW Commercial Purchase Database

Alternative 2a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 2b – ACL equal to the ABC

In this alternative, the ACL would be set equal to the ABC, thus would equal 122 mt/yr (268,427 lbs/yr). The Council initially selected this at the 151st Council meeting in June 2011. While this alternative allows for no precaution in the fishery, there is currently no known deepwater shrimp fishery and the fishery, when present, tends to be sporadic.

Alternative 2c – ACL set at 0.91 ABC

In this alternative, the ACL would be set to 0.9 ABC, which equals 111 mt/yr (244,268 lbs/yr). This alternative provides some precaution against overfishing the fishery due to the localized depletion that commonly occurs with the shrimp fishery.

3.1.3 Guam

Deepwater shrimp (*Heterocarpus*) in Guam are not harvested at this time and there is no known deepwater shrimp fishery. A small-scale fishery was started in the 1970s, but no landings have been reported since. There also are no local permitting or reporting requirements in place for the deepwater shrimp fishery. There is one Federal crustacean permit issued for deepwater shrimp in Permit Area 3, which includes American Samoa, Guam, and CNMI; the vessel is based in CNMI.

NMFS/Council Estimation of OFL
There is no estimation of OFL.

SSC's Calculation of ABC

The MSY for the Guam deepwater shrimp stock is 27.7 mt/year (61,067 lbs/yr) (Moffitt and Polovina 1987; pg. 473). The Tier 4 control rule for stocks in which there is no fishery but an MSY exists results in an ABC that is 91% MSY, or 55,571 lbs.

Council ACL and AM Recommendations

The AM for the shrimp fishery in Guam will be an in-season adjustment in the year following the overage. Data collection in Guam is based on creel survey programs conducted by Guam Department of Agriculture (DOA). In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted due to the lack of fishery. Although management uncertainty may be higher because of the absence of in-season monitoring, there are currently no landings to monitor, thus it is highly unlikely that the ABC and/or ACL will be reached in any year.

Alternative 3a – No Action (Status Quo)

Under this alternative, the deepwater shrimp in Guam would remain in the crustaceans MUS and be considered in the fishery. ACLs would need to be specified for these species.

Alternative 3b – ACL of zero for deepwater shrimp in Guam

In this alternative, the ACL would be zero for deepwater shrimp in Guam. Because fisheries do not exist in these areas, an ACL of zero has a very low probability of being exceeded. AMs are not necessary in this alternative because the ACL is zero.

Alternative 3c – ACL equal to ABC for deepwater shrimp in Guam

Under this alternative, the ACL would be equal to the ABC, or 55,571 lbs. Because there has been no documented deepwater shrimp fishery in Guam, there is very little risk that the ACL will be exceeded, thus no reduction of ACL from ABC would be necessary.

3.1.4 Hawaii

In Hawaii, an intermittent deepwater shrimp fishery began in 1967 (Tagami and Ralston 1988) and continues to vary from year to year with an average of three vessels reporting the catch of deepwater shrimp to the state of Hawaii. There are currently no Federal crustacean permits

issued for deepwater shrimp harvest in Hawaii. Vessels ranged in size from 7.5 to 40 m in length, though the number of smaller vessels increased as larger vessels left the fishery (Tagami and Barrows 1988). To date, the highest landings (~275,000 lbs) of deepwater shrimp in Hawaii occurred in 1984; however, in 1989 nearly 270,000 lbs were landed, with an estimated ex-vessel value of more than \$1 million. In 2005, vessels from the Pacific Northwest fished for *Heterocarpus* spp. in Hawaii and landed over 100,000 lbs (less than 17% of the MSY). Between 1982 and 2005, the cumulative landings of *H. laevigatus* amounted to over 1.5 million lbs, while during the same time period, *H. ensifer* landings totaled over 20,000 lbs.

NMFS/Council Estimation of OFL

There is no estimation of an OFL for deepwater shrimp in Hawaii.

SSC's Calculation of ABC

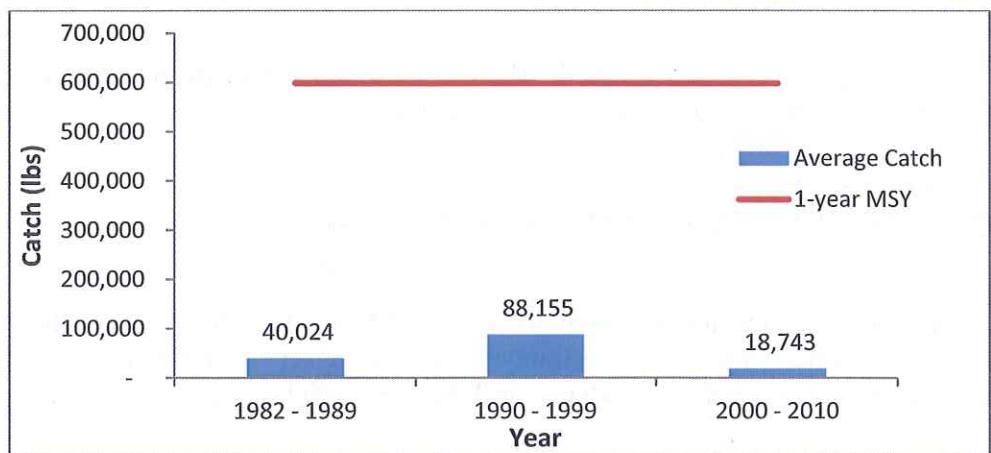
The MSY for deepwater shrimp in the Main Hawaiian Islands is 271.4 mt (598,328 lbs) (Ralston and Tagami 1992). The SSC determined that the ABC should equal the MSY because there is a record of recent catch in addition to an MSY estimate. The SSC initially utilized the Tier 4 control rule (for species without current harvest and sets the ABC equal to 91% MSY), but then set the ABC equal to MSY because, although there has been harvest, the MSY has never been reached by the average catch in any year (average presented due to confidentiality issues; Figure 2) and the overall average catch from 1982-2010 is only about 49,000 lbs, which is far below MSY. The SSC preferred including the entire time series in the estimate because of the variability associated with the catch data.

Council ACL and AM Recommendations

The AM for the shrimp fishery in Hawaii will be an in-season closure when the ACL is projected to be reached. Hawaii Department of Aquatic Resources (DAR) receives monthly catch reports for general fishing in Hawaii. Should a closure be needed within the last month of a fishing year, in lieu of a closure, a reduction to the subsequent year's ACL will be made. The primary issue associated with Hawaii DAR data collection is that it is monthly for general fishing, so in-season closures may prove difficult.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted due to a lack of a substantial fishery. Although management uncertainty may be higher because of the absence of in-season monitoring, the landings are low enough that it is highly unlikely that the ABC and/or ACL will be reached in any year.

Figure 2. Average catch of deepwater shrimp compared to MSY in Hawaii



Source: HDAR

Alternative 4a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 4b – ACL equal to the ABC

In this alternative, the ACL would be set equal to the ABC, thus would equal 598,328 lbs. The Council initially selected this at the 151st Council meeting in June 2011. While this alternative allows for no precaution in the fishery, it is clear from Figure 2 that the average catch has never been close to MSY in the history of the Hawaii shrimp fishery.

Alternative 4c – ACL set at 0.91 ABC

In this alternative, the ACL would be set to 0.91 MSY, or 91% of the ABC, which equals 544,478 lbs. This alternative provides some precaution against overfishing the fishery, which is susceptible to localized depletion. Additionally, it allows for the Tier 4 criteria to be taken into account at the ACL level as opposed to the ABC level, which could have been utilized due to the minimal fishing that occurs (Tier 4 states that ABC can be set at 0.91% MSY for fisheries that have no current fishery).

3.2 Spiny and Slipper Lobster

3.2.1 American Samoa

In American Samoa, spiny lobsters are the primary crustacean fishery. Lobsters are more expensive than finfish, but are often present in important meals such as wedding, funerals, Christmas, or New Years Day. Formerly, lobsters were provided at the level of the village/family, whereas nowadays, they are mainly bought at the market, caught by professional fishermen. Spiny lobster (*Panulirus penicillatus*) is the main species speared by night near the outer slope by free divers while diving for finfish. Total landings expanded from a market survey are estimated to average 1,271 lbs of spiny lobsters sold per year, without taking subsistence and recreational catches into account (Coutures 2003). There are currently no Federal permit holders

for lobster in American Samoa, thus harvest more than likely occurs solely within Territorial waters.

Slipper lobsters in American Samoa are not exploited. The species found in American Samoa is much smaller than those targeted in Hawaii and not much sought after.

NMFS/Council Estimation of OFL

There is no OFL estimate for slipper or spiny lobsters in American Samoa.

SSC's Calculation of ABC

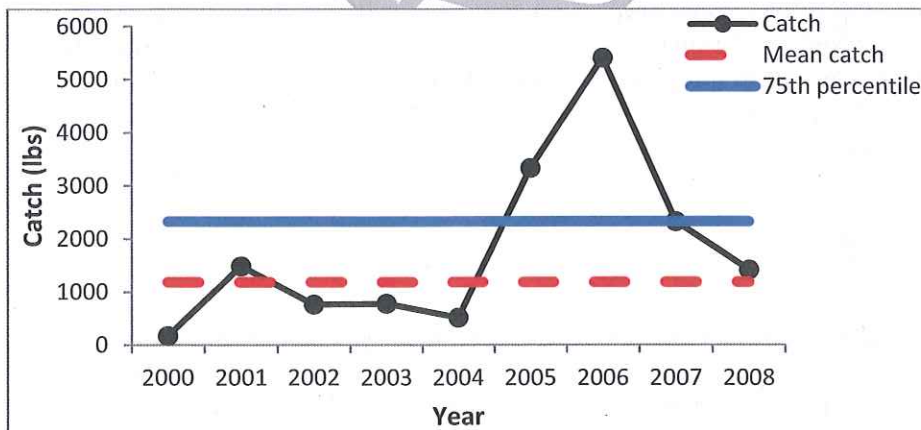
There is no MSY estimate for spiny lobsters in American Samoa. At the 107th SSC meeting, the SSC recommended that, for species with no MSY estimates, the ABC be set equal to 1 times the 75th percentile of the entire catch time series, which equals 2,330 lbs spiny lobster in American Samoa.

Council ACL and AM Recommendations

The AM for the lobster fishery in American Samoa will be an in-season adjustment in the year following the overage. Data collection in American Samoa is based on creel survey programs conducted by American Samoa DMWR. In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because the amounts of the landings have been low and because ACLs will be in line with previous years' catches, resulting in little socioeconomic impacts and decreased management uncertainty.

Figure 3. Catch time series for spiny lobster in American Samoa



Source: WPacFin (<http://www.pifsc.noaa.gov/wpacfin/>)

Alternative 5a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 5b – ACL equal to the ABC for spiny lobster and slipper lobster

In this alternative, the ACL would be set equal to the ABC, thus would equal 2,330 lbs in American Samoa. The Council initially selected this at the 151st Council meeting in June 2011. While this alternative allows for no precaution in the fishery, there is currently only a minimal commercial fishery in American Samoa, thus it is not expected to adversely impact the stock and has been shown to be sustainable for at least 10 years.

The ACL for slipper lobster would equal the ABC, which equals 33 lbs based on the proxy of the 75th percentile of the entire catch time series in Hawaii compared to the length of shoreline in Hawaii and length of shoreline in American Samoa. This low ACL is not expected to be exceeded because there is no documented slipper lobster fishery in American Samoa.

Alternative 5c – ACL set at 0.9 ABC for spiny lobster and slipper lobster

In this alternative, the ACLs would be set to 0.9 ABC, which equals 2,100 lbs in American Samoa. This alternative would allow for some precaution because there is no established MSY upon which to compare harvest amounts.

The ACL for slipper lobster would be set at 0.9 ABC, which equals 30 lbs based on the proxy of the 75th percentile of the entire catch time series in Hawaii compared to the length of shoreline in Hawaii and length of shoreline in American Samoa. This low ACL is not expected to be exceeded because there is no documented slipper lobster fishery in American Samoa.

3.2.2 CNMI

The CNMI fishery primarily targets spiny lobster in nearshore waters with reported catches taken almost exclusively within the 0–3-nautical mile zone of the inhabited southern islands, by hand harvesters with scuba or free diving. Beyond 3 nautical miles, the topography in most locations drops off steeply. These lobster habitats are relatively small and access is difficult. Anecdotal information indicates that in the northern islands on reef surrounding FDM, bottomfish fishermen anchored overnight occasionally dive for lobsters. Anchoring and diving at FDM occurs exclusively within 3 nautical miles and most likely on the leeward side within 100 yards of land. This activity is primarily for personal consumption. There are currently no Federal permits issued for the Federal lobster fishery in CNMI.

Slipper lobsters in CNMI are not fished for. Slipper lobsters found in the Mariana Archipelago are smaller than in Hawaii and not much in demand.

NMFS/Council Estimation of OFL

There is no OFL estimate for slipper or spiny lobsters in the Mariana Archipelago.

SSC's Calculation of ABC

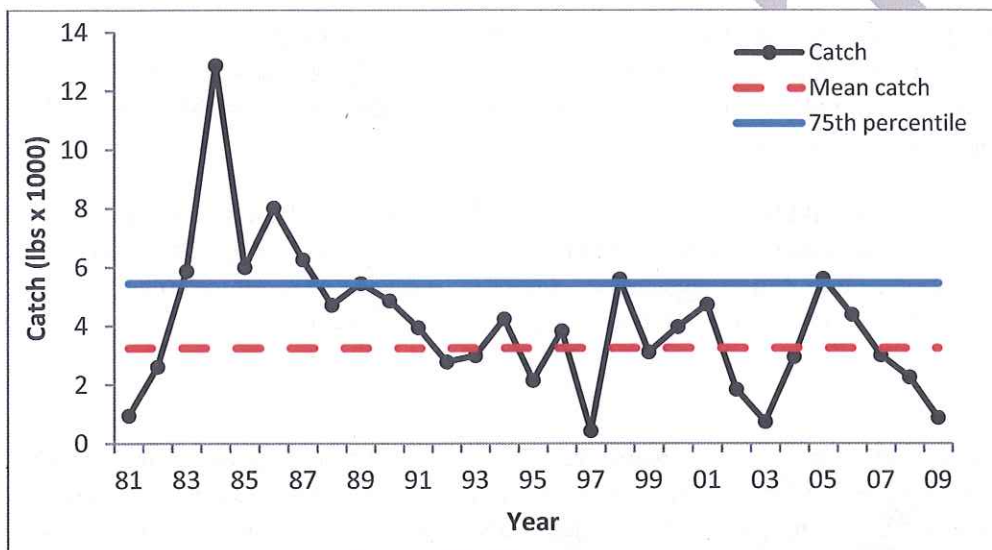
There is no MSY estimate for CNMI spiny lobsters. At the 107th SSC meeting, the SSC recommended for species with no MSY estimates that the ABC be set equal to 1 times the 75th percentile of the entire catch time series, which equals 5,450 lbs in CNMI.

Council ACL and AM Recommendations

The AM for the lobster fishery in CNMI will be an in-season adjustment in the year following the overage. Data collection in CNMI is based on creel survey programs conducted by CNMI DFW. In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because the amounts of the landings have been low and because ACLs will be in line with previous years' catches, resulting in little socioeconomic impacts and decreased management uncertainty.

Figure 4. Catch time series of spiny lobster in CNMI



Source: WPacFin (<http://www.pifsc.noaa.gov/wpacfin/>)

Alternative 6a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 6b – ACL equal to the ABC for spiny lobster and slipper lobster

In this alternative, the ACL would be set equal to the ABC, thus would equal 5,450 lbs in CNMI. The Council initially selected this at the 151st Council meeting in June 2011. While this alternative allows for no precaution in the fishery, there is currently only a minimal commercial fishery in CNMI.

The ACL for slipper lobster would equal the ABC, which equals 64 lbs based on the proxy of the 75th percentile of the entire catch time series in Hawaii compared to the length of shoreline in Hawaii and length of shoreline in CNMI. This low ACL is not expected to be exceeded because there is no documented slipper lobster fishery in CNMI.

Alternative 6c – ACL set at 0.9 ABC for spiny lobster and slipper lobster

In this alternative, the ACLs would be set to 0.9 ABC, which equals 4,905 lbs in CNMI.

The ACL for slipper lobster would be set at 0.9 ABC, which equals 58 lbs based on the proxy of the 75th percentile of the entire catch time series in Hawaii compared to the length of shoreline in Hawaii and length of shoreline in CNMI. This low ACL is not expected to be exceeded because there is no documented slipper lobster fishery in CNMI.

3.2.3 Guam

Little is known about Guam's crustacean fisheries. There are no Federal crustacean permits issued in Guam for lobster harvesting in Federal waters. Most fishing for crustaceans around Guam occurs in territorial waters in a subsistence or recreational context. An estimated 1,159 and 1,240 lbs of lobsters were harvested in 2008 and 2009, respectively.

Slipper lobsters in Guam are not fished for. The species is much smaller in these islands than in Hawaii and is not much in demand.

NMFS/Council Estimation of OFL

There is no OFL estimate for slipper or spiny lobsters in American Samoa.

SSC's Calculation of ABC

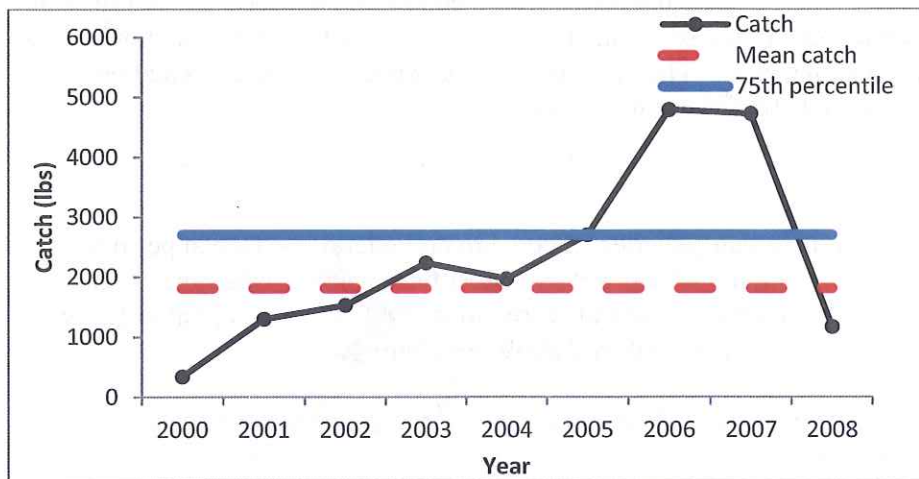
There is no MSY estimate for Guam spiny lobsters. At the 107th SSC meeting, the SSC recommended, for species with no MSY estimates, that the ABC be set equal to 1 times the 75th percentile of the entire catch time series, which equals 2700 lbs in Guam.

Council ACL and AM Recommendations

The AM for the lobster fishery in Guam will be an in-season adjustment in the year following the overage. Data collection in Guam is based on creel survey programs conducted by Guam DOA. In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because the amounts of the landings have been low and because ACLs will be in line with previous years' catches, resulting in little socioeconomic impacts and decreased management uncertainty.

Figure 5. Catch times series for spiny lobster in Guam



Source: WPacFin (<http://www.pifsc.noaa.gov/wpacfin/>)

Alternative 7a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 7b – ACL equal to the ABC for spiny lobster and slipper lobster

In this alternative, the ACL would be set equal to the ABC, thus would equal 2,700 lbs in Guam. The Council initially selected this at the 151st Council meeting in June 2011. While this alternative allows for no precaution in the fishery, there is currently only a minimal subsistence and recreational lobster fishery in Guam.

The ACL for slipper lobster would equal the ABC, which equals 20 lbs based on the proxy of the 75th percentile of the entire catch time series in Hawaii compared to the length of shoreline in Hawaii and length of shoreline in Guam. This low ACL is not expected to be exceeded because there is no documented slipper lobster fishery in Guam.

Alternative 7c – ACL set at 0.9 ABC for spiny lobster and slipper lobster

In this alternative, the ACLs would be set to 0.9 ABC, which equals 2,430 lbs in Guam. This allows for taking into account management uncertainty.

The ACL for slipper lobster would be set at 0.9 ABC, which equals 18 lbs based on the proxy of the 75th percentile of the entire catch time series in Hawaii compared to the length of shoreline in Hawaii and length of shoreline in Guam. This low ACL is not expected to be exceeded because there is no documented slipper lobster fishery in Guam.

3.2.4 Hawaii

Spiny and slipper lobster catch has primarily been confined to production in State waters. There are currently no Federal crustacean permits issued for lobster harvest in Hawaii. Spiny lobster production ranged from just over 1,400 lbs to about 14,000 lbs (mean 7,711 lbs) between 1966

and 2010. Slipper lobster landings range from about 40-900 lbs. Two federal permits were issued by NMFS for lobster fishing in EEZ waters around the main Hawaiian Islands (MHI) for only 2007 and 16-69 commercial fishermen reported landing spiny lobsters between 1966 and 2010. Only 4-12 commercial fishermen reported slipper lobster landings during the same time period. The 75th percentile of the time series for spiny lobster between 1966 and 2010 is about 10,000 lbs.

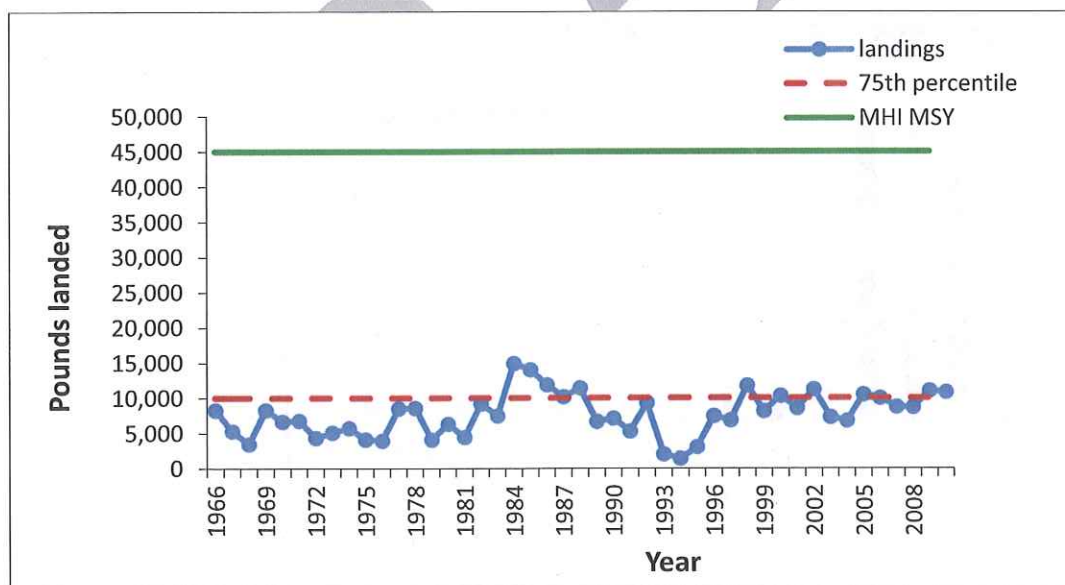
NMFS/Council Estimation of OFL

There is no OFL estimate for slipper or spiny lobsters in Hawaii.

SSC's Calculation of ABC

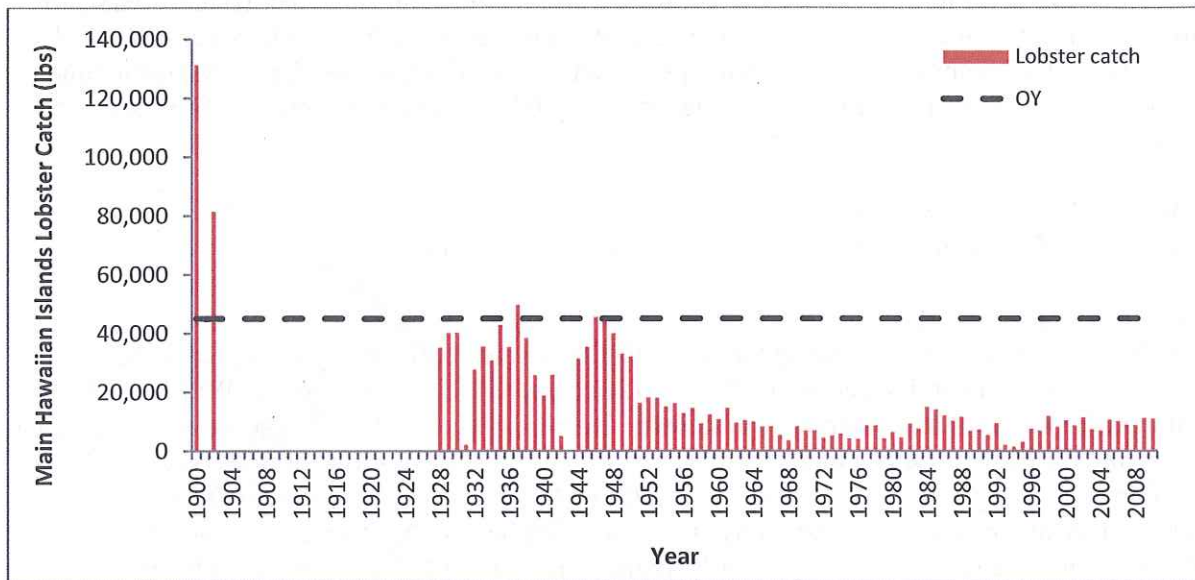
The Optimum Yield (OY) for spiny lobster in the MHI was provisionally estimated as being between 15,000-30,000 lobsters annually (8.26 cm carapace length and longer; WPFMC 1983), although the basis for this estimate is unknown. In this document, this OY estimate is being used as a proxy for MSY. Using a mean weight per lobster in the MHI of two pounds (Hawaii DAR unpublished data) gives an MSY range of 30,000-60,000 lbs, or a mean of 45,000 lbs, significantly higher than the current level of harvest (Figure 6). A larger catch time series, although with less reliable data in the early years, indicates that catches may have been equivalent to MSY for about two decades (Figure 7). It has been argued that the decline in landings after the early 1950s is a consequence of declining participation in the fishery for economic reasons (at that time focused mostly on Oahu), and not a resource issue (Morris 1968).

Figure 6. Catch time series for spiny lobster in Hawaii (87% *P. penicillatus* (Federal waters catch = 2.3%), 13% *P. marginatus*)



Source: HDAR

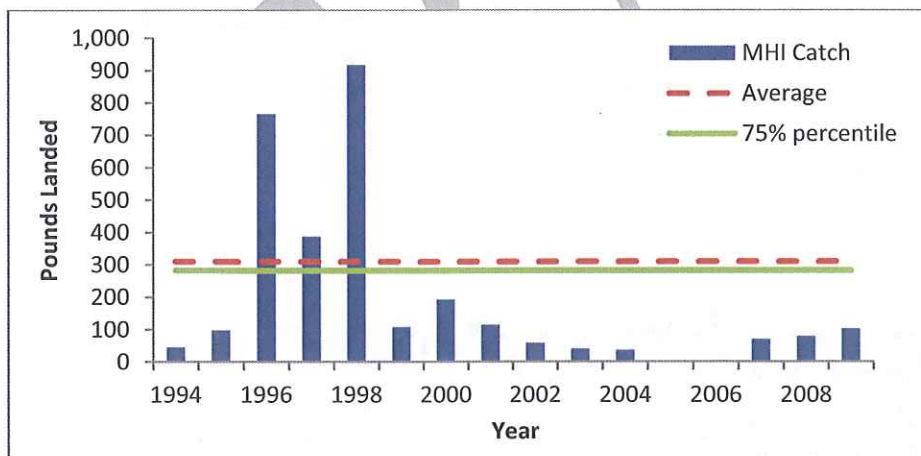
Figure 7. Main Hawaiian Island spiny lobster catch from 1900-2010



Source: HDAR

The MSY for slipper lobster is unknown. At the 107th SSC meeting, the SSC recommended, for species with no MSY estimates, that the ABC be set equal to 1 times the 75th percentile of the entire catch time series, which equals 282 lbs of slipper lobster (Figure 8).

Figure 8. Landings of slipper lobster in Hawaii 1994-2009.



Source: HDAR

Council ACL and AM Recommendations

The AM for the spiny and slipper lobster fishery in Hawaii will be an in-season closure when the ACL is projected to be reached. Hawaii Department of Aquatic Resources (DAR) receives trip catch reports for trap, net, and dive commercial fishing in Hawaii. Should a closure be needed

within the last month of a fishing year, in lieu of a closure, a reduction to the subsequent year's ACL will be made.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because the amounts of the landings have been significantly below MSY and ACLs will be in line with previous years' catches, resulting in little socioeconomic impacts and decreased management uncertainty.

Alternative 8a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 8b – ACL=ABC, and ABC = 75th percentile of the catch time series for both spiny and slipper lobsters

In this alternative, the ACL for spiny and slipper lobsters would be set equal to the ABC, where the ABC is set as the 75th percentile of the catch time series, or 10,000 lbs of spiny lobster (both *P. penicillatus* and *P. marginatus*) and 282 lbs of slipper lobster. The Council initially selected this at the 151st Council meeting in June 2011. Under this alternative the catch would be significantly lower than the estimated MSY for the stock and equivalent to recent levels of catch.

Alternative 8c –ACL = 0.5 ABC for spiny lobster; ACL = 90% ABC for spiny lobster

Under this alternative, the ABC would be set at the MSY (45,000 lbs) and the ACL set at half of the ABC, or 22,500 lbs, for the MHI spiny lobster stock (both *P. penicillatus* and *P. marginatus*). This would set the catch limit at about twice the current level of catch but only half of the estimated mid-point of the MSY range, and 75% of the lower bound of the MSY.

The ACL for slipper lobster would equal to 90% of the ABC, or 254 lbs, which would be set at the 75th percentile of the entire catch time series (282 lbs).

3.4 Kona Crab

3.4.1 American Samoa

Kona crab in American Samoa are not harvested at this time. There is no record of any fishery for Kona crab, but because their presence has been recorded, they were included in the management unit of the American Samoa archipelagic FEP. There are no Federal permit requirements for fishing Kona crab in American Samoa.

NMFS/Council Estimation of OFL

There is no OFL estimate for slipper or spiny lobsters in American Samoa.

SSC's Calculation of ABC

There is no MSY established for Kona crab in American Samoa. A proxy for ABC was developed by dividing the Hawaii 75th percentile of entire catch history by the general length of the coastline, then multiplying that number by the coastline length in American Samoa. This results in an ABC of 3,218 lbs.

Council ACL and AM Recommendations

The AM for the Kona crab fishery in American Samoa will be an in-season adjustment in the year following the overage. Data collection in American Samoa is based on creel survey programs conducted by American Samoa Department of Marine and Wildlife Resources (DMWR). In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because there is no recorded fishery for Kona crab in American Samoa. There are no expected socioeconomic impacts nor is there identified management uncertainty.

Alternative 9a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 9b – ACL of zero for Kona Crab in American Samoa

In this alternative, Kona crab would receive an ACL of zero in American Samoa. Because there are no recorded fisheries for Kona crab in this area, it is unlikely the ACL will be exceeded. No AM is required with an ACL of zero.

Alternative 9c – ACL based on 90% proxy ABC

The ACL for Kona crab in American Samoa, under this alternative, would be based on 90% of the proxy for ABC (3,218 lbs), which results in an ACL of 2,900 lbs.

3.4.2 CNMI

Kona crab in CNMI are not harvested at this time. There is no record of any fishery for Kona crab, but because their presence has been recorded, they were included in the Mariana Islands archipelagic FEP. There are no Federal permit requirements for fishing Kona crab in CNMI.

NMFS/Council Estimation of OFL

There is no OFL estimate for slipper or spiny lobsters in CNMI.

SSC's Calculation of ABC

There is no MSY established for Kona crab in CNMI. A proxy for ABC was developed by dividing the Hawaii 75th percentile of entire catch history by the general length of the coastline, then multiplying that number by the coastline length in CNMI. This results in an ABC of 6,295 lbs.

Council ACL and AM Recommendations

The AM for the Kona crab fishery in CNMI will be an in-season adjustment in the year following the overage. Data collection in CNMI is based on creel survey programs conducted by CNMI DFW. In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because there is no recorded fishery for Kona crab in CNMI. There are no expected socioeconomic impacts nor is there identified management uncertainty.

Alternative 10a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 10b – ACL of zero for Kona Crab in CNMI

In this alternative, Kona crab would receive an ACL of zero in the CNMI. Because there are no recorded fisheries for Kona crab in this area, it is unlikely the ACL will be exceeded. No AM is required with an ACL of zero.

Alternative 10c – ACL based on 90% proxy ABC

The ACL for Kona crab in CNMI, under this alternative, would be based on 90% of the proxy for ABC (6,295 lbs), which results in an ACL of 5,700 lbs.

3.4.3 Guam

Kona crab in Guam are not harvested at this time. There is no record of any fishery for Kona crab, but because their presence has been recorded, in the Mariana Islands archipelagic FEP. There are no Federal permit requirements for fishing Kona crab in Guam.

NMFS/Council Estimation of OFL

There is no OFL estimate for Kona crab in Guam.

SSC's Calculation of ABC

There is no MSY established for Kona crab in Guam. A proxy for ABC was developed by dividing the Hawaii 75th percentile of entire catch history by the general length of the coastline, then multiplying that number by the coastline length in Guam. This results in an ABC of 1,946 lbs.

Council ACL and AM Recommendations

The AM for the Kona crab fishery in Guam will be an in-season adjustment in the year following the overage. Data collection in Guam is based on creel survey programs conducted by Guam DOA. In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because there is no recorded fishery for Kona crab in Guam. There are no expected socioeconomic impacts nor is there identified management uncertainty.

Alternative 11a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 11b – ACL of zero for Kona Crab in Guam

In this alternative, Kona crab would receive an ACL of zero in Guam. Because there are no recorded fisheries for Kona crab in this area, it is unlikely the ACL will be exceeded. No AM is required with an ACL of zero.

Alternative 11c – ACL based on 90% proxy ABC

The ACL for Kona crab in Guam, under this alternative, would be based on 90% of the proxy for ABC (1,946 lbs), which results in an ACL of 1,800 lbs.

3.4.4 Hawaii

Kona crab landings have ranged from around 6,000 – 31,000 pounds (mean = 17,000 pounds) with 30-75% of landings being made from the EEZ or federal waters. While there is no Federal permit and reporting requirements, fishermen are required to have Hawaii Commercial Marine Licenses (CMLs) for commercial Kona crab harvest. The Kona crab fishery has been subject to regulations that include prohibition on taking females, no taking of crabs less than 4 inches, and a closed season from June to August. Penguin Bank accounted for more than 50% of the total landings in the fishery from 1948 through 2009; although Penguin Bank accounts for less than 20% of all trips taken for Kona crab, it has a significantly higher CPUE and larger crabs (Thomas 2011). From 2002-2009, only 3 fishers accounted for more than 50% of the trips.

NMFS/Council Estimation of OFL

There is no estimate of OFL at this time for Kona crab in Hawaii.

SSC's Calculation of ABC

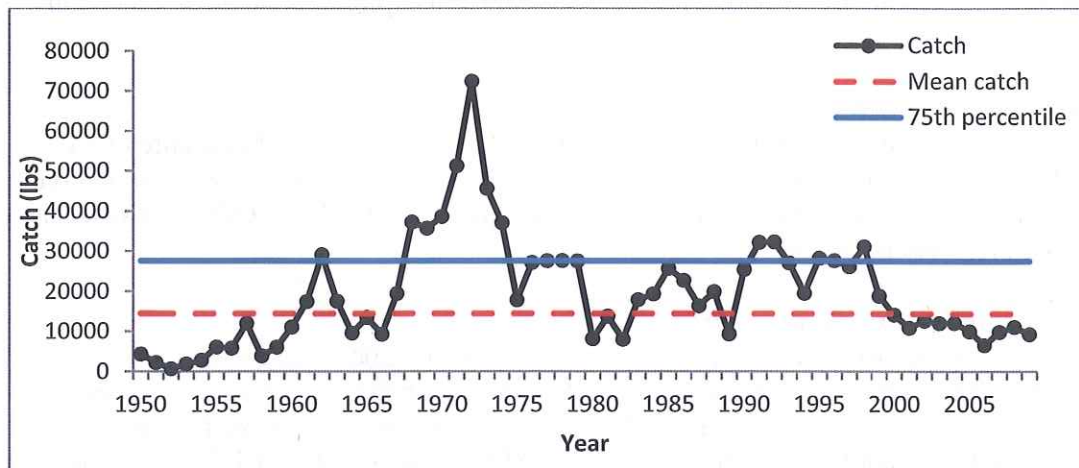
The SSC, at its 107th Meeting, recommended that ABC be set to the 75th percentile of the entire catch history for species without an MSY estimate. The 75th percentile of the entire catch history for Kona crabs is 27,560 lbs.

Council ACL and AM Recommendations

The AM for the Kona crab fishery in Hawaii will be an in-season closure when the ACL is projected to be reached. Hawaii Department of Aquatic Resources (DAR) receives trip catch reports for trap, net, and dive commercial fishing in Hawaii. Should a closure be needed within the last month of a fishing year, in lieu of a closure, a reduction to the subsequent year's ACL will be made.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because the current fishery is harvesting well below the mean catch. The ACLs therefore will result in little socioeconomic impacts.

Figure 9. Catch time series for Kona Crab in Hawaii (70% in EEZ)



Source: HDAR

Alternative 12a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 12b – ACL equal to the ABC

In this alternative, the ACL would be set equal to the ABC, thus would equal 27,560 lbs. The Council initially selected this at the 151st Council meeting in June 2011. This alternative provides no buffer between the ACL and the ABC. However, the use of the 75th percentile for calculating the ABC is a conservative method for estimating a proxy for MSY.

Alternative 12c – ACL set at 0.9 ABC

In this alternative, the ACL would be set to 0.9 ABC, which equals 24,800 lbs. This alternative allows a buffer between the ABC and ACL, is more conservative to compensate for a lack of an estimated MSY, and takes potential management uncertainty into account.

3.3 Precious Corals

3.3.1 All Precious Corals in American Samoa

Precious corals in American Samoa are not harvested. There are currently no known precious coral beds or precious coral fisheries in American Samoa EEZ waters, nor have any Federal precious coral permits been issued in American Samoa. However, precious coral MUS are known to exist in the American Samoa EEZ, thus a fishery could possibly develop. The American Samoa Exploratory Area has a 1,000 kg/year limit of all species combined except black coral.

The limit of 1,000 kg/area was determined with the goal of reducing the risk of overfishing a newly discovered bed while at the same time being large enough to provide economic incentive to engage in exploratory fishing (WPFMC 1979). There was no statistical basis for determining the limit, but instead was based on Council judgment that 1,000 kg/yr should be sufficient incentive for exploratory fishing while posing little risk to overfishing (WPFMC 1979).

NMFS/Council Estimation of OFL

There is no estimate of OFL provided for precious corals in exploratory areas of American Samoa.

SSC's Calculation of ABC

There is no estimate of ABC for exploratory areas in American Samoa. The nature of an exploratory area is one that has not yet been discovered; therefore it would be presumptuous and ill-advised to determine an ABC for an undiscovered area. An ABC of 1,000 kg/yr from each exploratory area may be appropriate.

Council ACL and AM Recommendations

The AM for the precious coral fishery in American Samoa will be an in-season adjustment in the year following the overage. Data collection in American Samoa is based on creel survey programs conducted by American Samoa DMWR. In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because there is currently no fishery in operation. The ACLs therefore will result in little socioeconomic impacts and little management uncertainty.

Alternative 13a – No Action (Status Quo)

Under this alternative, the precious corals in American Samoa would remain in the precious corals MUS and be considered in the fishery. ACLs would need to be specified.

Alternative 13b –Precious corals ACLs equal zero in American Samoa

In this alternative, precious corals would receive an ACL of zero in American Samoa. Because precious corals are not harvested in this area, an ACL of zero is not expected to be exceeded.

Alternative 13c – Precious corals ACL of 1000 kg in American Samoa

Under this alternative, the 1,000 kg/area limit would become an ACL of 1,000 kg/area so that the exploratory area precious coral fishery would comply with the requirements of the MSA to have ACLs implemented.

3.3.2 All Precious Corals in CNMI

Precious corals in CNMI are not harvested; there are no Federal precious coral permit holders in CNMI. In CNMI, no known precious coral harvests have occurred within the EEZ waters of CNMI since a report of *Corallium spp.* being taken prior to World War II (WPFMC 2009d). CNMI EEZ waters are currently defined as Exploratory Area XP-CNMI with a 1,000 kg/year harvest limit for all species combined except black coral.

The limit of 1,000 kg/area was determined with the goal of reducing the risk of overfishing a newly discovered bed while at the same time being large enough to provide economic incentive to engage in exploratory fishing (WPFMC 1979). There was no statistical basis for determining the limit, but instead was based on Council judgment that 1,000 kg/yr should be sufficient incentive for exploratory fishing while posing little risk to overfishing (WPFMC 1979).

NMFS/Council Estimation of OFL

There is no estimate of OFL provided for precious corals in exploratory areas of CNMI.

SSC's Calculation of ABC

There is no estimate of ABC for exploratory areas in CNMI. The nature of an exploratory area is one that has not yet been discovered; therefore it would be presumptuous and ill-advised to determine an ABC for an undiscovered area. An ABC of 1,000 kg/yr from each exploratory area may be appropriate.

Council ACL and AM Recommendations

The AM for the precious coral fishery in CNMI will be an in-season adjustment in the year following the overage. Data collection in CNMI is based on creel survey programs conducted by CNMI DFW. In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because there is currently no fishery in operation. The ACLs therefore will result in little socioeconomic impacts and little management uncertainty.

Alternative 14a – No Action (Status Quo)

Under this alternative, the precious corals in CNMI would remain in the precious corals MUS and be considered in the fishery. ACLs would need to be specified.

Alternative 14b –Precious corals ACLs equal zero in CNMI

In this alternative, precious corals would receive an ACL of zero in CNMI. Because precious corals are not harvested in this area, an ACL of zero is not expected to be exceeded.

Alternative 14c – Precious corals ACL of 1000 kg in CNMI

Under this alternative, the 1,000 kg/area limit would become an ACL of 1,000 kg/area so that the exploratory area precious coral fishery would comply with the requirements of the MSA to have ACLs implemented.

3.3.3 All Precious Corals in Guam

Precious corals in Guam are not harvested; there are no issued Federal precious coral permits in Guam. In Guam, surveys in the 1970s showed presence of very little pink and red corals (WPFMC 2009d). There is currently no precious coral fishery operating around Guam, nor has there been any reported or observed landings of precious corals from the EEZ of Guam. Guam EEZ waters comprise the Exploratory Area XP-GU with a limit of 1,000 kg/year for all species combined except black coral.

The limit of 1,000 kg/area was determined with the goal of reducing the risk of overfishing a newly discovered bed while at the same time being large enough to provide economic incentive to engage in exploratory fishing (WPFMC 1979). There was no statistical basis for determining the limit, but instead was based on Council judgment that 1,000 kg/yr should be sufficient incentive for exploratory fishing while posing little risk to overfishing (WPFMC 1979).

NMFS/Council Estimation of OFL

There is no estimate of OFL provided for precious corals in exploratory areas of Guam.

SSC's Calculation of ABC

There is no estimate of ABC for exploratory areas in Guam. The nature of an exploratory area is one that has not yet been discovered; therefore it would be presumptuous and ill-advised to determine an ABC for an undiscovered area. An ABC of 1,000 kg/yr from each exploratory area may be appropriate.

Council ACL and AM Recommendations

The AM for the precious coral fishery in Guam will be an in-season adjustment in the year following the overage. Data collection in Guam is based on creel survey programs conducted by Guam DOA. In-season tracking is not fully possible because catch data is not readily available, thus an AM that adjusts the ACL in a subsequent year should be utilized.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because there is currently no fishery in operation. The ACLs therefore will result in little socioeconomic impacts and little management uncertainty.

Alternative 15a – No Action (Status Quo)

Under this alternative, the precious corals in Guam would remain in the precious corals MUS and be considered in the fishery. ACLs would need to be specified.

Alternative 15b – Precious corals ACLs equal zero in Guam

In this alternative, precious corals would receive an ACL of zero in Guam. Because precious corals are not harvested in this area, an ACL of zero is not expected to be exceeded.

Alternative 15c – Precious corals ACL of 1,000 kg in Guam

Under this alternative, the 1,000 kg/area limit would become an ACL of 1,000 kg/area so that the exploratory area precious coral fishery would comply with the requirements of the MSA to have ACLs implemented.

3.3.4 Hawaii Black Coral

Virtually all harvested black coral in Hawaii has been taken by hand from a bed located in the Auau Channel. Most of the harvest has come from State of Hawaii waters; however, a portion of the black coral bed in the Auau Channel is located in the EEZ. In 1999, concern about harvesting pressure led the State of Hawaii to prohibit the harvest of black coral with a base diameter of less than 3/4 inches from state waters. Between 1990 and 1997, the annual harvest of black coral in Hawaii varied from a low of 864 pounds to a high of 6,017 lbs, with a yearly average of 3,084 lbs. For the years 2000-2010, the total harvest of black coral had average yearly landings of about 5,587 lbs (HDAR unpublished data). There are currently two Federal permits issued for precious coral harvest in Hawaii.

NMFS/Council Estimation of OFL

There is no estimate of OFL provided for precious corals in exploratory areas of Hawaii.

SSC's Calculation of ABC

MSY was initially calculated at 5,000 kg/year (11,000 lbs/yr) (Grigg 1976), but increased harvest, increased demand, and proliferation of an invasive species that threatens black corals caused a reassessment of MSY that is 25% less than the original MSY, or 3,750 kg/yr (8,250 lbs/yr). The average yearly landings of 5,587 lbs are below the MSY of 8,250 lbs/yr by 32%. Data are reported in 10-year increments due to data confidentiality issues (i.e. less than 3 permits or less than 3 fishermen reported in a year). There is no known recreational component to this fishery.

There currently is a 5000 kg (11,000 lbs) biennial quota for black coral in the Auau Channel. The SSC, at the 107th SSC meeting in 2011, recommended an ABC equal to MSY, which has been estimated at 3,750 kg (8,250 lbs) annually (Grigg 2004; WPFMC 2009a).

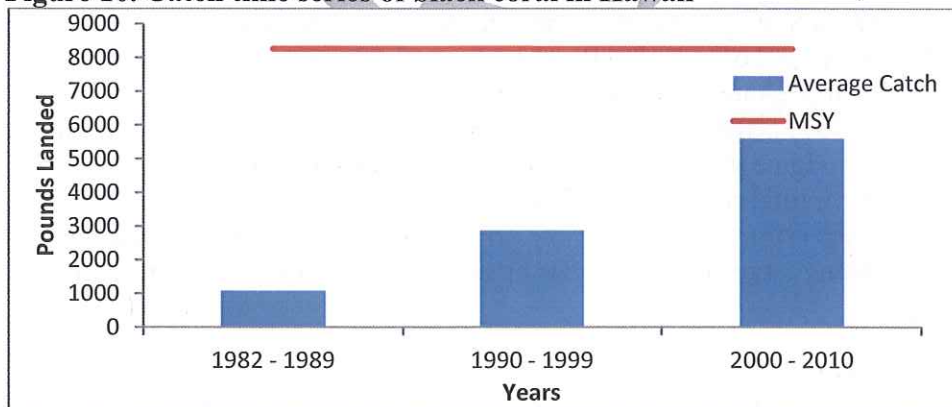
Council ACL and AM Recommendations

The AM for the precious coral fishery in Hawaii will be an in-season closure when the ACL is projected to be reached. Hawaii DAR receives trip catch reports for trap, net, and dive commercial fishing in Hawaii. Should a closure be needed within the last month of a fishing year, in lieu of a closure, a reduction to the subsequent year's ACL will be made.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because the amounts of the landings have been significantly below MSY. The ACLs therefore will be in line with previous years' catches, resulting in little socioeconomic impacts and decreased management uncertainty.

Should the Council select alternatives 16c, 16d, or 16e, housekeeping action should be taken to eliminate the biennial quota system for the Auau Channel.

Figure 10. Catch time series of black coral in Hawaii



Source: HDAR

Alternative 16a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries. However, a biennial quota of 11,000 lbs would remain in effect.

Alternative 16b – ACL specified biennially that is equal to previous quotas

Under this alternative, the ACL would be set equal to the previous quota of 11,000 lbs biennially. This would maintain the pounds that the fishery has been operating with, but is potentially in conflict with annual catch limits because it would be a biennial limit. It would allow more flexibility for harvesting the black coral than otherwise is afforded under a strict annual allocation.

Alternative 16c – ACL specified annually that is equal to previous quotas

Under this alternative, the ACL would be based on the previous biennial quota of 11,000 lbs, but instead would be an ACL specified annually of 5,500 lbs. While this would maintain the current harvest limit for the fishery, it would restrict management decisions for the fishermen who may have chosen to harvest every other year, or would have harvested more in one year than another.

Alternative 16d – ACL equal to the ABC

In this alternative, the ACL would be set equal to the ABC, thus would equal 8,250 lbs annually. The Council initially selected this at the 151st Council meeting in June 2011. This alternative would change the management regime such that the ACL (quota) would be specified annually and be 2750 lbs higher than the previous quota (if the quota had been divided equally across the two years at 5,500 lbs per year).

Alternative 16e – ACL set at 0.9 ABC

In this alternative, the ACL would be set to 0.9 ABC, which equals 7,425 lbs. The ACL would be higher still than the previously-specified quota (if the quota had been divided equally across the two years at 5,500 lbs per year). It also would be more precautionary to account for the slow growth of the black coral.

3.3.5 Hawaii Exploratory Areas

Currently there is a 1000 kg/area limit (all species except black coral). The limit of 1,000 kg/area was determined with the goal of reducing the risk of overfishing a newly discovered bed while at the same time being large enough to provide economic incentive to engage in exploratory fishing (WPFMC 1979). There was no statistical basis for determining the limit, but instead was based on Council judgment that 1,000 kg/yr should be sufficient incentive for exploratory fishing while posing little risk to overfishing (WPFMC 1979). 1,000 kg/yr in Hawaii represents about one-third of the estimated MSY for the precious coral species in all Established and Conditional beds while being large enough to offer an economic incentive for exploration (WPFMC 1979).

NMFS/Council Estimation of OFL

There is no estimate of OFL provided for precious corals in exploratory areas of Hawaii.

SSC's Calculation of ABC

There is no estimate of ABC for exploratory areas in Hawaii. The nature of an exploratory area is one that has not yet been discovered; therefore it would be presumptuous and ill-advised to determine an ABC for an undiscovered area. An ABC of 1,000 kg/yr from each exploratory area may be appropriate.

Council ACL and AM Recommendations

The AM for the precious coral fishery in Hawaii will be an in-season closure when the ACL is projected to be reached. Hawaii DAR receives trip catch reports for trap, net, and dive commercial fishing in Hawaii. Should a closure be needed within the last month of a fishing year, in lieu of a closure, a reduction to the subsequent year's ACL will be made.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because there has been no fishery to date in exploratory areas.

Alternative 17a – No Action

Under this alternative, there will remain a 1000 kg/area limit for all species combined except black corals. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries.

Alternative 17b – ACL set to 1000 kg/area

Under this alternative, the 1000 kg/area limit would become an ACL of 1000 kg/area so that the exploratory area precious coral fishery would comply with the requirements of the MSA to have ACLs implemented.

3.3.6 Hawaii Pink and Bamboo Coral

Pink coral (*Corallium secundum*) and bamboo coral (*Lepidisis olapa*) in Hawaii is currently managed by bed and either on a biennial basis or annual basis as follows:

Bed	Pink Coral Limit (kg)	Bamboo Coral Limit (kg)	Timeframe
Makapuu	2,000	500	Biennial
180 Fathom Bank*	222	56	Biennial
Brooks Bank*	444	111	Annual
Kaena Point*	67	17	Annual
Keahole*	67	17	Annual
Westpac	0	0	Annual

*Conditional bed

Because the data on harvest did not differentiate beds, the reported landings for pink corals (*C. secundum* and *C. regale*) are combined for all beds. The total allowed landings (if biennial were divided equally into two, so Makapuu equals 1,000 kg and 180 Fathom Bank equals 111) is 1,689 kg/yr. Landings in 1999 and 2000 were less than 2% and 45% of the allowed landings, respectively. There has been no reported harvest of these species since then.

NMFS/Council Estimation of OFL

There is no estimation of precious coral OFLs in the Makapuu Established bed, the other Conditional beds identified above, or the Westpac Refugia area.

SSC's Calculation of ABC

For the Makapuu Bed, a 2002 report (Grigg 2002) provided a revised MSY for pink coral of 1,500 kg/year, which is 50% greater than the previous MSY of approximately 1,150 kg. The

limits for the Makapuu Bed and 180 Fathom Bank are expressed as two-year harvest quotas because it is economically disadvantageous to utilize the expensive specialized equipment required for selective harvesting of precious coral for only part of each year on only one coral bed. The more flexible biannual schedule makes it easier for harvesters to deploy in other areas once the two-year Makapuu Bed quota is taken. The other reason for two-year harvest quotas was that 2-year pulse fishing appeared to be the best combination for minimizing biological risks in conjunction with economic optimization (WPFMC 1979).

Also for the Makapuu Bed, the natural mortality rate for pink coral (0.066) was used as a proxy for determining the MSY for bamboo corals, resulting in an MSY of 285 kg/year (WPFMCa 2009). The limits in the above table were determined by calculating the MSY across the area of the bed. The limits for the Makapuu Bed and 180 Fathom Bank are expressed as two-year harvest quotas because it is economically disadvantageous to utilize the expensive specialized equipment required for selective harvesting of precious coral for only part of each year on only one coral bed. The more flexible biennial schedule makes it easier for harvesters to deploy in other areas once the two-year Makapuu Bed quota is taken.

The MSYs for the other beds were determined by extrapolating, based on bed size, from the Makapuu Established Bed using a comparison of MSY to bed size. Harvest quotas represent optimum yield based on extrapolations from rounded-down MSY values for Makapuu Bed.

The ABC should be based on the Tier 4 control rule because there are established MSYs but not harvest. The ABC for stocks with an MSY but no current harvest is 0.91 MSY, thus at Makapuu, the ABC is 1,365 kg annually for pink coral and 260 kg annually for bamboo coral. The SSC will make its decision on the established ABC at the 108th SSC meeting.

Council ACL and AM Recommendations

The AM for the precious coral fishery in Hawaii will be an in-season closure when the ACL is projected to be reached. Hawaii DAR receives trip catch reports for trap, net, and dive commercial fishing in Hawaii. Should a closure be needed within the last month of a fishing year, in lieu of a closure, a reduction to the subsequent year's ACL will be made.

The social, economic, ecological and management uncertainty (SEEM) analysis was not conducted because there is currently no fishery in operation. The ACLs therefore will result in little socioeconomic impacts and decreased management uncertainty.

Alternative 18a – No Action (Status Quo)

Under this alternative, no ACL would be specified. This would be contrary to the MSA mandate that requires implementation of ACLs for all fisheries. However, the biennial and annual quotas per bed would remain in effect.

Alternative 18b – ACLs specified equal to previous quotas

Under this alternative, the ACLs would be set equal to the previous quotas listed in the above table with the same timeframes as identified above. This would maintain the pounds that the fishery has been operating with, but is potentially in conflict with annual catch limits because

two are biennial limits. It would allow more flexibility for harvesting the pink and bamboo coral than otherwise is afforded under a strict annual allocation.

Alternative 18c – ACLs specified annually that is equal to previous quotas

Under this alternative, the ACLs would be based on the previous biennial quotas, but instead would be specified annually. The ACL for pink coral at Makapuu bed would be 1,000 kg/area annually and the ACL for 180 Fathom Bank would be 222 kg/area annually; the other limits already specified annually would remain the same (i.e. Kaena Point, Keahole, Westpac). The ACL for bamboo coral for Makapuu bed would be 250 kg/area annually and the ACL for 180 Fathom Bank would be 28 kg/area annually; the other limits already specified annually would remain the same (i.e. Kaena Point, Keahole, Westpac). While this would maintain the current harvest limit for the fishery, it would restrict business decisions for the fishermen who may have chosen to harvest every other year due to the financial burdens of redeploying equipment annually, or would have harvested more in one year than another.

Alternative 18d – ACL equal to the ABC

In this alternative, the ACL would be set equal to the ABC. The ABC for stocks with an MSY but no current harvest is 0.91 MSY, thus at Makapuu, the ABC is 1,365 kg annually for pink coral and 260 kg annually for bamboo coral. The Council initially selected this at the 151st Council meeting in June 2011. This alternative would change the management regime such that the ACL (quota) would be specified annually and, over the course of two years, would be 730 kg higher for pink coral and 20 kg higher for bamboo coral than the previous two-year quotas.

3.5 Pelagic Squid

There are three squid fisheries in the Western Pacific region that are based in Hawaii (WPFMC 2008). The first is a high-seas jig fishery for neon flying squids (*Ommastrephes bartrami*) which is conducted by a single operation that uses four catcher vessels and one large mothership and now is no longer in operation. These vessels operated under High Seas fishing Compliance Act permits and visited ports at Honolulu, Hawaii and in Alaska. Each vessel carried 21-38 jigging machines and fishes primarily to the north of the Hawaiian Archipelago during the summer months. The other two are small near-shore fisheries targeting purpleback squid (*Sthenoteuthis oualaniensis*) and diamondback squid (*Thysanoteuthis rhombus*) for food and bait. The purpleback squid is the only squid species of significant abundance and availability to coastal fishermen of the main Hawaiian Islands (Itano 2004) and provides food and bait. A small-scale fishery jig fishery for purpleback squid for local consumption exists on Kauai. Handline tuna fishery out of Hilo, Hawaii, catches squid for bait for the the ika shibi nighttime fishery (Itano 2004).

NMFS/Council Estimation of OFL

There is no estimate of OFL for the pelagic squid fishery.

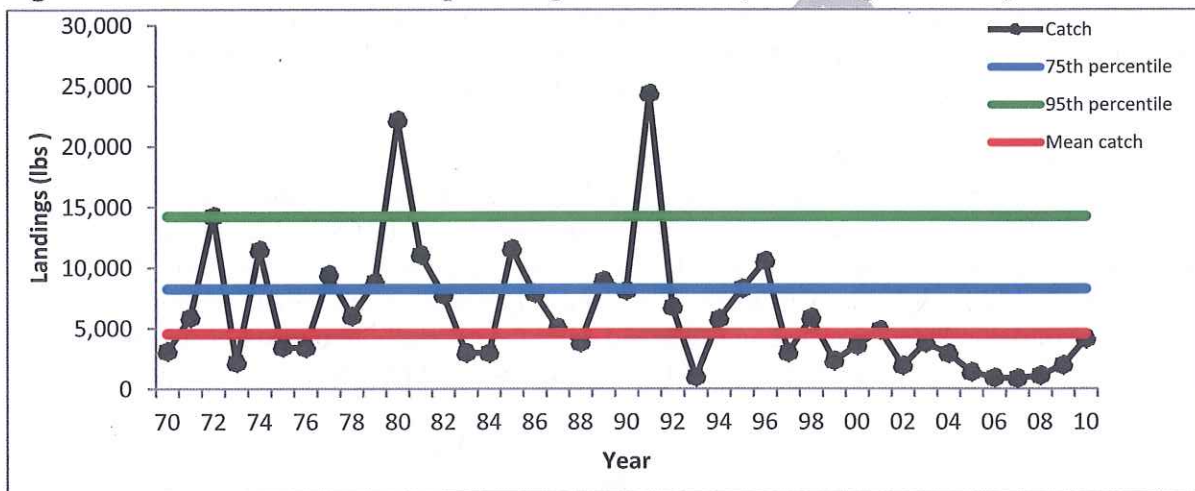
SSC's Calculation of ABC

Currently, there is very little information on the population biology of these species with which to develop stock determination criteria. The natural mortality rates, as well as the ratio of current biomasses to biomasses at MSY and fishing mortalities at their respective MSYs, are unknown.

The SSC, at its 107th Meeting, recommended that ABC be set to the 75th percentile of the entire catch history for species without an MSY estimate. The 75th percentile of the entire catch history for the squid fishery, and therefore the ABC, is 8,250 lbs. This value will be used for the entire Western Pacific region, since little to no squid landings are reported in American Samoa, Guam and CNMI.

ACL alternatives are not provided because, due to the 1-year lifespan exception in the National Standard 1 Guidelines, which do not require the specification of ACLs.

Figure 11. Catch time series for squid caught in Hawaii (75% caught in EEZ)



Source: HDAR

3.6 Alternatives Considered but Rejected

ACLs will not be specified for Kona crab, deepwater shrimp, precious corals, or lobster in the PRIA because commercial fishing is prohibited out to 50 nautical miles by Presidential Proclamation 8336, which established the Pacific Remote Island Marine National Monument (74 FR 1565, January 12, 2009). There are no lobsters, precious corals, deepwater shrimp, or Kona crab habitats beyond the monument boundaries. ACLs within the boundaries of the PRIA monument may be developed in the future through a separate action in accordance with Proclamation 8336, if the Secretary of Commerce determines non-commercial fishing can be allowed and managed as a sustainable activity.

5.0 References

- Coutures, E. 2003. The biology and artisanal fishery of lobsters of American Samoa. *DMWR Biological Report Series, No 103*.
- Grigg, R.W. 2004. Harvesting Impacts and Invasion by an Alien Species Decrease Estimates of Black Coral Yield off Maui, Hawai'i. *Pacific Science* 58(1): 1-6.
- Grigg, R.W. 1976. Fishery Management of Precious and Stony Corals in Hawaii. UNIH-SEAGRANT-TR77-03. 48 pp.
- Itano, D.G. 2004. Hawaii Domestic Squid Fishery. Summary report to the Pelagics Plan Team. Western Pacific Regional Fishery Management Council. Pelagics Plan Team meeting held April 27-29, 2004.
- King, M. 1988. Topic Review: Deep-water Shrimps. South Pacific Commission Workshop on Pacific Inshore Fishery Resources. New Caledonia, 14-25 March 1988. 25 pp.
- Moffitt, R.B., and J.J. Polovina. 1987. Fishery Bulletin. Vol. 85, no. 2, pp. 465-476 in Resources Assessment Investigation of the Mariana Archipelago, 1980-1985: Compilation of Published Manuscripts, Reports, and Journals. Compiled by Angela Karam.
- Morris, D. E. 1968. Some Aspects of the Commerical Fishery and Biology of Two Species of Spiny Lobsters, *Panulirus japonicus* (De Siebold) and *Panulirus penicillatus* (Oliver), in Hawaii. Thesis. University of Hawaii.
- Ralston, S. and D. T. Tagami. 1992. An Assessment of the Exploitable Biomass of *Heterocarpus laevigatus* in the Main Hawaiian Islands. Part 1: Trapping Surveys, Depletion Experiment, and Length Structure. *Fish. Bull.* 90(3). pp. 494-504.
- Tagami, D.T. and S. Barrows. 1988. Deep-sea shrimp trapping for *Heterocarpus laevigatus* in the Hawaiian Archipelago by a commercial fishing vessel. NOAA Technical Memorandum, NMFS, 14 pp.
- Tagami, D.T. and S. Ralston. 1988. An assessment of exploitable biomass and projection of maximum sustainable yield for *Heterocarpus laevigatus* in the Hawaiian Islands. Southwest Fisheries Center Administration Report H-88-14, 22 pp.
- Thomas, Lennon. 2011. Characterizing the Kona crab (*Ranina ranina*) Fishery in the Main Hawaiian Islands. Presentation at the 151st Western Pacific Fishery Management Council Meeting, Honolulu, Hawaii. June 2011.
- WPFMC. 2009a. Fishery Ecosystem Plan for the Hawaii Archipelago. Western Pacific Regional Fishery Management Council. Published September 24, 2009.
- WPFMC. 2009b. Fishery Ecosystem Plan for the American Samoa Archipelago. Western Pacific Regional Fishery Management Council. Published September 24, 2009.

WPFMC. 2009c. Fishery Ecosystem Plan for the Pacific Remote Island Areas. Western Pacific Regional Fishery Management Council. Published September 24, 2009.

WPFMC. 2009d. Fishery Ecosystem Plan for the Marianas Archipelago. Western Pacific Regional Fishery Management Council. Published September 24, 2009.

WPFMC. 2008. Amendment 15 to the Pelagics Fisheries Management Plan: Measures to Monitor and Manage Domestic Pacific Harvests of Pelagic Squid, including an Environmental Assessment. Western Pacific Regional Fishery Management Council. Published July 31, 2008.

WPFMC. 1983. Final Combined Fishery Management Plan Amendment 1 and Environmental Assessment for the Spiny Lobster Fisheries of the Western Pacific Region. Western Pacific Regional Fishery Management Council, Honolulu, Hawaii. 95 pp.

WPFMC. 1979. Fishery Management Plan for the Precious Coral Fisheries (and Associated Non-Precious Corals) of the Western Pacific Region. Western Pacific Regional Fishery Management Council, Honolulu, Hawaii. 79 pp.