Proposed Amendment to the Fishery Ecosystem Plan for the Mariana Archipelago

Modifying the Northern Mariana Islands Bottomfish Large Vessel Closed Areas

Including a Draft Environmental Assessment

DRAFT June 2, 2014

Western Pacific Regional Fishery Management Council
1164 Bishop St. Suite 1400
Honolulu, HI 96813

Draft Environmental Assessment Summary

Modifying the Northern Mariana Islands Bottomfish Large Vessel Closed Areas

Amendment 3 to the Fishery Ecosystem Plan for the Mariana Archipelago

DRAFT May 30, 2014

Responsible Agency:

Pacific Islands Region
National Marine Fisheries Service (NMFS)
National Oceanographic and Atmospheric Administration (NOAA)
Honolulu, Hawaii

Responsible Official:

Pacific Islands Region, NMFS, NOAA

For Further Information Contact:

Responsible Council and Contact:

Kitty M. Simonds
Executive Director
Western Pacific Fishery Management Council
1164 Bishop St. Suite 1400
Honolulu, HI 96813
(808) 522-8220

Project No.:

Abstract

Amendment 3 to the Fishery Ecosystem Plan for the Mariana Archipelago, which includes an environmental assessment (EA), was recommended by the Western Pacific Fishery Management Council (Council) at its 159th meeting in March 2014. It modifies the existing large bottomfish vessel closed area that the Council and NMFS put in place around parts of the Commonwealth of the Northern Mariana Islands (CNMI) in 2009. The reason the Council recommended establishing the closed areas was to protect the small boat fishing around the southern islands fleet from the impacts of large vessels entering the CNMI bottomfish fishery, especially those from nearby Guam. However, such interest by large vessel participants has not been observed, and members of the CNMI fishing community have voiced concern to the Council about the fact that the CNMI bottomfish fishery is not achieving optimum yield and thus not providing maximum benefit to the CNMI fishing community and the Nation. In addition, current regulations may have negative implications for the health and safety of community members and fishery participants.

The National Marine Fisheries Service (NMFS) will seek public comments on the draft amendment and on the analysis of potential environmental impacts of the proposed action. The proposed rule and instructions on how to comment on the document, and how to obtain copies of the EA can be found by searching on RIN XXX-XXXX at www.regulations.gov; or by contacting the responsible official at the above address.

EXECUTIVE SUMMARY

The bottomfish fishery around the Commonwealth of the Northern Mariana Islands (CNMI) is managed under the Fishery Ecosystem Plan for the Mariana Archipelago (FEP). There are currently five vessels federally permitted to harvest bottomfish around the Northern Mariana Islands. These vessels generally target deepwater species, particularly onaga (*Etelis coruscans*), on seamounts and banks. Landings are offloaded at Saipan or other CNMI commercial ports and may be exported by air to Japan. In 2009, the Western Pacific Fishery Management Council (Council) amended the Fishery Management Plan for the Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region (the predecessor of the FEP for the Mariana Archipelago) to prohibit commercial fishing for bottomfish by vessels greater than 40 ft in length overall in waters around CNMI's Southern Islands or in waters around the small-scale Alamagan fishing station in the Northern Islands. This change also required bottomfish vessels greater than 40 ft in length to carry vessel monitoring systems, mandated that all commercial bottomfishing vessels be Federally permitted and report their activities and catch using that Federal reporting forms, and required Federal reporting of all commercial bottomfish sales by medium and large vessels in EEZ waters around CNMI.

Since the prohibited areas were established, the number of federally permitted CNMI-based vessels larger than 40 feet decreased from a high of four (4) in 2010 to just one (1) in 2014. In Guam, the number of federally permitted Guam-based bottomfish vessels longer than 50' decreased from a high of seven (7) in 2010 to two (2) in 2014. Recently, CNMI bottomfish fishermen and Council advisors communicated that the closures are decreasing the efficiency and performance of the fishery. A 2012 NMFS stock assessment indicates the CNMI bottomfish multi-stock complex may be under-utilized; NMFS estimates bottomfish maximum sustainable yield (MSY) in CNMI at 172,900 ± 32,200 lb (Brodziak et al., 2012), while average estimated catch between 2007 and 2011 was approximately 36,000 lb annually (NMFS 2013). The estimated difference between annual average catch and MSY for the fishery is therefore more than 100,000 lbs. In addition, fishermen and Council advisors indicated that the closures are impacting the local bottomfishing fleet economically and socially, and believe there is now little basis for concern regarding the possibility of significant large vessel fishing activity in the subject waters. Therefore, the Council proposes to remove the medium and large vessel prohibited bottomfish fishing areas around the CNMI.

This document presents analysis of two alternative management actions: keeping the closures in place and removing the closures (the preferred alternative). An additional course of action that was previously considered in the development of this amendment, reducing the closed area from 50 to 30 nm, was determined to be ineffective, after bathymetrical analysis revealed that no additional bottomfish fishing grounds would become available to fishermen under that scenario.

The expected impacts of the alternatives considered in this action are described in Section 4.0. The analysis included a description of the baseline (no action) alternative and potential impacts of action alternatives on the fisheries and their target fish stocks, non-target fishes, bycatch, protected resources, Essential Fish Habitat (EFH) and Habitat areas of Potential Concern, and special resources or management areas. Direct, indirect, short-term, long-term, and cumulative impacts of each alternative were considered, as were potentials impacts associated with environmental justice and climate change. The preferred alternative was developed using the best

available information. Results of these analyses suggest the preferred alternative will balance the needs of CNMI's small-scale quasi-commercial bottomfish fishery with those of the larger commercial fishery in a manner that allows both sectors to continue fishing at sustainable levels. Analyses also indicate that the preferred alternative will provide for the sustained participation of the CNMI fishing community in the fishery and minimize adverse social and economic impacts on CNMI fishing community members, including fishery participants, as well as potentially improve the safety of human life at sea.

In doing so, there do not appear to be any expected significant negative impacts to target and non-target stocks or protected species. Although the preferred alternative is less likely to maintain existing levels of self-recruitment in bottomfish populations around CNMI, as well as to control any potential for local depletion in the southern areas currently closed to large vessel bottomfish fishermen if significant expansion of large vessel effort occurs, few large CNMI or Guam bottomfish vessels are currently fishing and no substantial increase in this component of the fleet is expected. In addition, the commercial fishery data reporting allows for timely tracking of fishery trends. The preferred alternative may reduce the potential for fishing pressure to expand to distant seamounts (greater than 50 nm from CNMI) that exist in the EEZ waters around CNMI. Bottomfish populations at the more distant seamounts are likely to depend on larvae transported from larger bank fish resources on CNMI's island slopes. Recruitment in such tends to be variable and unpredictable, causing seamount populations of deepwater bottomfish to be more sensitive to heavy fishing than island slope resources. Since bottomfish fishing for deepwater snappers around CNMI employs highly selective gear (vertical droplines with several branching lines), bycatch rates in the fishery are relatively low, and almost all bycatch is released alive.

Relevant Endangered Species Act listed species, such as green turtles, occur more commonly in nearshore waters. Because of this, the analyses indicates that the preferred alternative could increase the potential for protected species interactions in nearshore waters, since large vessel bottomfish fishing effort would be redistributed from distant seamounts. However, due to the concentration of small vessel effort in nearshore waters and the lack of any reported or observed interactions with protected species in this fishery, additional effort from a few larger vessels in the area is not expected to have additional impacts on protected species populations in this area.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

1.0 BACKGROUND INFORMATION

1.1 Introduction

Current Federal regulations prohibit commercial fishing vessels > 40 ft from fishing within approximately 50 nm of the southern islands of the CNMI (i.e., Rota, Aquijan, Tinian, Saipan and Farallon de Medenilla (aka FDM)), and within 10 nm of the island of Alamagan Island. The Western Pacific Fishery Management Council (Council) and NOAA Fisheries (NMFS) implemented these closures via Amendment 10 to the Fishery Management Plan for the Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region in 2009 to prevent localized depletion of bottomfish, and to protect the CNMI small vessel fishery (<40 ft) from a potential influx of, and competition from, large Guam-based bottomfish vessels displaced by a similar large vessel area closure around Guam.

The Council considered a range of preliminary options, many of them solicited via a public scoping process, and analyzed five alternatives in detail. The Council ultimately selected Alternative 5, which prohibited commercial fishing for BMUS by vessels greater than 40 ft (12.3 m) in length overall within EEZ waters 0-50 nm around CNMI in the area from the southern boundary of the EEZ (south of Rota) to the north latitude of 16° 10' 47" (halfway between Farallon de Medinilla and Anatahan) and within EEZ waters 0-10 nm around Alamagan. This alternative continued to allow receiving vessels to operate within these areas and required vessels greater than 40 ft in length overall fishing commercially for BMUS in EEZ waters around CNMI carry operational VMS units and complete Federal sales reports for any BMUS sold in CNMI. Finally, Alternative 5 required operators of all vessels fishing commercially for BMUS in EEZ waters around CNMI have Federal permits and submit Federal logbooks of their associated catch and effort.

Since the prohibited areas were established, the number of federally permitted CNMI-based vessels larger than 40 feet decreased from a high of four (4) in 2010 to just one (1) in 2014. The closure may also have deterred large Guam-based bottomfish vessels from fishing in the CNMI. In Guam, the number of federally permitted Guam-based bottomfish vessels longer than 50' decreased from a high of seven (7) in 2010 to 2 in 2014.

A 2012 NMFS stock assessment indicates the CNMI bottomfish multi-stock complex may be under-utilized as NMFS estimates bottomfish maximum sustainable yield (MSY) in CNMI at 172,900 ± 32,200 lb (Brodziak et al., 2012). Average estimated annual catch between 2007 and 2011 was approximately 36,000 lb (NMFS 2013).

In addition to the possibility of Guam-based vessels entering the fishery, several other concerns regarding bottomfish fishing on CNMI's banks drove the adoption of Amendment 10. First, there was no comprehensive system to collect the fishery data needed to monitor catches and determine the impacts of the fishery on the stock(s) being harvested or to provide details on bycatch (discards) by these vessels. Second, harvests by large vessels – which require relatively large catches to cover operational costs – could deplete southern archipelago area stocks, which would threaten sustained community participation in the bottomfish fishery. Finally, traditional patterns of supply and consumption of bottomfish in the local community could have been

disrupted by reduced community participation and/or large exports of bottomfish fish from CNMI by the operators of large vessels.

Recently, CNMI bottomfish fishermen and Council advisors communicated that the closures are decreasing the efficiency and performance of the fishery and impacting the local bottomfishing fleet economically and socially. Further, these individuals have some doubt that large vessels operated by non-residents would have entered the Mariana Islands bottomfish fishery. They requested that the Council investigate options to modify the closed areas.

1.2 Initial Actions

At its 154th meeting in Honolulu (June 2012), the Council directed staff to solicit input about reducing the size of the large vessel bottomfish fishery closure around the southern islands of the CNMI from 50 to 30 nautical miles (nm). A reduction to 30 nm had previously been suggested by the public to the Council. Council staff conducted formal scoping meetings in CNMI and Guam in November 2013 to review existing federal management rules for bottomfish management unit species BMUS in the Marianas, present data on the current performance of the fishery, discuss the need for potential rule changes, and solicit general and specific comments on the management of the CNMI and Guam bottomfish fisheries.

Council staff conducted a review of the entry and exit patterns of those bottomfishing vessels in CNMI that are required to maintain federal permits and report catches on a per trip basis. Based on this analysis, very few vessels larger than 40 feet were permitted to fish in the CNMI area for bottomfish; all vessels whose bottomfish permits expired in 2013 were well under 40 feet (average length overall = 19.7 ft.). This is consistent with the finding of the Mariana Islands Small Boat survey that was recently conducted by NMFS PIFSC. A couple of the vessels over 40 feet are resident local vessels that are no longer permitted to fish for bottomfish in the NMI. Two of the prior permitted bottomfishing vessels were transfer longline vessels from Honolulu and have since returned to Hawaii to pelagic longline.

Council staff also worked with NMFS to map the areas contained within the 200 fathom contour, which is assumed bottomfish habitat, within the existing 50 mile closure and the suggested 30 mile closure to determine the extent of likely bottomfishing areas that would become available under that scenario. This analysis showed that practically no new bottomfishing areas would become available to the larger vessels if the closure area was reduced to 30 nm. Given these findings, the Council sent the Secretary of the CNMI Department of Land and Natural Resources a letter indicating no further scoping on this issue was warranted at the time. If bottomfish fishery operations or the status of the resource changed, the Council could reconsider further management measures then.

In June 2013, the Marianas Advisory Panel and broader CNMI fishing community re-engaged the Council seeking to remove the 50 nm large vessel closure for bottomfish fishing around the NMI's southern islands. The Council at its 157th meeting directed staff to re-scope the issue, which staff did through its public joint Advisory Panel and Regional Ecosystem Advisory Committee meeting in Saipan in August 2013. Based on further public vetting of the issues and community concerns, the Council at its 158th meeting directed staff to develop an options paper

considering the removal of the 50 nm bottomfish area closure which would be used for formal scoping.

Council staff worked with NMFS, the CNMI Department of Fish and Wildlife, and Council advisors to obtain additional information and develop an options paper for the Council. Proposed rule changes included removing the 50 mile area closure for vessels larger than 40 feet. Also considered was a closure reduction from 50 miles to 30 miles around the Southern Islands. Finally, the option to retain or remove the 10 mile closure around Alamagan was also discussed during these public meetings.

The options paper was presented to the the Council at its 159th meeting in the Mariana Archipelago. The Council selected option 3, removing the bottomfish area closures around the Southern Islands, and option 2, removing the bottomfish area closures around Alamagan, as preliminary preferred alternatives.

2.0 FISHERY MANAGEMENT MEASURES

2.1 Proposed Action

The Council is proposing to remove the large vessel bottomfish fishing prohibited areas in the NMI that prohibit bottomfish fishing by vessels 40 feet and longer within 50 nm of the southern islands and within 10 nm of Alamagan Island.

2.2 Purpose and Need for Action

The purpose of this action is to remove regulations that prohibit commercial fishing vessels 40 ft and longer from fishing within approximately 50 nm of the southern islands of the CNMI (i.e., Rota, Aquijan, Tinian, Saipan and Farallon de Medenilla or FDM) in order to increase efficiency and performance in the fishery and achieve optimum yield. NMFS and the Council implemented these closures in 2009 to prevent localized depletion of bottomfish, and to protect CNMI small vessels (<40 ft) from a potential influx of, and competition from, large Guam-based bottomfish vessels displaced by a similar large vessel area closure around Guam. In addition to preventing the CNMI bottomfish fleet from achieving optimum yield from the fishery, the current closed area regulations are prohibiting fishermen from fishing on their traditional fishing grounds using larger, safer vessels; presenting an economic barrier to small boat fishermen who wish to upgrade but not travel more than 100 miles (return trip) to conduct bottomfishing; constraining the availability of fresh local fish because of reduced volume (from smaller vessels who can fish closer to land) and reduced quality (from larger vessels who must endure longer trip times); and resulting in unnecessarily higher per trip costs for the large vessel component of the fleet.

2.3 Management Objective

The fishery management objective of this action is to remove unnecessary spatial based regulations in the form of large vessel prohibited bottomfish fishing areas in the CNMI to increase efficiency and performance in the fishery and achieve optimum yield.

2.4 Description of Alternatives for Modifying the Closures around the CNMI Southern Islands and Almagan

The following alternatives are intended to meet the purpose, need, and objectives described above.

2.4.1.1 Alternative 1: No Action

Under the No Action Alternative, NMFS would retain the existing 50 mile closure around the southern islands (Rota, Saipan, Tinian and FDM) and around Alamagan for vessels over 40 feet in length.

2.4.1.2 Alternative 2: Remove the closure around southern islands and Alamagan

Under Alternative 2, NMFS would remove the large vessel closures around the southern islands and Alamagan.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Overview of the Mariana Archipelago

The Mariana Archipelago is composed of 15 volcanic islands that are part of a submerged mountain chain stretching nearly 1,500 miles from Guam to Japan, and is comprised of two political jurisdictions: the CNMI and the Territory of Guam, both of which are U.S. possessions (Figure 1). The CNMI is situated between 14–21° N latitude and 144–146° E longitude stretching over a distance of 400 nm (740 km) from Rota northward to Farallon de Pajaros (also known as Uracas). The islands can be divided into two sections based on age and geology. The northern island complex stretches from Esmeralda Bank west of Tinian to Uracas Bank north of Uracas or Farallon de Parajos. The geographically older southern island complex encompasses the islands and banks from Rota to the Sonome Reef complex north of Farallon de Medinilla and east of Anatahan. The total land area of the CNMI is approximately 179 square miles (463 km2). The island of Guam, located at 13° 28’ N latitude and 144° 45 E longitude, is the southernmost island in the archipelago, and with a total land area of 216 square miles (560 km2) is also the largest (NOAA 2005).

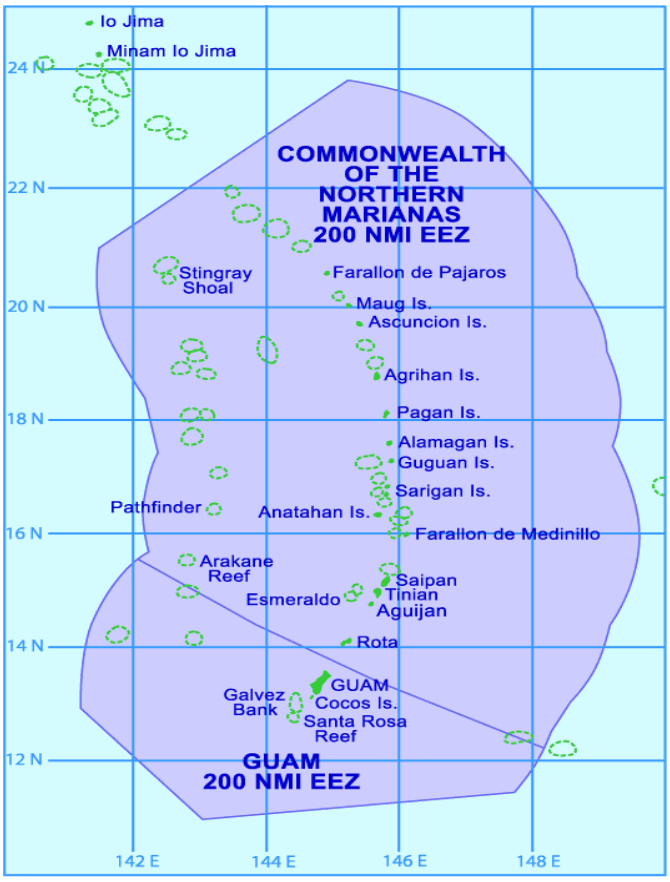

Figure 1. Guam and CNMI EEZ Waters
Source: NMFS, Pacific Islands Fisheries Science Center, Western Pacific Fisheries Information Network

3.2 Overview of Bottomfish Fisheries Management Program in Guam and CNMI

The federal fishery management area in the Mariana Archipelago is divided into two management subareas. The Guam management subarea includes all federal waters of the U.S. EEZ from 3 to 200 nm around Guam. The CNMI management subarea includes all federal waters of the U.S. EEZ from 3 to 200 nm around the CNMI, except for the three northern most islands of Uracus, Maug, and Asuncion, and the island of Farallon de Medinilla, where federal jurisdiction extends to the shoreline. At Tinain, federal waters also extend to the shoreline around certain lands leased by the U.S. government under the Lease Agreement Made Pursuant to the Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America, dated January 6, 1983, as amended.

3.2.1 Fisheries Data Collection and Monitoring

Bottomfish fisheries information in CNMI and Guam are collected by the CNMI Division of Fish and Wildlife, and Guam Division of Aquatic and Wildlife Resources, respectively with assistance from NMFS PIFSC Western Pacific Fisheries Information Network (WPacFIN) through three primary fisheries monitoring programs. They include: (1) the boat-based creel

survey program; (2) the shore-based creel survey program, and (3) the commercial purchase system or trip ticket invoice program. Federal regulations also require certain bottomfish fishing obtain permits and report catch and sales.

Boat-based creel survey program

The boat-based creel survey program collects catch, effort, and participation data on offshore fishing activities conducted by commercial, recreational, subsistence and charter fishing vessels. Surveys are conducted at boat ports or ramps, and data collection consists of two main components - participation counts (trips) and fisher interviews. Survey days are randomly selected and the number of survey days range from 3-8 per month. Surveys are stratified by week-days, weekend-days and day- and night-time. Data expansion algorithms are applied by NMFS WPacFIN to estimate 100% "coverage" and are based on port, type of day, and fishing method (Impact Assessment, 2008).

Shore-based creel survey program

The shore-based creel survey program was established to randomly sample inshore fishing trip information and consists of two components - participation counts and fishers interviews. Participation counts are based on a 'bus route' method, with predefined stopping points and time constraints. Survey days are randomly selected, and range from 2-4 times per week. Data expansion algorithms are applied by NMFS WPacFIN to estimate 100% "coverage" and are based on island region, type of day (e.g. weekday/weekend) and fishing method (Impact Assessment, 2008). The shore-based creel surveys cover fishing by persons engaged in commercial, recreational, and subsistence fishing activities.

Commercial purchase system

The commercial purchase system or "trip ticket invoice" monitor fish sold locally and collects information submitted by vendors (fish dealers, hotels and restaurants) who purchase fish directly from fishers. Each invoice usually compiles daily trip landings. Only American Samoa has mandatory requirements for vendors to submit invoice reports. All other islands have voluntary programs (Impact Assessment, 2008).

Federal permit and logbook reporting

In 2006, NMFS established federal permit and reporting requirements for bottomfish fishing vessels greater than 50 ft in length fishing in the U.S. EEZ around Guam (71 FR 64474, November 2, 2006). There is no federal permit or reporting requirements for bottomfish vessels less than 50 ft fishing in federal waters around Guam. A similar permit and reporting requirement applies to all commercial bottomfish vessels in the CNMI (73 FR 75615, December 12, 2008). All CNMI commercial bottomfish vessels are also required to submit sales reports.

In both Guam and CNMI, federally permitted bottomfish vessels comprise only a small portion of the total estimated vessels participating in bottomfish fisheries of the western Pacific. For example, of the estimated 17 vessels participating in the CNMI bottomfish fishery in 2013, only five vessels obtained a federal commercial bottomfish permit. In Guam, less than three of the estimated 285 bottomfish vessels active in 2013 were large vessels (greater than 50 ft), and thus required a federal bottomfish permit. For these reasons, NMFS relies primarily on the fishery

data collection programs administered by the respective local resource management agencies to obtain bottomfish catch and effort data.

3.2.2 Fishery Conservation and Management Measures

In addition to the federal permit and reporting requirements described above, the federal fisheries management regime under the Mariana FEP (WPFMC 2009) also includes vessel identification and at-sea observer requirements, and a prohibition on the use of poisons, explosives, or intoxicating substances, bottom trawls, and bottom set gillnets. The bottomfish fisheries of Guam and the CNMI are also each subject to an annual catch limit (quota) to prevent overfishing (WPFMC 2011a). The quota is reviewed annually, and is published in a notice in the Federal Register. For more information on annual catch limits, go to NMFS website at http://www.fpir.noaa.gov.

In Guam, federal regulations also prohibit vessels 50 ft and longer from fishing within 50 nautical miles (nm) of Guam (WPFMC 2006a). In the CNMI, federal regulations prohibit bottomfish fishing vessels 40 ft and longer from fishing within 50 nautical miles (nm) around the southern islands of Rota, Aquijan, Tinian, Saipan, and Farallon de Medenilla and within 10 nm around the island of Alamagan (WPFMC 2008). CNMI bottomfish vessels 40 ft and longer must also carry vessel monitoring systems onboard, which allow NMFS to track vessel location at all times and monitor compliance with bottomfish closed areas. Federal regulations governing this fishery can be found in the Code of Federal Regulations, Title 50, Part 665, Subpart D.

In 2009, Proclamation 8335 established the Marianas Trench Marine National Monument (Monument). The Monument includes certain waters and submerged lands around the three northernmost islands of the CNMI (Uracas or Farallon de Pajaros, Maug, and Asuncion), which comprise the "Islands Unit." The Monument also includes the submerged lands of designated volcanic sites (the "Volcanic Unit"), and the Marianas Trench ("Trench Unit)" (Figure 2). Federal regulations implementing Proclamation 8335 prohibits commercial fishing within the Islands Unit and establishes management measures for non-commercial fishing, including permit and reporting requirements, eligibility for such permits (WPFMC 2013). Federal regulations governing this fishery can be found in the Code of Federal Regulations, Title 50, Part 665, Subpart G.

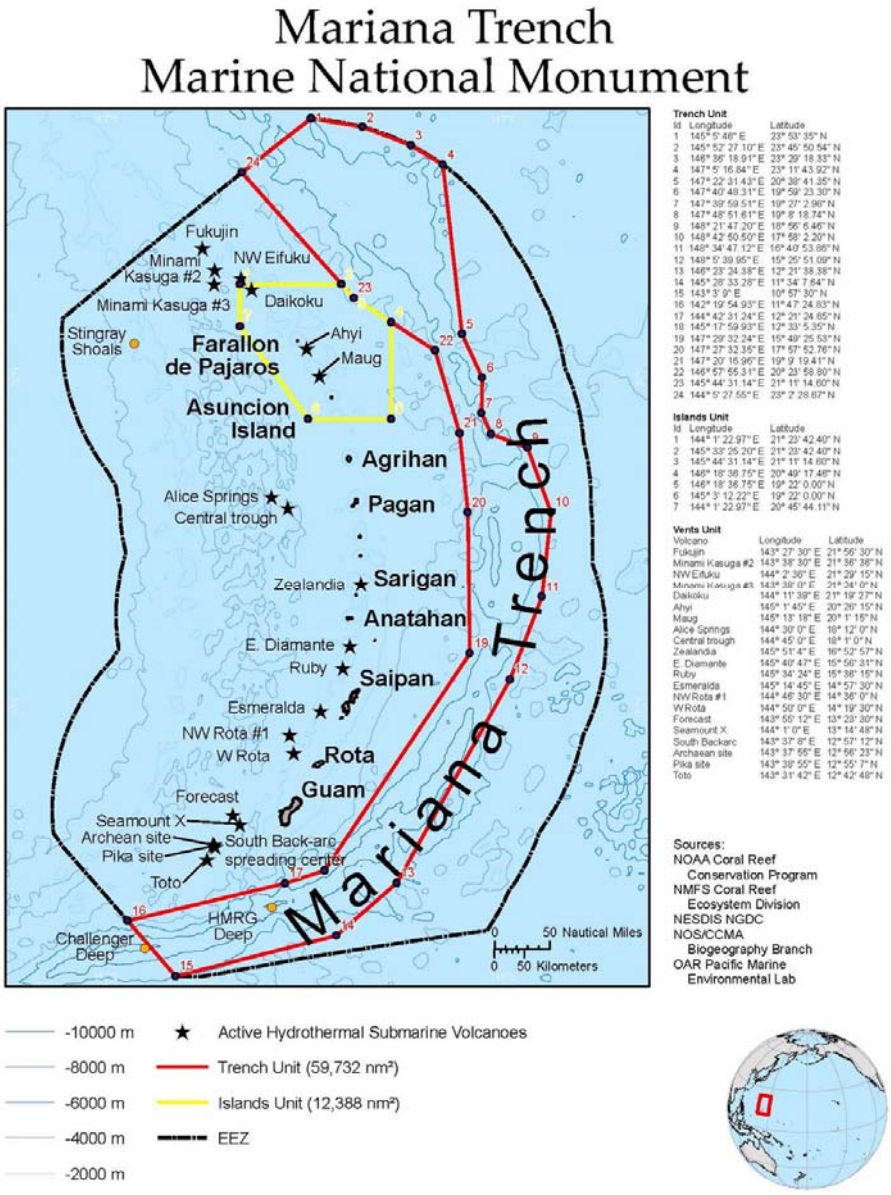

Figure 2. Mariana Trench Marine National Monument
Source: http://www.gop.gov/fdsys/pkg/FR-2009-01-12/pdf/E9-496.pdf

3.3 Mariana Bottomfish Management Unit Species

The commercial and non-commercial bottomfish fisheries of the Marianas Archipelago harvest a complex of 17 species that includes both shallow and deep-water snappers, and several species of groupers, emperors and jacks. In Table 1, the local names of bottomfish management unit species (BMUS) are provided in Chamorro and Carolinian, the two native languages spoken in

Guam and CNMI. Where local Chamorro or Carolinian are unknown, the symbol NA (not applicable) is provided.

Table 1. Mariana Archipelago BMUS

Scientific Name	English Common Name	Local Name Chamorro/Carolinian
Aphareus rutilans	red snapper/silvermouth	lehi/maroobw
Aprion virescens	gray snapper/jobfish	gogunafon/aiwe
Caranx ignobilis	giant trevally/jack	tarakitu/etam
Caranx lugubris	black trevally/jack	tarakiton attelong/orong
Epinephelus fasciatus	blacktip grouper	gadao/meteyil
Variola louti	lunartail grouper	bueli/bwele
Etelis carbunculus	red snapper	buninas agaga/ falaghal moroobw
Etelis coruscans	red snapper	buninas/taighulupegh
Lethrinus rubrioperculatus	redgill emperor	mafuti/atigh
Lutjanus kasmira	blueline snapper	funai/saas
Pristipomoides auricilla	yellowtail snapper	buninas/falaghal-maroobw
Pristipomoides filamentosus	pink snapper	buninas/falaghal-maroobw
Pristipomoides flavipinnis	yelloweye snapper	buninas/falaghal-maroobw
Pristipomoides seiboldii	pink snapper	NA
Pristipomoides zonatus	snapper	buninas rayao amiriyu/ falaghal-maroobw
Seriola dumerili	amberjack	tarakiton tadong/meseyugh

3.4 Description of CNMI Bottomfish Fishery

CNMI's bottomfish fishery consists primarily of small-scale local boats engaged in commercial and subsistence fishing, although a few (generally <5) larger vessels (30– 60 ft) also participate in the fishery. The bottomfish fishery can be broken down into two sectors: deep-water (>500 ft) and shallow-water (100–500 ft) fisheries. The deep-water fishery is primarily commercial, targeting snappers and groupers (WPFMC, 2009) while, the shallow-water fishery, which targets the redgill emperor (*Lethrinus rubrioperculatus*) is mostly commercial, but also includes subsistence fishermen (WPFMC, 2011b). These fishermen also harvest coral reef associated species as well. Hand lines, home-fabricated hand reels and small electric reels are the commonly used gear for small-scale fishing operations, whereas electric reels and hydraulics are the commonly used gear for the larger operations in this fishery. Fishing is often conducted during daylight hours, with vessels presumed to return before or soon after sunset, although larger vessels have made multi-day trips to the Northern Islands (north of Saipan) in the past.

3.4.1 Estimated Level of Participation in the CNMI Bottomfish Fishery

In the early 1980s, there were over 100 vessels participating in the CNMI bottomfish fishery. By 2005, the level of participation decreased to approximately 62 vessels (WPFMC 2006b). By 2009, CNMI creel survey data estimated that 40 vessels reported bottomfish landings. The total (permitted and non-permitted) number of vessels estimated to be fishing in 2013 was 17. As previously mentioned above, federal regulations require all commercial bottomfishing vessels to have a federal bottomfish permit. However, since NMFS and the Council implemented this requirement in 2009, a maximum of 14 vessels commercial fishing vessels have permitted in the fishery in any one year, falling to just five vessels in 2013 (Table 2). This may indicate that nearly three-quarters of the bottomfish fleet is non-commercial.

Table 2. Number of Bottomfish Vessels in CNMI (2000-2014)

	Estimated No. of Vessels[1]	No. of Federally Permitted Vessels Less than 40 ft.[2]	No. of Federally Permitted Vessels greater than 40 ft.[2]	Total No. of Federally Permitted Vessels[2]
2000	72	No data	No data	No data
2001	74	No data	No data	No data
2002	53	No data	No data	No data
2003	59	No data	No data	No data
2004	43	No data	No data	No data
2005	65	No data	No data	No data
2006	46	No data	No data	No data
2007	41	No data	No data	No data
2008	48	No data	No data	No data
2009	43	2	1	3
2010	28	8	4	12
2011	32	8	1	9
2012	21	14	0	14
2013	17	4	1	5
2014		Less than 3	0	Less than 3

[1] Source: Draft 2013 CNMI Bottomfish Annual Report Module (WPFMC in prep).

[2] Source: NMFS PIRO unpublished data

Table 3. Number of CNMI Bottomfishing Hours/Trips (2000-2014)

Year	Bottomfishing Hours	Bottomfishing Trips
2000	31,019	7,111
2001	31,772	7,741
2002	18,248	4,363
2003	17,599	4,314
2004	15,432	3,732
2005	12,853	2,966
2006	17,349	3,382
2007	12,606	2,680

2008	14,833	3295
2009	17,895	3794
2010	17,975	3958
2011	12,951	2755
2012	11,506	2671
2013	10,881	2706
2014	N/A	N/A

3.4.2 Estimated Total and Estimated Commercial Catch of CNMI BMUS (2000-2014)

Table 4 provides the estimated total catch and estimated commercial catch of CNMI BMUS for 2000 through 2013. During this period, the percent of total bottomfish sold ranged between 22 and 103 percent, although in 9 of the 11 years where data is available, less than half of the bottomfish caught were sold.

Table 4. Estimated Total and Commercial Catch

Year	Est. Total Catch (lb)[1]	Est. Commercial Catch (lb)[2]	Percent Sold[3]
2000	66,666	14,968	22
2001	54,352	25,303	47
2002	24,044	24,869	103
2003	43,253	18,063	42
2004	36,915	12,973	35
2005	36,529	16,538	45
2006	38,054	12,262	32
2007	27,459	18,606	68
2008	37,316	18,389	49
2009	40,222	20,418	51
2010	28,958	14,729	51
2011	25,100	16,271	64
2012	16,665	11,072	66
2013	16,919	14,328	85
2014	N/A	N/A	N/A

[1]Source: 2000-10 data from Table 2 in Brodziak et al., (2012); 2011-13 from Draft 2013 CNMI Bottomfish Annual Report Module (WPFMC in prep).
[2] Source: NMFS WPacFIN website: http://www.pifsc.noaa.gov/wpacfin/cnmi/Data/Landings_Charts/ce3c.htm (accessed 05/05/2014)

3.4.3 Review of CNMI Bottomfish Fishery Bycatch

CNMI bottomfishing bycatch is obtained directly from bottomfishing interviews where bycatch was voluntarily reported. It is an unexpanded number. In general, bottomfishing in the CNMI results in minimal bycatch. Interactions with protected species are also believed to be minimal. To date, there have been no reported or observed interactions between protected species and

coral reef fisheries in Federal waters around the CNMI and the potential for interactions is believed to be low due to the gear types and fishing methods.

Table 5. CNMI Bottomfishing Bycatch

Species Name	Interview with Bycatch	All Interview	Released Alive	Total Catch	Bycatch Percentage
No-Charter	3	539			0.56%
Blackjack			1	56	1.79%
Eel (freshwater)			0	1	0.00%
Blueline Snapper			4	644	0.62%
Pufferfish			0	5	0.00%
Dogtooth Tuna			1	42	2.38%
All Species with Bycatch			**6**	**748**	**0.80%**
Compared with All Caught				**14802**	**0.04%**
Charter	12	341			3.52%
Jobfish (uku)			1	41	2.44%
Black Tip Grouper			4	228	1.75%
Flagtail Grouper			4	423	0.95%
Lyretail Grouper			5	85	5.88%
Blueline Snapper			3	313	0.96%
Red Snapper			5	9	55.56%
Emperor (mafute/misc.)			7	237	2.95%
Triggerfish (misc.)			55	929	5.92%
Redgill Emperor			6	333	1.80%
All Species with Bycatch			**90**	**2598**	**3.46%**
Compared with All Caught				**4075**	**2.21%**

3.4.4 CNMI Bottomfish Prices 2011

Table 6 provides the commercial price per pound for CNMI BMUS for 2011, the most recent year data is available. In 2011 BMUS price ranged from $1.75 for tarakitu or giant trevally (*Caranx ignoblis*) to $4.29 for buninas or onaga (*Etelis carbunculus*) with average price per pound for all BMUS combined at $2.86.

Table 6. Average Commercial Price per pound for CNMI BMUS

Scientific Name	English Common Name	Local Name Chamorro/Carolinian	2011
Aphareus rutilans	red snapper/silvermouth	lehi/maroobw	$2.97
Aprion virescens	gray snapper/jobfish	gogunafon/aiwe	$1.99
Caranx ignobilis	giant trevally/jack	tarakitu/etam	$1.75
Caranx lugubris	black trevally/jack	tarakiton attelong/orong	$2.22
Epinephelus fasciatus	blacktip grouper	gadao/meteyil	N/A
Variola louti	lunartail grouper	bueli/bwele	N/A
Etelis carbunculus	red snapper	buninas agaga/ falaghal moroobw	$3.76
Etelis coruscans	red snapper	buninas/taighulupegh	$4.29
Lethrinus rubrioperculatus	redgill emperor	mafuti/atigh	N/A
Lutjanus kasmira	blueline snapper	funai/saas	$2.31
Pristipomoides auricilla	yellowtail snapper	buninas/falaghal-maroobw	N/A
Pristipomoides filamentosus	pink snapper	buninas/falaghal-maroobw	$3.01
Pristipomoides flavipinnis	yelloweye snapper	buninas/falaghal-maroobw	N/A
Pristipomoides seiboldii	pink snapper	NA	$2.54
Pristipomoides zonatus	snapper	buninas rayao amiriyu/ falaghal-maroobw	$3.72
Seriola dumerili	amberjack	tarakiton tadong/meseyugh	N/A
Average BMUS price per pound			**$2.86**

Source: PIFSC Internal Report IR-12-041

3.4.5 Estimated Revenue of the CNMI Bottomfish Fishery

Based on an estimated average CNMI BMUS price of $2.86 lb, the estimated ex-vessel revenue of the CNMI bottomfish fishery in 2011 was $48,420 based on a commercial catch of 16,930 lb. Assuming participation and effort were equal throughout the 9 commercial vessels active in 2011, each vessel would have sold approximately 1,881 lb of bottomfish valued at $5,380.

In 2012, the ex-vessel revenue of the fishery dropped to $33,391 based on a commercial catch of 11,675 lb. Assuming participation and effort were equal throughout the 14 commercial vessels active in 2012, each vessel would have sold approximately 834 lb of bottomfish valued at $2,385.

3.4.6 Estimation of MSY and OFL and Specification of ACLs

According to the PIFSC 2012 bottomfish stock assessment (Brodziak et al., 2012), the long-term MSY for CNMI bottomfish is estimated to be 172,900 ± 32,200 lb, which is lower than the previous MSY estimate of 200,500 ± 40,500 lb reported in the 2007 assessment by Moffitt et al. (2007). Stock projection results shown in Table 7 indicate that catch of bottomfish of approximately 246,000 lb would result in a 34 percent probability of overfishing in 2013, rising in 2014 to approximately a 50 percent probability of overfishing if harvested consecutively over this two-year period. The maximum risk of overfishing allowable by law is 50 percent (74 FR 3178, January 9, 2011). Therefore, while 172,900 lb is the long-term estimate of MSY, 246,000 lb is considered the OFL proxy until a new stock assessment is conducted.

Table 7. CNMI BMUS probabilities of overfishing in 2013 and 2014 for a range of catches

ACL (lb)	% Probability of Overfishing (2013)	% Probability of Overfishing (2014)
4,000	0	0
130,000	5	5
162,000	10	11
183,000	15	17
203,000	20	26
206,200	21	28
209,400	22	29
212,600	23	31
215,800	24	32
219,000	25	34
222,000	26	36
225,000	27	38
228,000	28	39
231,000	29	41
234,000	30	43
237,000	31	45
240,000	32	47
243,000	33	48
246,000	34	50

Source: Values interpolated from Table 16 in Brodziak et al., (2012)

Based on the information above, the Council recommended and NMFS implemented an annual catch limit (ACL) of 228,000 lb of bottomfish for the 2013 and 2014 fishing year (79 FR 4276, January 27, 2014). As shown in Table 8, the 2013 estimated catch was 14,328 lb, far below the CNMI BMUS ACL. Based on past level of catch, the Council does not expect 2014 catches will exceed the ACL.

3.4.7 CNMI Bottomfish Stock Status Determination

In 2010, the most recent year for which stock status information is available, F_{2010}/F MSY = 0.09 while B_{2010}/B_{MSY} = 1.78 (Table 13 in Brodziak et al., 2012). The production model results indicate that the CNMI bottomfish complex was not overfished and did not experience overfishing at any point between the periods 1986 and 2010 (Figure 3). Based on risk projections in Table 8, an annual catch of 246,000 lb in 2013 and again in 2014 would be necessary to produce an F/F_{MSY} ratio of 1.0 (i.e., overfishing). These projections remain valid until a new stock assessment is produced.

3.5 Description of Guam Bottomfish Fishery

Bottomfishing on Guam is a combination of recreational, subsistence, and small-scale commercial fishing. The fishery can be separated into two distinct fisheries targeting species complexes separated by depth and species composition: shallow-water and deep-water bottomfish complexes. The shallow water complex (<500 feet) makes up a larger portion of the total bottomfish effort and harvest and is comprised primarily of reef-dwelling species under genus *Lutjanus*, *Lethrinus*, *Aprion*, *Epinephelus*, *Variola*, and *Caranx*. The deepwater complex (>500 feet) consists primarily of groupers and snappers of the genera *Pristipomoides*, *Etelis*, *Aphareus*, and *Epinephelus* (WPFMC 2011b).

The shallow-water component is the larger of the two in terms of participation because of the lower expenditure and relative ease of fishing close to shore (Myers 1997). Participants in the shallow-water component seldom sell their catch because they fish mainly for recreational or subsistence purposes (WPRMC 2006b). The commercially oriented highliner vessels tend to be longer than 25 feet, and their effort is usually concentrated on the deep-water bottomfish complex. Most fishermen troll for pelagic fish to supplement their bottomfishing effort and most of those who sell their catch also hold jobs outside the fishery (WPFMC 2006b).

Guam's bottomfish fishery can be highly seasonal, with effort significantly increasing when sea conditions are calm, generally during the summer months. During these periods, bottomfishing activity increases substantially on the offshore banks to the south of Guam (in federal waters), as well as offshore banks on the east side of the island (in territorial waters), which are more productive fishing areas that is generally inaccessible to small boats during most of the year due to rough seas.

3.5.1 Estimated Level of Participation in the Guam Bottomfish Fishery

Participation in the Guam bottomfish fishery peaked in 2003 with 481 vessels. Since then, participation has fluctuated between 233 and 355 vessels with approximately 285 vessels active in fishery in 2013 (WPFMC in prep). As previously mentioned above, federal bottomfishing permits are only required for 50 ft. and longer. Since NMFS and the Council implemented this requirement in 2006, the maximum number of large vessels participating in this fishery was 6 in 2010 and 2011. Since then, participation has decline to less than three (Table 9).

Table 8. Number of Bottomfish Vessels in Guam (2000-2014)

Year	Estimated No. of Vessels[1]	Total No. of Federally Permitted Vessels (only vessels greater than 50ft)[2]
2000	312	No data
2001	337	No data
2002	351	No data
2003	481	No data
2004	347	No data
2005	233	No data
2006	261	No data
2007	320	1
2008	286	2
2009	322	1
2010	355	6
2011	295	6
2012	250	Less than 3
2013	285	Less than 3
2014	N/A	Less than 3

[1] Source: Draft 2013 Guam Bottomfish Annual Report Module (WPFMC in prep).

[2] Source: NMFS PIRO unpublished data

Table 9. Number of Guam Bottomfishing Hours/Trips (2000-2014)

Year	Bottomfishing Hours	Bottomfishing Trips
2000	31,019	7,111
2001	31,772	7,741
2002	18,248	4,363
2003	17,599	4,314
2004	15,432	3,732
2005	12,853	2,966
2006	17,349	3,382
2007	12,606	2,680
2008	14,833	3295
2009	17,895	3794
2010	17,975	3958
2011	12,951	2755
2012	11,506	2671
2013	10,881	2706
2014	N/A	N/A

3.5.2 Estimated Total and Estimated Commercial Catch of Guam BMUS (2000-2014)

Table 11 provides the estimated total boat-based and shore based catch and estimated commercial catch of Guam BMUS for 2000 through 2013. During this period, the percent of

total bottomfish sold ranged between 25 and 68 percent, although in 9 of the 13 years where data is available, less than half of the bottomfish caught were sold.

Table 10. Annual Estimated Catch of BMUS in Guam (2000-2014)

Year	Est. Total Catch (lb)[1]	Est. Commercial Catch (lb)[2]	Percent Sold[3]
2000	66,666	20,371	31
2001	54,352	23,690	44
2002	24,044	17,561	73
2003	43,253	10,841	25
2004	36,915	24,947	68
2005	36,529	23,002	63
2006	38,054	17,100	45
2007	27,459	16,074	59
2008	37,316	11,484	31
2009	40,222	15,867	39
2010	28,958	13,810	49
2011	58,627	15,985	27
2012	25,232	10,000	40
2013	31,026	N/A	N/A
2014	N/A	N/A	N/A

[1]Source: 2000-10 data from Table 2 in Brodziak et al., (2012); 2011-13 from Draft 2013 Guam Bottomfish Annual Report Module (WPFMC in prep).
[2] Source: NMFS WPacFIN website: http://www.pifsc.noaa.gov/wpacfin/guam/dawr/Data/Landings_Charts/ge3c.htm (accessed 05/05/2014)
[3] Percent sold derived by dividing estimated commercial catch by estimated total catch

3.5.3 Review of Guam Bottomfish Fishery Bycatch

With an overall bycatch (discard) rate of less than 4 percent, most fish caught in the Guam bottomfish fishery are kept, regardless of size or species (Table 12). However, the charter fishing sector commonly practices catch-and-release fishing, resulting in an overall bycatch rate of 20 percent (WPFMC in prep).

Table 11. 2013 Guam Bottomfish Fishery Bycatch

	Number Released				Bycatch
Species Name	**Alive**	**Dead/Injured**	**Both**	**Total**	**(%)**
Non-Charter					
Serranidae	10	0	10	36	27.78
Mullidae	10	0	10	18	55.56
Misc. Shallow Bottomfish		6	6	216	2.78
Non-Charter Bycatch Total	10	6	26	270	9.63
Comparison with All Species Caught				1,128	2.30

	Number Released				Bycatch (%)
Species Name	**Alive**	**Dead/Injured**	**Both**	**Total**	
Charter					
Serranidae	3	0	3	3	100.00
Seriola dumerili	5	0	5	5	100.00
Mullidae	3	0	3	3	100.00
Parupaneus sp.	4	0	4	4	100.00
Scaridae	1	0	1	1	100.00
Balistidae	2	0	2	2	100.00
Charter Bycatch Total	18	0	18	18	100.00
Comparison with All Species Caught				94	19.15
All Bycatch Total	38	6	44	288	15.27
Comparison with All Species				1,222	3.60

Source: Draft 2013 Guam Bottomfish Annual Report Module (WPFMC in prep).

Trends in bycatch rates for Guam's bottomfish fishery are illustrated in Table 13. These rates have been declining since 2001.

Table 12. Guam Bottomfish Fishery Bycatch (2001-2013)

Year	Released alive	Released dead/injured	Total Number Released	Total Number Landed	Percent Bycatch*	Interviews with Bycatch	Total Number of Interviews	Percent of Interviews with Bycatch
2001	620	3	623	3,896	16.0	58	183	31.7
2002	356	0	356	2,504	14.2	33	137	24.1
2003	191	0	191	1,888	10.1	14	101	13.9
2004	122	0	122	1,795	6.8	11	100	11
2005	66	0	66	1,669	3.95	6	103	5.82
2006	142	3	145	5,666	2.55	6	91	6.59
2007	139	0	139	5,361	2.59	5	12	41.66
2008	121	0	121	5,618	2.15	11	91	12.08
2009	75	2	77	2,702	2.84	8	134	5.97
2010	29	0	29	2,587	1.12	2	22	9.1
2011	45	0	45	2,081	2.16	3	10	30.0
2012	37	0	37	961	3.85	3	48	6.3
2013	**38**	**6**	**44**	**288**	**3.60**	**5**	**55**	**9.09**

*"percent bycatch" is the number of fish that was released or discarded compared to the total number of bottomfish that was landed. The bycatch information is obtained from unexpanded raw data, taken only from actual interviews that reported bycatch.

Source: Draft 2013 Guam Bottomfish Annual Report Module (WPFMC in prep).

3.5.4 Guam Bottomfish Prices 2011

Table 14 provides the commercial price per pound for Guam BMUS for 2011, the most recent year data is available. In 2011 BMUS price ranged from $2.40 for tarakiton attelong or black

jack (*Caranx lugubris*) to $4.82 for buninas or onaga (*Etelis coruscans*) with average price per pound for all BMUS combined at $3.47.

Table 13. Average Price per pound Guam BMUS

Scientific Name	English Common Name	Local Name Chamorro/Carolinian	2011
Aphareus rutilans	red snapper/silvermouth	lehi/maroobw	$3.70
Aprion virescens	gray snapper/jobfish	gogunafon/aiwe	$2.70
Caranx ignobilis	giant trevally/jack	tarakitu/etam	N/A
Caranx lugubris	black trevally/jack	tarakiton attelong/orong	$2.40
Epinephelus fasciatus	blacktip grouper	gadao/meteyil	N/A
Variola louti	lunartail grouper	bueli/bwele	N/A
Etelis carbunculus	red snapper	buninas agaga/ falaghal moroobw	$3.96
Etelis coruscans	red snapper	buninas/taighulupegh	$4.82
Lethrinus rubrioperculatus	redgill emperor	mafuti/atigh	N/A
Lutjanus kasmira	blueline snapper	funai/saas	N/A
Pristipomoides auricilla	yellowtail snapper	buninas/falaghal-maroobw	N/A
Pristipomoides filamentosus	pink snapper	buninas/falaghal-maroobw	$3.84
Pristipomoides flavipinnis	yelloweye snapper	buninas/falaghal-maroobw	$2.92
Pristipomoides seiboldii	pink snapper	NA	$3.67
Pristipomoides zonatus	snapper	buninas rayao amiriyu/ falaghal-maroobw	$3.96
Seriola dumerili	amberjack	tarakiton tadong/meseyugh	$2.69
Average BMUS price per pound			**$3.47**

Source: PIFSC Internal Report IR-12-041

3.5.5 Estimated Ex-vessel Revenue of the Guam Bottomfish Fishery

Based on an estimated average Guam BMUS price of $3.47 lb, the estimated ex-vessel revenue of the Guam bottomfish fishery in 2011 was $55,468 based on a commercial catch of 15,985 lb. In 2012, the ex-vessel revenue of the fishery dropped to $34,700 based on a commercial catch of 10,000 lb. There is no data to determine what percentage of the total number of vessels in the fishery are commercial vessels. Therefore, it is impossible to determine per vessel ex-revenue. Similarly, data to estimate ex-vessel revenue by vessel size is not available.

3.5.6 Estimation of MSY and OFL and Specification of ACLs

According to a PIFSC 2012 bottomfish stock assessment (Brodziak et al., 2012), the long-term MSY for Guam bottomfish is estimated to be 55,000 lb ± 7,900 lb, which is slightly higher than the previous MSY estimate of 53,000 ± 9,500 lb reported in the 2007 assessment by Moffitt et al. (2007). Stock projection results shown in Table 15 indicate that catch of bottomfish of approximately 70,400 lb would result in a 34 percent probability of overfishing 2013, rising in 2014 to approximately a 49 percent probability of overfishing if consecutively taken over this two year period. The maximum risk of overfishing allowable by law is 50 percent (74 FR 3178, January 9, 2011). Therefore, while 55,000 lb is the long-term estimate of MSY, 70,400 lb is considered to be the OFL proxy until a new stock assessment is conducted.

Table 14. Guam probabilities of overfishing in 2013 and 2014 for a range of catches

ACL (lb)	% Probability of Overfishing (2013)	% Probability of Overfishing (2014)
22,000	0	0
44,000	5	5
51,000	10	11
56,000	15	17
61,000	20	26
61,800	21	28
62,600	22	30
63,400	23	31
64,200	24	33
65,000	25	35
65,600	26	37
66,200	27	38
66,800	28	40
67,400	29	41
68,000	30	43
68,500	31	45
69,200	32	46
69,800	33	48
70,400	34	49
71,000	35	51

Source: Values interpolated from Table 17 in Brodziak et al., (2012)

Based on the information above, the Council recommended and NMFS implemented an annual catch limit (ACL) of 66,800 lb of bottomfish for the 2013 and 2014 fishing year (79 FR 4276, January 27, 2014). As shown in Table 11, the 2013 estimated catch of 31,026 lb did not exceed the ACL. Based on past level of catch, the Council does not expect 2014 catches will exceed the ACL.

3.5.7 Guam Bottomfish Stock Status Determination

In 2010, the most recent year for which stock status information is available, F_{2010}/F MSY = 0.36 while B_{210}/B_{MSY} = 1.594 (Table 14 in Brodziak et al., 2012). The production model results indicate that during the period 1982 through 2010, the Guam bottomfish complex has not been overfished and has not experienced overfishing, except perhaps in 2000 (Figure 3). Based on risk projections in Table 15, an annual catch between 70,400 lb and 71,000 lb in 2013 and again in 2014 would be necessary to produce an F/F_{MSY} ratio of greater than 1.0 (i.e., overfishing). These projections remain valid until a new stock assessment is produced.

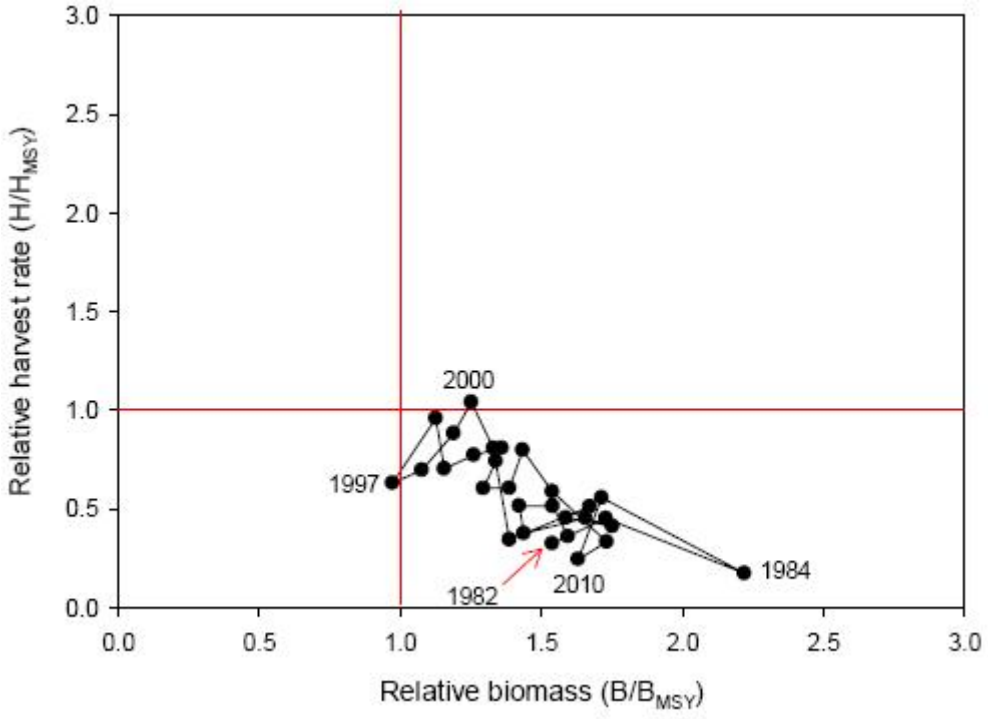

Figure 3. Kobe Plot of relative biomass and relative exploitation rate from the best fitting production model for Guam, 1982-2010
(Source: Brodziak et al., 2012, Figure 39)

3.6 Economic, Social and Cultural Characteristics of CNMI's Fisheries

3.6.1 Overview

Because participants in CNMI's various marine fisheries are not concentrated in specific locales but rather reside in villages and small towns across the islands, and because fishing, seafood, and fishing-related businesses assume extensive social and economic importance throughout the region, the CNMI may be envisioned to encompass a single fishing community. In this regard, the CNMI is like other island communities in the Western Pacific, where the surrounding ocean and its resources have long provided residents with a source of food and opportunities for maritime commerce and recreation. As part of NOAA's ongoing effort to document and monitor fishing-related aspects of life in coastal and island communities around the U.S., the Pacific Islands Fisheries Science Center recently completed a descriptive profile of the CNMI as a

fishing community. This and a range of additional secondary source materials are used in the following sections to describe fishing and fishing-related activities and their role in organizing community life across this island region.

3.6.1.1 Historical Context

Portions of the Marianas Archipelago were settled as early as 3,500 years ago or earlier by navigators who undertook voyages of unprecedented distance (cf. Russell 1998:78, Rainbird 1994). Fishing hooks, spear points, sinkers, lures, and osteal remains from a variety of nearshore and offshore fish species have been recovered from archeological sites around the Mariana Islands. This is indicative of extensive human reliance on the region's marine resources following initial colonization (cf. Amesbury 1986).

Magellan made first contact with indigenous residents of the Marianas in 1621 (Rogers 2011). Legazpi claimed the islands for Spain in 1565 (Carano and Sanchez 1964 as cited in Allen and Amesbury 2012). Driver's (2000) summary of literature from the contact period notes that the Europeans were impressed by the skills of indigenous residents who trolled from sailing canoes for flying fish, marlin, mahimahi, and skipjack tuna. Fish and other living marine resources were central to the local diet and were used for a variety of customary purposes, including consumption during religious ceremonies, recompense for various crimes, and as gifts for the dying (Driver 2000).

A Jesuit mission was established in the Marianas in 1668, initiating a long period of social change among descendants of the original seafaring settlers. As noted by Taitano (1985), these descendants were known as Chamorrans, a term deriving from the indigenous *chamorri*, meaning "of high caste." The author notes that:

> The term *"Chamurres"* was used by the Legazpi expedition of 1565, and appears in other records from the same period. By the time of the Jesuit missionary expedition led by Diego Luis de San Vitores a century later, the terms "*Chamorris*" and "*Chamorros*" were commonly used to refer to the indigenous population (Taitano 1985).

Social change among the Chamorrans was extensive following contact with Europeans. Small but culturally sophisticated maritime societies underwent extensive change as new diseases were introduced in a context of limited immunity; as new technologies, systems of belief, and economic arrangements were brought by each newly arriving group of foreign visitors and migrants; and as in-migrating social and genetic groups interacted with local societies.

An important fishing-specific change occurred during the early post-contact period as the sailing canoes used by Chamorrans to access offshore banks and sea mounts were systematically destroyed by the Spanish to concentrate the indigenous population in a few settlements. This served the interests of colonial rulers and missionaries who sought religious conversion (Amesbury and Hunter-Anderson 1989). According to Myers (1997), by the mid-19th century only 24 outrigger canoes were being used to fish around Guam, largely within the fringing reef.

Typhoons and tsunami events in the Caroline Islands led the indigenous seafaring people known as Refaluwasch to immigrate to the Mariana archipelago during the early 19th century (Bowers 2001, D'Arcy 2006). Sometimes called Carolinians, members of this culture group migrated primarily to Saipan, where they continue to perpetuate a unique Micronesian language and way of life (cf. Ellis 2012).

The Mariana Islands were politically divided at the end of the Spanish-American War. Guam became an American possession administered by the U.S. Navy and remained so until capture by Japanese forces soon after the attack on Pearl Harbor. The island was retaken by American forces in 1944. The remainder of the archipelago was administered by a succession of powers – first Germany, then Japan, and finally the United States at the end of World War II (see Allen and Amesbury 2012).

Naval administrators working on Guam during the early 1900s documented a variety of local fishing techniques (cf. Amesbury and Hunter-Anderson 2008). Nets typically were deployed by groups of residents, and the catch was shared among the participants' extended families. Amesbury et al. (1986) report that fishing activities were relatively limited during this period, occurring primarily along or in readily accessible lagoons and shorelines. New gear and materials were introduced during the early 20th century, including swimming goggles for spear fishing and manufactured hooks and line for pole and line fishing. Perceiving the need for a consistent local supply of pelagic fish, territorial administrators established an offshore fishing program in 1934.

Extensive fishing operations were conducted off Saipan and Tinian during the Japanese occupation of World War II, with extensive participation by fishermen of Okinawan ancestry. Immediately after the war, fisheries were especially challenged by lack of capital and limited shoreside infrastructure (Amesbury et al.1986). Some net fishing was undertaken during this period, most notably by fishermen residing in Merizo and Umatac on Guam.

A cooperative of indigenous fishermen was established on Saipan soon after World War II. According to Spoer (2000:129) approximately100 tons of bonito were harvested in 1948. But infrastructure and marketing conditions were less than ideal, and the firm was soon defunct (cf. Spoehr 2000:129-130).

As described by Allen and Amesbury (2012), some small-scale and traditional fishing activities continued to occur during and after the war years. A small-boat fishing fleet gradually developed in the CNMI during the 1960s and 1970s in conjunction with post-war improvements in hull materials and engine technology, and a small number of residents engaged in small-scale commercial and food-oriented open-ocean fishing activities during that time.

In the early 1980s, U.S. purse seine vessels established a seafood transshipment operation on Tinian, wherein tuna was shipped to American Samoa for canning. A similar operation was established on Saipan in the early 1990s when tuna harvested in the waters of the Federated States of Micronesia was offloaded for air travel from Saipan to destinations in Japan. While extensive volumes of tuna were shipped through Saipan, local economic benefits were minimal (cf. Hamnett and Pintz 1996). Both operations are now defunct.

Garment manufacturing and tourism were the leading forms of economic production in the CNMI during the 1980s and 1990s. Growth in the tourism sector was rapidly attenuated by the Asian economic crisis of the late 1990s, though it remained central to the regional economy during the early 2000s (Allen and Amesbury 2012) and continues to be the primary source of non-governmental employment and revenue throughout the islands. The garment industry has largely vacated the region for reasons described further along in this section.

Subsequent to World War II, the northern Mariana islands were administered by the United States as part of the United Nations Trust Territory of the Pacific Islands. The recent history of the political relationship between the territory and the U.S. government is described by Allen and Amesbury (2012:31) as follows:

> In 1975, the voters of the Northern Marianas chose to join the U.S. as a commonwealth . . . and in 1976 the U.S. Congress passed and the President signed the Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America (Covenant) (Public Law 94-241). The Covenant defines the political relationship between the CNMI and the United States, with the CNMI as a self-governing entity under the sovereignty of the U.S. The relationship is governed by the Covenant together with those provisions of the U.S. Constitution, treaties and laws of the U.S. applicable to the CNMI. The CNMI government adopted its own constitution in 1977, and the constitutional government took office in 1978 when Dr. Carlos S. Camacho became the first governor of the CNMI . . .The Covenant was fully implemented on November 3, 1986, pursuant to Presidential Proclamation 5564, which conferred United States citizenship on legally qualified CNMI residents. The people of CNMI are U.S. citizens, but they cannot vote in the U.S. presidential election. In 2008, Congress established a nonvoting CNMI delegate's seat in the U.S. House of Representatives; the first CNMI delegate took office in January 2009.

3.6.1.2 Recent and Contemporary Situation

The CNMI consists of 14 main islands. From north to south these are: Farallon de Pajaros, Maug, Asuncion, Agrihan, Pagan, Alamagan, Guguan, Sarigan, Anatahan, Farallon de Medinilla, Saipan, Tinian, Aguijan, and Rota. Only Saipan, Rota, and Tinian are permanently inhabited. The total land area of the CNMI is 176.5 square miles, with an Exclusive Economic Zone of some 292,712 square miles. Saipan was home to 48,220 persons at the time of the 2010 Census, with some 3,136 persons residing on Tinian and 2,537 residing on Rota. Overall population density in the region was 296 persons per square mile at the time of the most recent Census (U.S. Census Bureau 2010).

The social and economic interplay between CNMI residents and the surrounding ocean environment is central to an understanding of community life in the archipelago. The islands are relatively small and most towns and villages are located along the coastal zone. As such, the ocean is an ongoing visual presence in the lives of all residents. Because the region is located some 1,800 miles from the nearest continent and over 5,500 miles from North America, goods must be transshipped on or over thousands of miles of ocean. This has led to a relatively high

cost of living and limited availability of certain goods and services. The tourism economy is closely related to recreation and leisure opportunities along the coastal zone, and it too is conditioned by distance of travel to the islands. Fishing activities are important across the Commonwealth, and living marine resources are used for commercial sale, household consumption, and as a source of recreation. Various aspects of local and indigenous history, culture, and society are closely related to the surrounding ocean and use of its resources.

Global economic forces have led to significant socioeconomic and demographic change in the CNMI in recent years. For example, the number of tourists visiting the islands nearly tripled between the late 1980s and mid-1990s, and tourist expenditures peaked at $587 million in 1996. But the Asian economic crisis and loss of air service between the CNMI and Korea led to a 33 percent decline in the number of persons visiting the region later in the 1990s (Bank of Hawaii 1999). The situation generated a variety of detrimental impacts to businesses across the region.

The first decade of the 2000s was a particularly notable period of change in the CNMI. Most significantly, the number of persons living in the region declined by over 22 percent between the most recent Census years – from 69,221 persons in 2000 to 53,833 persons in 2010. As described by the Secretariat of the Pacific Community (2009), this unprecedented loss was directly related to evolving macro-social forces in Asia and North America and the subsequent departure of firms in the CNMI garment industry:

> CNMI is experiencing its most challenging economic status since the birth of the Commonwealth in 1976. One of these challenges is the total loss of its garment industry. During the 1980s CNMI successfully capitalized on its status as a free trade area with the USA (while not being subject to the same labor or immigration laws) to establish a garment manufacturing industry whose products could be labelled 'Made in USA'. At its peak, the industry had some 15,000 employees, many of whom were immigrants from China. However, China's accession to the World Trade Organization, and the consequent lifting of restrictions on Chinese imports into the USA, as well as the passing of the Fair Minimum Wage Act of 2007 by the US Congress, put the industry under severe pressure, leading to immediate closures of several factories permanently and others leaving for Third World countries.

Challenging regional economic conditions are also indicated in the recently published GAO Highlights Report (GAO 2014) documenting economic changes following from escalation of the minimum wage in the region. The authors note that "in real terms, [the CNMI GDP] decreased by approximately 36 percent between 2006 and 2012." While the GAO indicates some improvement in the tourism sector of the region's economy, its overall assessment suggests that economic challenges will continue for some time.

Analysis of recent demographic trends clearly indicates that CNMI householders have been struggling in response to regional and international economic downturns. For example, median income among CNMI households dropped from $22,898 in 2000 to $19,958 in 2010, and the local rate of unemployment, which was at 5.5 percent in 2000, rose to 11.2 percent in 2010. Similarly, the percentage of residents living in conditions of poverty increased from 46 percent

in 2000 to 51.3 percent in 2010. Notably, the rate of poverty among residents of the U.S. as a whole was 11.3 percent in 2000 and 15.1 percent in 2010 (U.S. Bureau of the Census 2000, 2010). Per capita income among CNMI residents was $9,656 in 2010 – essentially unchanged from the year 2000 Census (GAO 2014; U.S. Bureau of the Census 2000, 2010).

Departure of the garment industry from the CNMI in the mid-2000s also appears to have affected the ethnic composition of the resident population. For example, while the number of resident Chammorans and Carolineans enumerated during the most recent Census years was similar, the frequency distribution of other groups varied extensively during the period. Year 2000 Census data indicate that approximately 26 percent of CNMI residents were of Filipino ancestry and 22 percent were of Chinese ancestry. At the time of the 2010 Census, however, over 35 percent of enumerated residents identified themselves as Filipino, and only 6.8 percent identified themselves as Chinese.

3.6.2 Contemporary Community Dependence on Fishing and Seafood

A variety of recently completed research products are available to assist in summarizing fishing activities and fishing-related aspects of community life in the CNMI. These and past studies are useful points of reference for analysis of fisheries-related trends and conditions across the region.

Hospital and Beavers (2014) analysis of small boat fishing in the CNMI was conducted as part of NOAA's ongoing work to monitor near- and long-term socioeconomic and operational changes among fishing fleets in the Western and Central Pacific. The research involved implementation of an in-depth cost-earnings survey with 112 fishermen across the CNMI.

Impact Assessment, Inc. (2012) conducted fieldwork on each of the inhabited islands during 2011 and 2012, with the goal of documenting the current status of small-scale and traditional fishing activities and related infrastructure in the CNMI, Guam, and American Samoa. This project was funded by the then-active Pelagic Fisheries Research Program at the University of Hawaii at Manoa.

Kotowicz and Richmond (2013) documented traditional fishing patterns in what is now the Marianas Trench Marine National Monument. This NOAA-funded study was conducted to document traditional indigenous fishing activities as these have occurred in the northern reaches of the Marianas Archipelago over the course of time.

Finally, Allen and Amesbury (2012) examined fishing-related aspects of community life in the CNMI as part of NOAA's strategy to characterize and monitor fishing communities around the nation's coastal zone. Key findings from these and other studies are used here to briefly summarize contemporary human aspects of marine fisheries in the CNMI, and the ways in which fishing and seafood function to organize social life in the region.

Fishing and seafood are indeed important organizing aspects of life on the islands of Saipan, Rota, and Tinian. Although certain elements of traditional Chamorro and Carolinian culture were lost during the post-Contact period, it should be noted here that culture and tradition are

dynamic rather than static social phenomena and that human societies universally retain certain values while adopting new approaches on a continual basis.

Contemporary Chamorros and Refulwasch retain certain traditional-indigenous values and concepts, while also accepting and acting on values and concepts that have arrived from outside the region over centuries past. In the context of fishing and community life in the region, such blended values are expressed in a variety of ways that include but are not limited to: (a) extensive consumption and sharing of seafood in extended family settings; (b) sale of seafood at local markets, with proceeds typically covering the costs of fishing and/or various household expenses; and (c) consumption and communal sharing of seafood during religious festivals, weddings, funerals, christenings, and various holidays (Amesbury and Hunter-Anderson 1989; Rubinstein 2001; Kotowicz and Richmond 2013).

Based on a series of in-depth interviews and oral histories conducted with key fishermen on the main islands of the CNMI, Kotowicz and Richmond (2013) were able to document the nature of 129 trips from the main islands of Saipan, Tinian, and Rota to waters around the northernmost islands of Urucas, Maug, and Ascuncion – now components of the new marine monument. Based on analysis of the resulting information, the authors assert that:

> Residents of the [inhabited] Marianas assign cultural importance and non-use values to the waters and lands of the northern islands, which can be at least partially attributed to their continued visits to this area and to the exchange of [harvested] marine resources between the southern and northern [islands] Kotowicz and Richmond (2013:iii).

Hospital and Beavers' (2014) survey of 112 small boat fishermen in the CNMI confirms the importance of fishing and seafood in the region, and the tendency of local fishermen and their extended families to perpetuate customs that prioritize use of seafood for dietary and cultural purposes. While some local small-boat operators seek to generate income through the harvest and sale of seafood, the costs of fishing tend to constrain net revenues (see also Western Pacific Regional Fishery Management Council 2011). Hospital and Beavers (2012) state that:

> Based on the average disposition of landings in the CNMI, it is clear that for nearly all fishery participants, the social and cultural motivations for fishing far outweigh any economic prospects. In considering fishing profitability, we find that nearly all fishermen supplement their income with other jobs and essentially are subsistence fishermen, selling occasionally to recover trip expenses. Using reported revenues, we found that 58% of fishermen reporting the sale of fish earned fishing revenues of $750 or less, which would not cover overall trip expenditures for the year. Additionally, we find that fish are an important source of food security for fishing families as 86% of survey respondents consider the fish they catch to be an important source of food . . with 91% and 93% affirming likewise for bottomfish and reef fish, respectively . . . We find the CNMI small boat fishery to be a complex mix of subsistence, cultural, recreational, and quasi-commercial fishermen whose fishing behaviors provide evidence of the

> importance of fishing to the communities of the CNMI (Hospital and Beavers 2014:55).

Interview data collected and analyzed by Impact Assessment, Inc. (IAI 2012) are also indicative of the overarching importance of fishing and seafood to the indigenous and non-indigenous residents of the CNMI. The firm's 2012 report is largely descriptive in nature, intended to update understanding of the nature and extent of small-scale and traditional fishing in the CNMI, Guam, and American Samoa. Using direct observation at harbors and moorings around the islands, and interviews with local harbormasters and fishery managers, the authors enumerated roughly 15 active small fishing vessels on Rota, 20 active vessels on Tinian, and nearly 100 active vessels on Saipan.

At the time of IAI's (2012) study, the Saipan fleet included roughly 60 trailered vessels under 26 feet in length; roughly 30 moored vessels between 16 and 32 feet in length, three charter fishing vessels, and five pelagic fishing vessels over 35 feet in length. Interview work with local fishery managers indicated that captains and crew operating the small fleet of relatively large vessels: (a) travel and harvest primarily within a 100-mile radius of the islands, (b) undertake trips ranging from three to five days in length; and (c) return with landings that are typically comprised of about 40 percent pelagic species and 60 percent bottomfish species. Hospital and Beavers (2014) used the term "highliners" to categorize this group, and IAI (2012) asserted that a relatively large proportion of the fleet's landings were sold to local vendors and business owners in the tourism sector. The authors also describe the existence of specialized fishing operations, the captains and crew of which tend to focus on providing fish for familial and community celebrations:

> Some of the small-boat owner-operators are considered *pescadors* – a term used to refer to fishermen who provide seafood for important community and familial events; especially important are those dedicated to patron saints. *Pescadors* will customarily provide as much as 100 or 200 pounds of reef fish for cooked dishes, and [an undisclosed poundage of] pelagic species for ***kelaguen,*** a raw fish recipe used extensively during community and family celebrations (IAI 2012:27).

The work of Allen and Amesbury (2012) also describes fishing activities and fishing-related infrastructure, services, and governance in the CNMI. The work underscores the perspective that because fishing, seafood, and related sociocultural and economic activities are pervasive aspects of life on Saipan, Tinian, and Rota, the island region should be considered a fishing community for purposes of fisheries management and assessment of potential management-induced impacts – as prescribed by National Standard 8 of the reauthorized Magnuson-Stevens Fisheries Management and Conservation Act. As such, the authors reiterate the rationale underlying the 1999 decision of the Western Pacific Regional Fishery Management Council to designate the entirety of the CNMI as a fishing community:

> In contrast to most U.S. mainland residents, who [in total] have little contact with the marine environment, a large proportion of the people living in the western pacific region observe and interact daily with the ocean for food, income and recreation . . . fishing also continues to contribute to the cultural integrity and social cohesion of island communities . . . In each island area within the region

> the residential distribution of individuals who are substantially dependent on or substantially engaged in the harvest or processing of fishery resources approximates the total population distribution. These individuals are not set apart ... from island populations as a whole (Western Pacific Regional Fishery Management Council 1998:52-53 as cited in Allen and Amesbury 2012:2).

Allen and Amesbury (2012) provide extensive description of the history and current status of fishing, fishermen, and use of seafood in the CNMI. Attention is given to strategies used by fishermen and fishing-oriented families to adapt to perennially challenging local economic conditions. These strategies include: (a) readiness to take on additional forms of wage-earning labor (see also Orbach 1980, and Amesbury and Hunter-Anderson 1989); (b) the sharing of a variety of harvested seafood with friends and family; (c) the occasional or (in certain cases) frequent sale of seafood to cover fishing costs and/or various household expenses; and (d) participation in an overall process of reciprocal sharing of funds, labor, and goods within and between networks of interacting extended families (Allen and Amesbury 2012; Impact Assessment, Inc. 2012).

These findings are similar to those discussed by Amesbury and Hunter-Anderson (1989), who also noted that certain reef fish and shallow-water bottomfish were particularly important items of non-commercial exchange. Notably, Allen and Amesbury (2012) assert that the local harvest of reef fish is insufficient for meeting regional demand, and that various compatible resources are therefore being imported from elsewhere in Micronesia and the Philippines.

In sum, while additional research would be required to determine the overall level of dependence of all CNMI residents on seafood, fishing, and related economic activities, it is patently clear that a sizeable population of residents is directly and/or indirectly dependent on fishing-related activities and various seafood products. Synthesis of available research findings suggests that such dependence is magnified in the contemporary context of widespread economic challenges.

Based on enumeration of small-vessel fleets around Saipan, Tinian, and Rota in 2011 and 2012 (Allen and Amesbury 2012; IAI 2012), but excluding an undoubtedly large number of shore-based harvesters around the islands, many hundreds of local families are in some manner and to some extent dependent on living resources available in the adjacent marine environment. The harvest includes a wide variety of reef fish, reef-associated invertebrate species, neritic-pelagic species, bottomfish, and pelagic species (cf. Allen and Amesbury 2012:51). The resources are variably: (a) consumed, (b) sold, (c) shared, (d) bartered, (e) gifted, (f) subject to customary exchange, (g) used as important commodities in extensive systems of local reciprocal exchange, (h) the targeted subject of ocean-based recreation, (i) constitute the basis of economic production in various fishery support sectors, and (j) function as the dietary focus of important social and cultural functions among indigenous and non-indigenous residents. Inasmuch as all such uses involve the ongoing participation and organization of people and various economic resources, it can be said that fishing and seafood continue to function as elemental aspects of social life across the CNMI.

3.7 Protected Resources in the CNMI and Guam

A number of species protected under the Endangered Species Act (ESA) Marine Mammal Protection Act (MMPA), and Migratory Bird Treaty Act (MBTA) inhabit or use waters around the Mariana Archipelago and there is, therefore, the potential for interactions with the bottomfish fisheries of Guam and CNMI under the proposed action described in Section 2. This section summarizes the occurrence of potentially affected protected species in the Mariana Archipelago. Additional detailed descriptions of these species and their life histories can be found in Section 3.3.3 of the FEP for the Mariana Archipelago (WPFMC 2009) and is not repeated here.

3.7.1 Listed ESA Species

Table 16 identifies species listed as endangered or threatened under the ESA that are known to occur, or could reasonably be expected to occur, in marine waters around the Mariana Archipelago, and which may have the potential to interact with CNMI bottomfish fisheries. They include a number of whales, five sea turtles, and a seabird. There is no critical habitat designated for ESA-listed marine species around CNMI.

Table 15. Endangered and threatened marine species and seabirds known to occur or reasonably expected to occur in waters around the Mariana Archipelago

Endangered and threatened marine species and seabirds known to occur or reasonably expected to occur in waters around the Marina Archipelago				
Common name	**Scientific Name**	**ESA listing status**	**Occurrence**	**Interactions with the CNMI bottomfish fisheries**
Listed Sea Turtles				
Green sea turtle Haggan Betde	*Chelonia mydas*	Threatened	Most common turtle in the Mariana Archipelago. Foraging and minor nesting confirmed on Guam, Rota, Tinian and Saipan.	No interactions observed or reported.
Hawksbill sea turtle Haggan Karai	*Eretmochelys imbricata*	Endangered	Small population foraging around Guam and suspected low level around southern islands of the CNMI.	No interactions observed or reported.

Endangered and threatened marine species and seabirds known to occur or reasonably expected to occur in waters around the Marina Archipelago				
Common name	**Scientific Name**	**ESA listing status**	**Occurrence**	**Interactions with the CNMI bottomfish fisheries**
			Low level nesting on Guam.	
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Occasional sightings around Guam. Not known to what extent they are present around Guam and CNMI.	No interactions observed or reported.
Olive ridley sea turtle	*Lepidochelys olivacea*	Threatened	Range across Pacific: not confirmed in the Mariana Archipelago.	No interactions observed or reported.
North Pacific Loggerhead sea turtle Distinct Population Segment	*Caretta caretta*	Endangered	No known reports of loggerhead turtles in waters around the Mariana Archipelago.	No interactions observed or reported.
Listed Marine Mammals				
Blue whale	*Balaenoptera musculus*	Endangered	Extremely rare.	No interactions observed or reported.
Fin whale	*Balaenoptera physalus*	Endangered	Infrequent sightings.	No interactions observed or reported.
Humpback whale	*Megaptera novaeangliae*	Endangered	Infrequent sightings. Winter in the CNMI.	No interactions observed or reported.
Sei whale	*Balaenoptera borealis*	Endangered	Infrequent sightings.	No interactions observed or reported.
Sperm whale	*Physeter macrocephalus*	Endangered	Regularly sighted.	No interactions observed or reported.

Endangered and threatened marine species and seabirds known to occur or reasonably expected to occur in waters around the Marina Archipelago				
Common name	**Scientific Name**	**ESA listing status**	**Occurrence**	**Interactions with the CNMI bottomfish fisheries**
Listed Sea Birds				
Newell's Shearwater	*Puffinus auricularis newelli*	Threatened	Rare visitor.	No interactions observed or reported.

3.7.2 Marine Mammals

Several species of whales, dolphins and porpoises occur in waters around the Mariana Archipelago and are protected under the Marine Mammal Protection Act (MMPA). Additionally, a single dugong, listed as endangered, was observed in Cocos Lagoon, Guam in 1975 (Randall et al., 1975). Several sightings were also reported in 1985 on the southeastern side of Guam (Eldredge 2003). Since that time, no reports of dugong sightings have been made, and no observations of dugongs have been reported for CNMI. Table 17 provides a list of marine mammals known to occur or reasonably expected to occur in waters around CNMI that have the potential to interact with bottomfish fisheries.

Table 16. Marine mammals known to occur or reasonably expected to occur in waters around the Mariana Archipelago

Marine mammals known to occur or reasonably expected to occur in waters around the Mariana Archipelago		
Common Name	**Scientific Name**	**Interactions with the CNMI Bottomfish Fisheries**
Humpback whale*	*Megaptera novaeangliae*	No interactions observed or reported.
Sperm whale*	*Physeter macrocephalus*	No interactions observed or reported.
Sei whale*	*Balaenoptera borealis*	No interactions observed or reported.
Fin whale*	*Balaenoptera physalus*	No interactions observed or reported.
Blue whale*	*Balaenoptera musculus*	No interactions observed or reported.
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.

Marine mammals known to occur or reasonably expected to occur in waters around the Mariana Archipelago		
Common Name	**Scientific Name**	**Interactions with the CNMI Bottomfish Fisheries**
Common dolphin	*Delphinus delphis*	No interactions observed or reported.
Cuvier's beaked whale	*Ziphius cavirostris*	No interactions observed or reported.
Dwarf sperm whale	*Kogia sima*	No interactions observed or reported.
Dugong*	*Dugong dugong*	No interactions observed or reported.
False killer whale	*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.
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.
Sperm whale	*Physeter macrocephalus*	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.

*Species is also listed under the Endangered Species Act.
Source: Eldredge 2003, Randall et al., 1975, Guam DAWR, 2005, Council website: http://www.wpcouncil.org

3.7.3 Seabirds

The following seabirds are considered residents of the Mariana Archipelago: wedge-tailed shearwater (*Puffinus pacificus*), white-tailed tropicbird (*Phaethon lepturus*), red-tailed tropicbird (*Phaethon rubricauda*), masked booby (S*ula dactylatra*), brown booby (*Sula leucogaster*), red-footed booby (*Sula sula*), white tern (*Gygis alba),* sooty tern (*Sterna fuscata*), brown noddy (*Anous stolidus*), black noddy (*Anous minutus*), and the great frigatebird (*Fregata minor*). However, according to Wiles (2003), the only resident seabirds on Guam are the brown noddy and the white tern.

The following seabirds in Table 18 have been sighted and are considered visitors (some more common than others) to the Mariana Archipelago; short-tailed shearwater (*Puffinus tenuirostris;* common visitor), Newell's shearwater (*Puffinus auricularis;* rare visitor), Audubon's shearwater (*Puffinus iherminieri*), Leach's storm-petrel (*Oceanodroma leucorhoa*), and the Matsudaira's storm-petrel(*Oceanodroma matsudairae*). Of these, only the Newell's shearwater is listed as threatened under the ESA. There have been no sightings of the endangered short-tailed albatross (*Phoebastria albatrus*) in the Mariana Archipelago although the Mariana Archipelago is within the range of the only breeding colony at Torishima, Japan (WPFMC, 2009).

There have been no reports of interactions between seabirds and any of the Mariana Archipelago bottomfish fisheries (WPFMC, 2009) and the species is not known to prey on bottomfish.

Table 17. Seabirds occurring in the Mariana Archipelago

Seabirds of the Mariana Archipelago (R= Resident/Breeding; V= Visitor; Vr=rare visitor; Vc= Common visitor)		
	Common name	***Scientific name***
Vr	Newell's shearwater	*Puffinus auricularis newelli (ESA: Threatened)*
Vr	Wedge-tailed shearwater	*Puffinus pacificus*
V	Audubon's shearwater	*Puffinus lherminieri*
Vc	Short-tailed shearwater	*Puffinus tenuirostris (common visitor)*
V	Leach's storm-petrel	*Oceanodroma leucorhoa*
Vr	Matsudaira's storm-petrel	*Oceanodroma matsudairae*
Vr	Red-footed booby	*Sula sula*
Vr	Brown booby	*Sula leucogaster*
V	Masked booby	*Sula dactylatra*
Vr	White-tailed tropicbird	*Phaethon lepturus*
Vr	Red-tailed tropicbird	*Phaethon rubricauda*
Vr	Great frigatebird	*Fregata minor*
Vr	Sooty tern	*Sterna fuscata*
R	Brown noddy	*Anous stolidus*
V	Black noddy	*Anous minutus*
R	White tern / Common fairy-tern	*Gygis alba*

3.8 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). EFH definitions were also approved 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 spatially-oriented management plans (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 FEP MUS by life stage are summarized in Table 31. At its 154th meeting held June 2012, the Council recommended amending the Hawaii FEP to refine the EFH descriptions for Hawaii bottomfish and seamount groundfish and modify the extent of HAPC designations for these stocks. Until the amendment is submitted and approved, the EFH/HAPC designations summarized in Table 19 below remains in effect.

Table 18. EFH and HAPC for Western Pacific FEP MUS

MUS	Species Complex	EFH	HAPC
Mariana Bottomfish MUS	**Shallow-water bottomfish:** Gray snapper (*Aprion virescens*), giant trevally (*Caranx ignoblis*), black trevally (*Caranx lugubris*), blacktip grouper *(Epinephelus fasciatus)*, Lunartail grouper *(Variola louti)*, redgill emperor *(Lethrinus rubrioperculatus)*, taape (*Lutjanus kasmira*), **Deep-water bottomfish:** lehi (*Aphareus rutilans*), red snapper (*Etelis carbunculus*), red snapper (*Etelis coruscans*), yellowtail snapper (*Pristipomoides auricilla*), pink snapper (*P. filamentosus*), yelloweye snapper (*P. flavipinnis*), pink snapper (*P. sieboldii*), gindai (*P. zonatus*), and amberjack (*Seriola dumerili*).	**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 fm). **Juvenile/adults:** the water column and all bottom habitat extending from the shoreline to a depth of 400 m (200 fm)	All slopes and escarpments between 40–280 m (20 and 140 fm)
Mariana Crustaceans MUS	**Spiny and slipper lobster complex (all FEP areas):** spiny lobster (*Panulirus penicillatus, P.* spp.), ridgeback slipper lobster (*Scyllarides haanii*), Chinese slipper lobster (*Parribacus antarcticus*) **Kona crab (all FEP areas):** 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)	No HAPC designated for deepwater shrimp
Mariana Crustaceans MUS	**Deepwater shrimp (all FEP areas):** (*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 in the Mariana Archipelago.

MUS	Species Complex	EFH	HAPC
Mariana Precious Corals MUS	**Shallow-water precious corals (10-50 fm) all FEP areas:** black coral (*Antipathes dichotoma*), black coral (*Antipathis grandis*), black coral (*Antipathes ulex*) **Deep-water precious corals (150–750 fm) all FEP areas:** 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.)	No EFH designated for precious coral in the Mariana Archipelago.	No HAPC designated for precious coral in the Mariana Archipelago.
Mariana 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

To prevent and minimize adverse bottomfish fishing impacts to EFH, each western Pacific 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 impact 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).

4.0 IMPACTS OF THE ALTERNATIVES

4.1 Biological and Ecological Impacts

4.1.1 Impacts on Target Stocks

Due to the low effort and catch levels seen in the CNMI deepwater bottomfish fishery as compared to estimated MSY (Table 7), none of the alternatives are anticipated to cause overfishing of deepwater bottomfish populations throughout their range in EEZ waters around

CNMI. The current Federal permit and reporting requirements that provide for tracking of fishing activity and changes in fishery participation, largely address any concerns for unchecked expansion of this fishery.

Alternative 1 (No-Action) mitigates against a large vessel fishery sector in the EEZ waters around Saipan, Rota, Tinian and FDM that have been historically fished by small-scale fishermen. Thus, Alternative 1 is more likely than Alternative 2 to maintain existing levels of self-recruitment in bottomfish populations around CNMI, as well as to control any potential for local depletion in the southern areas currently closed to large vessel bottomfish fishermen. The potential for fishing impacts on bottomfish populations at distant seamounts would be anticipated to be similar to or slightly greater than Alternative 2 as some, but not all, medium and large vessels would be expected to have the capacity to explore and fish the distant seamounts. The Federal permitting, catch and commercial sales reporting requirements now in place provides fishery scientists and managers a mechanism to collect fishery data from the fishing fleet. This aids in improved monitoring and stock assessments that are used in current ACL-based management measures that achieve optimum yields and maintain a sustainable fishery.

As compared to the No Action Alternative, Alternative 2 (removal of the large vessel closed areas) would allow a few commercial large bottomfish vessels to reenter waters 3-50 nm around the southern islands of CNMI. If this were to occur, it may result in increased harvest of target species, as there is only one active CNMI-based large commercial bottomfishing vessel in operation at present. Vessels over 40 ft in length have historically not been known to fish within waters 0-3 nm around the southern islands, however under this alternative they may do so. It is not possible to quantify potential adverse impacts from this, such as catch completion with smaller vessels, but such impacts would be expected to increase with the number of vessels fishing.

Alternative 2 is less likely than Alternative 1 to maintain existing levels of self-recruitment in bottomfish populations around CNMI, as well as to control any potential for local depletion in the southern areas currently closed to large vessel bottomfish fishermen if significant expansion of large vessel effort occurs.

Alternative 2 may reduce the potential for fishing pressure to expand to distant seamounts (greater than 50 nm from CNMI) that exist in the EEZ waters around CNMI. Bottomfish populations at the more distant seamounts are likely to depend on larvae transported from larger bank fish resources on CNMI's island slopes. Recruitment in such tends to be variable and unpredictable, causing seamount populations of deepwater bottomfish to be more sensitive to heavy fishing than island slope resources. Impacts on bottomfish could be further reduced if the government of CNMI were to implement complementary measures for its citizens in waters 0-3 nm around CNMI.

4.1.2 Impacts on Non-Target Stocks

The only practical method of bottomfish fishing for deepwater snappers around CNMI is through the use of vertical droplines with several branching lines. This is a highly selective method of fishing because it targets depth ranges inhabited by particular bottomfish species. As shown in Tables 5 and 12, bycatch rates in both bottomfish fisheries are relatively low, and almost all

bycatch is released alive. The charter fishery has the highest bycatch rates due to its practice of catch and release fishing. The only known non-target mortality associated with CNMI's bottomfish fishery is to sharks.

Sharks are known to be abundant on many seamounts off the CNMI. Though local bottomfish fishermen rarely hook sharks, they report heavy losses of their catch to shark predation as lines are being retrieved. As a result, some shark mortality is believed to occur in association with CNMI bottomfish fishing because fishermen may deliberately cull sharks in an effort to thin the local population and reduce predation on their catch in areas where sharks are abundant. Since sharks are often more abundant in the remote areas (i.e., the distant seamounts that large vessels must now fish) and bottomfish fishing is often preceded by intensive fishing of sharks, Alternative 2 could potentially reduce shark mortality in the CNMI EEZ because large vessel bottomfish fishing effort would then occur in areas that are more regularly fished by other fishermen. Due to the current concentration of small vessel effort in nearshore waters (0-3 nm), additional effort from a few larger vessels in the area is not expected to result in any appreciable negative impact on shark populations in this area. And, Alternative 2's continuing reporting requirement would provide for data collection to allow fishery managers to ensure that shark populations are not adversely impacted by fishery operations.

4.1.3 Impacts on Protected Species

From October 2003 – June 2005, the Hawaii-based bottomfish NWHI fishery was monitored under a mandatory NMFS observer program. Data for seven calendar quarters are available on the PIRO website. From the fourth quarter of 2003 through the second quarter of 2005, observer coverage in the bottomfish fleet averaged 21.4 percent, and there were no observed interactions with sea turtles or marine mammals. There were a total of six observed seabird interactions, including two unidentified boobies, one brown booby, one black-footed albatross and two Laysan albatrosses. Only the black-footed albatross interaction occurred during bottomfish fishing operations. All of the other interactions were observed in transit during trolling operations. Due to the type of fishing gears and methods used (hook-and-line fishing from largely stationary vessels), interactions between seabirds and bottomfishing operations around the Mariana Archipelago are believed to occur rarely if at all.

There have been no reported or observed physical interactions with any species of sea turtle and whales in any of the bottomfish fisheries based out of Hawaii, including during the NMFS 1990–1993 NWHI bottomfish vessel observer program (Nitta 1999) and the more recent 2003-2005 observer program. There are no observer data available for the CNMI bottomfish fishery, however based on the above information they are not expected to interact with any listed species in Federal waters around CNMI. There are no specific regulations currently in place which are aimed at protected species interaction mitigation, however, prohibitions on certain destructive gear types are in place.

The 2002 Biological Opinion concluded that the probability of an encounter between ESA-listed sea turtle and whale species and the bottomfish fishery is extremely low and that the fishery, as managed under the FMP, is not likely to adversely affect these species (NMFS 2002). The Final 2013 List of Fisheries under the Marine Mammal Protection Act lists the CNMI bottomfish

fishery as a Category III fishery, meaning that this fishery has a remote likelihood or no known incidental mortality and serious injuries of marine mammals. Furthermore, the 2005 EIS for the Bottomfish FMP (WPRFMC 2005) found that the region's bottomfish fisheries as a whole are expected to have no effect on the distribution, survival, or population structure of any seabird species.

As compared to Alternative 1, Alternative 2 (remove large-vessel closed areas) could increase the potential for protected species interactions in nearshore waters because large vessel bottomfish fishing effort would be redistributed from distant seamounts. ESA-listed species such as green turtles occur more commonly in nearshore waters. However, due to the pre-existing concentration of small vessel effort in nearshore waters (0-3 nm) and the lack of any reported or observed interactions with protected species in this fishery, additional effort from a few larger vessels in the area would be expected to have no additional impacts on protected species populations in this area. Alternative 2's continuing reporting requirement would provide for data collection to allow fishery managers to ensure that protected species are not adversely impacted by fishery operations.

4.1.4 Impacts on Biodiversity and Ecosystem Functions

To the extent that the CNMI bottomfish fishery has the capacity to adversely impact biodiversity and ecosystem function, it can be assumed that any such impacts occur, or have the likelihood to occur, in rough proportion to the type and level of fishing effort. The likelihood and magnitude of impacts are also a function of how fishing effort is temporally and geographically distributed (i.e., relative to the distributional aspects of biodiversity and ecosystem function). As seen in Table 5, reported bycatch in CNMI's bottomfish fishery is relatively low, with the majority consisting of fish caught and deliberately released alive from charter vessels.

Alternative 2 can be expected to affect overall redistribution of fishing effort in the bottomfish fishery relative to Alternative 1 (no action), both geographically and among different types of fisheries (i.e., gear types and target species).

Whereas Alternative 1 discouraged the renewal or expansion of CNMI's large vessel sector and thereby hindered expansion of the size and fishing capacity of the fleet as a whole, Alternative 2 would remove these barriers that could result in higher levels of fishing effort that could potentially result in greater impacts on biodiversity and ecosystem function. It would also potentially distribute fishing impacts to the marine ecosystem from large commercial vessels fishing for BMUS within waters 3-50 miles around the southern islands of CNMI. Vessels over 50 ft in length are not known to fish within waters 0-3 nm around CNMI however under this alternative they could seek to do so. Resultant adverse impacts on stocks in nearshore waters cannot be quantified but would obviously increase as the number of vessels fishing in this area increased with a possibility of associated reductions in the catches by smaller vessels. Nevertheless Alternative 2 would have lesser potential than Alternative 1 for maintaining existing levels of biodiversity as it allows for bottomfishing in waters 3-50 nm around CNMI. Alternative 2's existing reporting requirements would provided for data collection and allow fishery managers to ensure that biodiversity and ecosystem function are not adversely impacted by fishery operations.

4.1.5 Essential Fish Habitat

None of the alternatives considered by the Council are likely to adversely affect EFH or HAPC for any managed species as they are not likely to lead to substantial physical, chemical, or biological alterations to the habitat of these species or their prey. For the same reason, none of the alternatives is expected to cause substantial damage to the ocean or coastal habitats.

The line used while bottomfish fishing is continuously monitored by an individual fisherman. The weight and hooks are maintained near, but not on, the bottom because the target species occur from 1 to 20 m (3 to 66 ft) off the bottom. Because of the nature of this type of fishing, it is likely that the risk of direct impacts from fishing gear to EFH/HAPC and other benthic habitats is negligible. Anchors used by bottomfish fishing vessels can cause damage to benthic habitat. The presence of fishing vessels in the vicinity of shallow and intertidal habitats, including coral reefs, also brings some degree of risk of vessel groundings and pollutant spills that could degrade those habitats (the photic zone where coral reefs and reef building organisms are normally found ranges roughly between 0 and 50 to 100 m [164-328 ft]).

Although not specifically studied in CNMI, no adverse effects to water column EFH and HAPC have been attributed to bottomfish fishing in Hawaii (G. Davis, PIRO, personal communication). Some have theorized that sending a weighted handline with baited hooks and a small chum bag to bottom depths, generally to 50 fathoms and below, may introduce parasites or disease into the water column, but to date no such problems have been reported or documented in Hawaii's bottomfish fisheries (Kelley and Moffitt 2004).

The use of explosives, poisons, trawl nets, and other destructive gears that may adversely affect EFH and HAPC is prohibited under the Marianas FEP.

Indirect impacts to water column EFH or HAPC could occur through pollutant discharges from bottomfish fishing vessels. The day-to-day operations of a fishing vessel can produce a number of waste products, including oil, sewage, and garbage that may affect marine habitat. To the extent that these activities and events are subject to environmental regulations, their effects on EFH and HAPC are likely to be avoided, minimized, or mitigated.

A bottomfish fishing vessel striking the bottom could physically destroy habitat in the immediate area. A subsequent breakup of the vessel and release of fuel and oil could result in habitat pollution and mortality of marine life. However, considering that bottomfish fishing vessel groundings are rare events, groundings pose a remote threat to EFH or HAPC.

It is believed that bottomfish fishing activities do not significantly impact bottom-dwelling invertebrates such as cnidarians (e.g., corals that are not reef-building), sponges, sea stars, and urchins (Kelley and Moffitt 2004). The impacts of bottomfish fishing on competitors, predators, or prey of target species (e.g., kāhala, ulua) are not well understood. Some species may simultaneously be competitors, predators, and prey. However, overall, Kelly and Moffitt (2004) found that at studied sites in the NWHI impacts on competitors and prey species were not likely to be significant.

CNMI's bottomfish fishery is a hook-and-line fishery, which is considered to have low collateral impacts (Chuenpagdee et al. 2003). Existing data from studies around Hawaii indicate that bottomfish fishing activities are not significantly impacting the deep-benthic ecosystem in terms of bycatch removal, marine debris or derelict fishing gear, biodiversity, and competitor or predator release (Kelley and Moffitt 2004). According to a recent interagency study, the coral reef ecosystem of the NWHI has been found to be in "pristine" condition (Maragos and Gulko 2002), despite decades of bottomfish fishing activities in the NWHI.

The preceding discussion finds that the bottomfish fishing impacts associated with fishing debris, disease or parasite introduction from chum bait, and anchoring present few potential adverse impacts on EFH and HAPC. Thus, under Alternative 1 and 2, the continuation of CNMI's bottomfish fishery would not be expected to adversely affect the EFH and HAPC for any species managed under the FEPs of the Western Pacific Region.

4.2 Social and Economic Impacts

4.2.1 Impacts on Public Health and Safety at Sea

Commercial fisheries have always been one of the most dangerous occupations. According to the National Institute for Occupational Safety and Health, during 1992-2008 the average annual fatality rate for commercial fishermen was 128 deaths per 100,000 workers. For all U.S. workers, this number was only four deaths per 100,000. National Standard 10 instructs the Council and NMFS to promote, to the extent practicable, the safety of human life at sea when considering conservation and management measures. Further, the MSA requires that management measures describe issues related to the safety of human life at sea, including whether and to what extent such measures may affect the safety of participants in the fishery.

Council analysis shows that reducing the closed area to 30 nm from shore would not provide access to additional bottomfish fishing grounds. Smaller vessels, which are the only ones currently allowed to fish in areas within 50 nm of shore in the subject areas, are subject to a number of risks and dangers. Ben-Yami (2000) highlighted a number of important safety at sea considerations for small fishing vessels. These include bad weather; loss of power (many small fishing boats are powered by an outboard motor and do not carry either a spare engine or sailing rig); fire on board, especially when extra fuel is carried for extended trips; inadequate boat construction standards; unsuitable boats for prolonged fishing trips; economic hardship; inadequate communication capabilities; fishing techniques not suitable for the vessel; and lack of accessible shelters/anchorages.

Ben-Yami (2000) also suggested that certain fisheries management strategies may result in safety at sea issues. For example, he cites strategies that incentivize fishermen to take risks, such as limiting fishing time and area, as ones that could contribute to accidents and fatalities.

No data is available for bottomfish vessel accidents and losses according to vessel size in the CNMI, and it is likely that sample sizes would limit useful statistical analysis of such data. However, Wang et al. (2005), in an analysis of trends in U.K. fishing vessel accidents, found that the percentage at which accidents on vessels less than 40' (12 m) result in deaths is higher than that for vessels of between 40' and 78' and those greater than 78'. Their results also indicated

that vessels under 40' had the highest casualty rates and suffered more severe consequences when accidents occurred. Finally, their data showed that fishing vessels less than 40' were lost at a much higher rate than other vessel size categories they examined. The authors suggested these findings may be due to the size and stability of smaller vessels, especially when operating in bad weather conditions. If CNMI bottomfish fishermen were allowed to fish within 50 miles using boats greater than 40', they may chose to upgrade to larger, safer vessels.

In addition to concerns for the safety at sea of bottomfish participants, the current regulations may limit the availability of fresh local fish, which has the potential to impact public health. There are two ways in which the regulations are likely to impacting local seafood availability. First, since larger boats are restricted from fishing within 50 miles, those vessels must make relatively long trips in order to reach fishing grounds, fish, and come back. This extended trip time can affect fish quality. Second, the smaller (typically less than 25') vessels that can fish for bottomfish within 50 miles are unable to store much fish and are therefore unable to provide large volumes of fresh catch to the local market. This is a concern given the small size of the CNMI bottomfish fleet. Pacific Islanders are particularly dependent upon seafood. Though subsistence fish consumption data are not available for CNMI (SPC, 2011), Hawaii's seafood consumption rate is more than twice the national average (Kromer Baker, et al., 2012). When locally sourced fresh fish are unavailable, or are not available in sufficient quality, other foods will fill the void. In an archipelago with limited farming and other food productions resources, this means packaged and processed foods that shipped in. This is undoubtedly a reason that diabetes is an especially important chronic disease in the CNMI (Durand, et al., 1999).

4.2.2 Impacts on Fishery Participants and Communities

A management objective of this action is to achieve optimum yield from the CNMI bottomfish fishery. Of the three general categories of benefits to the Nation (food production, recreational opportunities, and conservation of marine ecosystems), it is food production in the CNMI that is the most important for this action.

As described in Section 3.3.1, the Council and NMFS have established the entire CNMI portion of the Mariana archipelago is a fishing community under the MSA. Although many residents do not directly participate in CNMI's bottomfish fishery, they may be indirectly affected by the alternatives considered here. For example, they may have family members (immediate or extended) or friends who bottomfish or who rely on bottomfishing for some portion of their income, food consumption, cultural traditions, recreational activities or lifestyle. This is because, as in almost all Pacific Islands, fish and fishing is important to CNMI's heritage and socio-cultural fabric. As such, changes to its fisheries can reverberate throughout the fishing community both positively and negatively.

In terms of numbers, there are more small vessel fishery participants than medium or large vessel participants. However medium and large vessel participants tend to be able to supply a larger portion of bottomfish to markets. Therefore, alternatives that strongly impact small vessel participants may have a great socio-cultural footprint, while alternatives that affect the larger vessels are more likely to have a greater impact on CNMI's fish markets and consumers.

In addition to the potential impacts described below, the impacts described immediately above in Section 4.2.1 can also be considered in this section. It is difficult to confidently predict impacts to fishery participants and fishing communities from some actions. There are often a number of variables that underpin when, where, and why fishermen chose to fish. In the case of this action, for example, the current large vessel closed areas were established in 2009 because it was feared that Guam-based large vessels might chose to fish in CNMI waters following a similar prohibition on large bottomfish vessels in Guam waters. However, some now believe this fear may have been exaggerated. In addition, the closed areas may be constraining the local fishery and resulting in unnecessary social and economic impacts to participants and the community. This discussion of impacts therefore is based on this new thinking, but does acknowledge potential disadvantages.

Under Alternative 1 (no action), the large-vessel commercial sector of the fishery would continue to incur higher operating costs due to the requirement that they fish on banks greater than 50 nm from the southern islands. Because these grounds are not as familiar as those closer to port, fishing operations are also likely to be less efficient. However, as of 2013, there was only one vessel greater than 40' registered to bottomfish in the CNMI, and so there is currently no substantial large vessel component of the fishery that would be impacted under this alternative. There are no data to understand the different operating costs incurred by smaller and larger vessels. However, in their study of the Guam bottomsfish fishery, Hospital and Beavers (2012) found that highliners incurred higher levels of expenditures. Highliners reported an average yearly expenditure of $12,030 and a median expenditure of $10,100, while non-highliners reported approximately $6275 in fishing-related expenditures with a median expenditure of $3478.

Under Alternative 1, small vessel participants would still be constrained from upgrading their vessels since doing so would mean they would then be forced to travel to offshore banks and seamounts that are relatively unknown to them. As previously mentioned, smaller boats can be less safe than larger vessels and, because of their limited storage capacity, can be less efficient than larger vessels, which can carry more fuel, ice, bait, gear, and catch.

Finally, maintaining the large vessel closed areas will continue to discourage, although not prevent, bottomfish exports, which are more likely to be associated with the medium and large-vessel component of the CNMI fishery.

Under Alternative 2 (remove the large-vessel closed areas around the southern islands and Alamagan) there would be an opportunity to relocate fishing effort into nearshore waters around CNMI. This would reduce the operating costs for the large vessel commercial sector of the fishery because they would no longer be required to travel to fish banks greater than 50 nm from the southern islands. It would also make fishing operations safer for those vessels, since they would no longer be required to travel as far to conduct bottomfishing and should make their operations more efficient and profitable, as fresher fish usually command greater prices.

Small vessel participants would no longer be constrained from upgrading and may chose to do so in order to fish from larger vessels which can be safer and can carry more fuel, ice, bait, gear, and catch.

However, economic impacts (including market and non-market impacts) on small-vessel commercial, recreational and charter fishery participants could be negative if localized depletion of bottomfish occurs from larger vessels being allowed to fish with 50 nm. If this were to occur, it would disrupt their income, investment value, food supply, recreational opportunities and lifestyles, and over a longer term, make fishing a less attractive occupation to potential new entrants into the fishery. Currently, however, there are only two large Guam-based vessels and one large CNMI-based vessel permitted to fish for bottomfish, so localized depletion of CNMI bottomfish resources from large vessels does not appear to be an immediate problem.

4.2.3 Environmental Justice Effects

Executive Order 12898 and White House Council on Environmental Quality guidance instruct agencies to determine, via NEPA, whether a proposed federal action is likely to have disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes. Where such effects are identified as a result of the proposed action or any alternative, agencies should analyze how environmental and health effects are distributed within the affected community.

The majority of fishery participants belong to minority groups as defined in E.O. 12898. The analysis presented above provides some basis for concluding that Alternative 1 (no action; status quo) will result in some adverse human health effects on these groups and that Alternative 2 would mitigate this situation. Currently, small boat participants are not allowed to upgrade vessels and then fish within 50 nm of the southern islands. Larger fishing vessels tend to be safer than smaller vessels operating in the same area and same conditions. Current regulations, therefore, have the potential to impact human health via safety at sea. In addition, these regulations are likely constraining the availability of fresh local seafood for CNMI residents, many of whom also belong to minority groups as defined in E.O. 12898. However, the available information does not suggest that these adverse human health effects are disproportionately high. Therefore, while the data indicate that Alternative 1will provide for the best environmental justice outcome, there is little basis to conclude that implementing Alternative 2 would violate Executive Order 12898.

4.3 Impacts on Administration and Enforcement

For Amendment 10, NMFS estimated that 50-125 vessels would make 10 to 50 trips per year, and average 1.2 days per trip. At that rate, the program would generate in the range of 600 to 7,500 daily fishing logbooks per year. However, since Amendment 10 was implemented, the total number of permits that NMFS has issued per year has been quite low, and the number of those vessels that were/are over forty feet has never exceeded five in one year (Table 20).

Table 19. Total Bottomfish Permits and Permitted Vessels over 40' in the CNMI Fishery

Year	Number of Permits	Vessels >40
2009	3	1
2010	12	4

2011	9	1
2012	13	0
2013	4	1

However, the current regulations still impose an administrative burden to implement and maintain the Federal permitting and data collections programs. The cost of the data reporting program includes the processing of fishermen's logbooks for all commercial fishermen and sales reports for vessels over 40 ft. Since the Council is not seeking to eliminate permitting, logbook, and reporting requirements, the ongoing burden to administer these regulations would remain, at an estimated annual cost of $1,200 – $3,100.

Production and distribution of logsheets, data coding and entry, data verification and management, system development to support the process, quality control, and fishermen feedback, as well as basic reporting and analysis functions, utilizes existing NMFS staff and office space on Saipan and in Honolulu, at an annual cost of $75K.

There will remain enforcement burdens on NMFS and the USCG for monitoring compliance with the permitting and data reporting requirements for all commercial bottomfish vessels. CNMI enforcement partner capabilities under the Joint Enforcement Agreement (JEA) are limited

In summary, NMFS estimates that the implementation of the recommended management measures would continue impose annual administrative and enforcement operating costs of around $145,000.

4.4 Cumulative Effects of the Proposed Action

To be drafted.

4.5 Climate Change Considerations

The alternatives consider various distances from shore at which larger CNMI and Guam bottomfish vessels could fish. The preferred alternative would reduce the distance that CNMI vessels would have to travel to conduct bottom fishing, which would reduce their greenhouse gas emissions. However, it could incentivize Guam vessels to travel farther from Guam, which would essentially offset those reductions. Given the small size of both fleets, the preferred alternative would not result in a federal contribution to greenhouse gas emissions greater than 25,000 mt carbon dioxide equivalents. Climate change impacts are not expected to affect the effectiveness of any of the alternatives with respect to achieving the fishery objectives and meeting the purpose and need for action. Climate change is also not expected to affect the environmental impact of implementing either of the alternatives.

4.6 Reasons for Choosing the Preferred Alternative

Council staff will prepare this section after the Council reviews the draft amendment on chooses a course of action.

5.0 CONSISTENCY WITH THE MSA AND OTHER APPLICABLE LAWS

5.1 Consistency with MSA National Standards

Section 301 of the Magnuson-Stevens Act requires that regulations implementing any FMP, FEP or amendment be consistent with the ten national standards listed below.

National Standard 1: Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

The preferred alternative is consistent with National Standard 1 because it would balance the needs of CNMI's small-scale quasi-commercial bottomfish fishery with those of the larger commercial fishery in a manner that allows both sectors to continue fishing at sustainable levels. It continues Federal permitting and reporting requirements for all vessels fishing commercially for bottomfish in EEZ waters around CNMI. This has improved data collection from this fishery and its harvests, allowing scientists and managers to better monitor and manage the fishery to achieve optimum yields on a continuing basis.

National Standard 2: Conservation and management measures shall be based upon the best scientific information available.

The preferred alternative is consistent with National Standard 2 because it was developed using the best available information, including information from CNMI's fishery monitoring systems, previous research on bottomfish stocks, their habitat, and associated resources, vessel observer programs conducted in similar fisheries, and anecdotal information provided by fishery participants and local fishery managers.

National Standard 3: To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

The preferred alternative is consistent with National Standard 3 because although it would directly affect the BMUS stock complex around CNMI, it was developed in coordination with a similar measure for bottomfishing around nearby Guam which is also part of the Mariana Archipelago. The degree of interconnectedness of the bottomfish stocks on the banks around CNMI and Guam has not be quantified to date, but it is believed to be considerable and this measure would provide a coordinated bottomfish management program for the Mariana Archipelago that recognizes the proximity of the island groups, while allowing for management measures to be developed in, and tailored to, the local conditions in each area.

National Standard 4: Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such

manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

The preferred alternative is consistent with National Standard 4 because it would not discriminate between residents of different States and it would not allocate or assign fishing privileges among specific CNMI fishermen. It will require fishing vessels from Guam fishing in CNMI water to obtain a federal permit and report catches, but this requirement will apply to all CNMI fishermen as well.

National Standard 5: Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

The preferred alternative is consistent with National Standard 5 because it facilitates efficiency of individual fishing operations via opening fishing access to areas closer to vessel ports providing for shorter trips, less fuel use and reduced cost for other consumables.
It would also increase efficiency by improving existing data collection systems, and the subsequent availability of complete data scientists and managers.

National Standard 6: Conservation and management action shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources and catches.

The preferred alternative is consistent with National Standard 6 because it addresses issues management concerns around CNMI in a manner that is responsive to the needs and concerns of CNMI's various bottomfish sectors, but is also coordinated with the recently implemented management measures for bottomfish around nearby Guam.

National Standard 7: Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

The preferred alternative is consistent with National Standard 7 because is the most cost-efficient alternative considered by the Council to meet the management objectives of this action and does not contain and measures that either conflict with, or duplicate existing local or Federal regulations. The Federal permitting and reporting requirements continues to ensure that complete catch and effort information is collected from all vessels commercially harvesting bottomfish from EEZ waters around CNMI. The data provided in the logbooks would overlap with some the data already collected through the CNMI-based creel survey, but the latter does not cover certain landing points in the CNMI, so the overlap would not be complete, and furthermore, the mandatory logbooks would have a higher degree of coverage than the voluntary creel surveys. If the data do overlap, they would be useful in terms of data validation and adjustment.

National Standard 8: Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and 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.

The CNMI and Guam are each defined as fishing communities under the MSA. The preferred alternative is consistent with National Standard 8 because a basis for action is to provide for the sustained participation of the CNMI fishing community in the fishery and to minimize adverse social and economic impacts on CNMI fishing community members, including fishery participants. In doing so, the action explicitly accounts for the the importance of fishery resources to the fishing community.

National Standard 9: Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided minimize the mortality of such bycatch.

The preferred alternative is consistent with National Standard 9 because it does not require any changes to current fishing operations that would increase bycatch or its mortality.

National Standard 10: Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

The preferred alternative is consistent with National Standard 10 because it provides for vessel operators to fish in new areas that might decrease the threats to the safety of human life at sea. Nearshore areas around the Southern Islands and Alamagan would be opened to vessels greater than 40 ft in length overall where these vessels have historically fished before. Distant areas to the north will continue to be open for larger vessels to operate during clam weather periods where there have been no significant incidences and thus it is believed that they will able to do so safely.

5.2 National Environmental Policy Act

As a consolidated document including an Environmental Assessment, as described in NOAA Administrative Order 216-6, Section 603.a.2, this proposed amendment to the Council's Marianas Archipelago FEP has been written and organized to meet the requirements of the National Environmental Policy Act. This document is part of the administrative record for rulemaking associated with U.S. Department of Commerce Regulatory Identifier Number (RIN) 0648-AW67.

5.2.1 Purpose and Need

The purpose and need for this action is described in Section 4.0.

5.2.2 Alternatives Considered

The alternatives considered for two proposed actions are described in Section 2.0. The document examines two alternatives. Topic 1) remove the large vessel area closure around Rota, Saipan, Tinian and FDM for vessels over 40 feet in length targeting BMUS; and 2) remove the 10 nm area closure to vessels over 40 feet in length targeting bottomfish around Alamagan.

5.2.3 Affected Environment

The affected environment for this action is described in Section 3.0. The main focus of the proposed action is the bottomfish fisheries in the waters of the U.S. EEZ surrounding Guam and the Northern Mariana Islands.

5.2.4 Impacts of the Alternatives

The expected impacts of the alternatives considered in this action are described in Section 4.0. The analysis included a description of the baseline (no action) alternative and potential impacts of action alternatives on the fisheries and their target fish stocks, non-target fishes, bycatch, protected resources, Essential Fish Habitat (EFH) and Habitat areas of Potential Concern, and special resources or management areas. Direct, indirect, short-term, long-term, and cumulative impacts of each alternative were considered in the analysis in section 4. The impacts with respect to Environmental Justice and climate change were also addressed in section 5.

5.3 Regulatory Impact Review

Please see Appendix A for the Regulatory Impact Review of this action. To meet the requirements of Executive Order 12866 (E.O. 12866), the National Marine Fisheries Service (NMFS) requires that a Regulatory Impact Review (RIR) be prepared for all regulatory actions that are of public interest. This review provides an overview of the problem, policy objectives, and anticipated impacts of regulatory actions, and ensures that management alternatives are systematically and comprehensively evaluated such that the public welfare can be enhanced in the most efficient and cost effective way.

Based on these findings, this rule is determined to not be significant under E.O. 12866. In accordance with E.O. 12866, the following is set forth: (1) This rule is not expected to have an annual effect on the economy of more than $100 million or to adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety; or state, local or tribal governments or communities; (2) This rule is not likely to create any serious inconsistencies or otherwise interfere with any actions taken or planned by another agency; (3) This rule is not likely to materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; (4) This rule is not likely to raise novel or policy issues arising out of legal mandates, or the principles set forth in the Executive Order.

5.4 Administrative Procedure Act

All federal rulemaking is governed under the provisions of the Administrative Procedure 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. This amendment complies with the provisions of the APA through the Council's extensive use of

public meetings, requests for comments, and consideration of comments. The proposed rule associated with this amendment will have request for public comments which complies with the APA; and the final rule will implement a 30-day delay of effectiveness.

5.5 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) 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. A copy of this document will be submitted to the appropriate government agency in CNMI for review and concurrence with a determination that because the proposed regulatory action would improve the management of bottomfish resources around CNMI, provided continued access to the bottomfish fishery for all fishery participants and help ensure a consistent supply of fresh bottomfish to CNMI's markets and consumers, the preferred alternative is consistent, to the maximum extent practicable, with CNMI's coastal zone management programs.

5.6 Information Quality Act

To the extent practicable, the information in this amendment complies with the Information Quality Act and NOAA standards (NOAA Information Quality Guidelines, September 30, 2002) which recognize information quality is comprised of three elements: utility, integrity, and objectivity. The information product was prepared by Council and NMFS staff based on information provided by NMFS Pacific Islands Fisheries Science Center (PIFSC) and NMFS Pacific Islands Regional Office (PIRO). The information product was reviewed by PIRO and PIFSC staff, and NMFS Headquarters (including the Office of Sustainable Fisheries). Legal review was performed by NOAA General Counsel Pacific Islands and General Counsel for Enforcement and Litigation for consistency with applicable laws, including but not limited to the Magnuson-Stevens Act, National Environmental Policy Act, Administrative Procedure Act, Paperwork Reduction Act, Coastal Zone Management Act, Endangered Species Act, Marine Mammal Protection Act, and Executive Orders 13132 and 12866.

One of the important potential costs in acquiring "perfect" information (which is never available), is the cost of delay in decision-making. While the precautionary principle suggests that decisions should be made in favor of the environmental amenity at risk, this does not suggest that perfect information is required for any preferred alternative to proceed. In brief, it does suggest that caution be taken but that it not lead to paralysis until perfect information is available. This document has used the best available information and made a broad presentation of it. The process of public review of this document provides an opportunity for comment and challenge to this information, as well as for the provision of additional information.

5.7 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 preferred alternatives do not establish any new collection of information requirements for the purpose of the Paperwork Reduction Act.

5.8 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. The assessment is done by preparing a Regulatory Flexibility Analysis when impacts are expected, however, the proposed alternatives, described in section 2.0, would have minimal impacts on small entities. Based on the preliminary evaluation of the economic impacts associated with the proposed alternatives (Appendix A), an initial regulatory flexibility analysis is not required and none has been prepared.

5.9 Endangered Species Act

The Endangered Species Act of 1973, as amended, (Public Law 93-205; 87 Stat. 884) prohibits the taking of any endangered species except under limited circumstances. Pursuant to Section 7 of the Endangered Species Act, in March 2002, NMFS prepared a biological opinion (BiOp) on the effects of the bottomfish and seamount groundfish fisheries in the Western Pacific region on sea turtles and whales. The BiOp concluded that the fishery is not likely to jeopardize the continued existence of any of the threatened or endangered species found in the area or adversely modify their critical habitat.

Section 3.7 describes the threatened and endangered species known to occur in CNMI and Section 4.1.3 describe the potential impacts the preferred alternatives may have on these listed species. There are no known interactions between seabirds and any of the Mariana Archipelago bottomfish fisheries. Based on the gear types used and the low likelihood of fishery interactions occurring under the preferred alternatives, the Council believes that the preferred alternatives will not jeopardize or adversely affect any populations or habitats of species listed as endangered or threatened under the ESA.

5.10 Marine Mammal Protection Act

The CNMI bottomfish fishery is classified as Category III under Section 118 of the Marine Mammal Protection Act (MMPA) (78 FR 53336, 29 August 2013), meaning that they have been determined by NMFS to have a remote likelihood of, or no known incidental mortality and serious injury of marine mammals (50 CFR 229.2). Vessel owners and crew that are engaged only in Category III fisheries may incidentally take marine mammals without registering or receiving an Authorization Certificate under the MMPA, but they are required to: 1) report all incidental mortality and injury of marine mammals to NMFS, 2) immediately return to the sea with minimum of further injury any incidentally taken marine mammal, 3) allow vessel observers if requested by NMFS, and 4) comply with guidelines and prohibitions under the MMPA when deterring marine mammals from gear, catch, and private property (50 CFR 229.5, 229.6, 229.7).

Please see Section 3.7.2 of this document for descriptions of marine mammals found around the Mariana Archipelago. Section 4.1.3 provides an analysis of the anticipated impacts on these species under each of the alternatives considered by the Council. Based on the gear types used and the low likelihood of fishery interactions occurring under the preferred alternatives, the Council believes that the preferred alternatives will not adversely affect any marine mammal populations or habitats.

6.0 REFERENCES

Amesbury, J. and R. Hunter-Anderson. 1989. Native Fishing Rights and Limited Entry in Guam. Western Pacific Regional Fishery Management Council, Honolulu.

Amesbury, J., R. Hunter-Anderson, and E. Wells 1989. Native Fishing Rights and Limited Entry in the CNMI. Western Pacific Regional Fishery Management Council, Honolulu.

Anon 1945. "Co-op fishing on Guam setup under military." Honolulu Star Bulletin, 6 July 1945, p.2.

Asakura et al. 1994 Asakura, A., Ohba, T., Miyano, S., Furuki, T., Kurozumi, T. and H. Harada. 1994. Outline of the biological expedition to the Northern Mariana Islands, Micronesia. Nat. Hist. Res. Special Issue 1: 1-11.

Bank of Hawaii (BOH).1999. Commonwealth of the Northern Mariana Islands Economic Report, October 1999. Bank of Hawaii: Honolulu.

Bank of Hawaii (BOH). 2004 Commonwealth of the Northern Mariana Islands Economic Report, October 2004. Bank of Hawaii: Honolulu.

Birkeland, C. 1997. Status of coral reefs in the Marianas. In R. W. Grigg and C. Birkeland (Eds.), Status of coral reefs in the Pacific. Honolulu, HI: University of Hawaii Sea Grant College Program.

Boehlert, G.W., C.D. Wilson and K. Mizuno.1994. Populations of the sternoptychid fish *Maurolicus muelleri* on seamounts in the Central North Pacific. Pac. Sci. 48(1):57-69.

Boehlert, G. W., and B. C. Mundy. 1993. Ichthyoplankton assemblages at seamounts and oceanic islands. Bulletin of Marine Science. 53(2):336–361.

Chave, E. H., and B. C. Mundy, 1994. Deep-sea benthic fish of the Hawaiian Archipelago, Cross Seamount, and Johnston Atoll. Pacific Science. 48:367–409.

Chuenpagdee, R., L. E. Morgan, S.M. Maxwell, E.A. Norse and D. Pauly. 2003. Shifting gears: assessing collateral impacts of fishing methods is US waters. Frontiers in Ecology and the Environment 1:10.

Donaldson, T. J. 1995. Comparative analysis of reef fish distribution patterns in the Northern and Southern Mariana Islands. Natural History Research. 2: 227–234.

Driver, M. 1983. "Fray Juan Pobre de Zamora and his account of the Mariana Islands. Journal of Pacific History 18(3):198-216.

Duenas and Swavely. 1985. Saipan Lagoon use management plan. Prepared for the CNMI Coastal Resources Management Office (Four-volume set).

Eldridge, L.G. 1983. Summary of environmental and fishing information on Guam and the Commonwealth of the Northern Mariana Islands. In Resources Assessment Investigation of the Mariana Archipelago, 1980–1985. Western Pacific Regional Fishery Management Council, Honolulu, Hawaii.

Eldredge, L.G., R.T. Tsuda, P. Moore, N. Chernin, and S. Neudecker. 1977. A natural history of Maug, Northern Mariana Islands. University of Guam Marine Laboratory.

Gourley, J. 1997. The Commonwealth of the Northern Mariana Islands: An assessment of the coral reef resources under local and federal jurisdiction. Report to Western Pacific Regional Fishery Management Council. Honolulu, HI.

Grigg, R. W., and L. G. Eldredge. 1975. The commercial potential of precious corals in Micronesia. Part —The Mariana Islands. University of Guam, Marine Laboratory Tech. Rep. 18. Sea Grant Publication UGSG-75-01.

Grigg, R. 1993. Precious coral fisheries of Hawaii and the U.S. Pacific Islands. Marine Fisheries Review 55(2):50-60.

Haight, W., D. Kobayashi, and K. Kawamoto. 1993a. Biology and management of deepwater snappers of the Hawaiian Archipelago. Marine Fisheries Review. 55(2):20–27.

Haight, W., J. Parrish, and T. Hayes.1993b. Feeding ecology of deepwater lutjanid snappers at Penguin Bank, Hawaii: Depth, time of day, diet, and temporal changes." Transactions of the American Fisheries Society. 122(3):338–347.

Haight, W. 1989. Trophic relationships, density and habitat associations of deepwater snappers (Lutjanidae) at Penguin Bank, Hawaii. Master's thesis, University of Hawaii.]

Hamnett M. and W. Pintz, 1996. The contribution of tuna fishing and transshipment to the economies of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam. Pelagic Fisheries Research Program. SOEST 96-05. JIMAR Contribution 96-303. 37p.

Hamnett M., R. Franco, C. Anderson, C. Severance. 1998. Coordinated investigation of pelagic fishermen: Commonwealth of the Northern Mariana Islands. Draft for review, December 1998.

Hensley, R.A. and T.S. Sherwood. 1993. An overview of Guam's Inshore Fisheries. Marine Fisheries Review. 55(2): 129-138.

Ikehara, I.I., H.R. Kami, and R.K. Sakamoto. 1970. Exploratory fishing survey of the inshore fisheries of Guam. In: K. Sugawara (ed.), The Kuroshio II, Proceedings of the 2nd Symposium on the Results of the Cooperative Study of the Kuroshio and Adjacent Regions, Tokyo, September 28 - October 1, 1970. Saikon Publ. Co., Tokyo, pp. 425-437.

Intergovernmental Panel on Climate Change. 2007a. Summary for Policy Makers. *In:* Solomon, S., D. Quin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (Eds.), Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

---. 2007b. Summary for Policy Makers. In: Solomon, S., D. Quin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (Eds.), Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Itano, D.G. 1991. A review of the development of bottomfish fisheries in American Samoa. South Pacific Commission. Noumea, New Caledonia.

Jennison-Nolan J. 1979. Guam: changing patterns of coastal marine exploitation. Sea Grant Publication UGSG 79-12.

G.P. Jones, M.J Millcich, M.J. Emslle, C. Lunow. 1999. Self-Recruitment In A Coral Reef Fish Population..Nature(London) 402:67636763, 802-804, Nature Publishing, 1999.

Jones G.P., S. Planes and S. Thorrold. 2005. Coral reef fish larvae settle close to home . Current Biology , Volume 15 , Issue 14

Kelley, C. and Moffitt, R. 2004. The impacts of bottomfishing on Raita and West St. Rogatien Reserve Preservation Areas in the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. Draft Final Report. Hawaii Undersea Research Laboratory and NOAA Fisheries Pacific Islands Fisheries Science Center.

Knudson, K.E. 1987. Non-commercial production and distribution in the Guam fishery. Contract WPC-0983, Completion Report, Western Pacific Regional Fishery Management Council. Honolulu, HI.

Leis, J. 1987. Review of the early life history of tropical groupers (Serranidae) and snappers (Lutjanidae). In J. J. Polovina and S. Ralston (Eds.), Tropical snappers and groupers: Biology and fisheries management(189—237 pp). Boulder, CO: Westview Press.

Leis, J. 2006. Are larvae of demersal fishes plankton or nekton? *In* Advances in Marine Biology by A.J. Southward and D.William Sims. Academic Press, 2006

Levington, J. S. 1995. Marine biology. New York: Oxford University Press.

Miller, S.A. 2001. Economic assessment of the domestic fisheries development potential of the Commonwealth of the Northern Mariana Islands. Prep. for National Marine Fisheries Service, Saltonstall-Kennedy Grant Program, Grant No. NA 96FD0471.

Maragos J. and D. Gulko (eds), 2002. Coral Reef Ecosystems of the Northwestern Hawaiian Islands Emphasizing the 2000 Surveys. U.S. Fish and Wildlife Service and the Hawaii Department of Land and Natural Resources. Honolulu.

Moffitt, R. B. 1993. Deepwater demersal fish. In A. Wrightand L. Hill (eds.),Nearshore marine resources of the South Pacific (pp. 73–95). IPS (Suva), FFA(Honiara), ICOD (Canada).

Moffitt, R., and F. Parrish. 1996. Habitat and life history of juvenile Hawaiian pink snapper Pristipomoides filamentosus. Pac. Sci. 50(4):371-381

Moffitt, R and J. Polovina. 1987. Distribution and yield of the deepwater shrimp Heterocarpus resource in the Marianas in Resources Assessment Investigation of the Mariana Archiepelago, 1980-1985: Compilation of Published Manuscripts, Reports and Journals. Compile by Angelea Karam for the Western Pacific Regional Fishery Management Council. Honolulu HI.

Myers, R. 1993. "Guam's small-boat-based fisheries." Marine Fisheries Review 55(2):117-128.

Myers, R. F. 1997. Assessment of coral reef resources of Guam with emphasis on waters of federal jurisdiction. Report prepared for the Western Pacific Regional Fisheries Management Council.

Nitta, E. 1999. Draft. Summary Report. Bottomfish Observer Trips in the NWHI. October 1990 to December 1993. NMFS Pacific Islands Area Office, Pacific Islands Protected Species Program, Honolulu.

NMFS (National Marine Fisheries Service). 2002. National Marine Fisheries Service Endangered Species Act - Section 7 Consultation [for Management of the Bottomfish and Seamount Groundfish Fisheries in the Western Pacific Region According to the Fishery Management Plan for the Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region]. Sustainable Fisheries Division, Southwest Region, Pacific Islands Area Office.

Orbach M. 1980. Report on the social, cultural, and economic aspects of fishery development in the Commonwealth of the Northern Mariana Islands. Center for Coastal Marine Studies, University of California, Santa Cruz.

Ostazeski, J. 1997. The deepwater shrimp fishery of the Northern Mariana Islands. Honolulu Laboratory, Southwest Fisheries Science Center, NMFS. Southwest Fisheries Science Center Admin. Rept. H-97-10C.

Parrish, J. D. 1987. The trophic biology of snappers and groupers. In J. J. Polovina and S. Ralston (Eds.), Tropical snappers and groupers: Biology and fisheries management (pp. 405–464). Boulder, CO: Westview Press.

Parrish, F. 1989. Identification of habitat of juvenile snappers in Hawaii. Fisheries Bulletin. 87:1001–1005.

Polovina, J. 1985. Variation of catch rates and species composition in handline catches of deepwater snappers and groupers in the Mariana Archipelago. Proceedings of the Fifth International Coral Reef Congress. Tahiti, Vol. 5, p. 515-520.

Polovina, J.J. and S. Ralston. 1986. An approach to yield assessment for unexploited resources with application to the deep slope fishes of the Marianas. Fishery Bulletin, 84(4):759-770.

Polovina, J., G. Mitchum, N. Graham, M. Craig, E. DeMartini and E. Flint. 1994. Physical and biological consequences of a climate event in the Central North Pacific. Fisheries Oceanography. 3(1): 15-21.

Ralston, S., M. Gooding, and G. Ludwig. 1986. An ecological survey and comparison of bottomfish resource assessments (submersible versus hand-line fishing) at Johnston Atoll. Fish. Bull. 84(1):141-155.

Ralston, S., and H. A. Williams. 1988. Depth distributions, growth, and mortality of deep slope fishes from the Mariana Archipelago. NOAA Tech. Memo. NMFS.

Rohmman, S., J. Hayes, R. Newell, M. Manaco, R. Grigg. 2005. The area of potential shallow-water tropical and subtropical coral ecosystems in the United States. Coral Reefs 24:370-383.

Rogers, A.D. 1994. The biology of seamounts. Advances in Marine Biology, vol. 30. Academic Press Ltd., p. 305-350.

Rubinstein, D. 2001. A Sociocultural Study of Pelagic Fishing Activities in Guam. Final progress report available from University of Hawaii Joint Institute for Marine and Atmospheric Research, Pelagic Fisheries Research Program. Also available at: http://www.soest.hawaii.edu/PFRP/pdf/rubinstein01.pdf

Scavia, D., J.C. Field, D.F. Boesch, R.W. Buddemeier, V. Burkett, D.R. Cayan, M. Fogarty, M.A. Harwell, R.W. Howarth, C. Mason, D.J. Reed, T.C. Royer, A.H. Sallenger, and J.G. Titus. 2002. Climate change impacts on U.S. coastal and marine ecosystems. Estuaries, 25(2):149-164.

Starmer, J., C. Bearden, R. Brainard, T. de Cruz, R. Hoeke, P. Houk, S. Holzwarth, S. Kolinksi, J. Miller, R. Schroeder, M. Timmers, M. Trianni, and P. Vroom. 2005. The state of coral reef ecosystems of the Commonwealth of the Northern Mariana Islands. In J. Waddell (Ed.), The state of coral reef ecosystems of the United States and Pacific Freely Associated States: 2005. NOAA Tech. Memo. NOS NCC11.

Sturman, A. P., and H. McGowan. 2003. Climate. The Pacific Islands: Environment and society. M. Rapaport (Ed.). Honolulu, Hawaii: The Bess Press.

Sturman et al. Sturman, A. P., and H. McGowan. 2003. Climate. In M. Rapaport (Ed.), The Pacific Islands: Environment and society. Honolulu, HI: The Bess Press.

Swearer, S.E., J.E. Caselle, D.W. Lea and R. R.Warner.1999. Larval retention and recruitment in an island population of a coral-reef fish. Nature 402, 799-802.

Trianni, M. 1998. Qualitative assessment of World War II ordinance sites in coral reef habitats at the island of Rota: A historical record. CNMI Division of Fish and Wildlife Technical Assistance Report 98a.

Walther, G.R., E. Post, P. Convey, A. Menzel, C. Parmesan, T.J. Beebee, J.M. Fromentin, O. Hoegh-Guldberg, and F. Bairlein. 2002. Ecological responses to climate change. Nature 416: 389-395.

Wilson, R. R., and R. S. Kaufman. 1987. Seamount biota and biogeography. Geophysics Monographs. 43:355–377.

WPRFMC (Western Pacific Regional Fishery Management Council). 1986. Combined Fishery Management Plan, Environmental Assessment and Regulatory Impact Review for the Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region. Final March 1986. Western Pacific Regional Fishery Management Council, Honolulu.

WPRFMC (Western Pacific Regional Fishery Management Council). 2002a. Guam Bottomfish Scoping Meeting Report; August 8, 2002, Guam Fishermen's Cooperative, Agana, Guam.

WPRFMC (Western Pacific Regional Fishery Management Council). 2002b. Options for Managing the Bottomfish Fishery in Federal Waters around Guam; for consideration in adjusting or amending the Fishery Management Plan for the Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region. Draft, September 25, 2002.

WPRFMC (Western Pacific Regional Fishery Management Council). 2003. Fishery Management Plan for Coral Reef Ecosystems of the Western Pacific Region. Volumes I-III [including Regulations, Regulatory Impact Review / Initial Regulatory Flexibility Analysis, Environmental Impact Statement, and Essential Fish Habitat for Management Unit Species]. Honolulu, Hawaii. 14 March 2003.

WPRFMC (Western Pacific Regional Fishery Management Council). 2005. Final Environmental Impact Statement; Bottomfish and Seamount Groundfish Fishery in the Western Pacific Region. Honolulu, Hawaii. 14 March 2003.

WPRFMC (Western Pacific Regional Fishery Management Council). 2006. Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region 2005 Annual Report. Honolulu, Hawaii.

APPENDIX A: REGULATORY IMPACT REVIEW AND PRELIMINARY REGULATORY FLEXIBILITY ACT ANALYSIS

Preliminary Regulatory Flexibility Act Analysis to be drafted.