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Amendment to the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region

Regarding Catch and Effort Limits for Pelagic Management Unit Species Specified by Regional Fishery Management Organizations and a Framework for the Specification of Annual Catch and Effort Limits for the U.S. Fisheries in the Western Pacific Region

and

Specification of Annual Catch Limits and Accountability Measures for North Pacific Striped Marlin in the Western Pacific Pelagic Fisheries as of January 2015

Including an Environmental Assessment
And
Regulatory Impact Review

RIN

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List of Acronyms/Abbreviations

ASG	**American Samoa Government**
BiOp	**Biological Opinion**
CCM	**Cooperating members, non-members, and participating territories of the WCPFC**
CFCAA	**Consolidated and Further Continuing Appropriation Act**
CMM	**Conservation and management measure**
CPUE	**Catch per unit of effort**
Convention	**Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean**
Council	**Western Pacific Regional Fishery Management Council**
DPS	**Distinct Population Segment**
EA	**Environmental assessment**
EEZ	**Exclusive Economic Zone**
EFH	**Essential Fish Habitat**
EIS	**Environmental Impact Statement**
EPO	**Eastern Pacific Ocean**
ESA	**Endangered Species Act**
FAD	**Fish aggregation device**
FEP	**Fishery ecosystem plan**
FMP	**Fishery management plan**
FR	**Federal Register**
HAPC	**Habitat Areas of Particular Concern**
HLA	**Hawaii Longline Association**
HMS	**Highly migratory species**
ITS	**Incidental Take Statement**
IATTC	**Inter-American Tropical Tuna Commission**
lb	**Pound(s)**
MBTA	**Migratory Bird Treat Act**
MCP	**Marine Conservation Plan**
MMPA	**Marine Mammal Protection Act**
MSA	**Magnuson-Stevens Fishery Conservation and Management Act**
MSY	**Maximum sustainable yield**
mt	**Metric ton(s)**
MUS	**Management unit species**
nm	**Nautical mile(s)**
NMFS	**National Marine Fisheries Service**
NEPA	**National Environmental Policy Act**
NOAA	**National Oceanic and Atmospheric Administration**
Pelagics FEP	**Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region**
PIFSC	**Pacific Islands Fisheries Science Center**
PIRO	**Pacific Islands Regional Office**
PMUS	**Pelagic management unit species**
PRIA	**Pacific Remote Island Areas**
PT	**Participating Territory**

RFMO	**Regional fisheries management organization**
Section 113 of 2012	**Section 113 of the Consolidated and Further Continuing Appropriation Act**
SIDS	**Small Island Developing States**
SPC-OFP	**Secretariat of the Pacific Community – Oceanic Fisheries Program**
UNCLOS	**United Nations Law of the Sea Convention, 1982**
USFWS	**U.S. Fish and Wildlife Service**
VMS	**Vessel monitoring system**
WCPFC	**Western and Central Pacific Fisheries Commission**
WCPO	**Western and Central Pacific Ocean**
WPRFMC	**Western Pacific Regional Fishery Management Council**

Chapter 1: Introduction

Striped marlin in the North Pacific comprises two stocks, the Eastern Pacific Ocean stock (EPO) and the Western and Central North Pacific (WCNP) stock. This latter stock has been determined by the National Marine Fisheries Service (NMFS) to be overfished and subject to overfishing, based on a stock assessment by the International Scientific Committee (ISC) 2012 stock assessment (ISC 2012).

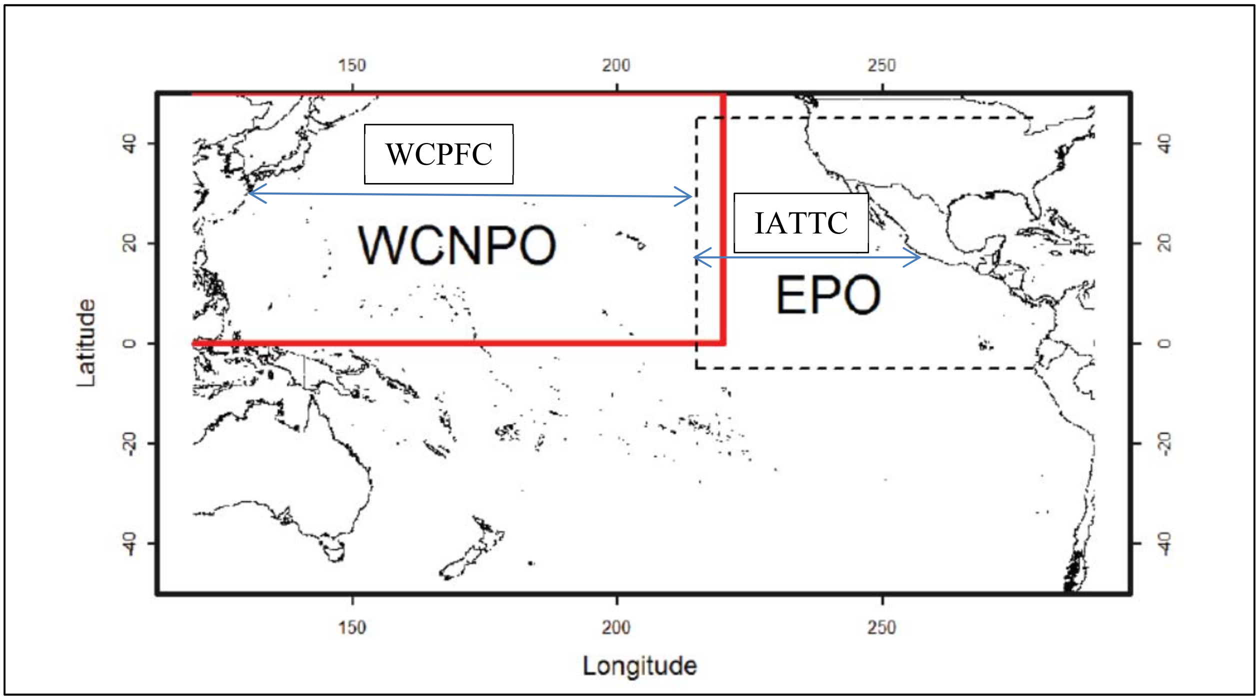

Figure 1. Stock boundary delineated for the 2011 stock assessment of western and central north Pacific striped marlin (WCNPO) indicating by the red lines. The dash lines indicate the eastern Pacific Ocean stock boundary. The jurisdictions of the WCPFC and IATTC in the North Pacific are also shown.

The delineation of the two stock boundaries shows an overlap (Figure 1), with the eastern boundary of the WCNP stripe marlin stock at 140 deg W line of longitude, or 10 degrees to the east of the 150 deg W longitude boundary between the Western and Central Pacific Fishery Commission (WCPFC) and the Inter-American Tropical Tuna Commission (IATTC). Both these tuna regional fishery management organizations (tRFMOs) provide international management measures for tuna and tuna-like species in their areas of jurisdiction.

Under the Magnuson-Steven Act (MSA), a fishery management Council is obliged to take action when a fish stock has been determined to be subject to overfishing or is overfished. Typically, under MSA National Standard 1, a Council has to establish annual catch limits (ACLs) for federally managed fish stocks and develop a rebuilding plan for the overfished stock. However, WCNP striped marlin is subject to international fishery management by the WCPFC so that the international exception to determining an ACL applies, and the Council is not obliged to establish an Acceptable Biological Catch (ABC) or an ACL. Further, where a stock is subject to overfishing from international fishing pressure, and where unilateral action by the United States will not recover the stock, then the Council is obliged to develop domestic regulations to address the relative impact of US fishing vessels. The Council is also obliged to develop and submit recommendations to the Secretary of State and to Congress for international actions that will overfishing in the fishery and rebuild the affected stock.

This amendment established a framework mechanism by which domestic regulatory actions stemming from the tRFMOs can be implemented through the FEP process. Having established the framework, the framework is then used to develop catch limits and accountability measures for WCNP striped marlin.

1.1 Responsible Council and Agency

1.2 Public Review Process

1.3 Document Overview and Preparers

1.4 Background Information

1.5 Council Actions

The Council considered the implications of the 2012 stock assessment at its 157th Meeting in June 2013, anticipating an overfished evaluation from NMFS. The Council made the following recommendation:

> **Regarding a Potential New WCPFC Conservation and Management Measure for North Western and Central Pacific Striped Marlin, the Council recommended NMFS develop management measures that will end overfishing and lead to stock recovery, such as fishing at a constant catch of 3,600 mt as noted in the 2012 stock assessment, and further advocate for measures that establish limits of not more than 500 mt for any CCMs with a history of catching less than 500 mt of striped marlin.**

The Council communicated this recommendation to NMFS in a letter dated July 8, 2013 and received a response dated July 24, 2013, which acknowledged that the Council recommendations were based on sound scientific advice.

In December 2013, NMFS makes WCNP striped marlin overfishing determination and informed Council of its decision. In May 2014 NMFS publishes WCNP striped marlin overfishing determination in the Federal Register, and the Council included this on the agenda for the 160th Council Meeting. At its 160th Meeting (June 24-27, 2014) the Council made the following recommendation:

> **Regarding the overfished condition of West Central North Pacific striped marlin stock, the Council directed staff to prepare, for consideration at the 161st meeting, draft domestic regulations to prohibit the retention of WCNP striped marlin in the Hawaii longline fishery when 95% of the US limit is reached by the Hawaii longline fishery.**

This amendment is the response to the Council's recommendation

1.6 Purpose and Need

The purpose for action by the Western Pacific Regional Fishery Management Council (Council) is that Conservation and Management Measures (CMMs) or Resolutions by Pacific regional tuna management organizations (tRFMOs) may require domestic implementation through the Council's Pelagics Fisheries Ecosystem Plan. Further, domestic regulation may require that formal rulemaking be conducted based on CMMs from the tRFMOs. Currently, the FEP does not include a framework for the Council to establish management measures that apply to US fisheries in the Western Pacific Region stemming from tRFMO CMMs and Resolutions.

In this instance, the National Marine Fisheries Service (NMFS) has made a determination that Western and Central North Pacific (WCNP) striped marlin is an overfished stock. NMFS informed the Council about this determination for WCNP striped marlin on December 5 2013, but the Federal Register announcement was not made until May 19, 2014. NMFS based its decision on the most recent stock assessment of, conducted in 2012 by the International Scientific Committee (ISC) (Lee et al. 2012). The results support a conclusion that the stock is subject to overfishing because the fishing mortality F/F_{MSY} is > 1.0 (1.25) indicating the stock is subject to overfishing, and the spawning biomass (938 mt) is lower than the minimum stock size threshold (MSST) of 1,628 mt.

The need for Council action stems from National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), which requires that 'conservation and management measures shall prevent overfishing while achieving optimum yield from each fishery for the United States fishing industry. Further, the evaluation of the overfished and overfishing condition of WCNP striped marlin stated that the Council is obliged to take action under sections 304(i) and 304(i)(2) of the Magnuson-Steven Act to address international and domestic impacts, respectively. The Council must develop domestic regulations to address the relative impact of the domestic fishing fleet on the stock, and develop recommendations to the Secretary of State and Congress for international actions to end overfishing and rebuild WCNP striped marlin.

1.7 Proposed Action

The proposed action would amend the Pelagics FEP to establish a framework within the FEP to specify catch or effort limits provided by RFMOs and applicable to US pelagic fisheries in the Western Pacific Region.

1.8 Action Area

The action area is the area of operation for U.S. vessels permitted under the Pelagics FEP and other federal regulations. This generally includes the U.S. EEZ around the U.S. Territories and State of Hawaii (3-200 nm offshore except around the Pacific Remote Island Areas (PRIAs) where the EEZ is 0-200 nm) and the high seas within the WCPFC Convention Area.

Chapter 2: Description of Alternatives

A main feature common to all Alternatives is that the longline fisheries of the western Pacific region would continue to be managed in accordance with the Pelagics FEP and its associated regulations, and other applicable laws. Regardless of which Alternative is selected, the Hawaii longline fishery will continue to be a limited entry fishery that is subject to a suite of management measures to ensure it remains sustainable. Management measures applicable to western Pacific longline fisheries include requirements for permits, pre-trip notification of American Samoa- and Hawaii-based fishing trips, logbooks, observer requirements, vessel monitoring system, use of circle hooks and other specific gear requirements, prohibited fishing areas, and requirements related to the safe handling of protected species to reduce the severity of interactions.

2.1 Alternative 1- No Action, do not establish a framework to implement tRFMO measures

Under this Alternative, the Council would not amend the Pelagics FEP, and there would be no FEP framework mechanism to implement measures stemming from the tRFMOs. Moreover, if an MUS species is subject to some form of limitation and has been evaluated as overfished then taking no action would be contrary to Section 304(i)(2) of the MSA which requires Councils to address the relative impact of fishing vessels of the United States on the stock. Under Alternative 1, the Hawaii longline and other fisheries would continue to harvest striped marlin, but there would be no accountability measure for the fishery in the event that the WCPFC specified limit is exceeded since striped marlin have been evaluated as overfished by NMFS and thus action needs to be taken as prescribed by the MSA. In the absence of such a mechanism, the Council could develop recommendations for domestic regulations to address the relative impact of fishing vessels of the United States on the stock, which NMFS could implement through the authority of the Tuna Treaty Act of 1950 for Eastern Pacific Tuna Fisheries, or the WCPFC Implementation Act. This alternative is included as the baseline environmental or status quo alternative and allows a comparison of the impacts of action alternatives.

2.2 Alternative 2 - Establish a framework within the FEP to specify catch or effort limits provided by RFMOs and applicable to US pelagic fisheries in the Western Pacific Region (Preliminarily Preferred)

Under the Alternative, the Pelagics FEP would be amended to include a framework provision whereby any limits to fishing effort or catch developed by a tRFMO could be implemented through the Council amendment process and domestic rule making.

a) WCNP Striped Marlin Specification Sub-alternatives

i) No specification of annual catch limit for striped marlin in Hawaii's pelagic fisheries

The WCPFC striped marlin catch limit is specific to US fisheries, which means Hawaii. CMM 2010-01, which implemented the striped marlin catch limit, contained language that "Nothing in this measure shall prejudice the legitimate rights and obligations of Small Island Developing State Members and participating territories in the Convention Area seeking to develop their own domestic fisheries." This is because Guam, Commonwealth of the Northern Mariana Islands and American Samoa meet the WCPFC definition of a Small Island Developing State.

Under this Alternative, there would be no specification of an annual catch limit for striped marlin, and Hawaii's pelagic fisheries would continue to fish, even if they exceeded the WCPFC catch limit. As noted earlier, in the absence of a catch limit specification under the MSA, the Council could develop recommendations for domestic regulations to address the relative impact of fishing vessels of the United States on the stock, which NMFS could implement through the authority of the WCPFC Implementation Act or MSA Section 305. This alternative is included for the purpose of evaluating impacts of the proposed striped marlin ACL specification and AM

ii) Specification of an annual striped marlin catch limit of 458 mt for Hawaii's pelagic fisheries (Preliminarily Preferred)

Under this alternative an over-arching annual catch limit of 458 mt would be implemented for Hawaii's pelagic fisheries. Unlike CMMs of other species such as tunas, CMM 2010-01 refers to all fisheries and not specifically to longline or other modes of pelagic fishing. Thus the limit of 458 mt would apply to a combined catch of longline, troll and handline fisheries. Note that the limit applies to commercial fisheries and not to recreational catches of striped marlin.

The annual total is based on the formula from CMM 2010-01, where the highest annual catch of striped marlin between 2000 and 2003 from the WCPO was 573 mt, which gives a limit of 458 mt (see Section 3.2.1 for more details)

b) WCNP Striped Marlin Accountability measure Sub-alternatives

i) Do not establish accountability measure

Under this Alternative, no action would be taken if the WCPO striped marlin limit was reached or exceeded.

ii) Prohibit all striped marlin retention when limit is reached

The accountability measure described this sub-alternative and sub-alternative 2.b.iii would only apply if a catch limit is implemented. Under this Alternative, all commercial pelagic fisheries catching striped marlin in the WCPO would be obliged to discard any striped marlin once the 458 mt was reached. This provision would apply to troll and handline vessels as well as longline vessels. The difficulty with this Alternative is going to be keeping near-real time cumulative totals for the striped marlin catches by troll and handline vessels.

iii) Prohibit retention in Hawaii longline fishery when 95% of catch limit is reached by longline fishery (Preliminarily Preferred)

Table 1. Catches of striped marlin by Hawaii's commercial pelagic fisheries

Year	Deep set longline	Shallow set longline	Troll[1]	Total	Troll % total
2009	234	24	10	268	3.72%
2010	153	12	5	171	3.19%
2011	343	20	16	378	4.20%
2012	270	11	11	293	3.87%
2013	376	15	10	401	2.38%

Under this alternative, only the cumulative total of the longline fishery would be monitored, until 95% of the 458 mt total striped marlin catch was reached. Table 1 shows that the troll fishery typically catches less than 5% of the commercial striped marlin catch thus the longline fishery only would be subject to non-retention when a catch of 435 mt is reached, and with little danger that the non-longline catch retention would cause all commercial pelagic fisheries catch to exceed the overall total of 458 mt.

iv) Other Alternatives

Another Alternative that was considered as an accountability measure but ultimately rejected by the Council was to implement a size limit for retention of striped marlin, where the catch limit would apply only to those fish larger than some minimum retention length. A size limit of 150 cm would be established as the minimum size for retention of striped marlin, which is close to the 50% length at sexual maturity (Bigelow 2011, 2012).

[1] No striped marlin has been caught by the handline fishery since 2004

This measure would still permit catch and retention of striped marlin, albeit that fish smaller than 150 cm would have to be released. Released fish would be subject to some post release mortality but survivors would have a chance to grow to become sexually mature and contribute to further recruitment.

However, implementation of a size limit may impose a significant regulatory burden on the Hawaii longline fishery, troll fishery, Council, NMFS and State of Hawaii disproportionate to the impact of the measure on the fishing mortality of the stock. About 50% of the fish caught by the deep set longline fishery are reported as dead on longline hauls, thus the impact of a minimum size may be very limited in terms of conservation gains. Although the troll fishery is currently only 3.8% of total striped marlin landings, a minimum size for retention would disproportionately affect the charter vessel fishery which in 2011 landed 54% of the striped marlin (WPRFMC 2013).

Chapter 3: Description of the Affected Environment

3.1 Status of Pelagic Management Unit Species

For a comprehensive discussion of the biology and life history of pelagic MUS, see the Pelagics FEP. Table 2 provides a summary of the stock status of pelagic MUS under the Pelagics FEP.

Table 2: Stock status of pelagic management unit species under the Pelagics FEP.

Species	Stock	Overfishing?	Overfished?
Albacore (*Thunnus alalunga)*	North Pacific	Unknown	Unknown
	South Pacific	No	No
Bigeye tuna (*Thunnus obesus)*	Pacific	Yes in WCPO	No in WCPO
		No in EPO*	No in EPO
Pacific bluefin tuna (*Thunnus orientalis*)	Pacific	Yes	Yes
Yellowfin tuna (*Thunnus albacares)*	Central Western Pacific	No	No
	Eastern Tropical Pacific	No	No
Skipjack tuna (*Katsuwonus pelamis*)	Central Western Pacific	No	No
Striped marlin (*Kajikia audax*)	Western Central North Pacific	Yes	Yes
Blue marlin (*Makaira nigricans*)	Pacific	No	No
Swordfish *(Xiphias gladius)*	Central Western North Pacific	No	No
	Eastern Tropical Pacific	No	No
Oceanic whitetip shark (*Carcharhinus longimanus*)	Pacific	Unknown	Unknown
Blue shark (*Prionace glauca*)	Pacific	No	No
Shorfin mako shark (*Isurus oxyrinchus*)	North Pacific	Unknown	Unknown

Longfin mako shark (*Isurus paucus*)	North Pacific	Unknown	Unknown
Mahimahi (*Coryphaena* spp.)	Pacific	Unknown	Unknown
Wahoo (*Acanthocybium solandri*)	Pacific	Unknown	Unknown
Opah (*Lampris* spp.)	Pacific	Unknown	Unknown
Pomfret (family Bramidae)	Western Pacific	Unknown	Unknown

Note: This table omits some non-target and incidentally caught pelagic MUS in 50 CFR § 665.800, which have unknown status determinations. Statuses are based on NMFS' determinations through August 2013, or other best scientific information available.
* 2013 IATTC stock assessment for bigeye tuna in the EPO concludes overfishing is not occurring; however, at the time of writing, NMFS has not revised its status determination of subject to overfishing.
Source: http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm; NMFS unpublished.

3.1.1 Status of Tuna Stocks

3.1.1.1 WCPO Bigeye Tuna

The most recent stock assessment for bigeye tuna in the WCPO was conducted by Harley et al (2014). The main conclusions of the current assessment are consistent with recent assessments presented in 2010 and 2011. Current catches exceed maximum sustainable yield (MSY) and recent levels of fishing mortality exceed the level that will support the MSY, as are levels of spawning potential are most likely at or below the level which will support the MSY.

3.1.1.2 WCPO Yellowfin tuna

The most recent stock assessment for yellow tuna in the WCPO was conducted by Davies et al (2014). The main conclusions of the current assessment are consistent with recent assessments presented in 2009 and 2011. Current catches marginally exceed the MSY, while recent levels of fishing mortality are most likely below the level that will support the MSY. Recent levels of spawning potential are most likely above the level which will support the MSY.

3.1.1.3 WCPO Skipjack

The most recent stock assessment for skipjack tuna in the WCPO was conducted by Rice et al (2014a). Latest catches slightly exceed the MSY, while fishing mortality for adult and juvenile skipjack tuna is estimated to have increased continuously since the beginning of industrial tuna fishing, but fishing mortality still remains below the level that would result in the MSY. Recent levels of spawning potential are well above the level that will support the MSY.

3.1.1.4 North Pacific Albacore

The most recent stock assessment of North Pacific albacore was conducted in 2014 (ISC 2014a). The assessment concluded that the North pacific albacore stock is healthy and that current productivity is sufficient to sustain recent exploitation, assuming that average historical recruitment prevails. The stock is not experiencing overfishing and is likely not in an overfished condition at present

3.1.4.5 Pacific Bluefin

The most recent stock assessment of Pacific bluefin was conducted in 2014 (ISC 2014b). The stock assessment showed that Pacific bluefin is both overfished and continues to be subject to overfishing. Moreover, recruitment in 2012 was relatively low, and the average recruitment for the last five years may have been below the historical average level. Current stock projections from the assessment indicate the neither WCPFC or IATTC conservation and management measures will eb effective unless recruitment returns to historical average levels.

3.1.2 Status of Billfish Stocks

3.1.2.1 West-Central North Pacific Striped Marlin

Catches of WCNP striped marlin have exhibited a long-term decline since the 1970s. Catches averaged roughly 8,100 metric ton (mt) per year during 1970-1979 and declined by roughly 50% to about 3,800 mt per year during 2000-2009. Lee et al. (2012) identified the stock is subject to overfishing and overfished relative to MSY.

Estimates of population biomass of the WCNP striped marlin stock exhibit a long-term decline (Figure 2). Population biomass (age-1 and older) averaged roughly 18,200 mt, or 42% of unfished biomass during 1975-1979, the first 5 years of the assessment time frame, and declined to 6,625 mt, or 15% of unfished biomass in 2010. Spawning stock biomass (SSB) is estimated to be 938 mt in 2010 (35% of SSB_{MSY}, the spawning biomass to produce MSY (Figure 3). Fishing mortality on the stock (average F on ages 3 and older) is currently high (Figure 4) and averaged roughly F = 0.76 during 2007-2009, or 24% above F_{MSY}. The predicted value of the spawning potential ratio (SPR, the predicted spawning output at current F as a fraction of unfished spawning output) is currently $SPR_{2007-2009}$ = 14% which is 19% below the level of SPR required to produce MSY. Recruitment averaged about 328 thousand recruits during 1994-2008, which was roughly 30% below the 1975-2010 average. No target or limit reference points have been established for the WCNP striped marlin stock under the auspices of the WCPFC. Compared to MSY-based reference points (see Figure 3), the current (2010) spawning biomass is 65% below SSB_{MSY} and the current fishing mortality (average F for 2007-2009) exceeds F_{MSY} by 24% (Figure 4). Therefore, overfishing is currently occurring relative to MSY and the stock is in an overfished state (Figure 5).

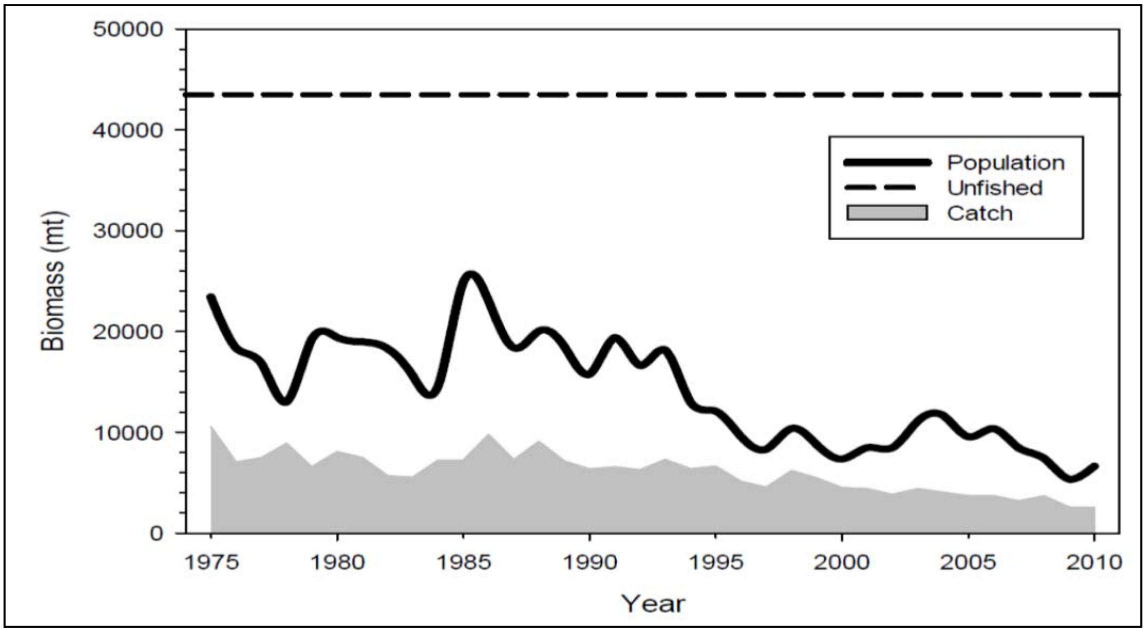

Figure 2. Trends in population biomass and reported catch biomass ofWestern and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2010. Source: Lee et al. (2012)

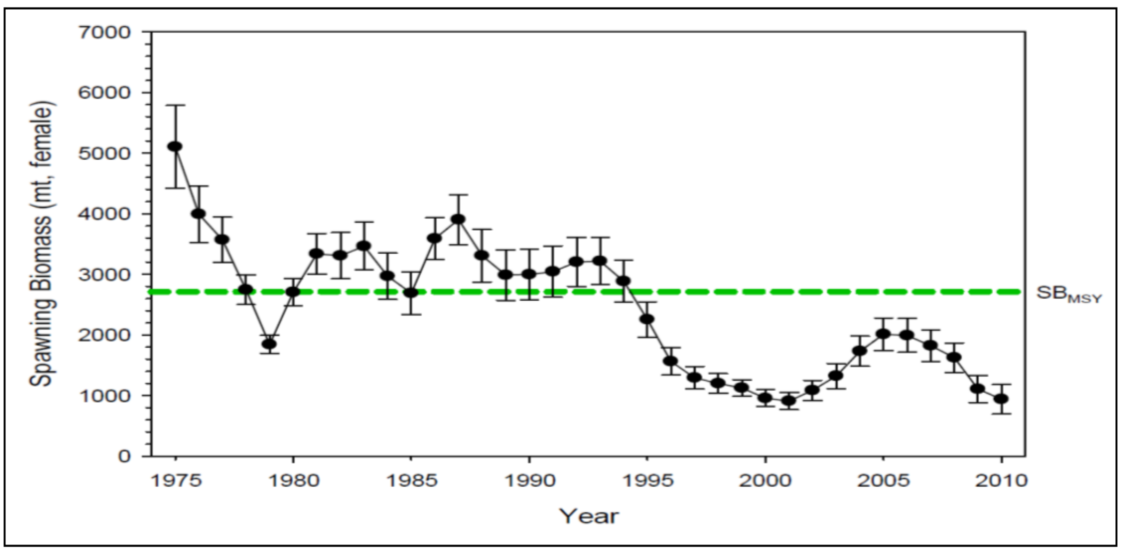

Figure 3. Trends in estimates of spawning biomass of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2010 along with 80% confidence intervals. Source: Lee et al. (2012)

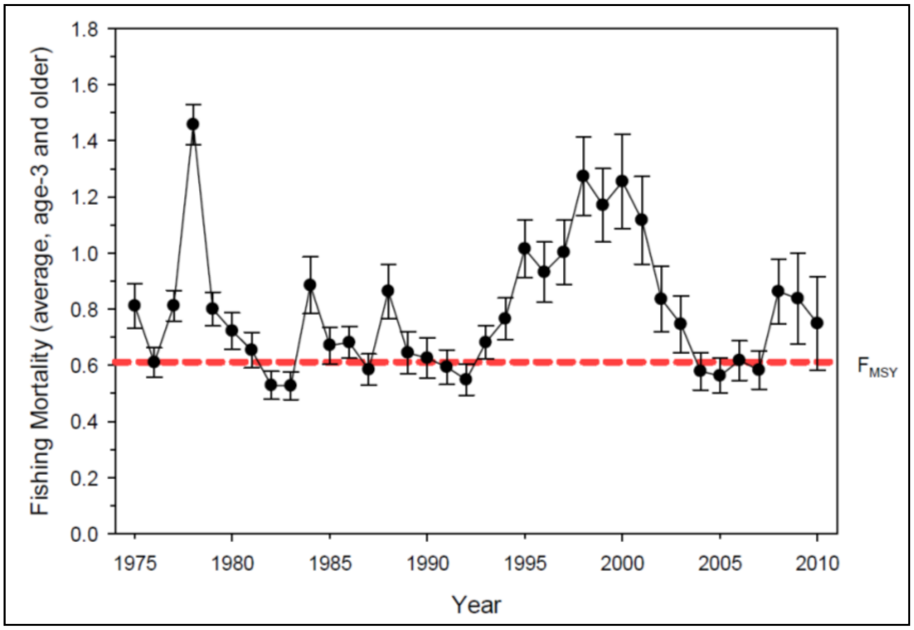

Figure 4. Trends in estimates of fishing mortality of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2010 along with 80% confidence intervals.
Source: Lee et al. (2012)

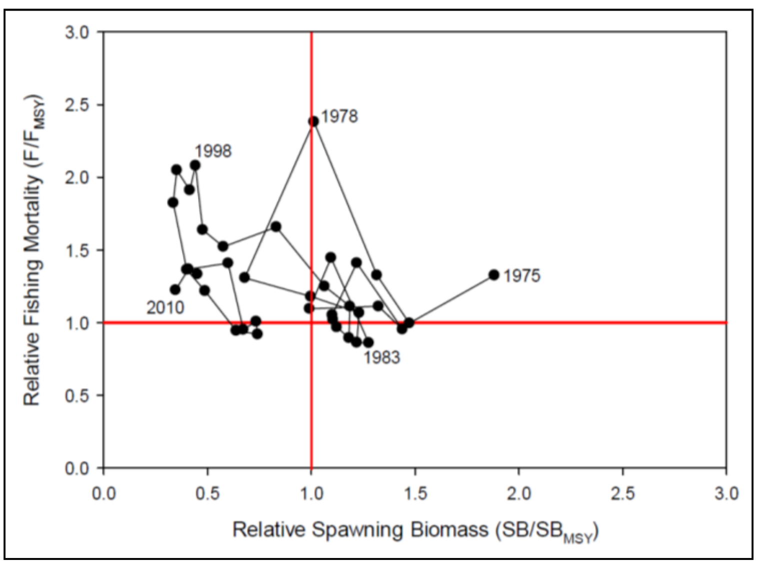

Figure 5. Kobe plot of the trends in estimates of relative fishing mortality and relative spawning biomass of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2010.
Source: Lee et al. (2012)

The ISC provided the following scientific information as conservation advice:

- Fishing at FMSY would lead to spawning biomass increases of roughly 45% to 72% from 2012 to 2017.
- Fishing at a constant catch of 2,500 mt would lead to potential increases in spawning biomass of 133% to 223% by 2017.
- Fishing at a constant catch of 3,600 mt would lead to potential increases in spawning biomass of between 48% and 120% by 2017.

By comparison:

- Fishing at the current fishing mortality rate would lead to spawning biomass increases of 14% to 29% by 2017.
- Fishing at the average 2001-2003 fishing mortality rate would lead to a spawning biomass decrease of 2% under recent recruitment to an increase of 6% under the stock-recruitment curve assumption by 2017.

3.1.2.2 Pacific Blue Marlin

The most recent assessment of Pacific blue marlin was conducted in 2013 (ISC 2013). The stock assessment indicate that the Pacific blue marlin spawning stock biomass decreased to the MSY level in the mid-2000s, and since then has increased slightly. The assessment model indicates that the Pacific blue marlin stock is currently not overfished and is not subject to overfishing relative to MSY-based reference points.

3.1.2.3 Western and Central North Pacific Swordfish

The most recent assessment of North pacific swordfish was conducted in 2014 (ISC 2014c). The stock assessment showed that overfishing likely occurred in only a few years, but may be occurring in recent years. In 2012, there was a 55% probability that overfishing was occurring in 2012, but there was a less than 1% probability that the stock was overfished. Retrospective analyses indicated that there was a clear retrospective pattern of underestimating exploitable biomass and overestimating harvest rate.

3.1.3 Status of Shark Stocks

The most recent stock assessment of North Pacific blue sharks was conducted by ISC (2014d) and Rice et al (2014b). These assessments found that North Pacific blue sharks were not overfished nor being subjected to overfishing.

Stock assessments for oceanic white-tip and silky sharks were conducted in 2012 and 2013 respectively (Rice & Harley 2012; 2013). Both assessments showed that overfishing is occurring and that both species were in an overfished state.

3.2 International Management of HMS Stocks in the Pacific

As described in section 1.4, HMS stocks are internationally managed in the Pacific by the WCPFC and IATTC. The United States is a member of both RFMOs. The following provides an overview of species-specific conservation and management measures established by the WCPFC. There is currently no management measure for EPO striped marlin neither by the IATTC as this stock continues to be healthy and is neither overfished nor subject to overfishing.

3.2.1 Western and Central Pacific Fisheries Commission

The Seventh Meeting of the WCPFC adopted CMM 2010-01 that required CCMs to reduce total catches of North Pacific Striped Marlin in a phased reduction that by January 1, 2013, the catch would be at 80% of the levels caught in 2000 to 2003. The CMM covered all fisheries, not just longliners. Most striped marlin in Hawaii is landed by the longline fishery (≈96-97%), and most of this longline striped marlin catch comes from WCPO (≈90%). US historical longline catches of striped marlin in the NP WCPO have ranged between 200-700 mt. Applying CMM 2010-01 to the period 2000-2003, where the maximum catch in Hawaii (longline plus troll/handline) from the WCPO was 573 mt, produces a catch limit of 458 mt. Total catches of striped marlin in Hawaii in 2012 and 2013 amounted to 293 mt and 401 mt respectively.

No management measures have been adopted for ENPO striped marlin stock which as noted above is not overfished or subject to overfishing.

3.3 Pelagic Fisheries of the State of Hawaii

Hawaii's pelagic fisheries, which include the longline, Main Hawaiian Islands (MHI) troll and handline, offshore handline, and the aku boat (pole-and-line) fisheries, are the state's largest and most valuable fishery sector. Tuna, billfish, and other tropical pelagic species (such as mahimahi, ono, and opah) supply most of the fresh pelagic fish consumed by Hawaii residents and support popular recreational fisheries. Hawaii longline vessels are capable of traveling long distances to high-seas fishing grounds, while the smaller handline, troll, charter and pole-and-line fisheries, which may be commercial, recreational or subsistence, generally occur within 25 miles of land, with trips lasting only one day.

The catch trend for pelagic species across all fisheries over time has been increasing from 16 million pounds (7,260 mt) in 2004 to a maximum of about 27 million pounds (12,250 mt) in 2007, with a mean of 22 million pounds (9,980 mt). Over this period, the swordfish fishery reopened in 2004, which contributed to higher total landing volumes (WPRFMC 2012).

Longline

Longline fishing has almost a century of operations in Hawaii, commencing in 1917 with wooden sampan vessels operating basket-style tarred rope longlines, and using floats with marker flags, which gave rise to this fishery as the 'flag-line' fishery. Fishing was conducted close to shore and targeted bigeye and yellowfin tunas. The limited entry program caps the number of permits for the Hawaii longline fisheries at 164, and maximum vessel length is limited to 101 ft.

In the early 2000s when the Hawaii-based longline fishery experienced area and other closures to protect sea turtles, U.S. longline vessels from the west coast fished in the high seas of the WCPFC Convention Area north of Hawaii and landed their catch on the U.S. West Coast. No rules currently prevent a tuna longliner based on the west coast from fishing in the WCPFC area. If there should again be an expansion of such fishing, in combination with the Hawaii longline fishery it would be subject to the WCPFC limit of 3,763 mt of bigeye tuna.

There are two distinct Hawaii longline fisheries: one which sets lines deep to maximize the catch of bigeye tuna (deep-set fishery), and the other that sets gear shallow (shallow-set fishery) to target swordfish. Some swordfish vessels may switch to deep-set tuna fishing as the swordfish season ends. Since 2004, an average of 126 vessels actively deep-set, and 28 of these vessels switch seasonally to actively shallow-set. Unless distinctly discussed, the Hawaii deep-set and shallow-set fisheries will be referred to as the Hawaii longline fishery.

About one-third of the catch (numbers of fish) in the deep-set fishery is bigeye tuna, with the balance of the catch primarily mahimahi, blue shark, oilfish, pomfret, albacore, yellowfin, and skipjack tunas, moonfish (opah), striped marlin, spearfish and wahoo. Most of these fish are retained, apart from the blue shark, which is mostly discarded alive. About 40 percent of the shallow-set catch (numbers of fish) comprises swordfish, with blue shark, mahimahi, albacore and oilfish forming most of the balance of the catch. Although the shallow-set fishery targets swordfish, it also catches bigeye tuna and striped marlin incidentally. Like the deep-set fishery, most of the catch is retained aside from the blue shark catch which is discarded alive.

Effort trends for the Hawaii deep-set longline fishery are summarized in Table 3. From 2004-2012, the annual number of vessels that participated in the deep-set fishery has remained relatively stable, ranging from 124 to 129, and NMFS does not expect the number to increase much beyond this range in the near future (Table 3). Although there is potential for the number of active vessels to increase in under the limited entry program, which is capped at 164 permits, it is difficult to speculate on new vessels entering fishery due to new vessel costs, fishing participant turnover, and the existing regulatory environment.

The average number of deep-set trips per year (1,484) slightly decreased from 2004-2012, while the average number of sets per trip and hooks per set slightly increased from 10 to 12 and 2,007 to 2,374, respectively. Therefore, analyses show vessels are making fewer trips yet deploying more hooks per set. It is likely that fishermen are making more sets per trip and deploying more hooks per set to increase efficiency and spend less money on fuel, which has increased significantly over the last several years.

NMFS' Pacific Islands Fisheries Science Center (PIFSC) provided a statistical analysis of past fishing effort from 2004-2012 to inform the anticipated level of future effort in the Hawaii deep-set fishery. The deep-set fishery operated largely unchanged from 2004 to 2008, in terms of the area of operation and the number of vessels that deep-set fish. During this period, the fishery operated without catch limits and the number of hooks increased by roughly 2.1 million per year. In 2004, the fishery set 31,913,246 hooks and in 2008, the fishery set 40,083,935 hooks. In 2009 through 2012, the fishery was subject to a bigeye tuna catch limit of 3,763 mt in the western and central Pacific, where the majority of historical effort has occurred, constraining annual effort to

37,770,913 and 37,244,432 hooks, respectively. However, in 2011 and 2012, the fishery operated under a Section 113 arrangement that provided additional fishing opportunity beyond the catch limit of 3,763mt. As a result, the deep-set fishery operated throughout the year, and new records for hooks set were reached in 2011 and 2012. In these years, it operated similar to 2007 and 2008 in terms of total catch of bigeye tuna. Total hooks deployed in 2012 were 43,965,781. Spatial distribution of the deep-set fishery for 2011 is shown in Figure 6.

The annual number of shallow-set fishing vessels also remains stable at roughly 30 vessels per year. Since the shallow-set fishery does not target bigeye tuna and derives most of its income from swordfish catch, further description of this fishery is not provided here.

Catch statistics and economic data from the Hawaii's commercial fisheries are provided in Table 4 and Table 5. The Hawaii longline fishery is the largest fishery in Hawaii in terms of volume and value, representing over $85 million in ex-vessel revenue in 2012. Bigeye tuna comprises around two thirds of landings by the Hawaii longline fishery, but nearly 75 percent of the value (See Table 9).

Table 3: Number of active longline vessels, effort, and bigeye tuna caught in the Hawaii deep-set fishery, 2004-2012 (includes WCPO and EPO).

Year	Vessels making deep-sets	Deep-set fishing effort (hooks)	Deep-set fishing effort (trips)	Deep-set fishing effort (sets)	Bigeye tuna caught (number)
2004	125	31,913,246	1,522	15,902	142,188
2005	124	33,663,248	1,590	16,550	127,315
2006	127	34,597,343	1,541	16,452	117,465
2007	129	38,839,377	1,588	17,815	158,086
2008	127	40,083,935	1,532	17,885	150,852
2009	127	37,770,913	1,402	16,810	118,204
2010	122	37,244,432	1,360	16,085	135,636
2011	129	40,766,334	1,462	17,173	155,266
2012	128	43,965,781	1,356	18,069	158,951
Mean	**126**	**37,649,401**	**1,484**	**16,971**	**140,440**

Source: NMFS PIFSC, unpublished.

In the next five years, NMFS anticipates the Hawaii deep-set fishery to continue to operate largely unchanged in terms of fishing location, the number of vessels that deep-set fish, catch rates of target, non-target, bycatch species, depth of hooks, or deployment techniques in setting longline gear. Based on a statistical analysis of logbook data, NMFS expects fishing effort (sets and hooks) to slightly increase or remain similar to recent years and it is plausible that the current deep-set fleet of 124-129 vessels may be operating near its maximum in terms of hooks, sets, and trips. Based on fishery effort trends, NMFS estimates 128 vessels to make 1,523 trips, with18,592 deep sets, and deploying 46,117,532 deep-set hooks in the near future (NMFS unpublished data). It is possible over time that effort may gradually increase if latent permits (approximately 35) are assigned to vessels and begin fishing or if existing vessels are replaced with larger vessels that may be able to expend more fishing effort.[2] However, as previously stated, increases in potential number of vessels are difficult to speculate given issues relating to operational costs, participant turnover, new vessels costs, and existing regulatory environment. Based on these factors, NMFS does not anticipate that the number of vessels or effort in the Hawaii longline will substantially increase in the near future.

[2] Note that the Hawaii longline limited entry program is restricted to vessels less than 101 ft in length.

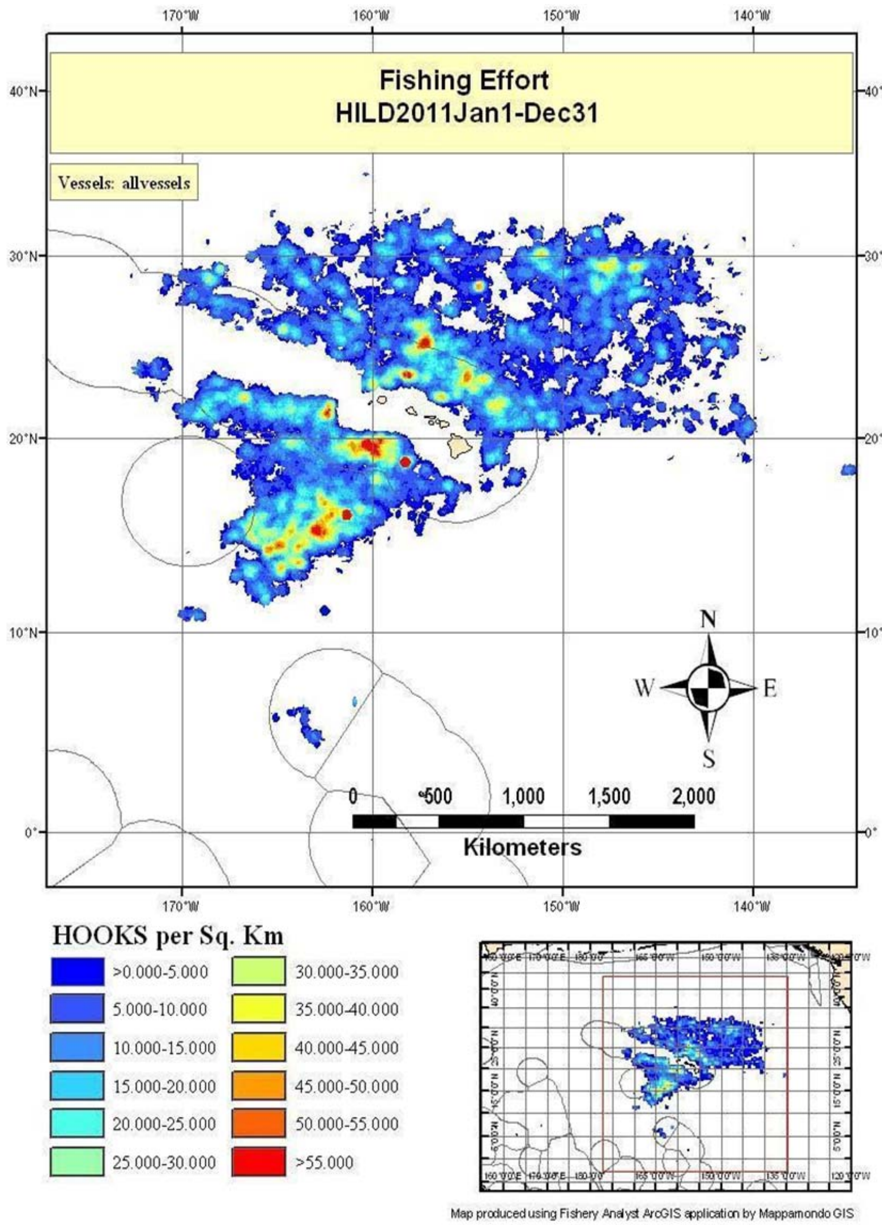

Figure 6: Spatial distribution of fishing effort by the Hawaii longline deep-set fishery, 2011.
Source: NMFS PIFSC, unpublished.

Table 4: Hawaii commercial pelagic landings, revenue, and average price by species for the Hawaii-based deep-set and shallow-set longline fisheries, 2011-2012.

	Deep-set longline						Shallow-set longline					
	2011			2012			2011			2012		
	Kept (1000 lbs)	Kept Value ($1000)	Avg. Value ($/lb)	Kept (1000 lbs)	Kept Value ($1000)	Avg. Value ($/lb)	Kept (1000 lbs)	Kept Value ($1000)	Avg. Value ($/lb)	Kept (1000 lbs)	Kept Value ($1000)	Avg. Value ($/lb)
Tuna PMUS												
Albacore	1,473	$2,463	$1.67	1,419	$3,345	$2.36	64	$62	$0.96	27	$34	$1.29
Bigeye tuna	12,315	$51,976	$4.22	12,731	$60,942	$4.79	106	$399	$3.76	75	$366	$4.90
Bluefin tuna	0	$3	$9.02	1	$5	$9.02	0	$0	$0.00	0	$2	$10.22
Skipjack tuna	453	$405	$0.89	540	$728	$1.35	1	$0	$0.43	1	$0	$0.43
Yellowfin tuna	2,009	$6,025	$3.00	1,885	$7,397	$3.92	38	$132	$3.44	29	$141	$4.88
Other Tunas	0	$0	$0.00	0	$0	$0.00	0	$0	$0.00	0	$0	$0.00
Tuna PMUS Subtotal	**16,252**	**$60,873**	**$3.75**	**16,576**	**$72,416**	**$4.37**	**210**	**$593**	**$2.83**	**131**	**$543**	**$4.15**
Billfish PMUS												
Swordfish	456	$1,340	$2.94	557	$1,659	$2.98	3,100	$7,933	$2.56	2,567	$7,343	$2.86
Blue marlin	797	$1,025	$1.29	629	$1,172	$1.86	27	$22	$0.83	26	$34	$1.29
Striped marlin	756	$949	$1.25	596	$1,298	$2.18	43	$50	$1.18	25	$44	$1.76
Spearfish	511	$554	$1.08	354	$648	$1.83	6	$8	$1.41	5	$8	$1.63
Other Marlins	33	$41	$1.24	23	$35	$1.54	0	$0	$0.76	0	$0	$0.00
Billfish PMUS Subtotal	**2,552**	**$3,908**	**$1.53**	**2,159**	**$4,813**	**$2.23**	**3,176**	**$8,014**	**$2.52**	**2,623**	**$7,429**	**$2.83**
Other PMUS												
Mahimahi	860	$2,219	$2.58	888	$2,219	$2.50	60	$161	$2.71	46	$122	$2.64
Ono (wahoo)	352	$1,009	$2.86	366	$1,167	$3.19	1	$2	$2.22	1	$3	$2.48
Opah (moonfish)	1,616	$2,923	$1.81	1,574	$3,191	$2.03	6	$10	$1.74	17	$44	$2.60
Oilfish	555	$761	$1.37	538	$739	$1.38	33	$42	$1.27	25	$34	$1.39
Pomfrets (monchong)	398	$1,343	$3.37	682	$1,913	$2.81	1	$4	$2.87	5	$17	$3.66
PMUS sharks	202	$173	$0.85	186	$200	$1.08	16	$11	$0.70	27	$23	$0.85
Other PMUS Subtotal	**3,984**	**$8,428**	**$2.12**	**4,233**	**$9,430**	**$2.23**	**117**	**$231**	**$1.98**	**121**	**$244**	**$2.01**
Other pelagics	**47**	**$36**	**$0.76**	**22**	**$26**	**$1.18**	**0**	**$0**	**$0.47**	**0**	**$0**	**$0.19**
Total pelagics	**22,835**	**$73,244**	**$3.21**	**22,990**	**$86,685**	**$3.77**	**3,503**	**$8,839**	**$2.52**	**2,876**	**$8,216**	**$2.86**

Source: PIFSC unpublished.

The Hawaii longline fishery is restricted under an annual longline bigeye tuna limit of 3,763 mt (8,293,652 million pounds) in the WCPO and 500 mt limit in the EPO for vessels over 24 meters.[3] The WCPO U.S. catch limit of bigeye tuna applicable to the Hawaii longline fleet represents approximately 5.3 percent of the total 2012 WCPO bigeye tuna longline catch (approx. 70,000 mt).

The WCPO striped marlin limit applicable to the U.S. (i.e. Hawaii) longline fishery is 458 mt. Catch of north Pacific striped marlin by the Hawaii longline fishery in 2012 was 209 mt (Table 11).

Troll

The number of commercial troll fishers is typically between 1,500 and 1,600 per year, while the troll catch has varied between 2.5 and 3.5 million lb, with an average of 2.8 million lb. The predominant species in the troll catch include yellowfin and skipjack tunas, mahimahi, blue marlin, and wahoo. The troll fishery primarily occurs within the U.S. EEZ around Hawaii, from 3-50 nm offshore. Average catch of bigeye tuna is 102 lb from 1991 to 2011.

Handline

The “offshore handline fishery” has evolved steadily and undergone a number of changes. This fishery originally centered on handline and troll fishing on tuna found in aggregations around the Cross Seamount and four offshore moored NOAA weather buoys. Although the FADs moored offshore of Hawaii by the State government have not been used extensively by the offshore handline fishery, the fishery has, in recent years, expanded to include fishing operations on privately-set FADs, some of which are relatively close to shore, thus blurring the distinction between “offshore handline” and “MHI handline” fisheries, as distinguished by the State of Hawaii Division of Aquatic Resources.

The offshore handline fishery targets juvenile and sub-adult bigeye tuna (53% of the catch) with a considerable catch of juvenile, sub-adult and adult size yellowfin (45% of the catch). Catch of bigeye tuna in the handline fishery is small and averages 114 pounds from 1991 to 2011 After developing the short-line to target large bigeye tuna, it became apparent that large quantities of pomfret were also available when fishing above seamounts found within the EEZ around Hawaii. By modifying the gear slightly, it was found that the gear could effectively target this species of monchong (pomfrets) while also catching medium and large bigeye tuna. Short-lines, which are defined as less than one nm in length, are not regulated as longline gear under current federal regulations. Unlike the troll and MHI handline fisheries, the offshore handline fishery does not include recreational fishermen.

Like the troll fishery, the MHI handline fishery includes full time and part time commercial fishermen and recreational fishers that possess a commercial license. Yellowfin tuna comprises about two-thirds of the catch with albacore accounting for nearly 20 percent and bigeye tuna 8 percent. MHI catches have varied from 0.7 to 2.4 million pounds, with an overall mean of 1.4 million pounds, 1991 through 2011.

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[3] These limits have been agreed to by the U.S. as a member of the WCPFC and IATTC, respectively. These limits are promulgated in Federal regulations (50 CFR § 300.224).

Hawaii's commercial pelagic fisheries landed about 31,642,000 lb (14,356 mt) in 2011 and 32,117,000 lb (14,572 mt; see Table 5 for more information).

Table 5: Hawaii commercial pelagic landings, revenue, and average price per pound by fishery, 2011-2012.

	2011			2012		
Fishery	**Pounds landed (x1000)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**	**Pounds landed (x1000)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**
Deep-set longline	22,835	$73,244	$3.21	22,990	$86,685	$3.77
Shallow-set longline	3,503	$8,839	$2.52	2,876	$8,216	$2.86
MHI trolling	2,962	$5,766	$2.85	3,666	$8,594	$3.29
MHI handline	1,112	$2,132	$2.48	1,568	$3,361	$2.54
Offshore handline	611	$834	$2.36	561	$1,094	$2.95
Other gear	619	$1,087	$1.96	456	$980	$2.82
Total	**31,642**	**$91,902**	**$3.05**	**32,117**	**$108,930**	**$3.57**

Sources: WPMFC 2012 and WPFMC unpublished.

Non-Target Species and Bycatch in the Hawaii Longline Fishery

The 2011 NOAA Fisheries U.S. National Bycatch Report provides an estimate of the total discards in terms of pounds caught and discarded is given, with data through 2005 (see Table 11). In 2005, the total percent of catch released for all species combined in the Hawaii longline fisheries was 26.77 percent. Generally, most marketable species such as tuna and billfish have low discard rates. Although striped marlin and other miscellaneous pelagic catch such as mahimahi, blue fin tuna, and wahoo are not directly targeted, these species are highly marketable and also have low rates of discards of less than 5 percent. In general, sharks caught are discarded. Blue shark and other sharks are not marketable, and therefore a high percentage of those species are discarded alive. However, a relatively higher proportion of mako and some thresher sharks are kept since there is a market for their meat (see Table 6).

Table 6: Total weight of discards, landings, and total catch in the Hawaii deep-set and shallow-set longline fisheries in 2005.

Species	Discards (pounds)			Percent of bycatch total for both deep- and shallow-set	Landings pounds	Total Catch pounds	Total in metric tons	Discards as percent of Total Catch
	Deep set	Shallow set	Total					
Albacore	8,027	15,928	23,955	0.28%	662,000	685,955	311.1	3.49%
Bigeye tuna	128,091	5,986	134,076	1.57%	10,977,000	11,111,076	5,039.9	1.21%
Bignose shark	66	66	132	0.00%		132	0.1	100.00%
Billfishes*	24,738	4,720	29,458	0.35%	473,000	502,458	227.9	5.86%
Black mackerel	55		55	0.00%		55	0.0	100.00%
Black marlin	611	152	763	0.01%		763	0.3	100.00%
Blue shark	4,816,698	822,524	5,639,222	66.22%	66,000	5,705,222	2,587.8	98.84%
Bony fishes	119	2	121	0.00%		121	0.1	100.00%
Bony fishes	258	95	353	0.00%		353	0.2	100.00%
Pomfret	1,168	4	1,173	0.01%	632,000	633,173	287.2	0.19%
Brilliant pomfret	723		723	0.01%		723	0.3	100.00%
Cartilaginous		6,969	6,969	0.08%		6,969	3.2	100.00%
Cookie shark	0	2	2	0.00%		2	0.0	100.00%
Cottonmouth Jacks	49		49	0.00%		49	0.0	100.00%
Crestfish	2,998		2,998	0.04%		2,998	1.4	100.00%
Crocodile shark	6,418	51	6,468	0.08%		6,468	2.9	100.00%
Dolphinfish	37,406	19,418	56,824	0.67%	972,000	1,028,824	466.7	5.52%
Driftfishes	42		42	0.00%		42	0.0	100.00%
Escolar	11,378	12,912	24,291	0.29%		24,291	11.0	100.00%
Galapagos shark	1,325	818	2,143	0.03%		2,143	1.0	100.00%
Great barracuda	8,490	22	8,512	0.10%		8,512	3.9	100.00%
Hammerhead sharks	2,414		2,414	0.03%		2,414	1.1	100.00%
Indo-Pacific blue marlin	27,353	11,398	38,751	0.46%	731,000	769,751	349.2	5.03%
Knifetail pomfret	12,932	88	13,020	0.15%		13,020	5.9	100.00%
Longfin mako shark	2,504	278	2,782	0.03%		2,782	1.3	100.00%
Longnose lancetfish	922,036	5,677	927,713	10.89%		927,713	420.8	100.00%
Louvar	0	15	15	0.00%		15	0.0	100.00%
Makos*	2,476	3,331	5,807	0.07%	233,000	238,807	108.3	2.43%

Species	Discards (pounds)			Percent of bycatch total for both deep- and shallow-set	Landings pounds	Total Catch pounds	Total in metric tons	Discards as percent of Total Catch
	Deep set	Shallow set	Total					
Manta ray	2006	132	2138	0.01%		2138	1.0	100.00%
Ocean sunfish	37,968	5,767	43,735	0.51%		43,735	19.8	100.00%
Oceanic whitetip shark	58,403	38,640	97,043	1.14%		97,043	44.0	100.00%
Oilfish	5,159	2,778	7,937	0.09%	380,000	387,937	176.0	2.05%
Omosudid	269		269	0.00%		269	0.1	100.00%
Opah	0	2,780	2,780	0.03%	1,093,000	1,095,780	497.0	0.25%
Pacific bluefin tuna	0		0	0.00%	1,000	1,000	0.5	0.00%
Pelagic puffer	2,022	146	2,167	0.03%		2,167	1.0	100.00%
Pelagic stingray	38,043	487	38,530	0.45%		38,530	17.5	100.00%
Pelagic thresher shark	2,005	150	2,155	0.03%		2,155	1.0	100.00%
Pompano dolphin	401		401	0.00%		401	0.2	100.00%
Rainbow runner	154		154	0.00%		154	0.1	100.00%
Razorback scabbardfish	2,692		2,692	0.03%		2,692	1.2	100.00%
Roudi escolar	2,388		2,388	0.03%		2,388	1.1	100.00%
Rough pomfret	1,671		1,671	0.02%		1,671	0.8	100.00%
Rough triggerfish	4		4	0.00%		4	0.0	100.00%
Sailfish	346		346	0.00%		346	0.2	100.00%
Salmon shark	600	628	1,228	0.01%		1,228	0.6	100.00%
Sandbar shark	3,225	1,082	4,308	0.05%		4,308	2.0	100.00%
Scalloped hammerhead	774		774	0.01%		774	0.4	100.00%
Scalloped ribbonfish	35		35	0.00%		35	0.0	100.00%
Shark	130		130	0.00%		130	0.1	100.00%
Sharks	51,085		51,085	0.60%	15,000	66,085	30.0	77.30%
Sharptail mola	6,217		6,217	0.07%		6,217	2.8	100.00%
Shortbill spearfish	36,218	3,168	39,386	0.46%		39,386	17.9	100.00%
Shortfin mako	156,618	31,522	188,140	2.21%		188,140	85.3	100.00%
Sickle pomfret	4,996	168	5,163	0.06%		5,163	2.3	100.00%
Silky shark	36,035	2,500	38,535	0.45%		38,535	17.5	100.00%

Species	Discards (pounds)			Percent of bycatch total for both deep- and shallow-set	Landings pounds	Total Catch pounds	Total in metric tons	Discards as percent of Total Catch
	Deep set	Shallow set	Total					
Skipjack tuna	81,196	172	81,368	0.96%	197,000	278,368	126.3	29.23%
Slender mola	34,557	11	34,568	0.41%		34,568	15.7	100.00%
Smooth hammerhead	2,454	930	3,384	0.04%		3,384	1.5	100.00%
Snake mackerel	156,338	686	157,024	1.84%		157,024	71.2	100.00%
Striped marlin	27,278	17,699	44,976	0.53%	1,177,000	1,221,976	554.3	3.68%
Swordfish	23,735	76,785	100,520	1.18%	3,527,000	3,627,520	1,645.4	2.77%
Tapertail ribbonfish	2,546		2,546	0.03%		2,546	1.2	100.00%
Thresher shark	483,539	7,568	491,108	5.77%	73,000	564,108	255.9	87.06%
Tiger sharks	4,310	5,578	9,888	0.12%		9,888	4.5	100.00%
Tunas*	20,719	776	21,495	0.25%		21,495	9.7	100.00%
Velvet dogfish	844		844	0.01%		844	0.4	100.00%
Wahoo	13,287	73	13,360	0.16%	458,000	471,360	213.8	2.83%
White shark	93		93	0.00%		93	0.0	100.00%
Yellowfin	86,273	628	86,902	1.02%	1,624,000	1,710,902	776.1	5.08%
Total	7,405,009	1,111,311	8,516,320	100.00%	23,291,000	31,807,320	14,427.6	26.77%

Note: An asterisk following the names of stock groups indicates fisheries for which bycatch estimates were available only for the generalized stock group.
Source: NMFS 2011.

3.3.5 WCNP Striped Marlin Catches in the Pacific

Catches of striped marlin by Japanese fleets exceed those taken by fleets from all other nations fishing in the North Pacific (Figure 7). For example, the 1984 catch by Chinese-Taipei and the 1994 and 1997 catches by South Korea were the only national annual totals other than Japan above 1000 mt since the start of the data series. In contrast, three Japanese fleets (distant-water and offshore longline; coastal longline; large-mesh gill net) each caught more than 1,000 mt in several different years.

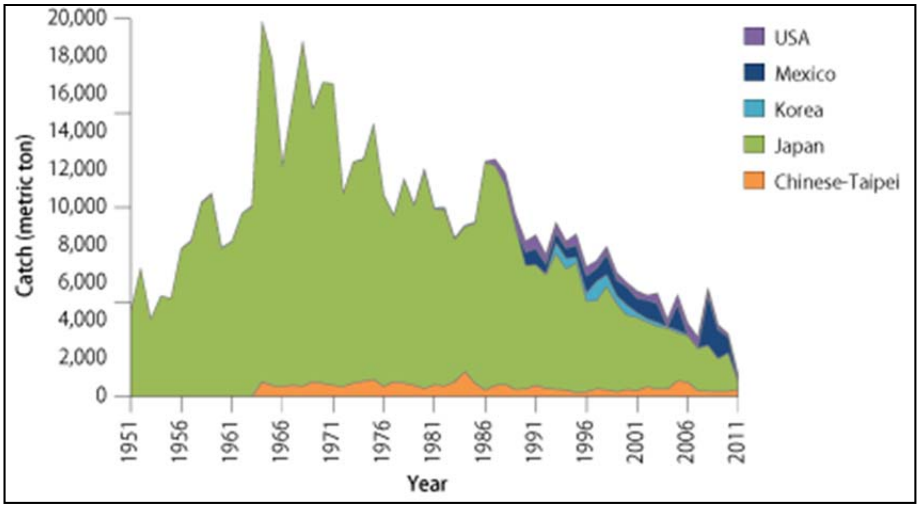


Figure 7. Annual landings of striped marlin reported by ISC members in the North Pacific Ocean.

Source: ISC web site,
http://isc.ac.affrc.go.jp/fisheries_statistics/index.html

The national annual catch totals from the USA and Chinese-Taipei are similar in magnitude at several hundred metric tons. Recent figures from the ISC (Table 7)[4] indicate that Japanese catches of North Pacific striped marlin averaged about 74% of the total catch between 2006-2010, evenly split by longline and drift gillnet (Figure 8). US catches over this period averaged about 14% of the total.

Table 7. Recent catches (mt) of striped marlin by country in the North Pacific[5]

Year	Chinese Taipei	Japan	Korea	USA	Total	WCPFC area
2006	741	2,447	56	630	5,076	1,308
2007	301	2,220	47	567	5,540	1,083
2008	270	2,408	29	440	5,729	1,446
2009	262	1,719	22	270	3,788	974
2010	253	2,028	18	177	3,310	1,074

[4] Data can be downloaded from http://isc.ac.affrc.go.jp/fisheries_statistics/index.html
[5] Data for Mexico's sports fisheries omitted from table since this fishery catches exclusively EPO striped marlin which are not overfished or subject to overfishing.

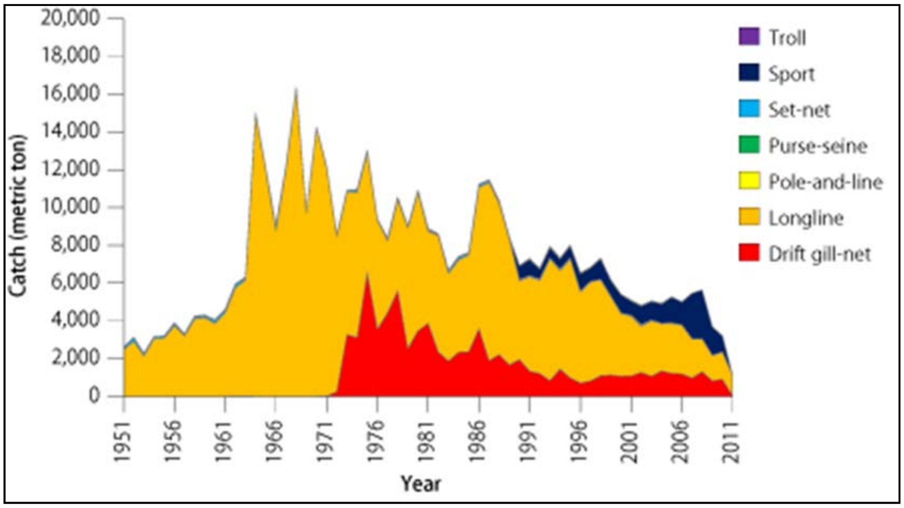


Figure 8. **Annual landings of striped marlin by main fishing gears in the North Pacific Ocean.**

Source: ISC web site,
http://isc.ac.affrc.go.jp/fisheries_statistics/index.html

3.3.6 WCNP Striped Marlin Catches by Hawaii Longline Vessels in the Pacific

Recent striped marlin catches by the Hawaii longline fishery in total have ranged from 165 – 391 mt (Table 8). Most of this catch has been taken by the deep set bigeye targeting segment of the Hawaii fishery, which accounts on average for about 94% of the striped marlin catch. The deep set longline fishery striped marlin catch per unit of effort (CPUE) shows a general declining trend between 2003 and 2013, with CPUE dropping by about 50% (Figure 9). The shallow-set striped marlin CPUE is more variable but about the same order of magnitude, with the deep and shallow trends tending to converge since 2006 (Figure 9).

Table 8. Recent catches of striped marlin by the Hawaii-based longline fishery

Year	Deep set longline	Shallow set longline	Total
2009	234	24	258
2010	153	12	165
2011	343	20	363
2012	270	11	281
2013	376	15	391

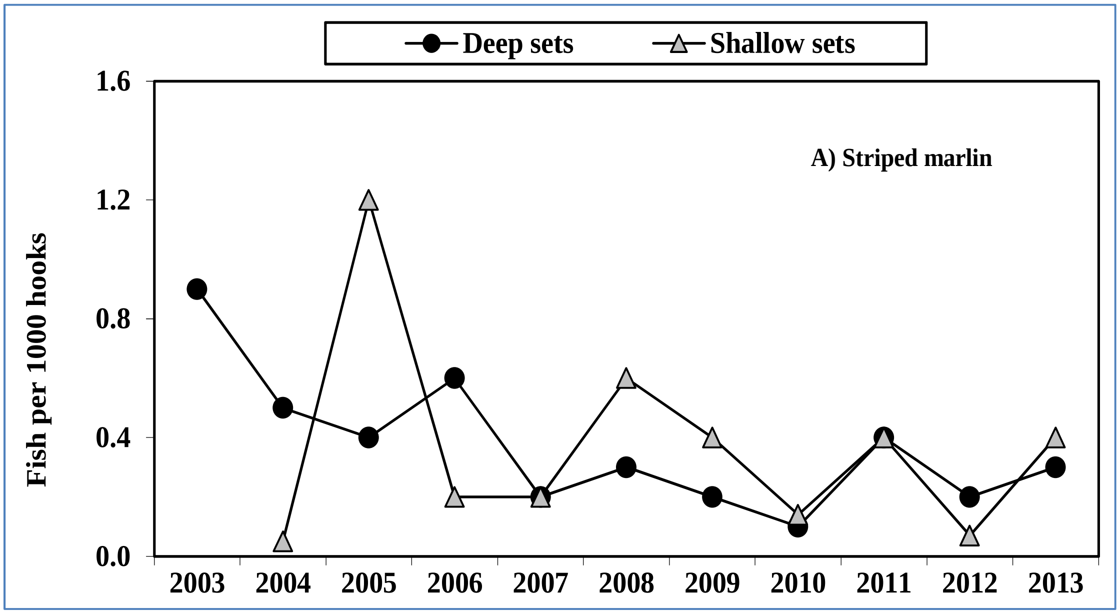


Figure 9. Longline CPUE by deep & shallow longline trips, 2003-2013.

3.3.7 Striped Marlin Catches by Hawaii troll and handline fisheries in the WCPO

Recent non-longline catches of striped marlin in Hawaii have been entirely taken by troll vessels, (Table 9), although in years before 2009, there are records of between 1-5 mt of striped marlin taken by Main Hawaiian Islands handline fishery.

Table 9. Catches of striped marlin (1000 lb) by Hawaii's troll and handline fisheries

Year	Troll	Main Hawaiian Islands handline	Total
2009	22	0	22
2010	12	0	12
2011	35	0	35
2012	25	0	25
2013	21	0	21

The troll CPUE of striped marlin ion the Hawaii fishery shows a declining trend and is similar in trajectory to the seep set Hawaii longline fishery striped marlin CPUE. Overall, the CPUE has declined by about 75%, from 2 lb/day fished to 0.5 lb/day fished (Figure 10).

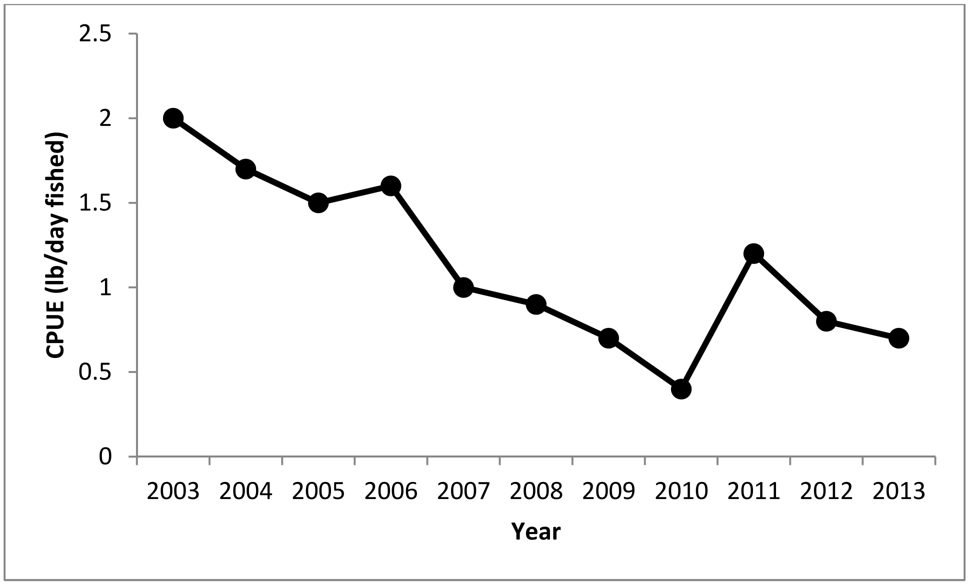


Figure 10 Striped marlin Troll CPUE in Hwaii, 2003-2013.

3.4 Protected Species

Applicable Laws

Endangered Species Act

The ESA provides for the conservation of species that are endangered or threatened, and the conservation of the ecosystems on which they depend. Section 7(a)(2) of the ESA requires each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. To "jeopardize" means to reduce appreciably the likelihood of survival and recovery of a species in the wild by reducing its numbers, reproduction, or distribution. When a federal agency's action "may affect" an ESA-listed species, that agency is required to consult formally with NMFS (for marine species, some anadromous species, and their designated critical habitats) or the U.S. Fish and Wildlife Service (USFWS; for terrestrial and freshwater species or their designated critical habitat). The product of formal consultation is the agency's biological opinion (BiOp). Federal agencies are exempt from this formal consultation requirement if they have concluded that an action "may affect, but is not likely to adversely affect" ESA-listed species or their designated critical habitat, and NMFS or USFWS concur with that conclusion (see ESA section 7 Formal Consultation; 50 CFR § 402.14(b)).

The ESA also prohibits the taking[6] of listed species except under limited circumstances. Western Pacific regional fisheries are operated in accordance with terms of ESA consultations that consider the potential interactions of fisheries with listed species, the impacts of interactions on the survival and recovery of listed species, and the protection of designated critical habitat.

[6] The definition of "take" includes to harass, harm, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct.

As provided in 50 CFR § 402.16, NMFS is required to reinitiate formal consultation if:

(1) the amount or extent of the incidental take is exceeded;

(2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in an opinion;

(3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in the opinion; or

(4) a new species is listed or critical habitat designated that may be affected by the action.

Longline and other pelagic fishing vessels operating in the western Pacific region and targeting pelagic species have the potential to interact with a range of protected species (such as marine mammals, sea turtles, and seabirds). Table 10 presents species listed as endangered or threatened under the ESA that have the potential to interact with longline and other fisheries under the Pelagics FEP. This section also provides the number of interactions expected between protected species and the American Samoa and Hawaii longline fisheries with regards to recent fishing effort.

Table 10: ESA-listed species with the potential to interact with vessels permitted under the Pelagics FEP.

Species	**ESA status**
Sea Turtles	
Green turtle (*Chelonia mydas*)	Threatened, except for Mexico's Pacific coast nesting population which is Endangered
Hawksbill turtle (*Eretmochelys imbricata*)	Endangered
Leatherback turtle (*Dermochelys coriacea*)	Endangered
North Pacific loggerhead turtle distinct population segment (DPS) (*Caretta caretta*)	Endangered
South Pacific loggerhead turtle DPS	Endangered
Olive ridley turtle (*Lepidochelys olivacea*)	Threatened, except for Mexico's nesting population which is Endangered
Marine Mammals	
Blue whale (*Balaenoptera musculus*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Hawaiian monk seal (*Monachus schauinslandi*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Main Hawaiian Islands insular false killer whale (*Pseudorca crassidens*)	Endangered
North Pacific right whale (*Eubalaena japonica*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Sperm whale (*Physeter macrocephalus*)	Endangered
Seabirds	

Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*)	Endangered
Newell's shearwater (*Puffinus auricularis newelli*)	Threatened
Short-tailed albatross (*Phoebastria albatrus*)	Endangered
Sharks	
Scalloped hammerhead Indo-West Pacific DPS	Threatened
Scalloped hammerhead Eastern Pacific DPS	Endangered

The following refers to existing BiOps and summarizes the information contained in these documents (identified below) in describing baseline conditions. For further information, refer to the following documents on NMFS' website below, or by contacting NMFS using the contact information at the beginning of the document.
http://www.fpir.noaa.gov/DIR/dir_public_documents.html

NMFS 2001, Biological Opinion on Authorization of Pelagic Fisheries under the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region.

NMFS 2005, Continued authorization of the Hawaii-based Pelagic, Deep-Set, Tuna Longline Fishery based on the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region.

NMFS 2010, Endangered Species Act Section 7 Consultation Biological Opinion on Measures to Reduce Interactions Between Green Sea Turtles and the American Samoa-based Longline Fishery-Implementation of an Amendment to the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region.

NMFS 2012, as amended, Continued operation of the Hawaii-based Shallow-set Longline Swordfish Fishery - under Amendment 18 to the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region.

USFWS 2012, Biological Opinion of the U.S. Fish and Wildlife Service for the Operation of Hawaii-based Pelagic Longline Fisheries, Shallow-Set and Deep-Set, Hawaii.

<u>Marine Mammal Protection Act</u>
The Marine Mammal Protection Act (MMPA) prohibits, with certain exceptions, the take of marine mammals in the U.S. EEZ and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States. The MMPA gives the Secretary authority and duties for the protection and conservation of all cetaceans (whales, dolphins, and porpoises) and pinnipeds (seals and sea lions, except walruses). The MMPA requires NMFS to prepare and periodically review marine mammal stock assessments. *See* 16 U.S.C. § 1361, *et seq*.

Pursuant to the MMPA, NMFS has promulgated specific regulations that govern the incidental take of marine mammals during fishing operations (50 CFR 229). Under section 118 of the

MMPA, NMFS must publish, at least annually, a List of Fisheries that classifies U.S. commercial fisheries into three categories, based on relative frequency of incidental mortality and serious injury to marine mammals in each fishery:

- Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing. Annual mortality and serious injury of a stock in a given fishery is by itself responsible for the annual removal of greater than or equal to 50 percent or more of any stock's potential biological removal (PBR) level (i.e., frequent incidental mortality and serious injuries of marine mammals).

- Category II designates fisheries with occasional serious injuries and mortalities incidental to commercial fishing. Annual mortality and serious injury of a stock in a given fishery is, collectively with other fisheries, responsible for the annual removal of greater than 10 percent of any stock's PBR level, and is by itself responsible for the annual removal of between 1 and less than 50 percent, exclusive, of any stock's PBR level (i.e., occasional incidental mortality and serious injuries of marine mammals).

  Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities. A Category III fishery is, collectively with other fisheries, responsible for the annual removal of 10 percent or less of any stock's PBR level; or collectively with other fisheries, more than 10 percent of any stock's PBR level, but is by itself responsible for the annual removal of 1 percent or less of PBR level (i.e., a remote likelihood or no known incidental mortality and serious injuries of marine mammals).

The Hawaii deep-set longline fishery is a Category I fishery and the Hawaii shallow-set and American Samoa longline fisheries are Category II fisheries in the 2014 List of Fisheries (79 FR 14418, March 14, 2014). Among other requirements, owners of vessels or gear engaging in a Category I or II fishery are required under 50 CFR 229.4 to obtain a marine mammal authorization to lawfully incidentally take non-ESA listed marine mammals by registering with NMFS' marine mammal authorization program. The CNMI and Guam longline fisheries are inactive and not designated at this time.

3.4.1 Sea Turtles

All Pacific sea turtles are listed under the ESA as either threatened or endangered except for the flatback turtle (*Natator depressus*), which is native to Australia and does not occur in the action area and thus will not be covered in this document. In addition to the BiOps listed in the previous section, more detailed information, including the range, abundance, status, and threats of the listed sea turtles, can be found in the recovery plans for each species at the following NMFS websites:

Green turtle: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_green_pacific.pdf
Green turtle: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_green_eastpacific.pdf
Hawksbill: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_hawksbill_pacific.pdf
Olive ridley: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_oliveridley.pdf

Leatherback: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_leatherback_pacific.pdf
Loggerhead: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_loggerhead_pacific.pdf

Sea Turtle Interactions

All sea turtles, being air-breathers, are typically found closer to the surface, e.g., in the upper 100 m of the ocean's surface; however, some turtles are also susceptible to deep-set longlining because of deeper foraging behavior. Therefore, sea turtles are vulnerable to longline fishing gear in the Hawaii deep- and shallow-set longline fisheries, American Samoa deep-set longline fishery, Guam and the CNMI longline fisheries. Other pelagic fisheries impacts are primarily limited to the potential for collisions with sea turtles. After considering a range of potential impacts on sea turtles, NMFS has determined that the pelagic fisheries of the western Pacific, operating in accordance with the Pelagics FEP and implementing regulations, would not jeopardize the survival or recovery of any listed species including sea turtles. NMFS has authorized a certain level of interactions (incidental take) through incidental take statements (ITS)) for these fisheries.

Hawaii deep-set longline fishery

A 2014 BiOp issued by NMFS for the deep-set longline fishery authorizes incidental take for green, leatherback, loggerhead, and olive ridley sea turtles (NMFS 2014) (Table 11). Fishery interactions are monitored by NMFS and at least 20 percent of all deep-set trips are observed. NMFS statistically expands the observed totals (Table 12), based on observer coverage levels, to develop a fleet-wide estimate (Table 14). Each year the fleet-wide estimates are compared to the incidental take statement (Table 11).

Table 11: The numbers of turtles estimated captured and/or killed in the Hawaii deep-set fishery over three consecutive years (3-year ITS) in the 2014 biological opinion.

Sea Turtle Species	Estimated Incidental Take	
	Interactions	Mortalities
Green	9	9
Leatherback	72	27
Loggerhead	9	9
Olive ridley	99	96

Source: NMFS 2005.

Table 12: Observed interactions and conditions of sea turtles caught in the Hawaii deep-set fishery, 2009-2011.

Sea turtles species	Observed Number of Interactions				
	2009	2010	2011	2012	2013
Green	0	1 injured	1 dead	0	1 dead
Leatherback	1 injured	1 injured	3 injured	1 dead	3 injured
Loggerhead	0	1 injured	0	0	2 dead

Olive Ridley	4 dead	3 injured	6 dead	6 dead	9 dead

Note: These observations represent approximately 20 percent of the total number of trips.
Source: NMFS observer program annual status reports
http://www.fpir.noaa.gov/OBS/obs_hi_ll_ds_rprts.html

Table 13: Comparison of recent, extrapolated estimates of sea turtle interactions in the Hawaii deep-set fishery with authorized take in the 2005 biological opinion.

Sea turtles species	Sum of Estimated Incidental Take 2009-2011		3-year Incidental Take Statement in 2005 BiOp	
	Interactions	Mortalities	Interactions	Mortalities
Green	6	6	21	18
Leatherback	24	6.48	39	18
Loggerhead	6	6	18	9
Olive Ridley	64	59.52	123	117
Hawksbill	0	0	0	0

Note: The estimated incidental take includes an expansion of the observed sets and applied over the entire fishery for each year.
Sources: McCracken 2010, 2011b, 2012; NMFS 2005.

Table 14: Annual sea turtles interactions expanded from observed data to fleet-wide estimates for the Hawaii deep-set longline fishery, 2005-2013.

Year	Sea Turtles			
	Green	Leatherback	Loggerhead	Olive Ridley
2005	0	4	0	17
2006	6	9	0	55
2007	0	4	6	26
2008	0	11	0	17
2009	0	4	0	18
2010	1	6	6	10
2011	5	14	0	36
2012	0	6	0	34
2013	5	15	11	42
Mean	2	7	2	26

In June 2013, NMFS reinitiated consultation on the Hawaii deep-set fishery because of the recent listing of the MHI insular false killer whale DPS, and because of a single interaction with a sperm whale. The expected number of interactions and severity of interactions with sea turtles may be reduced in the future because the fishery is now required to use circle hooks (as opposed to J-style hooks) under take reduction plan regulations for false killer whales.

Critical habitat has not been designated in the action area, so no critical habitat would be affected by the Hawaii deep-set longline fishery.

Hawaii shallow-set longline fishery

The Hawaii shallow-set fishery is conducted in accordance with a NMFS 2012 BiOp. The fishery interacts with sea turtles; however, because of ongoing mitigation measures employed by the fishery, which includes training and handling requirements for reducing the severity of interactions, requirements for the fishery to use large circle hooks and mackerel-type fish bait, and the fact that he fishery closes once the interaction limit for sea turtles has been reached, the BiOp concludes that the fishery is not likely to jeopardize the continued existence of any ESA-listed sea turtle. The 2012 BiOp authorizes incidental take for the north Pacific loggerhead DPS, leatherback sea turtles, olive ridley sea turtles, and green sea turtles (Table 15). The NMFS Observer Program monitors incidental interactions in the fishery. Currently, all shallow-set trips are observed. Table 16 shows shallow-set fishing effort (sets), number of interactions between 2004 and 2011, and interaction rates of sea turtles per set.

Critical habitat has not been designated in the action area, so no critical habitat would be affected by the Hawaii shallow-set longline fishery.

Table 15: The numbers of sea turtles estimated to be captured and/or killed in the Hawaii shallow-set fishery over two consecutive calendar years in NMFS' 2012 biological opinion.

Species	1-year		2-year	
	Interactions	Mortalities	Interactions	Mortalities
N. Pacific loggerhead	34	7	68	14
Leatherback	26	6	52	12
Olive ridley	2	1	4	2
Green	3	1	6	2

Source: NMFS 2012b.

Table 16: Fishing effort (sets), and observed interactions and interaction rates in the Hawaii shallow-set longline fishery for the five species considered in NMFS' 2012 biological opinion over an 10-year period.

Year	Sets [a]	Interactions			
		N. Pacific loggerhead	Leatherback	Olive ridley	Green
2004	135	1	1	0	0
2005	1,645	12	8	0	0
2006	850	17	2	0	0
2007	1,570	15	5	1	0
2008	1,605	0	2	2	1
2009	1,761	3	9	0	1
2010	1,875	7	8	0	0
2011	1,463	12	16	0	4
2012	1307	5	7	0	0
2013	912	5	7	0	0
Total	13,123	77	65	3	6
Interaction Rate [b]		0.0058	0.0049	0.0002	0.0005

[a] PIRO Observer Program, unpublished data. Number of sets is based on begin set date.
[b] Interaction rates are calculated by dividing total interactions by total sets. The interaction rates then provide the basis for estimating the annual interactions.
Source: NMFS 2012b.

American Samoa longline fishery
The American Samoa longline fishery is conducted in accordance with the provisions of the NMFS 2010 BiOp (NMFS 2010b) on the expected impacts of the fishery on ESA-listed species. NMFS concluded that the longline fishery is not likely to adversely affect loggerhead turtles, sperm whales, or humpback whales and will have no effect on blue, fin, or sei whales. The 2010 BiOp concluded that the American Samoa longline fishery is not likely to jeopardize the continued existence or recovery of green turtles, hawksbill turtles, leatherback turtles, and olive ridley turtles and issued an ITS for these turtles. NMFS has not designated critical habitat in the action area, so the American Samoa longline fishery would not affect critical habitat.

The NMFS Observer Program monitors interactions with approximately 20 percent of all trips observed, although past coverage was less due to lower federal funding. The fishery is required to conduct operations in accordance with a suite of management measures designed to reduce the number and severity of interactions with sea turtles. These include requirements for safe handline and mitigation training of protected species, specific requirements for gear configuration to set gear at a minimum depth of 100 m, and accommodation of observers upon request. The annual numbers of interactions and mortalities expected to result from the American Samoa longline fishery are shown for a 3-year period in Table 17 (i.e., a 3-year ITS). Recent fleet-wide estimates of sea turtle interactions for the American Samoa longline fishery are not available at time of writing; however, one green, two leatherbacks, and one olive ridley sea turtle interaction have been observed since completion of the BiOp and implementation of that proposed action.

Table 17: The numbers of sea turtles estimated to be captured and/or killed in the American Samoa longline fishery over three consecutive years (3-year ITS) in the 2010 biological opinion.

Species	Authorized Incidental Take		
	Interactions	Mortalities	Adult female equivalents
Green turtles	45	41	10
Hawksbill turtles	1	1	1
Leatherback turtles	1	1	1
Olive ridley turtles	1	1	1

Source: NMFS 2010.

Table 18: Number of Sea Turtle Interactions by Species Observed in the American Samoa Longline Fishery from 2006-2012.
Source: http://www.fpir.noaa.gov/OBS/obs_as_ll_rprts.html

Guam and CNMI longline fisheries

NMFS concluded a formal consultation and issued a BiOp for the pelagic fisheries in the western Pacific on March 29, 2001. In this Opinion, NMFS examined the impact of Guam and CNMI longline fisheries on endangered species. At the time, there were three permitted longline vessels in Guam and one in the CNMI, but none were active. Although neither of these longline fisheries were active at the time, NMFS utilized fishery information from American Samoa longline fishery to estimate incidental take and mortality of ESA-listed species. The BiOp analyzed the annual effort of longline fishing in the 1998 American Samoa fishery (26 vessels and 2,359 trips). The BiOp established ITS for sea turtles for the Guam and CNMI longline fisheries and determined that this level of anticipated take is not likely to result in jeopardy to the green turtle, leatherback turtle, loggerhead turtle, or olive ridley turtle under the proposed regulations for the Guam and CNMI longline fisheries. Although this BiOp did not discuss hawksbill sea turtles, they are considered hard shell turtles and are included in the ITS. The BiOp also concludes that the fisheries are not likely to adversely affect ESA-listed marine mammals or critical habitat that has been designated. See **Table 19** for the number of sea turtle authorized to be taken in the Guam and CNMI longline fisheries.

Table 19: The number of turtles estimated to be annually taken (captured and/or killed) in the Guam and CNMI longline fisheries in the 2001 biological opinion.

Fishery	Annual Estimated Incidental Take (All Species Combined)	Annual Estimated Incidental Mortality (All Species Combined)
Guam Longline	3 hardshell turtles, 1 leatherback	1 hardshell turtle
CNMI Longline	3 hardshell turtles, 1 leatherback	3 hardshell turtles, 1 leatherback

Source: NMFS 2001.

There were no observed or reported interactions with sea turtles in the CNMI longline fishery (from the two to four vessels that were active from 2008 to 2012). Currently there are no active longline vessels in Guam; therefore, there have been no observed or reported interaction with a sea turtle.

3.4.2 Marine Mammals

***ESA-listed Marine Mammal*s**

Table 14 and below list marine mammal species that are listed as endangered or threatened under the ESA that have been observed or may occur in the area where Pelagics FEP fisheries operate.

- Blue whale (*Balaenoptera musculus*)
- Fin whale (*Balaenoptera physalus*)
- Hawaiian monk seal (*Monachus schauinslandi*)
- Humpback whale (*Megaptera novaeangliae*)
- Main Hawaiian Islands insular false killer whale (*Pseudorca crassidens*)
- North Pacific right whale (*Eubalaena japonica*)
- Sei whale (*Balaenoptera borealis*)
- Sperm whale (*Physeter macrocephalus*)

Detailed information on these species' geographic range, abundance, bycatch estimates, and status can be found in the most recent stock assessment reports (SARs), available online at: http://www.nmfs.noaa.gov/pr/sars/. Additional, recent information may be found in NMFS 2012b.

Although blue whales, fin whales, north Pacific right whales, and sei whales are found within the action area and could potentially interact with the Pelagics FEP fisheries, there have been no reported or observed incidental hookings or entanglements of these species in these fisheries. In 2011, the Hawaii deep-set longline fishery interacted with one sperm whale, which was the first recorded interaction since NMFS began observer coverage in 1994. Interactions with listed marine mammals are described below.

Non-listed Marine Mammals

Based on research, observer, and logbook data, the following marine mammals, not listed under the ESA, may occur in the region and may be affected by the fisheries managed under the Pelagics FEP:

- Blainville's beaked whale (*Mesoplodon densirostris*)
- Bryde's whale (*Balaenoptera edeni*)
- Bottlenose dolphin (*Tursiops truncatus*)
- Common dolphin (*Delphinus delphis*)
- Cuvier's beaked whale (*Ziphius cavirostris*)
- Dwarf sperm whale (*Kogia sima*)
- False killer whale (*Pseudorca crassidens*) other than the MHI Insular DPS
- Fraser's dolphin (*Lagenodelphis hosei*)
- Killer whale (*Orcinus orca*)
- Longman's beaked whale (*Indopacetus pacificus*)
- Melon-headed whale (*Peponocephala electra*)
- Minke whale (*Balaenoptera acutorostrata*)
- Northern fur seal (*Callorhinus ursinus*)
- Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)
- Pantropical spotted dolphin (*Stenella attenuata*)
- Pilot whale, short-finned (*Globicephala macrorhynchus*)
- Pygmy killer whale (*Feresa attenuata*)
- Pygmy sperm whale (*Kogia breviceps*)
- Risso's dolphin (*Grampus griseus*)
- Rough-toothed dolphin (*Steno bredanensis*)
- Spinner dolphin (*Stenella longirostris*)
- Striped dolphin (*Stenella coeruleoalba*)

Detailed information on these species' geographic range, abundance, bycatch estimates, and status can be found in the most recent stock assessment reports (SARs), available online at: http://www.nmfs.noaa.gov/pr/sars/. Interactions with marine mammals are described in the next section.

Marine Mammal Interactions

The Hawaii deep-set longline fishery operates in accordance with NMFS' 2005 BiOp, which requires a minimum of 20 percent observer coverage for the fishery to monitor protected species interactions, including marine mammals. Based on observer data from 2006 to 2011, the fishery interacted with several species of marine mammals (**Table 20**). Most of the animals were released injured. Many of these injuries were determined to be "serious injuries," or injuries likely leading to death. False killer whales have interacted with deep-set longline gear more than other marine mammal species and NMFS has implemented changes to the operations of the fishery based on the recommendations of the False Killer Whale Take Reduction Team to reduce incidental interactions. The mitigation requirements include: the use circle hooks, a permanently closed area, and an interaction limit, which, when reached, triggers a southern longline fishing exclusion zone (see 50 CFR § 229.37).

There are records of fishery interactions with humpback whales and one sperm whale. In addition, NMFS has assigned prorated interactions to the population of MHI insular false killer whales based on interactions with pelagic false killer whales, and on interactions with false killer whales from unknown populations and unidentified blackfish.

Table 20: Observed marine mammal interactions in the Hawaii deep-set fishery, 2006-2011.

Species	Number caught	Released injured	Released dead
Bottlenose dolphin	3	3	0
False killer whale	28	27	1
Risso's dolphin	5	4	1
Short-finned pilot whale	6	6	0
Striped dolphin	2	0	2
Spotted dolphin	1	0	1
Unidentified cetacean	5	5	0
Unidentified dolphin	3	3	0
Unidentified whale	10	10	0
Sperm whale	1	1	0

Note: Protected species interactions for Observer Program Quarterly and Annual Reports are based on vessel arrivals. The tally of an interaction may fall in a year other than the year when the interaction actually occurred.
Source: NMFS Observer Program Annual Status Reports
http://www.fpir.noaa.gov/OBS/obs_qrtrly_annual_rprts.html

Since observer coverage is approximately 20 percent of all deep-set trips per year, NMFS' PIFSC expands the observed interactions statistically to get an annual estimate for the total number of incidental interactions for all deep-set fishing trips that landed in that calendar year. **Table 21** provides the extrapolated number of marine mammal interactions estimated to occur with the Hawaii deep-set longline fishery, from 2006 to 2010. These are estimates of all interactions, including those that result in mortality, serious injury, and non-serious injury. Extrapolated estimates for 2011 are not yet available.

Table 21: Estimated annual marine mammal interactions (including mortalities, and serious and non-serious injuries) with the Hawaii deep-set longline fishery from 2006-2010.

Species	2006	2007	2008	2009	2010	Mean*
Blackfish	16	0	9	0	3	5.4
Risso's dolphin	5	3	2	0	3	2.6
Short-finned pilot whale	6	2	5	0	0	2.6
False killer whale	18	15	11	55	19	23.7
Pantropical spotted dolphin	0	0	3	0	0	0.6
Striped dolphin	6	0	0	0	0	1.2
Bottlenose dolphin	1	0	0	5	4	2.1
Unidentified cetacean	2	4	3	17	12	7.8
Unidentified beaked whale	7	0	0	0	0	1.3

Note: These estimates are extrapolated from observed interactions in the fishery, which is covered by observers at a rate of approximately 20% annually. "Blackfish" include unidentified whales considered to be either false killer whales or short-finned pilot whales.
*Annual estimates are rounded to whole numbers. Five-year means are based on unrounded annual estimates, so they may differ from a five-year average of the rounded figures.
Source: McCracken 2011a.

Because of inter-annual variability in marine mammal interaction rates, NMFS typically evaluates multi-year averages when determining whether those rates exceed sustainable thresholds (e.g., Potential Biological Removal level, or PBR).

Main Hawaiian Islands insular false killer whale

False killer whales may become hooked or entangled by longline gear, especially while depredating on bait or catch. From 2005-2009, the range of data in the 2011 SAR, NMFS attributed 0.6 MHI insular false killer whale takes annually to the deep-set fishery from a PBR of 0.2 (Carretta et al. 2012). The 2012 SAR presents the bycatch estimates from 2006-2010. During that period, the deep-set fishery had an estimated average of 0.5 mortalities and serious injuries of MHI insular false killer whales per year (McCracken 2011a). This exceeds the stock's PBR level of 0.3 animals per year (Carretta et al. 2013). However, the permanent closure of the seasonally contracted longline prohibited area from October through January, as well as the required use of weak circle hooks and strong leaders, due to the December 2012 implementation of the FKWTRP, substantially reduces the potential for interactions with the MHI insular false killer whale (NMFS 2011b). This could reduce interactions that would be counted against PBR levels in the near future.

Sperm whales

Sperm whales are deep divers that spend little time at the surface. In 2011, one sperm whale interaction (entanglement) occurred in the deep-set fishery, and NMFS has preliminarily determined the interaction is prorated as 0.75 to serious injury and 0.25 to non-serious injury (according to Large Cetacean Injury Criteria outlined in NMFS' guidelines for distinguishing serious from non-serious injury of marine mammals, NMFS Instruction 02-238-01). The 2011 interaction is the only record from the deep-set fishery since observer coverage began in 1994.

The 2005 BiOp did not contain an ITS for sperm whales and an MMPA section 101(a)(5)(E) incidental take permit has not been issued.

Carretta et al. (2012) estimate 6,919 sperm whales occur within the EEZ around the Hawaii. The stock's PBR level inside this EEZ is 15 sperm whales per year (Carretta et al. 2012). With one interaction with a sperm whale in the deep-set fishery occurred in 19 years of data collection, this level likely does not exceed the stock's PBR level of 15 annually. This level of impact is extremely low and unlikely to affect the viability of the population.

Table 22 provides total marine mammal interactions observed in the shallow-set fishery from 2006 through 2010. All trips are observed in the shallow-set fishery; therefore, expansion of the data is not necessary.

Table 22: Total annual marine mammal interactions (including dead, serious injuries, and non-serious injuries) for the Hawaii shallow-set longline fishery, 2006-2010.

Species	**2006**	**2007**	**2008**	**2009**	**2010**	**Mean****
Blackfish*	0	0	1	0	0	0.2
Risso's dolphin	2	3	4	3	7	3.8
Humpback whale	1	0	1	0	0	0.4
False killer whale	0	0	1	1	0	0.4
Striped dolphin	0	0	1	0	2	0.6
Bottlenose dolphin	1	3	0	0	2	1.2
Unidentified cetacean	0	0	0	1	1	0.4
Pygmy or dwarf sperm whale	0	0	1	0	0	0.2

Note: * "Blackfish" includes unidentified whales considered to be either false killer whales or short-finned pilot whales. ** Annual estimates are rounded to whole numbers. Five-year means are based on unrounded annual estimates, so they may differ from a five-year average of the rounded figures.
Source: McCracken 2011a.

To date, no humpback, sperm, blue, fin, or sei whale interactions have been observed or reported in the American Samoa longline fishery. Observed marine mammal interactions in the American Samoa longline fishery are shown in **Table 23**. The target rate for observer coverage is 20 percent of all trips. This is subject to funding limitations and may fluctuate. The average rate of coverage is 26 percent since 2010.

Table 23: Number of marine mammal interactions observed in the American Samoa longline fishery, 2006-2011.

Year	2006	2007	2008	2009	2010	2011
Number of sets observed	287	410	379	306	798	1,257
Rough-toothed dolphin (6 released injured)	0	0	1	0	0	5
Cuvier's beaked whale (1 released dead)	0	0	0	0	0	1
False killer whale (4 released injured, 1 dead)	0	0	2	0	0	3
Unidentified cetacean (2 released injured)	0	0	0	0	0	2

Source: NMFS PIRO American Samoa Observer Program 2006-2011 Status Reports.

Note: Protected species interactions for Observer Program Quarterly and Annual Reports are based on vessel arrivals rather than when the interaction occurred. The tally of an interaction may fall in a year other than the year when the interaction actually occurred.

Recent estimates of the total (extrapolated) number of marine mammal interactions in the American Samoa longline fishery are not available. However, based on 2006-2008 data, the total estimated number of serious injuries and mortalities for marine mammals per year in the American Samoa longline fishery is 3.6 rough-toothed dolphins (CV=0.6) and 7.8 false killer whales (CV=1.7) (Carretta et al. 2012).

With no active longline fishery in Guam or the CNMI, there are no interactions with marine mammals reported for the past several years.

3.4.3 Seabirds

ESA-listed Seabirds

The endangered short-tailed albatross, threatened Newell's shearwater, and endangered Hawaiian dark-rumped petrel have ranges that overlap the fishing grounds of the Hawaii longline fisheries. The short-tailed albatross has a range that overlaps the pelagic fisheries operating around the CNMI and Guam. In addition, three other seabirds in the South Pacific were determined to be endangered under the ESA in 2009: the Chatham petrel (*Pterodroma axillaris*), Fiji petrel (*Pseudobulweria macgillivrayi*), and the magenta petrel (*Pterodroma magentae*). However, apart from Newell's shearwater, which was sighted on Tutuila only once in 1993 and considered an accidental visitor, the ranges of the other three species are assumed not to overlap with that of the American Samoa longline fishery or other pelagic fisheries north of the Equator (see sources cited in WPRFMC 2011). A comprehensive description of the species' distribution, population status, threats, and recovery strategy can be found in the species' recovery plans.[7] Since NMFS initiated the observer programs in Hawaii in 1994 and American Samoa in 2006, there have been no observed interactions between ESA-listed seabird species and the fisheries under the Pelagics FEP.

In 2012, an ESA section 7 consultation with the U.S. Fish and Wildlife Service covering the potential impacts of the Hawaii deep-set and shallow-set fishery on listed seabirds concluded that the Newell's shearwater and the Hawaiian petrel are not affected by the Hawaii deep-set fishery. In addition, USFWS concluded in the USFWS 2012 BiOp that the continued operation of the Hawaii deep- and shallow-set longline fisheries will adversely affect the short-tailed albatross but will not jeopardize its survival and recovery in the wild. No critical habitat has been designated for this species; therefore, none will be affected. The BiOp covering the short-tailed albatross anticipates that two (2) short-tailed albatross in the deep-set fishery and (1) short-tailed albatross in the shallow-set fishery may be taken every five years in the form of injury or death as a result of interactions with fishing activity operating under existing regulations (USFWS 2012a). This is an authorized observed level of take and if this level is exceeded, NMFS will be required to reinitiate consultation with the USFWS. Since NMFS initiated the mandatory Hawaii

[7] Available online at: http://ecos.fws.gov/tess_public/TESSWebpageRecovery?sort=1.

longline observer program in 1994, there have been no observed interactions between ESA-listed seabird species and Hawaii deep-set or shallow-set longline fisheries under the Pelagics FEP.

In an informal consultation, dated May 19, 2011, USFWS concurred with NMFS' determination that the American Samoa longline fishery is not likely to adversely affect the Newell's shearwater. In a separate communication on July 29, 2011, and recorded in a memorandum for the record on the same date, USFWS advised that, because of the lack of overlap between the range of the American Samoa longline fishery and the ranges of Chatham, Fiji, and magenta petrels, the fishery would likely not adversely affect those petrels.

Seabirds interactions have not been reported or observed in the Guam or CNMI longline fisheries, therefore; a 2011 ESA section 7 consultation with USFWS determined these fisheries are not likely to adversely affect the Newell's shearwater or the short-tailed albatross. Since 2012, there have been no active longline vessels in Guam or CNMI, so there are no reports of interactions with seabirds.

Non-listed Seabirds
Seabird regulations for the Hawaii longline fisheries were published in the *Federal Register* on December 19, 2005 (70 FR 75075). Deep-set fishing operations north of 23º N latitude are required to comply with seabird mitigation regulations that are intended to reduce interactions between seabirds and Hawaii longline fishing vessels (50 CFR parts 600 and 665). The regulations require that longline fishermen employ a suite of mitigation measures that are specific to side-setting or stern-setting, and may include blue-dyed bait, weighted branch lines, strategic offal discards, setting from the side of the vessel, using a "bird curtain", or a hydraulic line-setting machine, among others. These measures help deter birds from becoming hooked or entangled while attempting to feed on bait or catch. For a complete description of the requirements, see 50 CFR § 665.815. These requirements would remain in effect under all Alternatives.

In addition to the ESA-listed seabirds described above, the Hawaii deep-set and shallow-set longline fisheries occasionally interact with other seabirds such as albatrosses, Northern fulmar, and sooty shearwater.

Albatrosses
Albatrosses that forage by diving are some of the most vulnerable species to bycatch in fisheries (Brothers et al. 1999). These species are long-lived, have delayed sexual maturity, small clutches and long generation times, resulting in populations that are highly sensitive to changes in adult mortality. Nineteen of the world's 21 albatross species are now globally threatened with extinction according to the IUCN (IUCN 2004, BirdLife 2004), and incidental catch in fisheries, especially longline fisheries, is considered one of the principal threats to many of these species (Veran et al. 2007).

Hawaii longline fisheries interact at low levels with black-footed and Laysan albatross, but due to strict mitigation measures enacted under the Pelagics FEP, interactions have been drastically reduced since 2000. The Hawaii longline fishery has reduced seabird interactions by 67 percent in the deep-set fishery (Gilman et al. 2008), and a 96 percent in the shallow-set fishery. Increased observer coverage (20-26 percent for the deep-set fishery and 100 percent for the shallow-set fishery) has also resulted in better monitoring and reporting of interactions.

On October 7, 2011, in response to a petition to list the black-footed albatross under the ESA, the USFWS found that the Hawaiian Islands breeding population and the Japanese Islands breeding population of the black-footed albatross are separate distinct population segments, as defined by the DPS policy (76 FR 62503). However, the USFWS also found that neither DPS of the black-footed albatross currently warrants listing under the ESA. The USFWS observed that black-footed albatross bycatch should continue to be minimized by the implementation of effective bycatch minimization measures, and concluded that Hawaii-based longline fishing is not a significant threat to the black-footed albatross.

Non-listed Seabird Interactions

Table 24 contains the estimated numbers of albatross that have interacted with the Hawaii deep- and shallow-set longline fisheries from 2006 through 2011 based on observed interactions by the NMFS Observer Program. From 2004, observer coverage rates were approximately 20 percent in the deep-set fishery and 100 percent in the shallow-set fishery. The major reduction in the number of interactions was due in most part to requirement that the shallow-set longline fishery begin setting one hour after local sunset and to complete setting one hour before local sunrise. Seabirds likely drown if the interaction occurs during gear deployment (setting), but during gear retrieval (hauling), seabirds may be released alive when fishermen promptly apply seabird handling and release techniques. Based on observer data nearly all seabirds hooked or entangled in the Hawaii deep-set longline fishery are dead, since interactions presumably occur during the setting. In 2011, fishermen released two seabirds alive and observers recorded 46 dead (NMFS 2012a).[8]

In addition, from 2004 to 2011, based on observed sets, the deep-set fishery interacted with one red-footed booby, one brown booby and 23 sooty shearwaters. In the same period, the shallow-set fishery interacted with one northern fulmar and one sooty shearwater (http://www.fpir.noaa.gov/SFD/SFD_seabirds.html).

Table 24: Estimated total number of interactions with albatrosses in the Hawaii deep- and shallow-set longline fisheries, 2006-2011.

Year	Laysan	Black-footed	Total
2006	73	15	88
2007	85	83	168
2008	124	88	212
2009	139	141	280
2010	105	197	302
2011	92	236	328

Source: NMFS PIFSC.

[8]http://www.fpir.noaa.gov/SFD/SFD_seabirds.html

Most of the seabird interactions now occur in the deep-set longline fishery (**Table 25**). Although fewer are caught, a greater percentage of Laysan albatrosses are caught in the shallow-set fishery see **Table 26**).

Table 25: Estimated interactions with albatrosses in the Hawaii deep-set longline fishery, 2005-2011.

Year	Laysan	Black-footed	Total
2005	43	82	125
2006	7	70	77
2007	44	77	121
2008	55	118	173
2009	60	110	170
2010	157	66	223
2011	187	73	260
Average	79	85	164

Source: NMFS PIFSC.

Table 26: Observed albatross interactions in the Hawaii shallow-set longline fishery

Year	Laysan	Black-footed	Total
2004	1	0	1
2005	62	7	69
2006*	8	3	11
2007	40	8	48
2008	33	6	39
2009	81	30	112
2010	40	38	79
2011*	49	19	68
Average	39	14	53

Note: * NMFS closed the fishery before the end of the year because an annual turtle interaction limit was reached.

The USFWS issued a special permit in 2012 under the Migratory Bird Treaty Act (MBTA) to the Hawaii shallow-set fishery. The permit authorizes incidental take of certain seabirds for a period of three years (**Table 27**; USFWS 2012b).

Table 27: Total incidental take authorized under the three-year MBTA Special Purpose Permit for the Hawaii shallow-set longline fishery.

Year	**Authorized incidental take (N)**			
	Laysan albatross	Black-footed albatross	Northern fulmar	Sooty shearwater
2012	129	57	10	10
2013	143	64	10	10
2014	159	71	10	10
Total	430	191	30	30

Source: USFWS 2012b.

Many seabird species may occur in the area of operation of the American Samoa longline fishery, similar to Hawaii, Guam, and CNMI. Observers have recorded two interactions with unidentified shearwaters in the American Samoa longline fishery from 2006-2012.

Chapter 4: Environmental Consequences

4.1 Potential Impacts of the Alternatives

4.1.1 Potential Impacts to Target and Non-target Stocks

The preferred alternative and sub-alternatives would have little impact to target and non-target stocks. The preliminarily preferred alternative would establish a framework measure by which limit to catch of fishing effort stemming from tRFMO conservation and management measures or resolutions would be implemented domestically. The preliminarily preferred sub alternatives of establishing a domestic limit for all WCNP striped marlin catches caught commercially in Hawaii from the WCPO, are not likely to have a major impact on longline and non-longline pelagic fisheries.

Both the deep set and shallow set longline fisheries have an expectation of catching a range of economically valuable species, but the deep set fishery expects to maximize bigeye catches, while the shallow set fishery expects to maximize swordfish catches. Neither fishery sets longline gear to target or maximize striped marlin catches. As such, the striped catch limit for the Hawaii longline fishery is not likely to alter the pattern or method of fishing.

Targeting of striped marlin is generally not conducted by commercial troll fishermen, whose main targets are yellowfin, mahimahi and wahoo. Striped marlin catches in the commercial troll fishery are incidental to the catches of the three economically valuable species. Targeting of striped marlin does occur in the charter troll fishery, especially when the species becomes abundant around Hawaii in the spring months (Figure 11).

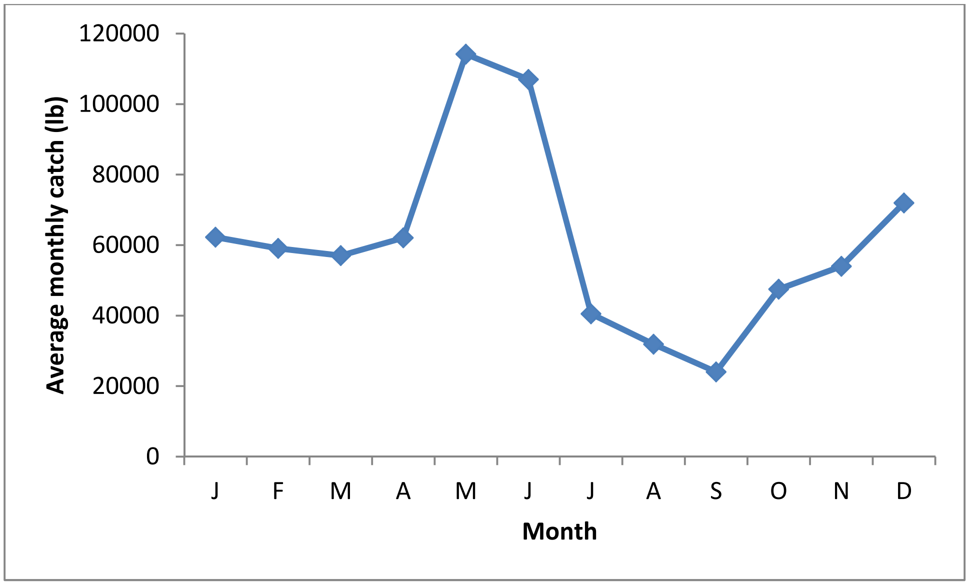
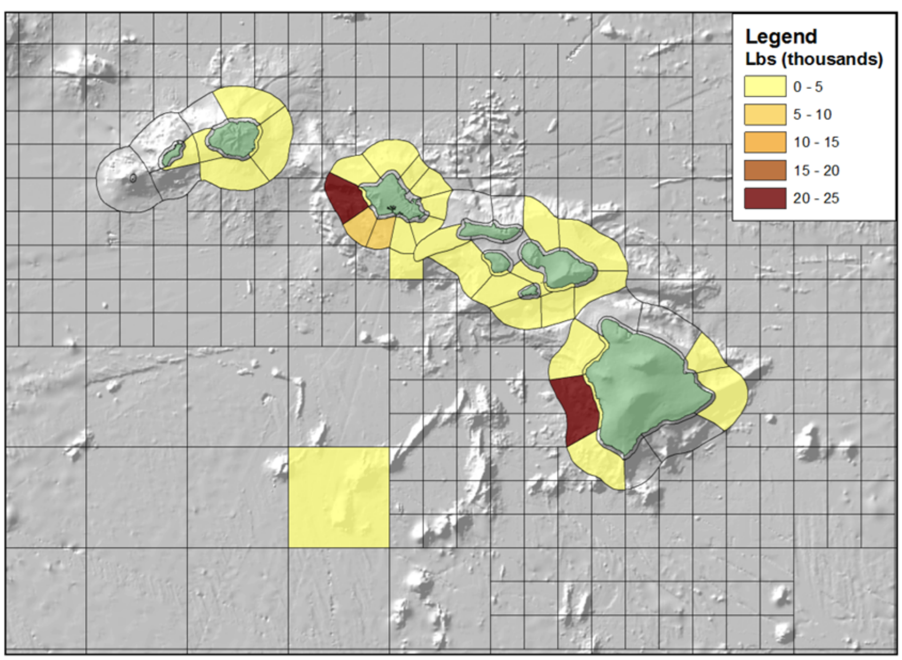


Figure 11 Average monthly troll catch in Hawaii, 2007-2010

There is also a strong spatial element of the catches of stripe marlins in Hawaii by the non-longline pelagic fishery (Figure 12. Aggregate landings by statistical grid of striped marlin in Hawaii, 2009-2013 (Figure 12), with about 47 % of the striped marlin caught and landed at Waianae and from the Kona coast by fishermen operating from these ports. Thus if additional measures are required for striped marlin, beyond the preliminarily preferred sub alternative then these will likely be disproportionately greater at these two locations than elsewhere in Hawaii.

Aggregate Striped Marlin Catch by Statistical Fishing Area 2009-2013



Note: 43 or 53.8% of the aggregate grid areas could not be presented due to data confidentiality.

Figure 12. Aggregate landings by statistical grid of striped marlin in Hawaii, 2009-2013

The limitation of 458 mt under the framework measure should play a tiny but nonetheless important role in rebuilding the WCNP striped marlin stock. It is expected that under the preferred alternative and sub alternative there would not be major shifts in fishermen behavior leading to changes in selectivity of fishing gears for target pelagic species, incidental catch and non-target species.

4.1.2 Potential Impacts to Protected Species

Under the preliminarily preferred alternative and sub-alternatives there would be little likelihood of any changes to the pattern of fishing by the longline and troll fisheries. As such, it is highly unlikely that there would be any changes in the level of interactions with protected species and charismatic mega fauna such as sharks. It is expected that levels of seabird, sea turtle, marine mammal and shark bycatch would remain unchanged and within historical bounds.

4.1.3 Impacts on Marine Habitat and Essential Fish Habitat

None of the methods of pelagic fishing, namely troll, handline or longline fishing typically result in gear being brought into contact with any seabed substrate. Further, the equipment is manufactured from materials typically inert in seawater. As such impacts to marine habitat and essential fish habitat from the preliminarily preferred alternative and sub alternatives will be negligible.

4.1.4 Impacts on Fishery Participants and Fishing Communities

The preliminarily preferred alternative and attendant sub-alternatives are not likely to have major impacts on the fishery participants and fishing communities, as they simply implement a framework for domestic rulemaking stemming from tRFMO actions.

The preferred suite of measures and accountability measures under the preliminarily preferred sub alternatives would aim to keep Hawaii's pelagic fisheries operating and in most years for the Hawaii longline fishery to not have to discard striped marlin. Only in 2013 did total striped marlin catch exceed 401 mt, and the WCNP striped marlin limit applies only to those fish caught to the west of the 150 deg W line of longitude. Moreover, the limit applies only to longline vessels, and even if the limit (435 mt) was reached, the non-longline pelagic fisheries would continue top fish under the assumption that they would not catch sufficient striped marlin to exceed the WCPFC limit of 458 mt.

4.1.5 Impacts on Administration and Enforcement

The impacts of the preliminarily preferred alternative and sub-alternatives will have some additional implications for administration and enforcement. The NMFS PIFSC will need to monitor the Hawaii longline fishery using the near–real time techniques pioneered for bigeye monitoring to establish an annual cumulative total against which the catch limit can be evaluated. If there is a real prospect of the 95% of the catch limit being breached by the Hawaii longline fishery, the NMFS PIRO will need to announce a closure date beyond which all striped marlin must be discarded. Given that there is confusion between juvenile blue marlin and striped marlin, there would likely need to be outreach to inform fishermen about the differences of blue versus striped marlin, so that they were not discarding blue marlins in the mistaken belief that these were striped marlin. Such outreach will create additional administrative costs.

4.2 Cumulative Impacts

The MSA and NEPA require appropriate analysis of the potential cumulative effects of a proposed action, as well as the cumulative effects of the Alternatives to the proposed action. Under NEPA, cumulative effects are defined as those combined effects on the human environment that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what federal or non-federal agency or person undertakes such other actions (40 CFR § 1508.7). The following cumulative effects analysis is organized by the following issues: target and non-target species, protected species, and fishery participants and communities.

4.2.1 Cumulative Effects to Target and Non-Target Species

4.2.1.1 Past, Present, and Reasonably Foreseeable Management Actions

Pelagics FEP

The Pelagic FMP was approved and implemented by the Secretary of Commerce in 1987. In 2009, the Secretary of Commerce approved the Pelagics FEP that replaced the FMP and included all previous requirements. Management actions under the FMP that have helped to ensure western Pacific fisheries are sustainable include establishment of the Hawaii longline limited entry program, capped at 164 permits, and the American Samoa longline limited entry program, which is capped at 60 permits. Also included in the Hawaii limited entry program is a restriction on vessel size of no greater than 101 ft, which limits the fishing capacity of individual vessels. Longline fisheries in Guam and CNMI are permitted with a Western Pacific general longline permit under the FEP and regulated with a suite of measures similar to the American Samoa and Hawaii longline fisheries. For example, the FEP established longline prohibited areas in the Marianas, extending 50 nm around Guam and 30 nm around the CNMI. All longline fisheries under the FEP are comprehensively managed through catch reporting, observers coverage, VMS, gear restrictions, vessel marking, and other management measures. See 50 CFR 665 for Pelagics FEP regulations.

Several recommended FEP amendments/regulatory amendments have been recommended by the Council, but are in drafting stage and yet to be transmitted for Secretarial review under the MSA. These include the following issues:

- American Samoa longline limited access permit program modifications to support fishery participation by small vessels (< 50ft) in the fishery and reduce program complexity;
- Establishment of regulations for an American Samoa-based shallow-set longline fishery;
- Large vessel (> 120 ft) prohibited fishing area around CNMI and Guam; and
- Prohibition on FAD sets by U.S. purse seine fishery in U.S. EEZ waters.

The proposed action Alternatives would not have interactive effects with the proposed actions listed above, primarily because the Alternatives would not change the current fisheries' impacts on target, non-target, and bycatch.

RFMO Management of HMS stocks
In the Pacific Ocean, the international management of HMS stocks is divided between two RFMOs, the WCPFC and IATTC (see Figure 1). The WCPFC and IATTC are a result of negotiated conventions between coastal states and states with vessels fishing on high seas and within waters of national jurisdiction of coastal states under access agreements. The conventions applicable to the WCPFC and IATTC are based upon existing international law such as the United Nations Law of the Sea Convention (UNCLOS), and the United Nations Fish Stocks Agreement on Straddling and Highly Migratory Species (UNFSA).

The U.S. is a member of both the WCPFC and IATTC and is obligated as a member to implement decisions of these RMFOs that are applicable to the U.S.

The management of HMS stocks in the Pacific is complicated by multiple factors including the need to balance rights of coastal states and small developing nations to gain and maintain access to fishery resources and interests of distant water fishing nations in maintaining economically viable harvests, the economic importance of fisheries for developing coastal states, and the overlapping multispecies characteristics of two the largest international fisheries, the purse seine fishery and the longline fishery. For example, the purse seine fishery targets skipjack and yellowfin tunas and dominates landings, representing approximately 75 percent of the total WCPO catch in 2011 and 56 percent of the value (Williams and Terawasi 2012). Longline fisheries for yellowfin, bigeye, and albacore tunas equate to approximately 10 percent of the WCPO catch, but 33 percent of value, with pole and line fisheries and artisanal coastal fisheries responsible for the remainder of the tuna harvests in the WCPO (Ibid.). The purse seine fishery also catches juvenile bigeye tuna incidentally while fishing on FADs. Although the percentage of bigeye tuna in the total catch of the purse seine fishery is believed to be relatively low (approximately 5% in WCPO), the massive catch volume of the purse seine fishery results in significant amount of juvenile bigeye tuna mortality (Williams and Terawasi 2013).

Most striped marlin fishing mortality comes from longline fishing as noted earlier, the WCPFC has addressed this for the WCNP striped marlin stock through the promulgation of CMM 2010-01. The measure states that the total catch of North Pacific Striped Marlin will be subject to a phased reduction such that by 1 January 2013 the catch is 80% of the levels caught in 2000 to 2003.

Each Commission Member and Cooperating Non-Member with vessels fishing in the convention area north of the equator was subject to the following catch limits for North Pacific Striped Marlin for the years 2011 and beyond:

a. 2011 [10%] reduction of the highest catch between 2000 and 2003;
b. 2012 [15%] reduction of the highest catch between 2000 and 2003;
c. 2013 and beyond: [20%] reduction of the highest catch between 2000 and 2003;

Thus the 20% reduction was to be achieved in a stepwise manner over the three year period, 2011-2013. This CMM also applied to all fisheries, not just longliners, hence the need in this amendment to consider non-longline fisheries catching striped marlin.

Future Actions
The WCPFC is scheduled to consider a new, multiyear tropical tuna (skipjack, yellowfin, and bigeye) conservation and management measure at its 10th Regular Session to be held in December 2013. It is expected to establish a measure that will reduce bigeye tuna fishing mortality by year 2018. Balancing the interests between purse seine and longline fisheries in terms of fishing reductions will be a key component of a new measure.

Purse seine fisheries catch juvenile bigeye tuna incidentally while fishing on FADs, so there is potential for juvenile bigeye tuna mitigation through a technical fix and/or operational practice; however, to date, an effective solution has yet to be identified.

The IATTC is also expected to consider a new tuna conservation resolution at its mid-2013 meeting and applicable to purse seine and longline fisheries in 2014 and beyond.

4.2.1.2 External Factors

Five major exogenous factors were identified as having the potential to contribute to cumulative effects on pelagic target and non-target stocks:

- Fluctuations in the pelagic ocean environment focusing on regime shifts
- Pacific-wide fishing effort
- Ocean noise
- Marine debris
- Ocean productivity related to global climate change

Fluctuations in the Pelagic Ocean Environment
Catch rates of pelagic fish species fluctuate in a time and space in relation to environmental factors (e.g., temperature) that influence the horizontal and vertical distribution and movement patterns of fish. Cyclical fluctuations in the pelagic environment affect pelagic habitats and prey availability at high frequency (e.g., seasonal latitudinal extension of warm ocean waters) and low-frequency (e.g., El Niño Southern Oscillation-related longitudinal extension of warm ocean waters). Low or high levels of recruitment of pelagic fish species are also strongly related to fluctuations in the ocean environment.

The effects of such fluctuations on the catch rates of PMUS obscure the effects of the combined fishing effort from Pacific pelagic fisheries. During an El Niño, for example, the purse seine fishery for skipjack tuna shifts over 1,000 km from the western to central equatorial Pacific in response to physical and biological impacts on the pelagic ecosystem (Lehodey et al. 1997). Future ocean shifts are likely to cause changes in the abundance and distribution of pelagic fish resources, which could contribute to cumulative effects. For this reason, accurate and timely fisheries information is needed to produce stock assessments that allow fishery managers the ability to regulate harvests based on observed stock conditions.

Pacific-wide Catches of Bigeye Tuna

See section 3.2 for Pacific-wide catches of bigeye tuna.

Oceanic Noise Pollution

In the last 50 years, there have been significant increases in sound producing ocean activities such as commercial shipping, hydrocarbon exploration and research, military sonar and other defense related-actions (Hildebrand 2005). Ambient noise from shipping in the Pacific Ocean has doubled every decade for the last 40 years (McDonald et al. 2006). Commercially important fish stocks and marine mammals can be affected by noise pollution by making it more difficult to find food and mates, avoid predators, navigate, and communicate (Popper 2003). Studies of bluefin tuna in the Mediterranean suggest that noise pollution from shipping results in changes to schooling behavior, which could impact migration (Sara et al. 2007). The effects of noise pollution on bigeye tuna and other target and non-targets stocks are unknown, but given the above information and depending on exposure duration and at what life stage, increases in oceanic noise levels could potentially have adverse impacts on target and non-target stocks.

Marine Debris

Derelict fishing gear such as drift-nets have the ability to ghost fish, i.e. continue to catch and kill fish and other animals long after they have been lost or discarded. The amount of derelict fishing gear in the Pacific has not been quantified nor has the amount fish species killed by ghost nets. Longline gear is not readily lost during normal fishing operations because the gear is equipped with radio transponder devices. In addition, Hawaii longline fishermen make efforts to prevent gear loss as well as participate in a voluntary derelict fishing net retrieval program based in Honolulu. Retrieved derelict nets are brought back to Honolulu Harbor and placed in a receptacle which is transported to Schnitzer Steel Corp. where the nets are cut up for incineration at Honolulu City and County's H-Power plant. Purse seine fisheries often used FADs to aggregate fish. While many of these FADs are equipped with radio transponders or GPS beacons to locate them, the FAD themselves are made of netting other loosely connect materials that have the potential to contribute to marine debris.

Ocean productivity related to global climate change

Using remotely-sensed chlorophyll concentrations from satellite observations, Polovina et al. (2008) have found that over the past decade primary productivity in the subtropical and transition zone has declined an average of 1.5 percent per year with about a 3 percent per year decline occurring at the southern limit of the North Pacific Transition Zone. The expansion of the low chlorophyll waters is consistent with global warming scenarios based on increased vertical stratification in the mid-latitudes.

Expanding oligotrophic[9] portions of the subtropical gyres in the world's oceans in time will lead to a reduction in chlorophyll density and carrying capacity in the larger subtropical gyres, thus impacting the abundance of target and non-target species. In general, it has been shown that large scale climate cycles can impact winds, currents, ocean mixing, temperature regimes, nutrient recharge, and affect the productivity of all trophic levels in the north Pacific Ocean (Polovina et al. 1994).

[9] Meaning waters where relatively little plant life or nutrients occur, but which are rich in dissolved oxygen.

For example, a scientific study using an enhanced version of the spatial ecosystem and population dynamics model (SEAPODYM[10]) suggests that by the end of this century, ocean temperatures in the WCPO will increase to levels that may not support bigeye tuna populations in the WCPO[11] In order to support the long-term sustainability target and non-target fish stocks, and taking in to account potential impacts from climate change, continued research, improved fishery data collection, and coordination with international organizations, will be important to facilitate adaptive fishery management.

4.2.1.3 Cumulative Effects

As described in sections 4.1.1 to 4.1.5 , the direct and indirect impact of the Alternatives are expected to have minor to moderately negative (Alternative 2 Sub-Alternative 2 b (ii and iii), but none are expected to be substantial. U.S. fisheries are sustainably managed and are operating consistent with internationally agreed upon conservation and management measures. Striped marlin is overfished in the WC North Pacific, but not in the Eastern Pacific Ocean, although the eastern stock boundary of the WCNP striped marlin stock is in the EPO. As such , this management approach is also consistent with the Magnuson-Stevens Act in managing the WCNP striped marlin tuna throughout the range of the species, taking into account stock status.

NMFS anticipates that the Pelagics FEP fisheries, including the Hawaii deep-set longline fishery, would continue to operate largely unchanged in terms of fishing location, the number of vessels that deep-set fish, the number of hooks deployed, catch rates of target, non-target, bycatch species, depth of hooks, or deployment techniques in setting longline gear, with respect to baseline operations.

4.2.2 Cumulative Effects to Protected Species

4.2.2.1 Sea Turtles

4.2.2.1.1 Past, Present, and Reasonably Foreseeable Future Management Actions

NMFS Listings Under the ESA

In the late 1970s, NMFS and the USFWS listed all five sea turtles species that occur in the U.S. EEZ as either threatened or endangered pursuant to the ESA (43 FR 32800). The ESA offers Federal protection to species that are displaying population trends that make them vulnerable to extinction.

Pelagics FEP Amendment Model Fishery and Sea Turtle Mitigation Measures

From 2001-2004, the Hawaii based shallow-set fishery was closed due to concerns related impacts on sea turtle populations. In 2004, the Council developed a suite of measures in an FEP

[10] The model based on advection-diffusion-reaction equations explicitly predicts spatial dynamics of large pelagic predators, while taking into account data on several mid-trophic level components, oceanic primary productivity and physical environment.

[11] SEAPODYM working progress and applications to Pacific skipjack tuna population and fisheries WCPFC-SC7-2011/EB-WP 06 rev. 1

amendment to reopen the Hawaii shallow-set swordfish longline fishery. Among the measures in the FEP amendment was a requirement by shallow setting longline vessels to use 18/0 or larger circle hooks and fish bait. This measure has reduced sea turtle interaction rates by 89 percent in comparison to historical interaction rates (Gilman et al. 2007). Deep hooking (thought to result in higher levels of sea turtle mortality) rates have also declined (Gilman et al. 2007).

Prior to requiring the use of circle hooks and fish bait in the Hawaii longline shallow-set fishery, 51 percent of the sea turtles were believed to have been deeply hooked. Furthermore, the 2004 regulations instituted annual interaction limits on loggerhead (17) and leatherback (16) sea turtles, which if reached, close the fishery for the remainder of the calendar year. The interaction limit for loggerheads was raised to 46 in 2009 (leatherbacks remained at 16), then reduced back down to 17 and 16, respectively in 2011 as a result of litigation. In January 2012, NMFS completed a new biological opinion on the Hawaii shallow-set longline fishery and concluded that 34 annual interactions with North Pacific loggerheads and 26 annual interactions with leatherbacks will not jeopardize these populations (see 77 FR 60637). **Figure 13** shows the significant reduction in sea turtle interactions in the Hawaii longline fisheries as a result of the 2001-2004 closure as well as reopening of the shallow-set fishery under strict sea turtle mitigation measures.

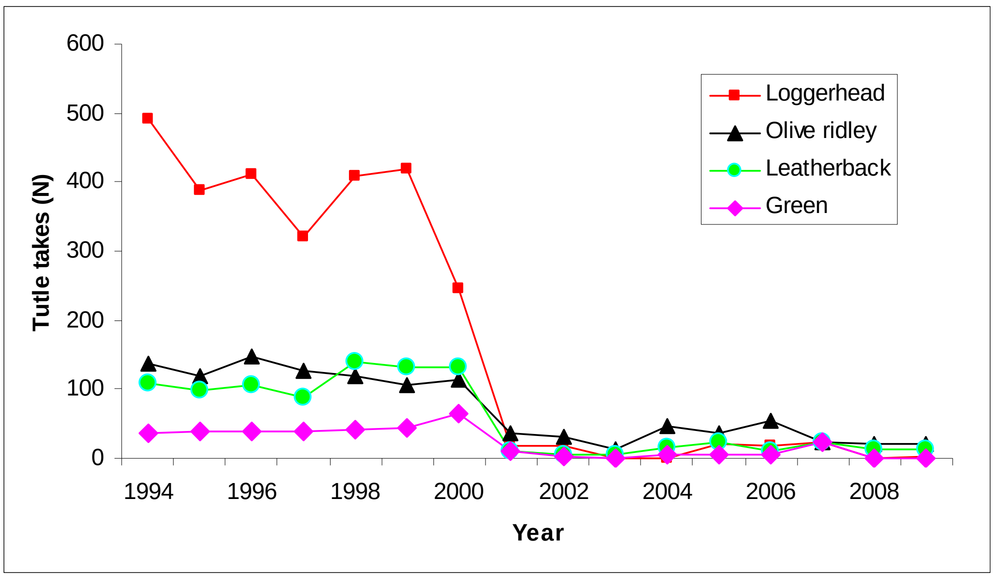


Figure 13: Estimated Annual Sea Turtle Interactions in the Hawaii Longline Fisheries (deep-set and shallow-set combined), 1994-2009.
Source: NMFS unpublished data

In 2009, the Council also recommended requiring American Samoa longline fishing vessels when fishing in the EEZ around American Samoa follow gear modifications to ensure that longline gear is fished at depth below 100 m. This measure is intended to reduce sea turtle interactions (primarily green sea turtles) with the longline fishery. Following the completion of a no-jeopardy biological opinion on September 16, 2010, NMFS implemented the Council's recommended regulations on this issue in 2011 (76 FR 52888). Since implementation, the fishery has had lower interaction rates with sea turtles.

NMFS issued a new BiOp for the Hawaii deep set longline fishery on September 19, 2014 (NMFS 2014). This BiOp stemmed from the listing of the Main Hawaiian Islands false killer whale population under the Endangered Species Act in 2012. The interaction and mortality limits for sea turtles under this recent BiOp are given in Table 28.

Table 28. Interaction and mortality limits for sea turtles for the Hawaii deep set longline fishery

Turtle Species	Interaction Limit (n)	Mortalities (n)
N. Pacific loggerhead turtles	9	9
Leatherback turtles	72	27
Olive ridley turtles	99	96
Green turtles	9	9

Council Sea Turtle Conservation Projects

The Pacific loggerhead and leatherback recovery plans identify several actions that can be taken to assist in recovering Pacific leatherback and loggerhead turtles (NMFS and USFWS 1998a; NMFS and USFWS 1998b). Among these activities are eliminating turtle and egg harvest, reducing nest predation by domestic and feral animals, protecting nesting beaches from erosion and human disturbance, collecting biological information on nesting turtle populations, educating local communities on the value of conserving sea turtles, and monitoring nesting activity to identify important nesting beaches (NMFS and USFWS 1998a; NMFS and USFWS 1998b). Both plans recognize that increasing hatchling production at nesting beaches is "[o]ne of the simplest means to enhance populations…" (NMFS and USFWS 1998a; NMFS and USFWS 1998b).

To that end, the Council has funded and partnered with several sea turtle conservation projects to assist in the long-term enhancement and recovery of loggerhead and leatherback sea turtles. Protection of nesting beaches in Japan and reducing bycatch and mortality in Baja California Mexico, for example, are specifically intended to benefit the loggerhead population that interacts with the fishery. Similarly, protecting nesting beaches and reducing mortality in Papua Barat Indonesia and Papua New Guinea are designed to benefit the leatherback populations that primarily interact with the fishery.

The Council's conservation projects are increasing hatchling production to varying degrees and reducing juvenile or adult mortality, and, consistent with their recovery plans, are making contributions to the recovery of loggerhead and leatherback turtles in the Pacific. It is generally accepted that only one turtle out of 1,000 eggs will reach adulthood. The Council's leatherback nesting beach conservation project in Wermon, Papua Indonesia is estimated to have conserved 397 adult leatherback turtles since 2004 (WPFMC 2009b). Such nesting beach projects in Papua Barat have been shown to produce over 10 times as many adult females for the same cost as the cost of protecting female sea turtles through current Hawaii shallow-set longline regulations aimed at reducing bycatch (Gjertsen 2008). Similarly, the Council's loggerhead nesting beach conservation project in Japan is estimated to have conserved 181 adult loggerhead turtles since 2004. In addition, in 2007, the Council's conservation project in Baja Sur, Mexico has resulted in several highline fishermen agreeing to not fish within the high density sea turtle area with gillnets and longline gear. It is estimated that approximately 700-900 loggerheads may be spared per year because of this agreement (Peckham, Pro Peninsula, pers. comm., December 2007).

As such, these important conservation accomplishments are assisting in fulfilling the goals of each ESA turtle recovery plan. Indeed, the applicable sea turtle recovery plans explain that increases in hatchling survival "enhance populations," and recognize such increases as important steps to achieving recovery (NMFS and USFWS 1998a; NMFS and USFWS 1998b). Based on the successful results of the projects, the Council's conservation projects are likely contributing positively to cumulative impacts on the loggerhead and leatherback populations.

Transferred Effects of Regulatory Regimes

An important aspect of past and present regulatory regimes is that of transferred effects. Transferred effects are indirect effects that may occur outside of the managed area as a result of management actions within the managed area. Adverse transferred effects may occur as a result of management actions intended to reduce adverse impacts on protected or managed species in a discrete fishery, but actually promote and increase adverse impacts on other populations. Transferred effects may affect the ultimate balance of environmental impacts, unintentionally driving the system in the opposite direction from the intent of the management measures when taken and evaluated in isolation. Beneficial transferred effects may also occur. For example, gear innovations and management approaches demonstrated to be effective in one fishery, might be transferred to another fishery and help to promote appropriate management of that resource. To this end, the Council has sponsored the International Fishers Forums series to spread effective gear technology around the world.

It is believed that adverse transferred effects resulted from the 2001-2004 closure of the Hawaii shallow-set longline fishery, and the current highly restrictive annual sea turtle hard caps, increased reliance on imported swordfish supplies from areas with potentially higher protected species interactions. After comparing bycatch rates, Rausser et al. (2008) found that the 2001 closure had paradoxically resulted in substantially greater sea turtle bycatch suggesting a significant adverse impact on sea turtle populations. Recognizing limitations in data for foreign fishery bycatch, Rausser et al. (2008) conservatively estimated a turtle bycatch rate per 1,000 hooks of 2.35 in Ecuador, 1.8 in Panama, 0.0031 in New Zealand, and 0.0613 in Vietnam. Compared to the fishery's bycatch rate of 0.1738 pre-2004 regulations, Rausser et al. (2008) concluded that the 2001 fishery closure led to a net increase of 1,835 interactions and 660 turtle mortalities per year.[12] Assuming that, absent a closure, the fishery would have operated during that time under the types of gear and operational restrictions now in place (catching just 0.019 turtles per 1,000 hooks[13]), the closure resulted in a net increase of 2,237 interactions and 805 turtle mortalities per year (Rausser et al. 2008). As documented by Rausser et al. (2008) and Sarmiento (2006), the paradoxical result of such regulatory restrictions imposed in the interest of sea turtle conservation is, conservatively, hundreds of additional sea turtle mortalities per year.

More recently, Chan & Pan (2012) found strong spillover (market transfer and/or production displacement) effects from regulation of the Hawaii shallow-set longline fishery for swordfish, resulting in more sea turtle bycatch from foreign fisheries as Hawaii swordfish production

[12] Rausser et al. (2008) assumed a mortality rate for foreign fleets similar to that assumed for the Hawaii fishery prior to the 2004 regulations, when in fact they are likely higher where turtles are often kept as food.
[13] The WCPFC has adopted this rate as the minimum interaction rate for shallow-set fisheries operating in the WCPO, above which they have to conduct mitigation measures such as circle hooks and fish bait.

declined. Conversely, Chan & Pan concluded that the expansion of the Hawaii-based shallow-set fishery would result in a positive spillover effect for turtles. Specifically, Chan & Pan projected a beneficial effect when the Hawaii shallow-set longline fishery produces 5,461 mt of swordfish and there is a one-to-one displacement of foreign fishery swordfish production serving U.S. markets, which results in proportionately fewer sea turtle interactions (Chan and Pan 2011). Chan & Pan further conclude that the expansion of the Hawaii-based shallow-set fishery to 5500 sets, with its historical contribution to the U.S. market, is likely to cause a reduction in imports from less turtle-friendly swordfish fisheries, thereby decreasing the overall sea turtle bycatch associated with U.S. consumption of swordfish (Chan & Pan 2011).

4.2.2.1.2 External Factors

Existing threats that are common to all species of sea turtles include:

- human use and consumption- legal and illegal harvest of adults, juveniles and/or eggs
- sea turtle nesting and marine environments, including directed takes, predation, and coastal habitat development
- marine debris (entanglement and ingestion)
- incidental capture in fisheries
- fluctuations in the ocean environment
- climate change

Human Use and Consumption

Globally, sea turtles have been exploited for their meat, eggs, shell, leather, and oil for centuries. Archaeological evidence suggests both over fishing that lead to decimation of localized populations as well as possible evidence of implemented conservation measures (Frazier 2003, Woodrom-Luna 2003a *in* WPRFMC 2004 Woodrom-Luna 2003b, Lutcavage et al. 1997, McCoy 1997, Nietschmann 1973). The oldest archaeological evidence of uses of turtles by human comes from the Arabian Peninsula dating about 5000 B.C. (Frazier 2003). The increase in global trade and money-based economies may have helped shape sea turtle consumption such that communities who previously used sea turtles for subsistence might now trade and sell sea turtles and their by-products for financial gain (Balazs 1995, Campbell 2003, Nietschmann 1979).

Sea Turtle Nesting and Marine Environments

The degradation of nesting habitats due to coastal development poses a serious and detrimental impact to sea turtles (Lutcavage et al. 1997, Spotila et al. 1996). The global impact to turtles, other than in a few isolated cases, remains predominantly unquantified. Nesting beach threats are brought about through habitat degradation from urban development, agriculture activities, timber harvest, mining, pollution, beach armoring, sand mining, and vehicular traffic on beaches, artificial lighting and direct impacts through human presence (Mitchell and Klemens 2000). Additional anthropogenic near shore threats, other than fishery impacts, also include dredging activities and boat strikes.

Beach armoring consists of hardening structures (concrete sea walls, wooden walls, rock revetments, and sandbag structure) meant to protect coastlines from erosion; however, it also results in the elimination of nesting habitat (Schroeder et al. 2000, Mosier and Witherington

2002). Artificial lighting disrupts critical adult nesting behavior and the nocturnal sea-finding behavior of hatchlings (Lutcavage et al. 1997).

Pollution, Marine Debris, and Entanglement

Sea turtles can achieve life spans longer than 50 years and thus have a potential to bio-accumulate heavy metals and pesticides (Lutcavage et al. 1997). Pollution and contaminate effects are difficult to quantify; however, chronic pollution from industry, agriculture and urban runoff are known to negatively impact sea turtles (Lutcavage et al. 1997). Pollutants, which may function to compromise a turtle's immune system, have been found in eggs, gonads, fat liver, muscle, scutes, and tissues of turtles, and pollutants are further implicated in disease expression such as fibropapilloma (Seminoff et al. 1999, Work and Balazs 1998, Ceron et al. 2000, Sakai et al. 1995, Sakai et al. 2000).

Reports have documented that marine pollution by plastic debris, tar balls, heavy metals and persistent organochlorine compounds are of great concern and may play a role in declining populations of sea turtles (Bjorndal et al. 1994, Carr 1987, Musick et al. 1995). Plastics are the most abundant type of anthropogenic debris found on beaches and in the oceans (Lutcavage et al. 1997). Balazs (1985) documented 79 cases of ingested plastics and 60 cases of entanglement in marine debris by sea turtles. Published reports of debris ingestion exist for all sea turtle species in all life stages. However, the dependence of pelagic juveniles upon convergence zones, where floating debris concentrates, and their omnivore foraging strategy leave pelagic turtles most susceptible to debris ingestion (Lutcavage et al. 1997, Witherington 2002).

Pollution and marine debris on beaches can cause physical obstructions and prevent beach access by adults or inhibit hatchlings from reaching the sea (Sarti et al. 1996). Numerous reports also exist implicating both ingested plastics and entanglement in the death of turtles (Balazs 1985, Chatto 1995, Bjorndal et al. 1994, Wallace 1985, Almengor et al. 1994, Mrosovsky 1981). Small quantities of ingested debris can kill turtles by obstructing the gut (Bjorndal et al. 1994), and entanglement in marine debris or derelict fishing gear can result in reduced mobility, making a turtle unable to feed, breathe, or flee from predators (Balazs 1985). Derelict fishing gear, in particular monofilament line, is one of the most commonly encountered anthropogenic debris items that entangle turtles and may account for 68 percent of all entanglement cases (NRC 1990, Lutcavage et al. 1997). Trailing debris may trap turtles between rocks or ledges resulting in death from drowning, constrict the neck and/or flippers, amputate limbs, and consequently lead to death from infection (Lutcavage et al. 1997, Balazs 1985).

Fluctuations in the Ocean Environment

Ocean climate fluctuations that change the habitat quality or the prey availability of sea turtles have the potential to affect their short or long-term distribution and abundance. Changes in oceanographic conditions may also alter rates of incidental takes of sea turtles in commercial fisheries. For example, sea turtles are known to follow temperature and chlorophyll fronts that may also be areas where fisheries are concentrated, and the overlap of fishing effort and foraging animals may result in increased interactions (NMFS 2000). The magnitude of potential effects is uncertain but this factor could contribute to cumulative effects on sea turtles.

Global Climate Change and Increasing Sea Surface Temperatures

Climate change may affect sea turtles in the following manner: 1) changes in hatchling sex ratios as a species that exhibits temperature-dependent sex determination; 2) loss of nesting beach habitat due to sea level rise; 3) changes in nesting behavior that correlate with fluctuations in sea surface temperature; and 4) alterations to foraging habitats and prey abundance resulting from global climate change. It is not possible to predict what specific impacts will occur to affect sea turtles; thus continued research will be needed track the status of sea turtle populations to monitor nesting success, migration and foraging habits, and on the impacts of fisheries on sea turtles.

Incidental Takes of Sea Turtles in Other Fisheries

The incidental mortality of all species of marine turtles in commercial fishing operations has long been recognized as a serious threat to the stability of those populations (NMFS and USFWS 1998a, 1998b, 1998c, 1998d, 1998e; National Research Council, 1990). In some instances, the effect of fishery mortality has a higher impact on population stability than many other sources of mortality (e.g., extensive egg harvest, nesting habitat destruction) because fisheries impact larger size/age classes of sea turtles. The effect of mortality in this size/age class is particularly damaging, as these turtles have some of the highest value to the population in terms of reproductive potential (Crouse et al. 1987; Crowder et al. 1994). Larger turtles not yet mature have survived many years of selective pressures but have not yet begun to support the population by reproducing themselves. Thus, while anthropogenic mortality may occur at many size/age classes in marine turtle population, it has been demonstrated that a relatively small anthropogenic mortality at these larger size/age classes will drive a population to extinction - despite almost complete protection of eggs and nesting females on the nesting beaches (Heppell et al. 1996).

4.2.2.2 Marine Mammals

4.2.2.2.1 Past, Present, and Reasonably Foreseeable Future Management Actions

The Marine Mammal Protection Act (MMPA) requires FEP-regulated fisheries be evaluated by NMFS for impacts on marine mammals and be designated as Category I, II, or III (with Category III having the lowest impact). The fishery classification criteria consist of a two-tiered, stock-specific approach that first addresses the total impact of all fisheries on each marine mammal stock, and then addresses the impact of individual fisheries on each stock. Under existing regulations (50 CFR 229.4-5), to lawfully incidentally take a marine mammal, all fishers participating in Category I or II fisheries must register under the Marine Mammal Authorization Program (MMAP), obtain an Authorization Certificate, carry an observer if requested by NMFS, and comply with any applicable take reduction plans. All commercial fishers, regardless of their fishery category, must report to NMFS any interactions with marine mammals.

The Hawaii longline fishery (deep-set and shallow-set) was previously listed as a single Category I fishery, primarily due to interactions between the deep-set (tuna) fishery and false killer whales (*Pseudorca crassidens*) within EEZ waters around the Hawaiian Islands. Dolphins and false killer whales are also known to take bait and catches from longline and bottomfish fishing lines, most often without becoming hooked or entangled. The Hawaii longline fishery is in compliance with the MMPA in that it is subject to observer coverage, participants must obtain an Authorization Certificate and report any interactions, and the fishery operates under a Take Reduction Plan for false killer whales.

NMFS determined in its List of Fisheries for 2009 (73 FR 73032, December 1, 2008) that the Hawaii deep-set and shallow–set longline fisheries are considered as separate fisheries, with each to be categorized independently based on its characteristics and interactions with marine mammals. The deep-set fishery (which has a history of interacting with false killer whales and exceeding the stock's potential biological removal (PBR) level) is a Category I fishery. The shallow-set fishery is a Category II fishery. Both fisheries are included in the scope of the False Killer Whale Take Reduction Plan; however, the measures implemented mainly address take reduction in the Hawaii deep-set fishery. A final rule for the Take Reduction Plan was published in November, 2012. The measures affect the operation of the fishery and include gear requirements (weak circle hooks and strong leaders), longline prohibited areas, training and certification in marine mammal handling and release, captains' supervision of marine mammal handling and release, and posting of NMFS-approved placards on longline vessels. The rule also recommends research and data collection programs and revises the boundaries of the longline prohibited area around the MHI to be consistent with the prohibited area established under the FKWTRP regulations. This action will not affect the Council's ability to manage Territory catch limits and arrangements nor change the outcome of the proposed action.

The American Samoa longline fishery has been Category II since the 2010 LOF (74 FR 58859, November 16, 2009) by analogy to the Hawaii longline fisheries and its interactions with rough-toothed dolphins and false killer whales. The Hawaii shortline fishery is also listed as Category II by analogy to the Hawaii longline fisheries and anecdotal reports of interactions with "blackfish." Several high seas fisheries in the western Pacific region are classified as Category II, and all other fisheries in the region are classified as Category III fisheries (see the 2012 LOF, 76 FR 73912, November 29, 2011, for further information).

Some marine mammals (e.g., Hawaiian monk seals, humpback whales, other large whales) occurring in the western Pacific region are also protected under the ESA, and NMFS must ensure that fisheries managed by the Council are not likely to jeopardize the continued existence and recovery of any threatened or endangered species or result in adverse impacts on the critical habitat of such species. The current NMFS BiOps have concluded that no fisheries managed by the Council are likely to jeopardize the continued existence and recovery of any ESA-listed marine mammal species or result in the destruction or adverse modification of designated critical habitat. NMFS issued a 3-year permit for incidental take of endangered Central North Pacific humpback whales in the Hawaii longline fisheries on May 28, 2010, based, in part, on a determination that mortality and serious injury of humpback whales incidental to the fishing operations would have a negligible impact on the stock (75 FR 29984). On June 3, 2013, NMFS reinitiated consultation on the Hawaii deep-set longline fishery in response to the listing of the MHI insular false killer whale DPS as endangered, and based on a single interaction with a sperm whale.

Future Actions

Through data collected from observer programs and other sources, the Council and NMFS will continue to monitor interactions between managed fisheries and marine mammals. NMFS scientists in association with other researchers will continue to collect biological samples to refine stock definitions as well as conduct surveys to monitor populations. The Council and NMFS will continue to conduct workshops with participation from fishermen to develop mitigation methods as appropriate, and NMFS will continue to conduct mandatory annual protected species workshops for all longline permit holders that teach how to identify marine mammals and how to reduce and mitigate interactions. As noted above, NMFS recently published a False Killer Whale Take Reduction Plan in late 2012 to address incidental serious injuries and mortalities of false killer whales in the Hawaii longline fisheries. NMFS will monitor the effectiveness of the Plan and, if necessary, amend the Plan to ensure its take reduction goals are achieved.

4.2.2.3 Seabirds

4.2.2.3.1 Past, Present, and Reasonably Foreseeable Future Management Actions

Prior to 1999, the shallow-set fishery was estimated to interact with around 2,000 albatross (black-footed and Laysan) per year. The short-tailed albatross, which is listed as endangered under the ESA, is thought to forage in areas where the shallow-set fishery operates; however, no interactions between the short-tailed albatross and the Hawaii longline fleet have ever been reported or observed. In 2002, the Council amended the Pelagics FEP to require Hawaii longline vessels to use known seabird mitigation measures that were expected to significantly reduce seabird interaction rates. These measures include blue-dyed bait, night-setting, line shooters, and weighted branch lines. In 2005, the Council amended the Pelagics FEP to allow longline vessels to side-set in lieu of most required Alternative measures (Figure 14).

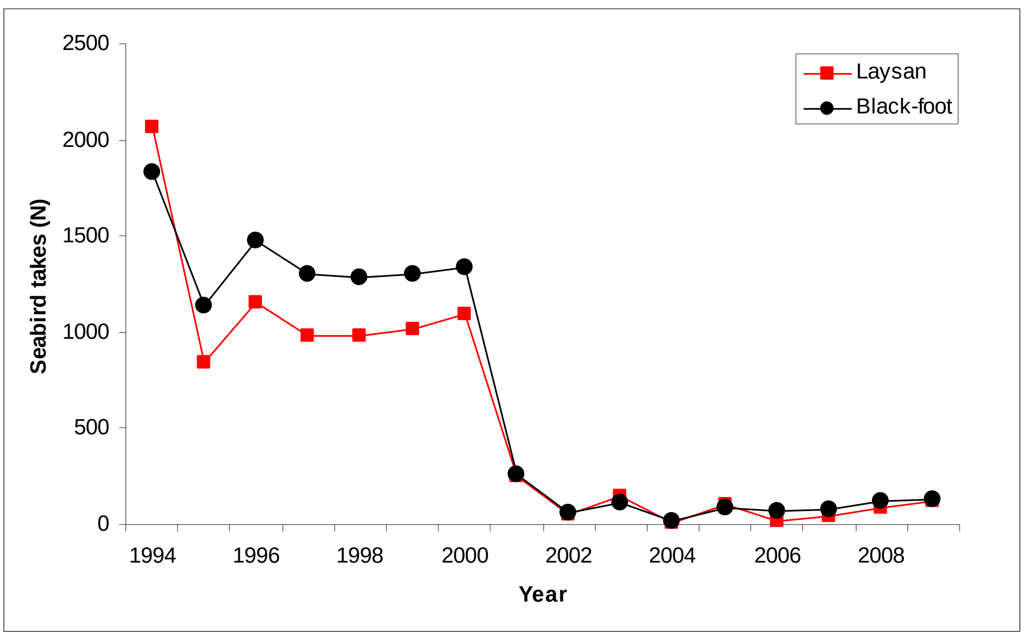


Figure 14: Annual estimated number of interactions between the Hawaii longline fisheries (deep-set and shallow-set) and Laysan and Black-footed albatrosses.
Source: NMFS unpublished data

The introduction of the above regulations in the Hawaii longline fishery reduced the seabird interaction rate by 67 percent on deep-sets (Gilman et al. 2008). The shallow-set fishery typically sets at night and hauls during the day; therefore, most of the interactions occur when fishermen retrieve the gear and birds are actively feeding. The 2011 shallow-set fishery interacted with 49 Laysan albatrosses and 19 black-footed albatrosses and 78 percent of these seabirds were released injured and alive. In the 2011 deep-set fishery observers documented interactions with 32 Laysan albatrosses, 13 black-footed albatrosses, and three sooty shearwaters; four percent of seabirds were released injured and alive.

In August 2012, the USFWS issued a special purpose permit to NMFS under the authority of the Migratory Bird Treaty Act and 50 CFR § 21.27. The 3-year permit authorizes the Hawaii-based shallow set longline fishery to incidentally interact with migratory seabirds, primarily Laysan and black-footed albatrosses. The permit continues the current management regime of the fishery, including the seabird deterrence regulations currently required by NMFS regulations and the 2012 USFWS BiOp (USFWS 2012) referenced above, with no changes to the operation of the fishery during the permit period (see 77 FR 50153). Compliance with the terms of the permit would be considered in the decision to renew any future permit.

The Council and NMFS will continue to monitor seabird interactions with managed fisheries, and if a management need arises, will recommend/implement appropriate measures

4.2.2.3.2 External Factors

Albatross populations in the North Pacific Ocean live in an environment that has been substantially affected by anthropogenic factors, some of which have been mitigated by conservation and management measures. Major activities of the past that are part of the existing baseline include the intensive collection of short-tail albatross feathers in Japan during the early 20 century; the Battle of Midway during World War II and subsequent U.S. military use of Midway Island; and Asian high-seas drift net fisheries during the 1980s.

Degradation of Albatross Nesting Habitats
Overall, negative human impacts to albatross nesting habitats are abating in Japan and the NWHI. Currently active breeding colonies for the short-tailed albatross in Japan and the major nesting colonies of the black-footed and Laysan albatrosses in the NWHI are part of government refuges managed for the conservation of wildlife. Thus, human access and associated disturbance are limited. Due to management changes at Midway Atoll National Wildlife Refuge, air traffic and visitor use are considerably reduced, diminishing the threats to seabirds from air strikes and ecotourism. Cruise boats occasionally land visitors at Midway and the airfield is maintained as an emergency landing site, so there is still potential for visitor-related and aircraft-related impacts.

Exposure to lead and PCBs remain hazards to seabirds at the decommissioned military base in the Midway Island National Wildlife Refuge and the decommissioned LORAN station at Tern Island, French Frigate Shoals. Despite previous lead remediation (1994-1997) on Midway, Laysan albatross chicks continue to be exposed to substantially elevated levels of lead from the ingestion of lead-based paint from deteriorating buildings. This represents a serious health threat based on several reports of increased morbidity and mortality of Laysan albatross chicks nesting in the vicinity of buildings. The death of Laysan albatross chicks in a species of low productivity impedes efforts to conserve this species (Finkelstein et al. 2003). The U.S. Fish and Wildlife

Service (USFWS) is currently attempting mitigate the lead paint problem. The potential of Midway Atoll NWR to serve as a nesting colony for short-tailed albatross, through either natural colonization or propagation efforts remains unknown (USFWS 2000).

Continued Exposure to Environmental Contaminants, Especially PCBs
Black-footed and Laysan albatrosses from the North Pacific Ocean contain higher levels of organochlorine residues (polychlorinated dibenzo-p-dioxins, PCDDS; polycholorinated dibenzofurans, PCDFs; and polychlorinated biphenyls, coplanar PCBs) than albatrosses in the South Pacific Ocean. Black-footed albatross have 3-4 times more mercury and organochlorines than Laysan albatross (Finkelstein et al. 2006). Residue levels in albatrosses from the remote North Pacific Ocean far from point sources of pollution are comparable to or higher than those in terrestrial and coastal birds from contaminated areas in developed nations. The long lives of albatrosses and ingestion of plastic resin pellets that account for a high percentage of marine debris in some areas of the ocean are plausible explanations for accumulation of these persistent contaminants in albatrosses (Tanabe et al. 2004). Over the long term, high levels of PCBs may negatively affect the health of North Pacific Ocean albatross populations.

Continued Exposure to Concentrations of Small Plastic Debris in the North Pacific Ocean
Studies in the last 25 years have documented the prevalence of plastic in the diets of many seabird species in the North Pacific Ocean. Plastics may be consumed directly because particles resemble prey items or, indirectly, by eating prey attached to plastics or with plastics in their gut. In turn, adult seabirds may pass plastics on to chicks by regurgitation.

Studies of the distribution and abundance of small plastic particles in the North Pacific Ocean report that pelagic plastic is most abundant in the central subtropical and western North Pacific Ocean. User plastics, small, weathered remnants of larger manufactured items that are discarded or lost at sea by fishing vessels and shipping traffic, are the predominant type of plastic ingested by seabirds in the central North Pacific Ocean (Day and Shaw 1987). Currents and convergences of the region concentrate marine debris at levels that appear higher than for any other oceanic regions of the world and leading to some of the highest global incidence of plastic ingestion in central North Pacific Ocean seabirds (Robards et al. 1997).

Available evidence suggests that plastics are damaging to seabirds when they are consumed in sufficient quantities to obstruct the passage of food or cause stomach ulcers, through bioaccumulation of polychlorinated biphenyls (PCBs), toxic effects of hydrocarbons, diminished feeding stimulus, reduced fat deposition, lowered steroid hormone levels and delayed reproduction. However, acute effects of plastic ingestion are rarely observed and a search for correlations between plastic load and health indices for wild populations of seabirds has been generally unsuccessful in producing any more than indirect evidence of chronic health effects. Spear et al. (1995) is the only investigation to show a statistically significant negative correlation between plastic loads and seabird body weight.

Incidental Seabird Mortality in Non-FEP Regulated Longline Fisheries
Black-footed and Laysan albatross, and occasionally short-tailed albatross, are incidentally captured in Alaskan demersal longline fisheries. NMFS published a final rule on January 13, 2004, to revise regulations requiring seabird avoidance measures in hook-and-line fisheries of

the Bering Sea and Aleutian Islands management area and Gulf of Alaska, and in the Pacific Ocean halibut fishery in U.S. Convention waters off Alaska. This action is intended to improve the current requirements and further mitigate interactions with the short-tailed albatross and other species of seabirds in hook-and-line fisheries in and off Alaska (69 FR 1930, Jan. 13, 2004). Reducing incidental seabird catch in U.S. fisheries alone will not significantly reduce longline fisheries as a source of mortality to North Pacific albatross populations. The Hawaii longline fleet is a small component of total pelagic longline fishing effort in the North Pacific Ocean. Pelagic longline fishing effort by Asian fleets continues to expand in the North Pacific Ocean. Some of these fleets are known to set gear using "shallow" swordfish and "mixed" tuna/billfish methods (Bartram and Kaneko 2004) that have levels of interactions with seabirds 40-70 times higher than deep-set methods (Cousins et al. 2000). For example, since 1997, fishing by the Taiwan freezer longline fleet targeting albacore tuna has been increasing in waters north of the Hawaiian Islands. In 2000, effort by this fleet between 25° and 40° N and between 180° and 140° W exceeded 6 million hooks (Wang et al. 2002).

The National Research Institute of Far Seas Fisheries of Japan's Fisheries Research Agency has initiated scientific activities to develop, evaluate and improve various kinds of seabird interaction avoidance methods. Of the many measures tested in Japan, blue-dyed bait has proven to be the most effective in reducing visibility of baits and in preventing bait-taking by seabirds. Japan's National Plan of Action for Seabirds requires longline vessels operating north of 20° N in the North Pacific Ocean to adopt at least one interaction avoidance measure to avoid interactions with seabirds. Longline vessels that operate within 20 miles of Torishima Island, the major breeding island of the short-tailed albatross, are required to adopt two or more seabird interaction avoidance measures (Kiyota et al. 2003).

The U.S. is implementing a National Plan of Action to reduce the incidental catch of seabirds in U.S. fisheries. Other than New Zealand, Japan and the U.S., few national governments are engaged in policy-making, research, monitoring and enforcement to reduce incidental seabird catches by fishing fleets under their flags. Negative effects on seabird populations remain high because the majority of North Pacific longline fishing continues without the use of seabird interaction avoidance measures.

Global climate change and seabirds

The effects of climate change on the three species of albatrosses are uncertain at this time. However, climate change does have the potential to affect both breeding and non-breeding phases of albatross life history through direct and indirect effects.

The most obvious consequence of global warming is sea level rise. About 99 percent of Laysan albatrosses and 96 percent of black-footed albatrosses breed in the Northwestern Hawaii Islands (NWHI) (Naughton et al. 2007). If sea levels rise, the amount of land area for nesting will be greatly reduced as described by Baker et al. (2006). Albatrosses are known for high breeding site fidelity. Given high site fidelity and the geographic isolation of these colonies, it is unlikely that these two species of albatrosses could easily relocate their breeding sites. The populations at these colonies have been monitored for at least 50 years (Naughton et al. 2007) and will continue to be monitored so changes in the number of breeding pairs would likely be detected. The third species of management concern because it has a potential to interact with longline fisheries is the

ESA-listed short-tailed albatross, would likely be little affected by sea level rise (Naughton et al 2008). Its main breeding colony at Torishima (30° 28' 48" N Latitude and 140° 18' 22" E longitude) is relatively high in elevation (394 m/1,293 ft) and has steep topography.[14] These characteristics would logically minimize the potential for sea level rise to reduce the amount of area available for nesting. In addition to the potential for sea level rise, climate change may affect foraging success. Changes in sea level and availability of suitable nesting habitat would also be detected by the USFWS, which manages the albatross colonies. Ongoing monitoring would allow wildlife and fishery managers to respond to any new adverse impacts to seabird populations. For these reasons, regardless of which Alternative is selected, the longline fisheries are expected to continue to be sustainable and impacts on seabirds would be addressed through future management actions. For this reason, none of the Alternatives would interact with impacts of climate change on albatrosses, to result in a large and adverse cumulative effect.

It is known that short-term (1-3 years) climate changes such as El Niño-Southern Oscillation can severely affect some seabird populations. These changes in weather can be closely correlated with reduced adult survival and breeding success in some seabird species due to reduced foraging success (WGSE 2008, Schreiber 2002). However, these changes may benefit other species (WGSE 2008). Seabird populations have evolved to survive these short-term changes. However, it is hypothesized that longer term changes in weather could have much more deleterious effects on some seabird populations (WGSE 2008, Schreiber 2002).

In addition to sea level rise, climate change could affect seabirds in the following three ways. First, it could cause changes to the prey base reducing or eliminating primary prey items from the environment. This would affect both adult survival and breeding success. Second, climate change has the possibility of causing seabirds to change their breeding periods and cause temporal mis-synchronization with usual prey items during critical chick rearing periods (WGSE 2008). Finally, climate change may cause oligotrophic tropical and sub-tropical water to expand reducing primary productivity that is the base of oceanic food webs (Polovina et al. 2008). Expansion of these poorly productive areas potentially higher energetic costs for seabirds as they would need to increase foraging effort in nutrient poor waters or fly further distances to more productive waters.

The trophic effects of climate change on North Pacific albatrosses are unclear at this point. The three species breed in tropical and subtropical areas, but they travel great distances to temperate and cold temperate waters to forage. Albatross distributions tend to be close to nesting colonies during the breeding seasons and closer to subtropical-temperate oceanic transition zones and continental shelves during non-breeding periods (Naughton et al. 2007; Naughton et al. 2008). It is possible that in the future, climate change could induce food web regime changes affecting albatrosses. However, the nature of these effects is unclear. Currently, there have been no wide spread population declines seen for any of the three North Pacific albatross species. One black-footed albatross colony at Laysan Island has seen slight declines, but there is no evidence that it is tied to climate change (Naughton et al. 2007; Naughton et al. 2008). The ESA-listed short-tailed albatross has seen a steady increase in its numbers since 1947 (Naughton et al. 2008).

[14] http://www.volcano.si.edu/world/volcano.cfm?vnum=0804-09, accessed on 7/26/08.

In summary, it is not possible to predict with specificity the impact of future climate change on seabirds. However, these effects would be considered in future management of the shallow-set longline fishery. Research will continue to track the status of seabird colonies, populations, nesting success, migration and foraging habits, and on the impacts of fisheries on seabirds. Information from the Hawaii shallow-set longline fishery will continue to be collected and analyzed through observer reports, and fishery participant's logbook accounts of interactions with seabirds. If there are changes to the status of seabirds or the fishery interactions with seabirds, the Council and NMFS would work to implement new fishery regulations that will help ensure the fishery is sustainable. In the case of the listed short-tailed albatross, if there were to be changes to the status of this species or to the fishery's interaction with it, NMFS would reinitiate consultation to ensure the fishery considers the impacts to this listed species. Therefore, the potential impacts of climate change on seabirds has been considered and will continue to be part of the environment affecting seabirds and the longline fishery that must be addressed through adaptive management regardless of which Alternative is implemented.

4.2.2.4 Cumulative Effects

As previously described, the Council and NMFS have taken significant steps to reduce sea turtle and seabird interactions within several FEP managed fisheries, and ongoing work is being conducted to further reduce interactions. FEP managed fisheries are being held as the benchmark (WCPFC Science Committee 2009 Report) for successful sea turtle, and seabird interaction reductions, and the successes of the Council and NMFS' work are being transferred to other fleets in the region. In addition, NMFS published a final rule for the False Killer Whale Take Reduction Plan, as required under the MMPA, to reduce false killer whale interactions in the Hawaii deep-set and shallow-set longline fisheries (77 FR 71260, November 29, 2012). Exogenous factors continue to be the biggest threat to protected species but implementing the preferred Alternatives is not expected to increase interactions with protected species beyond authorized levels. Even though U.S. and Territory longline fisheries interact with protected species on a rare basis, it is believed that U.S. vessels have a significantly lower negative impact on protected species when compared with less regulated foreign vessels due to the use of proven measures to avoid and reduce fisheries interactions with protected species.

Regardless of the Alternatives selected, including the no-action Alternatives, all U.S. longline vessels will continue to be subject to strict measures to avoid and reduce protected species interactions and to reduce the severity of interactions when they do occur. Impacts to protected species under all of the action Alternatives will be similar. The levels of interactions that are authorized in each fishery do consider the estimated impacts on the same species by all fisheries where the domestic fishery operates, as well as cumulative effects. Cumulative impacts of the U.S. fleets have been considered and authorized in the BiOps, and determinations of impacts to MMPA-protected species to a lesser extent, that apply to the domestic longline and other pelagic fisheries in the western Pacific region.

4.2.3 Cumulative Effects to Fishery Participants and Communities

4.2.3.1 Past, Present, and Reasonably Foreseeable Future Actions

The 1996 reauthorization of the MSA required that the Council identify fishing communities under its jurisdiction. A fishing community, as defined by the MSA, means "a community which is substantially dependent or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes vessel owners, operators, and crew and Unites States fish processors that are based in such a community" (16 U.S.C. § 1802). The Council has identified American Samoa, CNMI, Guam, and each of the inhabited Hawaiian Islands as fishing communities affected by the proposed action.

In accordance with the MSA, the Council and NMFS will continue to assess the impact of management actions on fishery participants and fishing communities, and where possible, minimize negative effects while developing appropriate measures for the conservation and management of fishery resources.

4.2.3.2 External Factors

There are a number of wide-ranging factors (that change over time) that have the potential to affect fishing participants as well as fishing communities. Current factors may include, but are not limited to, high fuel costs, high costs of other equipment and supplies, increased seafood imports, and restricted access to traditional fishing grounds. High fuel and materials/supply costs affect fishing participants by increasing the costs to go fishing. The effect is that fishery participants reduce the number of fishing trips, switch to less fuel-intensive fisheries, or simply do not go fishing at all. Some longline fishing in the western Pacific has shown contraction in recent years, with an example being longline fishing on small vessels in the American Samoa longline fishery.

The amount of imported seafood is also increasing, and where the U.S. now imports nearly 85 percent of consumed seafood.[15] Increased seafood imports are significant as the level of imports relates to market competition, where a glut of foreign fish products can flood the market and lower ex-vessel prices for U.S. fishermen. Once market channels are lost to imported seafood products it may also be hard for fishery participants to regain those channels. As described previously, the Territories face significant barriers to developing responsible longline fisheries and include lack of infrastructure, transportation, and access to markets.

In addition, a reliance on foreign imports by the U.S. Territories is believed to impact local food security. At a broader level, a recent study by the Great Britain's Royal Institute of International Affairs (Ambler-Edwards et al. 2009) has identified seven fundamental issues, which affect food production and food security. These are as follows:

1. Rapidly rising world population (population growth rates in the western Pacific region range from 1-7%)
2. Nutrition transition, i.e., a shift from traditional staples to processed foods high in sugars, oils, and fats
3. The rising costs of energy (oil, gas, electricity)
4. Limited availability of agricultural land (especially critical on small islands)
5. Increasing demands for water for agricultural and food production

[15] http://www.fishwatch.gov/farmed_seafood/index.htm

6. Climate change
7. Labor and urban drift

All of these seven fundamentals are especially critical to the small island archipelagos that comprise the Western Pacific Region.

4.2.3.3 Cumulative Effects

Regardless of which Alternative is selected, Western Pacific pelagic fisheries will continue to be managed sustainably. None of the Alternatives is expected to result in a large change to the fisheries in terms of area fished, effort, harvests, or protected species interactions.

Alternative 2 establishes a mechanism by the Council may establish domestic regulations in the event of a Conservation and Management Measure or Resolution from Pacific tuna RFMOs. Alternative 2.a.ii establishes a catch limit of 458 mt for the US catch of striped marlin from the WCPO, i.e. 80% of the highest catch of 573 mt caught between 2000 and 2003. As as an accountability measures, Alternative 2.b.ii would close the Hawaii longline fishery when 95% or 435 mt of this catch limit is reached, while troll and handline vessels would continue to be able to land striped marlin. Recent total catches of striped marlin have been ,lower than 435 mt, and thus the impacts of the measure may be expected to be minimal on the longline fishery, although the potential for a period of non-retention of striped marlin in a given year cannot be entirely ruled out.

The preferred alternative does place a limit on striped marlin catches from the longline fishery and may have the potential to limit supply to domestic and mainland US markets should 95% of the catch limit be reached. Non-retention would also increase bycatch since striped marlin would have to be discarded once the limit was reached. However, the limit is not an outright ban and may not be reached in a given year. Moreover, the small-scale troll and handline fisheries catching striped marlin would remain unaffected by the catch limit and thus may potentially benefit by increased prices for striped marlin if longline supply is reduced.

4.3 Environmental Justice

On February 11, 1994, President William Clinton issued Executive Order 12898 (E.O. 12898), "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." E.O. 12898 provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." E.O. 12898 also provides for agencies to collect, maintain, and analyze information on patterns of subsistence consumption of fish, vegetation, or wildlife. That agency action may also affect subsistence patterns of consumption and indicate the potential for disproportionately high and adverse human health or environmental effects on low-income populations, and minority populations. A memorandum by President Clinton, which accompanied E.O. 12898, made it clear that environmental justice should be considered when conducting NEPA analyses by stating the following:

> "Each Federal agency should analyze the environmental effects, including human health, economic, and social effects of Federal actions, including effects on minority populations, low-income populations, and Indian tribes, when such analysis is required by NEPA."[16]

In addition to Hawaii's indigenous and minority population, the American Samoa, CNMI, and Guam-based pelagic fisheries have participants representing a variety of ethnicities that would fall under the minority provisions of the Executive Order. None of the Alternatives are expected to have large impacts to the environment that would result in a disproportionately large and adverse effect on minority or low-income populations. Moreover, the preferred alternative allows small scale non-longline fisheries to continue to catch striped marlin in the event of non-retention after longliners have reached 95% of the catch limit. The loss of income for the longline should not be substantial, with striped marlin comprising 2-3% of the landed catches (WPRFMC 2013 and unpublished data), and the measure is not a total non-retention ban but a catch limit.

Finally, the proposed management action would not affect catches of striped marlin in the US Territories. CMM 2010-01 states that, "nothing in this measure shall prejudice the legitimate rights and obligations of Small Island Developing State Members and participating territories in the Convention Area seeking to develop their own domestic fisheries."

Chapter 5: Consistency with the Magnuson-Stevens Act and Other Laws

5.1 Consistency with National Standards

Section 301 of the Magnuson-Stevens Act requires that regulations implementing any FEP or FEP amendment be consistent with the 10 national standards (NS) listed below.

[16] Memorandum from the President to the Heads of Departments and Agencies. Comprehensive Presidential Documents No. 279 (February 11, 1994).

National Standard 1 *states that 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 proposed action is consistent with NS1 as it addresses the relative impact of US (Hawaii) fishing on WCNP striped marlin by focusing on the principal domestic fishery catching striped marlin, the Hawaii longline fishery by imposing a limit of 95% of the WCPFC catch limit. While the WCPFC catch limit applies to all fisheries it is anticipated that the troll fishery is unlikely to exceed 5% of the WCPFC catch limit. Moreover, the measure safeguards the striped marlin catches by the charter vessels fishery, which catches about 43% of the troll caught striped marlin catch.

National Standard 2 *states that conservation and management measures shall be based upon the best scientific information available.*

The proposed action is consistent with NS2 as the framework measures is based on the stock assessment for WCNP striped marlin stock assessment conducted by the ISC, and on data collected through logbooks for the Hawaii longline fishery and logsheets for the troll and charter vessels fisheries.

National Standard 3 *states that, 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 proposed action is consistent with NS3 as the domestic action by the Council is part of a greater effort by the WCPFC to manage and rebuild the overfished status of WCNP striped marlin.

National Standard 4 *states that 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 proposed action would be consistent with NS4 as it does not discriminate between residents of different States, either in the Hawaii longline fishery or the troll fishery.

National Standard 5 *states that 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 proposed action is consistent with NS5 as its purpose is to aid in the rebuilding and recovery of WCNP striped marlin, and not economic allocation.

National Standard 6 *states that conservation and management action shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources and catches.*

The proposed action is consistent with NS6 as it includes a framework process by which the Council can adapt any further WCPFC measures for striped marlin, beyond the implementation of a striped marlin catch limit.

National Standard 7 *states that conservation and management measures shall, where practicable, minimize costs, and avoid unnecessary duplication.*

The proposed action is consistent with NS7 as it avoids any duplication of management measures and acknowledges the differences between the Hawaii longline fishery and the troll fishry in terms of striped marlin catches and impacts on the stock.

National Standard 8 *states that 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 proposed action is consistent with NS8 as it recognizes the need to safeguard the charter vessel element of the troll fishery, and that the impacts to the longline fishery would likely be minimal if the catch limit is reached.

National Standard 9 *states that 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 proposed action is consistent with NS 9 since it does not involve any major changes to fishing by longline or troll that would increase bycatch. Some increase in bycatch may occur if the Hawaii longline fishery reached its 435 mt limit, although evidence to date suggests that even total annual catches of all striped marlin have continued to fall below this level.

National Standard 10 *states that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.*

The proposed action is consistent with NS10 as it involves no changes in fishing or fishermen behavior that would lead to compromising safety of human life at seas

5.2 National Environmental Policy Act

The FEP amendment covering proposed changes for the management of the western Pacific pelagic fisheries, which are managed under the Council's Pelagics FEP, includes a draft EA that has been written and organized in a way that meets the requirements of NEPA. Once finalized, NMFS will use this document to select an Alternative to implement and to determine whether the proposed action as described in section 1.7 would have the potential to result in significant environmental impacts that would then require the preparation of an environmental impact statement.

Purpose and Need for Action
The purpose and need for this action are in section

Alternatives Considered
The Alternatives considered for this action are described in detail in Chapter 2, including Alternatives initially considered but rejected from detailed consideration.

Affected Environment
The affected environment for this action, including a description of the fisheries, and an overview of the current management is provided as background in Chapter 3.

Impacts of the Alternatives

The impacts of the alternatives and environmental consequences is provided in Chapter 4.

Coordination with other agencies
Staff from the Council and NMFS developed this EA. The draft was coordinated with various federal and local government agencies that are represented on the Western Pacific Fishery Management Council. Specifically, agencies that participated in the deliberations and development of the proposed management measures include:

- Hawaii Department of Land and Natural Resources, Division of Aquatic Resources
- Hawaii Coastal Zone Management Program
- National Oceanic and Atmospheric Administration
- U.S. Coast Guard

Coordination with the Public
Section 1.2 describes the public review process for the proposed action, including how to comment and obtain copies of relevant documents.

5.3 Executive Order 12866

To meet the requirements of Executive Order 12866 (E.O. 12866), of September 30, 1993 (Regulatory Planning and Review), 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.

In accordance with E.O. 12866, the following is set forth: (1) The action Alternatives are 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) The action Alternatives are not likely to create any serious inconsistencies or otherwise interfere with any actions taken or planned by another agency; (3) The action Alternatives are 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) The action Alternatives is not likely to raise novel or policy issues arising out of legal mandates, or the principles set forth in the Executive Order. Based on these findings, the action Alternatives are determined to not be significant under E.O. 12866. An RIR is in Appendix A (to be completed).

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. NMFS will request public comment on Amendment 7 and draft EA for 60 days, and on the proposed rule and proposed specifications for 45 days. 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 FEP amendment will have a request for public comments. If the Secretary of Commerce approves the proposed action, NMFS will announce a final rule in the *Federal Register* and will have a 30-day delay before the final rule becomes effective.

5.5 Coastal Zone Management Act

The principal objective of the Coastal Zone Management Act (CZMA) is to encourage and assist states in developing coastal management programs, to coordinate state activities, and to safeguard regional and national interests in the coastal zone. Section307(c) of the CZMA requires that any Federal activity affecting the land or water uses or natural resources of a state's coastal zone be consistent with that state's approved coastal management program, to the maximum extent practicable.

NMFS initially finds that, as described in the impact review above, none of the action Alternatives would substantially change Hawaii longline fishing activity and would not have large changes to the land or water uses or natural resources of the coastal zone of Hawaii. Regardless of which Alternative is selected, our analysis found that Hawaii's fisheries would continue to be sustainably managed. NMFS submitted a copy of this document to the appropriate state government agency in Hawaii for review and concurrence with the finding that all of the Alternatives and sub-Alternatives, including the preferred Alternatives are consistent, to the maximum extent practicable, with the respective CZMA programs and that the proposed regulations would not result in changes to the way western Hawaii's pelagic fisheries affect the land, water uses, or natural resources of the coastal zone or to residents' uses of marine resources in the coastal zone of these areas.

5.6 Information Quality Act

Pursuant to section 515 of Public Law 106-554 (IQA), NMFS will conduct a pre-dissemination review of this Amendment and the combined proposed rule and proposed specifications, and will make the pre-dissemination review and documentation form available in their office.

5.7 Paperwork Reduction Act

To be completed

5.8 Regulatory Flexibility Act

To be completed

Chapter 6: Draft Proposed Regulations

Draft Proposed Regulations – Framework for implementing US Non-Territorial WCPFC catch or effort limits

PART 665--FISHERIES IN THE WESTERN PACIFIC

3. The authority citation for part 665 continues to read as follows:

Authority: 16 U.S.C. 1801 et seq.

4. In § 665.802, add paragraphs (p) to read as follows:

§ 665.802 Prohibitions.

* * * * *

(p) Use a fishing vessel permitted to retain on board, transship, or land pelagic MUS captured by longline gear in the WCPFC Convention Area, as defined in § 300.211 of this title, in violation of any restriction announced or promulgated in accordance with 50 CFR 665.820.

* * * * *

6. In 50 CFR part 665, add new section § 665.820 to read as follows:

§ 665.820 Non-Territorial catch and fishing effort limits.

(a) General.

(1) Notwithstanding § 665.4 of this part, if the WCPFC agrees to a catch or fishing effort limit for a stock of western Pacific pelagic MUS that is applicable to the U.S., the Regional Administrator may specify an annual or multi-year catch or fishing effort limit for a U.S. fishery authorized under this subpart, as recommended by the Council, not to exceed the WCPFC adopted limit.

(2) If the WCPFC does not agree to a catch or fishing effort limit for a stock of western Pacific pelagic MUS applicable to a fishery authorized under this subpart, the Council may recommend that the Regional Administrator specify such a limit that is consistent with the Pelagics FEP, other provisions of the Magnuson-Stevens Act, and other applicable laws.

(3) The Council shall review any existing or proposed catch or fishing effort limit specification and portion available for allocation at least annually to ensure consistency with the Pelagics FEP, Magnuson-Stevens Act, WCPFC decisions, and other applicable laws. At least annually, the Council shall recommend to the Regional Administrator whether such catch or fishing effort limit specification should be approved for the next fishing year.

(4) The Regional Administrator shall review any Council recommendation pursuant to paragraph (a) of this subpart and, if determined to be consistent with the Pelagics FEP, Magnuson-Stevens Act, WCPFC decisions, and other applicable laws, shall approve such recommendation. If disapproved, the Regional Administrator will provide the Council with a written explanation of the reasons for disapproval.

(b) Procedures and timing.

(1) After receiving a Council recommendation for a catch or fishing effort limit specification, the Regional Administrator will evaluate the recommendation for consistency with the Pelagics FEP, other provisions of the Magnuson-Stevens Act, and other applicable laws.

(2) The Regional Administrator will publish in the Federal Register a notice and request for public comment of the proposed catch or fishing effort limit specification.

(3) The Regional Administrator will publish in the Federal Register, and will use other reasonable methods to notify permit holders, a notice of the final catch or fishing effort limit specification.

(c) North Central Pacific Striped Marlin Catch Limit

(1) There is an annual catch limit 458 metric tons of north pacific central striped marlin applicable to non-territorial US fisheries operating in the WCPFC Convention Area.

(2) As an accountability to ensure that the limit identified in (c)(1) is not exceeded, there is a total annual catch limit of 435 metric tons applicable to vessels fishing with a Hawaii limited entry longline permit within the WCP-Convention Area.

(3) If the limit prescribed in paragraph (2) is exceeded in a calendar year, vessels permitted with a Hawaii limited entry longline permit are prohibited from retaining on board, transshipping, or landing striped marlin captured by longline gear in the WCPFC Convention Area.

References

Ambler-Edwards, S., K. Bailey, A. Kiff, T. Lang, R. Lee, T. Marsden, D. Simmons, and H. Tibbs. 2009. Food futures: Rethinking UK strategy. Royal Institute of International Affairs. Chatham House: London.
Balazs (1985)

Bigelow, K. 2011. Size, condition and disposition of striped marlin caught in Hawaii-based longline fisheries. NMFS PIFSC Internal Report IR-11-025, Honolulu, Hawaii, 21 pp.

Bigelow K. 2012. Economic impact on Hawaii-based longline fisheries of establishing size limit categories for striped and blue marlin. NMFS PIFSC Internal Report IR-12-007, Honolulu, Hawaii, 20 pp.

Bigelow, K & B. Mourato. 2010. Evaluation of longline mitigation to reduce catches of North Pacific striped marlin in the Hawaii-based tuna fishery. Western & Central Pacific Fishery Commission, Scientific Committee Sixth Regular Session, 10-19 August, 2010, Tonga, 24 pp.

Balazs, G.H. 1995. Innovative techniques to facilitate field studies of the green turtle, Chelonia mydas. In: J.I. Richardson and T.H. Richardson (Compilers). Proceedings of the Twelfth Annual Workshop on Sea Turtle Biology and Conservation, p. 158-161. U.S. Dept. of Commerce, NOAA Technical Memorandum NOAA-TM-NMFS-SEFSC-361, 274

BirdLife International. 2004. Threatened Birds of the World 2004. CD-ROM. Cambridge, UK: BirdLife International.

Bjorndal, K.A., A.B. Bolten, and C.J. Lagueux. 1994. Ingestion of marine debris by juvenile sea turtles in coastal Florida habitats. Marine Pollution Bulletin. 28:154-158.
Campbell 2003,

Carr, A. 1987. Impact of nondegradable marine debris on the ecology and survival outlook of sea turtles. Marine Pollution Bulletin. 18(6):352-356.

Carretta, J.V. ,K.A. Forney, E. Oleson, K. Martien, M.M. Muto, M.S. Lowry, J. Barlow, J. Baker, B. Hanson, D. Lynch, L. Carswell, R.L. Brownell Jr. J. Robbins, D.K. Mattila, K. Ralls, and M. C. Hill. U.S. Pacific marine mammal stock assessments: 2011. U. S. Department of Commerce National Oceanic and Atmospheric Administration, National Marine Fisheries Service Southwest Fisheries Science Center, NOAA-TM-NMFS-SWFSC-488, 360 pp

Carretta, J.V., K.A. Forney, E.O. Oleson, K. Martien, M.M. Muto, M.S. Lowry, J. Barlow, J. Baker, B. Hanson, D. Lynch, L. Carswell, R.L. Brownell Jr., J. Robbins, D.K. Matilla, K. Ralls, and M.C. Hill. 2012. U.S. Pacific Marine Mammal Stock Assessments: 2011. U.S. Dept. Commerce, NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-488. 356 p.

Ceron, J.A.J., Rocha, A.R.B., and H.G. Ruiz. 2000. Contamination by phthalate ester plasticizers in two marine turtle species. In: Abreu-Grobois, F. A., Briseno-Duenas, R., Marquez, R., Sarti, L. (eds.). Proceedings of the 18th International Sea Turtle Symposium. NOAA Tech. Memo. NMFS-SEFSC-436. p.118-119.

Chan, H.L., and M. Pan. 2012. Spillover effects of environmental regulation for sea turtle protection: the case of the Hawaii shallow-set longline fishery. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-PIFSC-30, 38 p. + Appendices.

Davies, N., S. Hoyle, S. Harley, A. Langley, P. Kleiber, and J. Hampton. 2011. Stock assessment of bigeye tuna in the Western and Central Pacific Ocean. Western and Central Pacific Commission Science Committee, Pohnpei, Federated States of Micronesia, August 9-17, 2011, WCPFC-SC7-2011/SA- WP-02, 133 pp.

Davies, N, S. Harley, J. Hampton and S. McKechnie. 2014. Stock Assessment Of Yellowfin Tuna In The Western And Central Pacific Ocean. WCPFC -SC10-2014/SA-WP-04

Finkelstein, M., S.K. Bradford, D.A. Croll, B. Tershy, W.M. Jarman, S. Rodriguez-Pastor, D.J. Anderson, P.R. Sievert, and D.R. Smith. 2006. Albatross species demonstrate regional differences in North Pacific marine contamination. Ecological Applications, 16(2):678–686.

Frazier, J.P. 2003. Prehistoric and Ancient Historic Interactions between Humans and Marine Turtles. pp: 1-38. In: P.L. Lutz, J.A. Musick, and J. Wyneken (Eds.), The Biology of Sea Turtles. Vol. II. CRC Press, Boca Raton, FL.

Gilman, E., D.R. Kobayashi, T. Swenarton, N. Brothers, P. Dalzell, and I. Kinan-Kelly. 2007. Reducing sea turtle interactions in the Hawaii-based longline swordfish fishery. Biological Conservation, 139(1-2): 19-28.

Gilman, E., D. Kobayashi, and M. Chaloupka. 2008. Reducing seabird bycatch in the Hawaii longline tuna fishery. Endangered Species Research, 5(2-3):309-323.
Gilman et al. 2007

Gjertsen, H. 2008. The Economics of Sea Turtle Conservation in the Pacific. Report submitted to the Southwest Fisheries Science Center, La Jolla, CA, 252 p

Harley, S., N. Davies, J. Hampton, S. McKechnie. 2014. Stock Assessment of Bigeye Tuna in the Western and Central Pacific Ocean. WCPFC-SC10-2014/SA-WP-01.

Hildebrand, J.A. 2005. Impacts of Anthropogenic Sound. In: J.E. Reynolds et al. (eds.), Marine Mammal Research: Conservation beyond Crisis. The Johns Hopkins University Press, Baltimore, MD.

ISC. 2012. Stock Assessment of Striped Marlin in the Western and Central North Pacific Ocean in 2011. Report Of The Billfish Working Group Stock Assessment Workshop International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean.

ISC. 2013. Stock Assessment of Blue Marlin in The Pacific Ocean In 2013. Report Of The Billfish Working Group International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean.

ISC. 2014a. Stock Assessment of Albacore Tuna in the North Pacific Ocean in 2014 WCPFC SC10-2014/ SA-WP-12

ISC. 2014b. Stock Assessment of Bluefin Tuna in the Pacific Ocean in 2014 WCPFC-SC10-2014/ SA-WP-11

ISC. 2014c. North Pacific Swordfish (*Xiphius gladius*) Stock Assessment in 2014 WCPFC-SC10-2014/ SA-WP-13

ISC. 2014d. Stock Assessment and Future Projections of Blue Shark in the North Pacific Ocean WCPFC-SC10-2014/ SA-WP-14 Rev 1

IUCN 2004. Red List of Threatened Species : A Global Assessment. International Union for Conseravtion of Nature and Natural Resources, Gland Switzerland and Cambridge UK, 191 pp.

Kiyota, M., H. Nakano, H. Matsunaga, and H. Minami 2003. Research activities and fishery management for the solution of incidental catch of sharks, seabirds and sea turtles in Japanese tuna longline fishing [BBRG-10]. Noumea, New Caledonia: SPC, Secretariat of the Pacific Community. Standing Committee on Tuna and Billfish, Mooloolaba, Queensland, Australia, 9-16 July 2003, 16th. 7 p.

Lutcavage, M.E., P. Plotkin, B. Witherington, and P.L. Lutz. 1997. Human Impacts on Sea Turtle Survival. In: P.L. Lutz, and J.A. Musick (eds.), The Biology of Sea Turtles, Vol. 1. (pp. 387–409). CRC Press, Boca Raton, FL

McCoy, M.A. 1997. The traditional and ceremonial use of the green sea turtle (Chelonia mydas) in the Northern Mariana Islands with recommendations for its use in cultural events and education. A report prepared for the Western Pacific Regional Fishery Management Council & University of Hawaii, Sea Grant College Program. 82pp.

Lee H-H, K.R. Piner, R. Humphreys & J. Brodziak. 2012. Stock assessment of striped marlin in the western and central North Pacific Ocean. Billfish Working Group, International Committee for Tuna and Tuna-like Species in the North Pacific Ocean. Pacific Islands Fisheries Science Center, PIFSC Internal Report, IR-12-035, 116 p.

Lehodey, P., M. Bertignac, J. Hampton, A. Lewis, and J. Picaut. 1997. El Niño Southern

Oscillation and tuna in the western Pacific. Nature, 389: 715-718.

McCracken, M. 2011a. Assessment of incidental interactions with marine mammals in the Hawaii longline deep and shallow set fisheries from 2006 through 2010. National Marine Fisheries Service Pacific Islands Fisheries Science Center, Working Paper Wp-11-012, 30 pp.
McDonald et al. 2006

McCracken, M.L. 2011b. Estimation of Incidental Interactions with Sea Turtles and Seabirds in the 2010 Hawaii Longline Deep Set Fishery. Pacific Islands Fisheries Science Center, PIFSC Internal Report IR-11-005, Issued 19 April 2011.

Mitchell, J.C. and M.W. Klemens. 2000. Chapter 1: Primary and secondary effects of habitat alteration. In: M.W. Klemens (ed.). Turtle Conservation. Smithsonian Institution Press.
Mosier and Witherington 2002).

Musick, J.A., M.J. Rybitski, and R.C. Hale. 1995. Distribution of organochlorine pollutants in Atlantic sea turtles. Copeia, 2:379-390.

Naughton, M.B, M.D. Romano, and T.S. Zimmerman. 2007. A Conservation Action Plan for Black-footed Albatross (Phoebastria nigripes) and Laysan Albatross (P. immutabilis), Ver. 1.0. 40 pp. Available at:
http://www.fws.gov/pacific/migratorybirds/PDF/Albatross%20Action%20Plan%20ver.1.0.pdf

Naughton, M., K. Morgan, and K. Rivera. 2008. Species Information – Short-tailed Albatross (Phoebastria albatrus). Unpublished report.

Nietschmann, B. 1973. Between Land and Water: The Subsistence Ecology of the Miskito Indians, Eastern Nicaragua. Seminar Press, New York. 279pp.

Nietschmann, B. 1979. Caribbean Edge: The Coming of Modern Times to Isolated People and Wildlife. Bobbs-Merrill, Indianapolis, IN. 280pp.
NMFS 2010b

NMFS and USFWS (National Marine Fisheries Service and U.S. Fish and Wildlife Service). 1998a. Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (Dermochelys coriacea), Prepared by the Pacific Sea Turtle Recovery Team.

NMFS and USFWS. 1998b. Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle (Caretta caretta). Prepared by the Pacific Sea Turtle Recovery Team.
Polovina et al. 1994

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 Oceanogrgraphy, 3:15–21.

Polovina, J.J., E.A. Howell, and M. Abecassis. 2008. Ocean's least productive waters are expanding. Geophysical Research Letters, 35. L03618, doi:10.1029/2007GL031745.

Popper, A.N. 2003. Effects of anthropogenic sound on fishes. Fisheries, 28(10):24-31.

Rausser, G.C., S.F. Hamilton, M. Kovach, and R. Stifter. 2009. Unintended consequences: the spillover effects of common property regulations. Marine Policy, 33:24-39.

Rice, J. and S. Harley. 2012. Stock Assessment of Oceanic White-tip Sharks in the Western and Central Pacific Ocean. WCPFC-SC8-2012/ SA-WP-06 Rev 1.

Rice, J. and S. Harley. 2013. Updated Stock Assessment of Silky Sharks in the Western and Central Pacific Ocean WCPFC-SC9-2013/ SA-WP-03.

Rice, J. S. Harley, N. Davies and J. Hampton. 2014a. Stock Assessment of Skipjack Tuna in the Western And Central Pacific Ocean WCPFC-SC10-2014/SA-WP-05 Rev1.

Rice, J., S. Harley, M. Kai. 2014. Stock assessment of Blue Shark in the North Pacific Ocean using Stock Synthesis. WCPFC-SC10-2014/ SA-WP-08.

Sakai, H., H. Ichihashi, H. Suganuma, and R. Tatsudawa. 1995. Heavy metal monitoring in sea turtles using eggs. Marine Pollution Bulletin. 30(5): 347-353.

Sakai, H., K. Saeki, K., Ichihashi, H., Suganuma, H., Tanabe, S., and R. Tatsukawa. 2000. Species-specific distribution of heavy metals in tissues and organs of loggerhead turtle and green turtle from Japanese coastal waters. Marine Pollution Bulletin; 40(8): 701-709.

Sarà, G., J.M. Dean, D. D'Amato, G. Buscaino, A. Oliveri, S. Genovese, S. Ferro, G. Buffa, M. Lo Martire, and S. Mazzola. 2007. Effect of boat noise on the behaviour of bluefin tuna Thunnus thynnus in the Mediterranean Sea. Marine Ecology Progress Series, 331: 243-253.
Schroeder et al. 2000,

Spotila J., A. Dunham, A. Leslie, A.Steyermark, P. Plotkin, and F. Paladino. 1996. Worldwide population decline of *Dermochelys coriacea*: are leatherback turtles going extinct? Chel. Cons. Biol., 2(2): 209-222.

USFWS (U.S. Fish and Wildlife Service). 2000. Endangered Species Act Section 7 Biological Opinion on the Effects of the Hawaii-Based Domestic Longline Fishery on the Short-Tailed Albatross (*Phoebastria albatrus*).

USFWS. 2012. Final Environmental Assessment – Issuance of an MBTA Permit to the National Marine Fisheries Service Authoring Take of Seabirds in the Hawaii-based Shallow-set Longline Fishery. U.S Fish and Wildlife Service. Pacific Region Portland, OR. July 27, 2012. p. 57.

Veran, S., O. Gimenez, E. Flint, W.L. Kendall, P.F. Doherty Jr., and J. Lebreton. 2007. Quantifying the impact of longline fisheries on adult survival in the black-footed albatross. J. Applied Ecology, 44(5):942–952.

Williams, P., and P. Terawasi. 2012. Overview of tuna fisheries in the western and central Pacific Ocean, including economic conditions – 2011. Western and Central Pacific Commission Science Committee, Busan, August 7-15, 2012, WCPFC-SC8-2012/GN WP-1, 49 pp.

Williams, P., and P. Terawasi. 2013. Overview of tuna fisheries in the western and central Pacific Ocean, including economic conditions – 2012. Western and Central Pacific Commission Science Committee, Busan, August 6-14, 2013. WCPFC-SC9-2013/GN WP-1, 56 pp.
Witherington 2002.

Woodrom-Luna, R. 2003. The merging of archaeological evidence and marine turtle ecology: A case study approach to the importance of including archaeological data in marine science. SPC Traditional Marine Resource Management and Knowledge Information Bulletin. No. 15. July 2003, pp: 26-30.

Woodrom-Luna, R. 2003. Traditional food prohibitions (tapu) on marine turtles among Pacific Islanders. SPC Traditional Marine Resource Management and Knowledge Information Bulletin. No. 15. July 2003, pp: 31-33.

Work, T.M. and G.H. Balazs. 1998. Causes of green turtle morbidity and mortality in Hawaii. In: S.P. Epperly, and J. Braun (eds.), Proceedings of the 17th Annual Sea Turtle Symposium. NOAA Tech Memo. NMFS-SEFSC-415, pp: 291-292.

WPRFMC. 2009. Pelagic fisheries of the Western Pacific Region 2007 Annual Report. Honolulu, HI, 283pp.

WPRFMC. 2011. Amendment 5 to the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region. Measures to Reduce Interactions between the American Samoa Longline Fishery and Green Sea Turtles. Western Pacific Regional Fishery Management Council Honolulu, HI, 140 pp.

WPRFMC. 2012. Pelagic fisheries of the Western Pacific Region 2010 Annual Report. Honolulu, HI, 337 pp.