Amendment 10 to the Fishery Ecosystem Plan for the Pelagic Fisheries of the Western Pacific Region

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Managing Loggerhead and Leatherback Sea Turtle Interactions in the Hawaii Shallow-set Longline Fishery

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Including a Final Environmental Assessment and Regulatory Impact Review
(RIN 0648-BJ27)

June 25, 2020

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Abstract

Since 2004, the Hawaii shallow-set longline fishery (shallow-set fishery), managed under the Western Pacific Regional Fishery Management Council's Pelagic Fishery Ecosystem Plan (Pelagics FEP), has reduced loggerhead and leatherback turtle interactions by approximately 90% through the implementation of improved technologies (large circle hooks and mackerel-type bait). Regulatory Amendment 3 to the Pelagic Fishery Management Plan (FMP) that established the requirements for these gear measures also established annual interaction limits for loggerhead and leatherback turtles (referred to as "hard caps"), which, if reached, would trigger the closure of the fishery for the remainder of the calendar year. The existing annual fleet-wide hard caps, first implemented in 2004, prevent loggerhead and leatherback takes above a specified limit, but do not provide early response to higher interaction rates that may indicate a potential for higher impacts to sea turtle populations or a fishery closure early in the calendar year.

The Council proposes to amend the Pelagics FEP to modify sea turtle mitigation measures for effectively managing impacts to leatherback and loggerhead sea turtles for the shallow-set fishery, consistent with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act and the Reasonable and Prudent Measures (RPMs) and Terms and Conditions (T&Cs) 1a and 1b of the 2019 Biological Opinion (2019 BiOp) pursuant to the Endangered

Species Act (ESA), while maintaining fishing opportunities during peak swordfish season (October through March). This action is needed to provide managers and fishery participants with the necessary tools to respond to and mitigate fluctuations in loggerhead and leatherback turtle interactions, to ensure a continued supply of fresh swordfish to U.S. markets, consistent with the conservation needs of these sea turtles. The Council is also proposing this amendment to ensure that the shallow-set fishery operates in compliance with the RPMs and Terms and Conditions of the 2019 BiOp. Specifically, the amendment proposes the following:

1. Set an annual fleet-wide hard cap limit on the number of leatherback turtle interactions at 16, consistent with RPMs and Terms and Conditions 1a under the 2019 BiOp. A limit of 16 represents an approximately 25% reduction from the Incidental Take Statement (ITS) of 21. Once this interaction limit is reached, the fishery closes for the remainder of the calendar year.

2. Do not set an annual fleet-wide hard cap limit on the number of North Pacific loggerhead turtle interactions. If the fishery exceeds the ITS in the current valid BiOp, Section 7 consultation would be reinitiated as required by ESA. The Council retains the authority for setting an annual fleet-wide hard cap limit on the number of North Pacific loggerhead turtle interactions under the Pelagic FEP, if necessary.

3. Establish individual trip interaction limits for loggerhead and leatherback turtles for the Hawaii longline limited entry permit vessels that declare their trips as a shallow-set trip, consistent with RPMs and Terms and Conditions 1b under the 2019 BiOp as follows:
    i. Set limits of 5 loggerhead turtles and 2 leatherback turtles per trip.
    ii. Upon determining that a vessel has reached either the loggerhead or leatherback turtle trip interaction limit based on data from NMFS observers, shallow-set vessels will be required to return to port without making additional sets.
    iii. The vessel will be prohibited from engaging in shallow-set longline fishing for 5 days after returning to port.
    iv. Vessels that reach the trip limit for either leatherback or loggerhead sea turtles twice in a calendar year shall be prohibited from shallow-set longline fishing for the remainder of the calendar year. In the following calendar year, such vessels shall have an annual vessel limit equivalent to a single trip limit for that species in which two trip limits were reached.
    v. The Council may make recommendations to NMFS to revise the individual trip limits upon periodic review of the effectiveness of the limits and consistent with the RPM of the current valid BiOp.

Copies of this EA and final rule are found under RIN 0648-BJ27 at www.regulations.gov, or by contacting the responsible official or Council at the above addresses.

ACRONYMS AND ABBREVIATIONS

B	Biomass
BE	Biological Evaluation
BiOp	Biological Opinion
B_{MSY}	Biomass that Produces Maximum Sustainable Yield
CNMI	Commonwealth of the Northern Mariana Islands
CNP	Central North Pacific
Council	Western Pacific Fishery Management Council
CPUE	Catch Per Unit Effort
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
F	Fishing Mortality Rate
FAD	Fish Aggregating Device
FEP	Fisheries Ecosystem Plan
FMP	Fishery Management Plan
F_{MSY}	Mortality Rate that Produces Maximum Sustainable Yield
FONSI	Finding of No Significant Impact
HAPC	Habitat Areas of Particular Concern
HMS	Highly Migratory Species
IATTC	Inter-American Tropical Tuna Commission
ISC	International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean
ITS	Incidental Take Statement
IUCN	International Union for Conservation of Nature
LRP	Limit Reference Point
LVPA	Large Vessel Prohibited Area
M	Natural Mortality Rate
MBTA	Migratory Bird Treaty Act
MFMT	Maximum Fishing Mortality Threshold
MHI	Main Hawaiian Islands
MHI IFKW	Main Hawaiian Islands False Killer Whale
MMAP	Marine Mammal Authorization Program
MMPA	Marine Mammal Protection Act
MPA	Marine Protected Area
MSST	Minimum Stock Size Threshold

MSY	Maximum Sustainable Yield
MUS	Management Unit Species
NEPO	Northeastern Pacific Ocean
nm	Nautical Miles
NMFS	National Marine Fisheries Service
NOAA OLE	NOAA Office of Law Enforcement
NPO	North Pacific Ocean
NWHI	Northwestern Hawaiian Islands
PBR	Potential Biological Removal
PIFSC	Pacific Islands Fisheries Science Center
PIRO	Pacific Islands Regional Office
PMUS	Pelagic Management Unit Species
PSW	Protected Species Workshop
PT	Participating Territory
PVA	Population Viability Analysis
r	Mean Long-term Population Growth Rate
RA	Regional Administrator
RFMO	Regional Fishery Management Organization
RPM	Reasonable and Prudent Measure
SA	Spawning Abundance
SAFE	Stock Assessment and Fishery Evaluation
SA_{MSY}	Spawning Abundance that Produces Maximum Sustainable Yield
SAR	Stock Assessment Report
SB	Spawning Biomass
SB_{MSY}	Spawning Biomass that Produces Maximum Sustainable Yield
SCL	Straight Carapace Length
SFD	Sustainable Fisheries Division
SIDS	Small Island Developing States
SPC	Secretariat of the Pacific Community
SSB	Spawning Stock Biomass
SSC	Scientific and Statistical Committee
SST	Sea Surface Temperature
t	Metric Ton(s)
T&C	Terms and Conditions
U.S. FWS	U.S. Fish and Wildlife Service
USCG	U.S. Coast Guard
WCNPO	Western and Central North Pacific Ocean
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean

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1 INTRODUCTION

1.1 Background Information

The Western Pacific Fishery Management Council (Council) and the National Marine Fisheries Service (NMFS) manage fishing for swordfish (*Xiphias gladius*) and other pelagic management unit species (PMUS) in the Exclusive Economic Zone (EEZ or federal waters, generally 3-200 nautical miles or nm from shore) around American Samoa, Guam, the Commonwealth of the Northern Mariana Islands (CNMI) and Hawaii, and on the high seas through the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region (Pelagics FEP) as authorized by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act; 16 U.S.C. § 1801 *et seq.*).

Regulatory Amendment 3 to the Pelagic Fishery Management Plan (FMP; currently the Pelagics FEP) established a model Hawaii shallow-set longline swordfish fishery (shallow-set fishery) and implemented a suite of sea turtle mitigation measures in 2004 to achieve optimum fishing yields for target species while not jeopardizing the long-term existence of sea turtles and other listed species (69 FR 17329, April 2, 2004; WPFMC 2004). The measures focused on reducing the number and severity of incidental hooking and entanglement of sea turtles, or "interactions", by implementing new technologies (e.g., large circle hooks and mackerel-type bait) to reduce sea turtle interaction rates and requiring Hawaii longline vessels to carry approved de-hooking devices to maximize the post-hooking survival The amendment also established a maximum effort limit of 2,120 shallow-sets per year administered through a set certificate program[1] and annual fleet-wide interaction limits for loggerhead and leatherback turtles (referred to as "hard caps"), which, if reached, would trigger the closure of the shallow-set fishery for the remainder of the calendar year. The hard cap limits are set equal to the estimated anticipated level of take[2] set forth in the most recent incidental take statement (ITS) included in the Biological Opinion (BiOp) issued by NMFS for the continued authorization of the shallow-set fishery, pursuant to Section 7 of the Endangered Species Act (ESA). These limits help ensure that impacts to these species do not exceed the number of annual interactions analyzed in the BiOp, and exceeding thresholds that trigger reinitiating of consultation. These combined measures implemented in 2004 were intended to control fishing effort and sea turtle interactions while information was being gathered on the model fishery.

The fishery has been subject to 100% observer coverage since 2004, providing NMFS and the Council with over a decade's worth of available information to assess the effectiveness of the mitigation measures intended to reduce sea turtle interactions. Evaluation of these measures in the shallow-set fishery for the period of May 2004 through March 2007 showed that sea turtle interaction rates were reduced by approximately 90% for loggerheads, 85% for leatherbacks, and 89% for combined species, compared to the period (1994-2001) when the fishery was operating

[1] In 2008, the Council recommended and NMFS approved removal of the annual effort set limit to optimize the harvest of swordfish without jeopardizing sea turtle populations (74 FR 65460, December 10, 2009).

[2] The word "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct (ESA §3(19)). Harm is further defined by NMFS to mean an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering (50 CFR 222.102).

without such measures (Gilman and Kobayashi 2007). A more recent analysis, including observer data through 2014, show that these mitigation measures continue to be effective with reductions in leatherback and loggerhead turtle interaction rates of 84% and 95%, respectively, for the post-regulation period (Swimmer et al. 2017). Nearly all loggerhead and leatherback sea turtles observed hooked or entangled in the fishery are released alive. Between 2004 and 2019, there were 193 interactions with loggerhead sea turtles in the fishery, with only two resulting in at-vessel mortality (i.e., immediate death when boarded or brought next to the vessel during fishing operations); and of 104 leatherbacks interactions, none have resulted in at-vessel mortality.

1.1.1 Recent Interactions with the North Pacific Loggerhead Sea Turtle and the Shallow-set Fishery

Since the sea turtle mitigations measures were introduced in 2004, fishing effort in the shallow-set fishery peaked in 2010 and has since declined (Table 1). The number of vessels participating in the fishery declined from a high of 35 vessels in 2006 to a low of 11 vessels in 2018. Total catch and adjusted revenue have also declined, with total catch peaking in 2008 at 4.3 million pounds and adjusted revenue peaking in 2007 at $8.5 million. The shallow-set fishery is highly seasonal, with effort typically increasing in October and peaking in March.

The shallow-set fishery has experienced four early closures since 2004, three times for reaching the hard cap limit, and once by court order:

1. On March 20, 2006, the fishery temporarily closed after reaching a hard cap limit of 17 interactions with the North Pacific loggerhead sea turtle (71 FR 14824, March 24, 2006).
2. On November 18, 2011, the fishery temporarily closed after reaching a hard cap limit of 16 interactions with leatherback sea turtles (76 FR 72643, November 25, 2011).
3. On May 8, 2018 (83 FR 21939, May 11, 2018), the fishery temporarily closed in compliance with court order[3] (*TIRN v. NMFS* (9th Cir. 2017)).
4. On March 19, 2019, the fishery temporarily closed after reaching a hard cap limit of 17 loggerhead sea turtles (84 FR 11654, March 28, 2019).

When a hard cap limit is reached, the consequence to the fishery is a closure for the remainder of the calendar year. Accordingly, a hard cap closure under the existing hard cap measure, especially during the peak Hawaii swordfish season, may reduce fishery yields and create a disruption in the U.S. domestic swordfish market. For example, the fishery's catch and revenue

[3] On December 27, 2017, a Ninth Circuit panel issued a split 2-1 opinion finding that NMFS's 2012 BiOp's no-jeopardy determination and associated ITS for the loggerhead turtle to be arbitrary and capricious. Turtle Island Restoration Network, et al. v. U.S. Dep't of Commerce, et al., 878 F.3d 725, 740 (9th Cir. 2017). On May 4, 2018, the District Court approved a settlement setting aside those portions of the 2012 biological opinion and ITS relating to North Pacific loggerheads, closing the shallow-set fishery through December 31, 2018, and reinstating a hard cap limit of 17 loggerhead turtles consistent with the ITS from the 2004 BiOp (see Turtle Island Restoration Network et al. v. U.S. Dep't of Commerce, et al., No. 1:12-cv-00594-SOM-RLP [D. Haw., May 4, 2018], Dkt. No. 80). The shallow-set fishery reopened on January 1, 2019, under an annual hard cap limit of 17 loggerheads (83 FR 49495). On March 19, 2019, the shallow-set longline fishery closed (84 FR 11654, March 28, 2019) for the remainder of 2019 due to reaching an annual interaction limit of 17 loggerheads.

for 2006 when the fishery closed in March from reaching the loggerhead hard cap limit was 37% and 46% lower, respectively, compared to one year before and after the closure.

The average annual number of observed interactions for the 2005-2016 period following the adoption of the 2004 mitigation measures was 9.9 loggerhead turtles (range = 0-17) and 7.8 leatherback turtles (range = 2-16) per year. Loggerhead turtle interactions in the shallow-set fishery in 2017, 2018, and 2019 were higher than those levels observed from 2004 through 2016. The total number of loggerhead interactions for 2017 was 21. From January to May 2018, prior to the court order that closed the fishery, 33 loggerhead interactions were observed. While 33 is one lower than the hard cap limit of 34 loggerhead turtles, 2017 and 2018 demonstrated that the fishery has the potential to experience higher interaction levels than the long-term average (12.4 loggerhead turtles annually from 2005-2018) in a short period. During the period of higher loggerhead turtle interactions in 2017-2018, a small number of vessels interacted with majority of the observed loggerhead turtles, while the majority of vessels during the period of high interactions also had at least one observed interaction. In 2019, the fishery interacted with 20 loggerheads, and as a result, the fishery closed for exceeding the hard cap limit of 17.

Table 1. Observed interactions and interactions per fishing effort (1,000 hooks) for loggerhead sea turtles in the shallow-set fishery based on interaction date, 2004-2018

Year	Observer Coverage (%)	Sets	Hooks	Interaction	Interactions/1,000 Hooks
2004	100	135	115,718	1	0.009
2005	100	1,646	1358247	10	0.009
2006	100	850	676,716	17	0.022
2007	100	1,569	1,353,761	15	0.011
2008	100	1,595	1,460,042	0	0.000
2009	100	1,761	1,694,550	3	0.002
2010	100	1,872	1,835,182	7	0.004
2011	100	1,474	1,505,467	12	0.008
2012	100	1,364	1,476,969	6	0.004
2013	100	962	1,074,909	6	0.006
2014	100	1,338	1,470,683	14	0.010
2015	100	1,156	1,274,805	13	0.011
2016	100	727	796,165	15	0.019
2017	100	1,005	1,083,216	21	0.019
2018	100	420	486,013	33	0.068
2019	100	312	374,487	20	0.053

Due to vessel confidentiality rules, data for the fourth quarter in 2007 are combined with data for 2008. Interaction data for 2007 reflect those from first, second and third quarters.
Source: WPFMC 2019; unpublished observer data.

NMFS Pacific Islands Fisheries Science Center (PIFSC) conducted a preliminary analysis of the 2017 and 2018 loggerhead turtle interactions in the shallow-set fishery as compared to prior years (PIFSC unpublished data). The analysis indicated that the spatial distribution of the interactions and fishing effort were not anomalous compared to previous years, and there was no apparent change in other operational characteristics within the fishery (e.g., gear configuration, bait, timing, duration) to explain the higher loggerhead interaction rates. Additionally, the average size of individual turtles observed in 2017 and 2018 was consistent with the average size observed in previous years. PIFSC continues to explore the linkage of loggerhead turtle

interactions in the shallow-set fishery to hatchling production at nesting beaches in Japan, as well as additional examination of the oceanographic environment and fishing behavior.

1.1.2 Council Actions

The existing annual fleet-wide hard caps are useful to prevent takes above a specified limit, but do not provide early response to higher interaction rates when the number of interactions is below the hard cap limit. Effective management of protected species interactions should consider responsive measures that can help ensure year-round operations while addressing the needs for protected species conservation. The 2017-2018 increase in loggerhead turtle interactions suggest the need for a more robust suite of conservation and management measures that can respond to higher interaction rates and fluctuations in sea turtle interactions that may indicate a potential for higher impacts to sea turtle populations or a fishery closure early in the calendar year. Development of a more responsive management approach would further minimize impacts to sea turtles while helping to ensure the year-round supply of fresh swordfish to meet market demands.

To address these needs, the Council considered and developed measures for managing loggerhead and leatherback turtle interactions in the shallow-set fishery under the Pelagics FEP, which is described in this document. In developing these measures, the Council considered, among other information described in section 2.1, new information on a population viability analysis (PVA) for loggerhead and leatherback turtles prepared by PIFSC for the Section 7 consultation (described in detail in section 3.2.2.2). The draft PVA results indicated that the North Pacific loggerhead turtle population exhibits a long-term increasing trend at a mean estimated population growth rate of 2.4% (updated to 2.3% by PIFSC in Martin et al. 2020), while the Western Pacific leatherback turtle population exhibits a long-term declining trend at a mean estimated population growth rate of -5.3% (updated to -6.1% by PIFSC in Martin et al. 2020). The Council also incorporated the reasonable and prudent measures (RPMs) and associated Terms and Conditions (T&Cs) from the 2019 Biological Opinion for the Continued Authorization of the Hawaii shallow-set longline fishery (NMFS 2019). Table 2 summarizes the Council actions, and other events, that led to the development of these measures. A more detailed summary of Council actions can be found in Appendix A of this EA. Detailed summaries of Council actions for respective meetings can also be found at the Council's website at: http://www.wpcouncil.org/.

Table 2. Timeline of events and summary of Council actions.

October 17-19, 2017	The Council at the 171st meeting, in response to the relatively stable loggerhead and leatherback turtle interactions from 2004-2016, and the lack of growing effort in the fishery, reviewed whether the continuation of sea turtle hard caps is necessary to achieve the management objectives of the Pelagics FEP. The Council recommended development of a draft amendment to the Pelagics FEP for managing sea turtles interactions, and selecting as its preliminary preferred alternative the removal of the hard cap measure.
December 2017	Increased interactions rates with the North Pacific loggerhead sea turtle and the shallow-set fishery observed.
December 27, 2017	The Ninth Circuit Court of Appeals issued a 2-1 opinion finding that NMFS 2012 BiOp no-jeopardy determination and associated ITS for the loggerhead turtle to be arbitrary and capricious.

March 14-16, 2018	The Council at the 172nd meeting considered a revised set of options for managing loggerhead and leatherback turtles in the shallow-set fishery, and recommended the development of a framework that may include, among other measures, specification of hard caps, in-season measures, real-time spatial management measures, and establishment of a fleet communication program.
April 20, 2018	NMFS reinitiated ESA Section 7 consultation for the shallow-set fishery.
May 4, 2018	In response to a directive from the 172nd meeting, the Council and the Hawaii Longline Association (HLA) convened an industry workshop to discuss the potential application of industry-led programs and improved fleet communications for mitigating incidental catch of sea turtles.
May 8, 2018	The fishery temporarily closes due to court order (*TIRN v. NMFS* (9th Cir. 2017)). At the time of the closure, the fishery had 33 North Pacific loggerhead sea turtle interactions since January 1, 2018, which was below the hard cap of 34.
June 11-13, 2018	The Council at the 173rd meeting recommended an amendment to the Pelagics FEP to establish management measures that consist of annual fleet-wide hard cap limits and individual trip interaction limits for loggerhead and leatherback turtles. Under these management measures, the Council recommended setting hard cap limits of 37 loggerhead and 21 leatherback turtles, and a trip limit of 5 loggerhead turtles. The limits were based on the anticipated level of interactions analyzed in the Biological Evaluation that reinitiated consultation of the fishery, and the Council noted that it would review its recommendation if the new BiOp from the consultation resulted in a jeopardy decision or otherwise resulted in a different ITS for North Pacific loggerheads or leatherbacks turtles. Additionally, the Council established a three-year timeline for monitoring the development, implementation, and review of a sea turtle interaction avoidance pilot program utilizing fleet communication to be implemented by the industry.
October 23-27, 2018	The Council at the 174th meeting reviewed information on a new population viability analysis for loggerhead and leatherback turtles prepared for the ongoing Section 7 consultation.
December 17, 2018	The Council at the 175th meeting considered final action on individual trip interaction limits for the Western Pacific leatherback sea turtle taking into consideration the results of the population viability analysis indicating a continuing long-term declining trend of the population. The Council deferred action until the draft BiOp and more complete information became available.
January 1, 2019	The shallow-set fishery reopens under a hard cap of 17 North Pacific loggerhead sea turtles pursuant to a stipulated settlement agreement and court order.
March 19, 2019	The fishery temporarily closed after reaching a hard cap limit of 17 loggerhead sea turtles (84 FR 11654).
March 28, 2019	NMFS provides a draft BiOp to the Council.
April 12, 2019	The Council at the 177th meeting reviewed its recommendations from the 173rd meeting for consistency with the draft BiOp and maintained its previous recommendation, with the addition of setting an individual trip limit of 2 leatherback turtles.
June 25-27, 2019	The Council at the 178th meeting deferred final action to allow adequate time for the Council and the SSC to review the final BiOp.
June 26, 2019	NMFS issued final BiOp.
August 8, 2019	The Council at the 179th meeting reviewed the revised draft amendment and environmental assessment incorporating the final BiOp and associated RPMs, and took final action to amend the Pelagics FEP to establish revised sea turtle measures, consistent with the RPMs and T&Cs of the 2019 BiOp, consisting of an annual fleet-wide hard cap limit of 16 leatherback sea turtles, no hard cap for the loggerhead sea

	turtle, and individual trip interaction limits of 5 North Pacific loggerhead sea turtles and 2 leatherback sea turtles.

1.1.3 2019 Biological Opinion on the Continued Authorization of the Shallow-set Fishery

On April 20, 2018, NMFS reinitiated ESA Section 7 consultation on the fishery due to the fishery's first-documented interaction with a threatened Guadalupe fur seal, issuance of a final rule listing 11 new green sea turtle distinct population segments (DPSs), the listing of the oceanic whitetip shark and giant manta ray as threatened under the ESA, the fishery's exceedance of the ITS for olive ridley sea turtles, and a Ninth Circuit Court of Appeals 2-1 opinion finding that NMFS 2012 BiOp no-jeopardy determination and associated ITS for the loggerhead turtle to be arbitrary and capricious. The final BiOp was issued on June 26, 2019, and concluded that the continued authorization of the fishery is not likely to jeopardize the continued existence of any ESA listed species that occur in the action area (Table 9). A detailed summary of the 2019 BiOp can be found in section 3.2.1 of this EA.

The ITS in the 2019 BiOp sets forth reasonable and prudent measures (RPMs) and associated terms and conditions (T&Cs) necessary to minimize the impacts of incidental take, which must be undertaken by NMFS for the take exemption in ESA section 7(o)(2) to apply. Of the six RPMs in the 2019 BiOp, RPM 1 and associated T&C 1a and 1b requires immediate implementation of measures to reduce the incidental capture and mortality of loggerhead and leatherback sea turtles in the shallow-set fishery (Table 3). This amendment provides the mechanism for implementing RPM 1 T&C 1a and 1b under the Pelagics FEP.

Table 3. 2019 BiOp RMP 1 and T&C 1a and 1b.

Reasonable and Prudent Measure 1	NMFS shall evaluate and develop a minimization measure, or a suite of minimization measures designed to reduce the incidental capture and mortality of leatherback and loggerhead sea turtles in the HI SSLL fishery.
Terms and Conditions 1a and 1b	1a. NMFS SFD shall, upon receiving a signed biological opinion, set an annual interaction limit for the fishery of 16 leatherback sea turtles, which represents an approximate 25% reduction in the number of turtles from our predicted interaction numbers in this biological opinion. If the fishery reaches this limit, NMFS shall close the HI SSLL fishery for the remainder of the calendar year. NMFS may modify this requirement as appropriate upon implementation of minimization measures identified in Term and Condition 1c.
	1b. NMFS SFD shall set a trip limit not to exceed 2 leatherback sea turtles or 5 loggerhead sea turtles per vessel trip. Any vessel that reaches the established trip limit must immediately stop fishing and return to port. These vessels will not engage in shallow set longline fishing for 5 days while NMFS evaluates vessel and turtle interactions to identify any problems and determine if guidance can be provided to the vessel to reduce the interactions. Vessels that reach the per trip limit for either leatherback or loggerhead sea turtles twice in a calendar year shall be prohibited from shallow-set longline fishing for the remainder of the calendar year. NMFS shall require any vessel that reaches a trip limit for either species twice in one calendar year to have an annual vessel limit of 2 leatherbacks or 5 loggerheads for the following year.

1.1.4 Marine Turtle Take (fishery mortality) Model for the Hawaii-Based Shallow Set Fishery

Following the issuance of the 2019 BiOp, PIFSC completed a PVA take model, or "fishery mortality" model, to assess the population level impacts of post-interaction mortality of loggerhead and leatherback turtle interactions in the shallow-set fishery, which was presented at the 134th SSC and 180th Council Meeting (described in detail in section 3.2.2.2). The model outputs indicated that the anticipated level of loggerhead turtle interactions analyzed in the 2019 BiOp show no discernable difference (i.e., statistically insignificant) in the population trend or the probability of the population falling below abundance thresholds within the 100-year projection period when compared to a scenario without take of loggerheads by the shallow set-fishery (i.e., -0.01 mean difference at 50% current annual nesters). Similarly, the anticipated level of leatherback turtle interactions show a negligible, or minor, difference in the population trend or the probability of the population falling below abundance thresholds within the 100-year projection period when compared to a scenario without take of leatherbacks by the fishery (i.e., 0.01 mean difference at 50% current annual nesters). A detailed summary of the take model can be found in section 3.2.2 of this EA.

1.2 Proposed Action

The proposed action would amend the Pelagics FEP to modify loggerhead and leatherback turtle mitigation measures for the shallow-set fishery as follows:

1. Set an annual fleet-wide hard cap limit on the number of leatherback turtle interactions at 16, consistent with RPMs and Terms and Conditions 1a under the 2019 BiOp. A limit of 16 represents an approximately 25% reduction from the Incidental Take Statement (ITS) of 21. Once this interaction limit is reached, the fishery closes for the remainder of the calendar year.

2. Do not set an annual fleet-wide hard cap limit on the number of North Pacific loggerhead turtle interactions. While the 2019 BiOp requires setting the leatherback hard cap limit at 16, it does not require a hard cap limit for North Pacific loggerhead turtles. The loggerhead population is increasing at about 2% per year, and has only a 25% risk of falling to less than half of its current abundance in the next 50 years. Nonetheless, if the fishery exceeds the ITS in the current valid BiOp, Section 7 consultation would be reinitiated as required by ESA. The Council retains the authority for setting an annual fleet-wide hard cap limit on the number of North Pacific loggerhead turtle interactions under the Pelagics FEP, if necessary.

3. Establish individual trip interaction limits for loggerhead and leatherback turtles for the Hawaii limited entry permit vessels that declare their trips as a shallow-set trip, consistent with RPMs and T&Cs 1b under the 2019 BiOp as follows:
    i. Set limits of 5 loggerhead sea turtles and 2 leatherback turtles per trip.
    ii. Upon determining that a vessel has reached either the loggerhead or leatherback turtle trip interaction limit based on data from NMFS observers, shallow-set vessels will be required to return to port without making additional sets.

iii. The vessel will be prohibited from engaging in shallow-set longline fishing for 5 days after returning to port.
iv. Vessels that reach the trip limit for either leatherback or loggerhead turtles twice in a calendar year shall be prohibited from shallow-set longline fishing for the remainder of the calendar year. In the following calendar year, such vessels shall have an annual vessel limit equivalent to a single trip limit for that species in which two trip limits were reached.
v. The Council may make recommendations to NMFS to revise the individual trip limits upon periodic review of the effectiveness of the limits and consistent with the RPM of the current valid BiOp.

1.3 Purpose and Need for the Action

The purpose of this action is to amend the Pelagics FEP to modify sea turtle mitigation measures for effectively managing impacts to leatherback and loggerhead sea turtles from the shallow-set fishery, consistent with the requirements of the Magnuson-Stevens Act and the RPM 1 T&C 1a and 1b of the 2019 BiOp pursuant to the ESA, while maintaining fishing opportunities during peak swordfish season (October through March). The existing annual fleet-wide interaction limits prevent loggerhead and leatherback interactions above a specified limit, but do not provide early response to higher interaction rates that may indicate a potential for higher impacts to sea turtle populations or a fishery closure early in the calendar year. Effective management of loggerhead and leatherback turtle interactions in the shallow-set fishery should consider responsive measures that can help ensure year-round operations while addressing the need for protected species conservation.

This action is needed to provide managers and fishery participants with the necessary tools to respond to and mitigate fluctuations in loggerhead and leatherback turtle interactions, and to ensure a continued supply of fresh swordfish to U.S. markets, consistent with the conservation needs of these sea turtles. The action is also needed to ensure that the shallow-set fishery operates in compliance with the RPMs and T&C of the 2019 BiOp. RPMs are actions necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take (50 CFR 402.02). These measures should minimize the impacts of incidental take to the extent reasonable and prudent. The RPMs and implementing T&C in the 2019 BiOp are non-discretionary for the exemption in ESA section 7(o)(2) to apply, and to ensure the continued operation of the shallow-set fishery.

1.4 Action Area

The action area is the area of operation of the Hawaii shallow-set longline fishery, which includes the US EEZ around Hawaii and the high seas to the north and northeast of the main Hawaiian Islands (MHI). Longline fishing is prohibited in the MHI longline fishing prohibited area ranging from 50-75 nm from shore, the Northwestern Hawaiian Islands (NWHI) protected species zone, and the Papahanaumokuakea Marine National Monument (Monument). From 2004-2018, the fishery operated in an area between 180°- 125° W and 17°- 45° N (Fig 1).

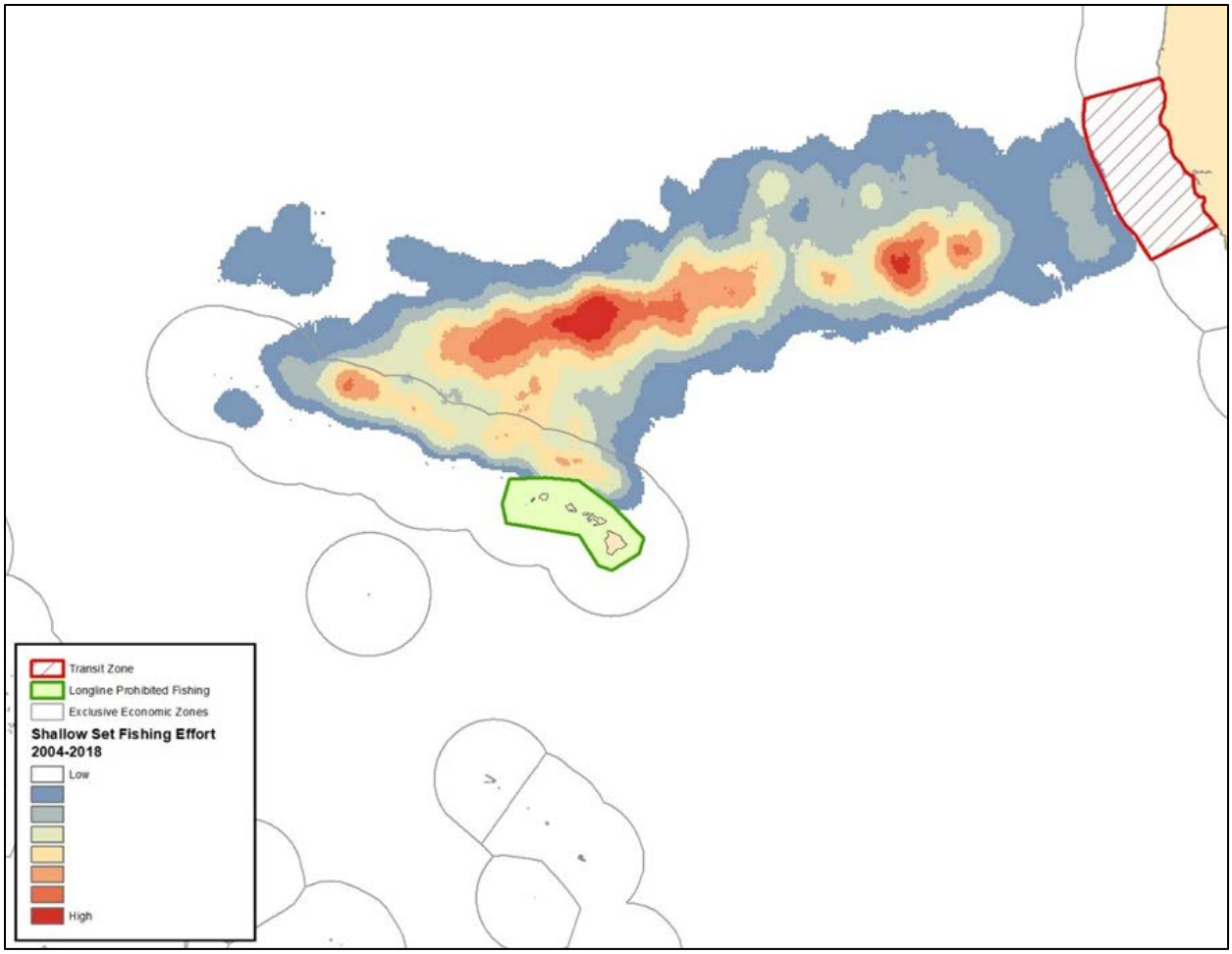

Figure 1. Action area with location of shallow sets made by the Hawaii longline fishery from 2004–2018.
Source: 2019 BiOp (NMFS 2019)

1.5 Decision(s) to be Made

This document will support a decision by the Regional Administrator (RA) of the NMFS Pacific Islands Region, on behalf of the Secretary of Commerce, whether to approve, disapprove, or partially approve the Council's recommendation. The RA will also use the information in this EA, along with the consideration of public comments, to make a determination about whether the proposed action would constitute a major federal action that has the potential to significantly affect the quality of the environment. If NMFS determines the action would not significantly affect the quality of the environment, NMFS will prepare a Finding of No Significant Impact (FONSI). If NMFS determines the proposed action is a major federal action that would significantly affect the quality of the environment, NMFS would prepare an environmental impact statement (EIS) before taking action.

1.6 List of Preparers and Reviewers

Western Pacific Fishery Management Council Staff
Asuka Ishizaki – Protected Species Coordinator

NMFS Pacific Islands Regional Office
Joshua Lee – Resource Management Specialist
Jarad Makaiau – Fish and Wildlife Administrator
Phyllis Ha – Resource Management Specialist
Ariel Jacobs – Pacific Islands Region NEPA Coordinator

1.7 Public Involvement

Council meetings and meetings of the Council's advisory bodies are open to the public and are noticed in the Federal Register and local newspapers and publications and on the Council's website (www.wpcouncil.org). Meeting agendas provide opportunities for public comment.

The Council considered the proposed action at the following public meetings:

- The 171st (Meeting (October 17-19, 2017, 82 FR 44382)
- The 172nd Meeting (March 14-16, 2018; 83 FR 7162)
- The 173rd Meeting (June 11-13, 2018; 83 FR 23640);
- The 174th Meeting (October 23-24 and 26-27, 2018; 83 FR 49364);
- The 175th Meeting (December 17, 2018; 83 FR 62309);
- The 177th Meeting (April 12, 2019; 84 FR 12229);
- The 178th Meeting (June 25-27, 2019; 84 FR 24759); and
- The 179th Meeting (August 8, 2019; 84 FR 34874).

The SSC considered the proposed action at the following public meetings:

- The 127th Meeting (October 10-12, 2017, 82 FR 44382)
- The 128th Meeting (March 6-8, 2018; 83 FR 7162)
- The 129th Meeting (June 6-8, 2018; 83 FR 23640);
- The 130th Meeting (October 15-17, 2018; 83 FR 49364); and
- The 133rd Meeting (August 7, 2019; 84 FR 34874).

The proposed action was additionally discussed at the following advisory group meetings:

- The Protected Species Advisory Committee (April 19-20, 2018; 83 FR 13732)
- The Protected Species Advisory Committee (December 17, 2018; 83 FR 62309);
- The Pelagic Plan Team (May 14-16, 2018; 83 FR 17803);
- The Hawaii Archipelagic FEP Advisory Panel (May 24, 2018; 83 FR 20794); and
- The Hawaii Archipelagic FEP Advisory Panel (August 7, 2019; 84 FR 34874).

On January 23, 2020, NMFS published the notice of availability for Amendment 10, including a draft environmental assessment, and request for public comments (85 FR 3889); the comment period ended March 23, 2020. On February 4, 2020, NMFS published a proposed rule that would implement the management measures described in Amendment 10 (85 FR 6131); that comment period ended on March 20, 2020. We received nearly 100 public comments on Amendment 10 and on the proposed rule, including a petition. Most of the comments generally supported most of the measures such as trip interaction limits and other accountability measures, but opposed removal of the hard cap on loggerhead turtles. Some comments also criticized the no-jeopardy findings for leatherback and loggerhead sea turtles contained in a 2019 Biological Opinion NMFS prepared for the fishery, and the analyses used to reach those conclusions. NMFS

considered public comments in finalizing the EA and in making its decision on the proposed action, and responds to comments in the final rule.

2 DESCRIPTION OF THE ALTERNATIVES

2.1 Development of the Alternatives

As described in Section 1.1.2 and Appendix A, the Council considered a range of options for managing the loggerhead and leatherback sea turtle interactions in the shallow-set fishery, including:

- Single year hard caps, multi-year hard caps, and removal of hard caps altogether;
- In-season measures (e.g., trip limits and in-season temporary closures);
- Spatial measures to manage interaction hotspots; and
- Non-regulatory measures (e.g., improvements to fleet communication, industry-led initiatives, and furthering research to minimize trailing gear).

In discussing the action, the SSC and Council considered the following information:

- Fisheries observer data for loggerhead and leatherback sea turtle interactions since 2004;
- Effort and economic performance trends of the fishery since 2004;
- Population assessments for the North Pacific loggerhead and Western Pacific leatherback turtle populations;
- The final 2019 BiOp for the shallow-set fishery;
- The recent characteristics of loggerhead turtle interaction patterns since 2017;
- The effectiveness of existing mitigation measures such as circle hooks and mackerel-type bait;
- Potential development of industry initiative for a sea turtle avoidance program;
- Impacts of the hard cap closures on fishery performance; and
- The 9th Circuit Court decision and settlement agreement.

Based on the information described above, the Council identified the primary needs for managing loggerhead and leatherback turtle interactions as follows:

- The need for early response measures to higher interaction rates that may indicate rapid accumulation of interactions, such as those seen in 2017-2018 for loggerhead turtles; and
- The need to minimize further interactions when such higher interaction rates are detected while helping to ensure year-round supply of swordfish to meet domestic demand.

At the 177th meeting held April 12, 2019, the Council recommended amending the Pelagics FEP to establish a framework for managing loggerhead and leatherback sea turtle interactions in the shallow-set fishery to include:

1. The establishment of annual fleet-wide hard cap limits on the number of North Pacific loggerhead and leatherback sea turtle interactions that the Council would recommend to NMFS consistent with the anticipated level of annual interactions described in the current valid biological opinion. Once either one of these interaction limits is reached, the fishery would close for the remainder of the calendar year.

2. The establishment of individual trip interaction limits for North Pacific loggerhead and leatherback sea turtles.
    i. Upon determining that a vessel has reached either the loggerhead or leatherback sea turtle trip interaction limit based on data from NMFS observers, shallow-set vessels would be required to return to port without making additional sets.
    ii. That vessel may resume shallow-set fishing operations after returning to port and providing the required 72-hour notification under 50 CFR 665.803 prior to departure.
    iii. The Council may make recommendations to NMFS to revise the individual trip limits upon periodic review of the effectiveness of those limits.

Using the framework described above, the Council also recommended that:

1. The Hawaii shallow-set longline fishery be reopened, and the following limits be implemented under the management framework:
    i. Annual fleet-wide hard cap limit of 36 loggerhead turtles and 16 leatherback turtles, consistent with the draft shallow-set longline fishery BiOp. For the 2019 fishing year, interactions occurring from January 1, 2019 until the fishery closure on March 19, 2019 shall apply against the 36 loggerhead and 16 leatherback limit; and
    ii. Individual trip limits of 5 loggerhead turtles and 2 leatherback turtles.

2. An annual review of the Hawaii shallow-set longline fishery's performance under the individual trip limits in the Annual SAFE Report.

The Council's recommendation to specify a loggerhead trip limit of 5 was based on the finding that it would provide a meaningful reduction in interactions in years with high interaction rates, such as those observed in 2017-2018. Observed sea turtle interaction data since 2004 indicate that most shallow-set longline trips with loggerhead turtle interactions have 1-2 interactions per trip, with a small proportion of trips having 4 or more interactions coinciding with years with the highest total fleet-wide interactions. Based on the PIFSC simulation applying different levels of trip limits to past observed interactions, a limit of 5 loggerhead turtles per trip would have reduced loggerhead turtle interactions in 2018 by 30%, even without accounting for avoidance behavior by the vessels (see Section 4.2.2). The Council therefore determined that the loggerhead trip limit of 5 would provide a mechanism for response to higher interaction rates, and minimize further interactions when such higher interaction rates are detected while helping to ensure year-round supply of swordfish to meet domestic demand.

The Council's earlier recommendation at its 173rd Meeting did not include specification of individual trip limits for leatherbacks because observed interaction data from 2004-2018 indicated that individual trip limits do not have a potential to provide substantial reduction of leatherback turtle interactions if interaction patterns remain similar to past years. Subsequently, the Council at its 177th Meeting recommended adding an individual trip limit specification of 2 leatherback turtles per trip, taking into consideration the long-term declining trend in the

population assessment conducted for the BiOp, and recognizing the potential for reducing leatherback turtle interactions if vessels are able to avoid a second interaction after encountering the first leatherback on a given trip.

The final 2019 BiOp issued on June 26, 2019, includes RPMs and associated T&Cs, compliance with which are mandatory for the Section 9 exemption under ESA section 7(o) to apply. Of the RPMs, RPM 1 and associated T&C 1a and 1b are to be immediately implemented for the continued authorization of the shallow-set fishery. These measures are similar to the Council's recommended action at the 177th meeting in that they include fleet-wide hard caps and individual trip limits, but differ in that the individual trip limit measure includes additional restrictions on vessels that reach a trip limit twice in a calendar year, and specifies that vessels that reach a trip limit will not engage in shallow-set longline fishing for 5 days while NMFS evaluates vessel and turtle interactions to identify any problems and determine if guidance can be provided to the vessel to reduce the interactions. Additionally, RPM 1a requires a leatherback hard cap limit of 16, but does not require a hard cap limit for loggerhead turtles. The main features of the 177th Council meeting actions and RPM T&C 1a and 1b are summarized in Table 4.

At the 179th meeting held August 8, 2019, the Council considered the four alternatives analyzed in this document, which combines the Council's recommended action from the 177th meeting and RPM T&C 1a and 1b.

Table 4. Comparison of the Council's 177th Meeting Recommended Action and RPM T&C 1a and 1b.

	177th Meeting Council Action		**RPM T&C 1a and 1b**	
Measures	**Loggerhead**	**Leatherback**	**Loggerhead**	**Leatherback**
Hard cap limits	36	16	None required	16
Procedures	➢ Council to recommend limits to NMFS consistent with the anticipated level of interactions set forth in the current valid BiOp. ➢ Once either one of the limits is reached, fishery closes for the remainder of the calendar year.		➢ Not applicable	➢ Once the limit is reached, fishery closes for the remainder of the calendar year.
Trip limits	5	2	5	2
Procedures	➢ Upon determining that a vessel has reached either of the trip limits based on data from NMFS observers, the vessel would be required to return to port without making additional sets. ➢ The vessel may resume shallow-set fishing operations after returning to port and providing the required 72-hour notification under 50 CFR 665.803 prior to departure. ➢ Annually review the Hawaii shallow-set longline fishery's performance under the trip limits in the Annual SAFE Report.		➢ Any vessel that reaches the established trip limit must immediately stop fishing and return to port. ➢ Vessels that reach a trip limit will not engage in shallow-set longline fishing for 5 days while NMFS evaluates vessel and turtle interactions to identify any problems and determine if guidance can be provided to the vessel to reduce the interactions. ➢ Vessels that reach the trip limit for either leatherback or loggerhead sea turtles twice in a calendar year shall be prohibited from shallow-set longline	

Measures	177th Meeting Council Action		RPM T&C 1a and 1b	
	Loggerhead	Leatherback	Loggerhead	Leatherback
	➢ Council may make recommendations to NMFS to revise the trip limits upon periodic review of the effectiveness of the limits.		fishing for the remainder of the calendar year. NMFS shall require any vessel that reaches a trip limit for either species twice in one calendar year to have an annual vessel limit of 2 leatherbacks or 5 loggerheads for the following year.	

2.2 Description of the Alternatives

This section describes the alternatives for managing loggerhead and leatherback turtle interactions in the Hawaii shallow-set longline fishery and the expected fishery outcomes that would occur under each alternative. Alternative 1 is the No Action alternative, and Alternative 2 is based on the Council's recommended action at the 177th meeting, consisting of annual fleet-wide hard cap limits and individual trip interaction limits for both loggerhead and leatherback turtles. Alternative 3 combines the Council's recommended action from the 177th meeting with RPM T&C 1a and 1b in the 2019 BiOp, consisting of a hard cap limit for leatherback turtles and individual trip interaction limits for both loggerhead and leatherback turtles with additional restrictions on vessels that reach a trip limit twice in a calendar year, and modifying the loggerhead hard cap limit equivalent to the ITS in the 2019 BiOp. Alternative 4 further modifies Alternative 3 by not setting a loggerhead hard cap limit.

At the 179th meeting, the Council selected Alternative 4 as the preferred alternative. In recommending an alternative that would not set a loggerhead hard cap limit, the Council considered the increasing trend of the North Pacific loggerhead turtle population and RPM T&C 1b requiring additional restrictions on vessels that reach a trip limit twice in a calendar year on top of the simple individual trip limit measure recommended at the 177th meeting, and determined that a fleet-wide hard cap limit for this species is not necessary at this time for the conservation of the loggerhead turtles.

Features common to all alternatives are described in Section 2.2.1, and general descriptions of measures contained in the alternatives are provided in Section 2.2.2. A summary of all alternatives, including possible fishery outcomes, are described in Table 6.

2.2.1 Features Common to all Alternatives

Under all alternatives considered, the shallow-set fishery will continue to be managed under existing gear and handling requirements to minimize impacts to sea turtles. These include the required use of 18/0 or larger circle hooks with no more than 10° offset and mackerel-type bait, adherence to regulations for safe handling and release of sea turtles, and required turtle handling and dehooking gear.

Under all alternatives considered, NMFS would continue to monitor the shallow-set fishery under statistically reliable observer coverage (currently 100%) and provide near real-time data on loggerhead and leatherback turtle interactions. Current NMFS observer data collection protocols

for the fishery instruct observers to report sea turtle interactions using a satellite phone after each observation. These call-in reports are used to monitor the existing hard caps in near real-time.

2.2.2 Description of Measures Contained in the Alternatives

All alternatives contain existing or modified annual fleet-wide hard cap limits, and Alternatives 2-4 contain individual trip limits, with some variation in implementation. This section describes the general features of the annual fleet-wide hard cap limits and the individual trip limits.

Annual Fleet-wide Hard Cap Limits

The Council may recommend setting annual fleet-wide hard cap limits for loggerhead and leatherback turtle interactions in the shallow-set fishery. The Council's recommended hard cap limits would be consistent with the anticipated level of annual interactions described in the current BiOp, or any applicable RPMs in the current BiOp. Once implemented, the limits would remain in place until such time that the Council makes a recommendation to NMFS to revise the specifications.

Loggerhead and leatherback turtle interactions are monitored in near real-time by NMFS observers. Current NMFS observer data collection protocols for the fishery instruct observers to report sea turtle interactions using a satellite phone after each observation. Upon reaching either of the interaction limits, NMFS would close the shallow-set fishery until the end of the calendar year in which the limit was reached.

Hard caps were first established in 2004 under Regulatory Amendment 3 of the Pelagic FMP as part of the measures intended to control fishing effort and sea turtle interactions while information was being gathered on the effectiveness of using circle hooks and mackerel-type bait in the fishery. At the time, this gear and bait combination had only been tested in Atlantic longline fishery experiments prior to approval for use in Hawaii fishery, and the shallow-set fishery operated as a model fishery to collect data on the effectiveness of these mitigation measures. These measures were developed by the Council under the Pelagics FMP to allow the shallow-set fishery to reopen following a three-year closure. While the ESA requires reinitiating Section 7 consultation when an ITS is exceeded, it does not necessarily require that the fishery suspend operations upon reaching an ITS, or require hard caps or other mechanisms to close the fishery. Because hard caps result in a fishery closure, they do provide additional assurance that the interactions remain below the anticipated level of interactions analyzed in the BiOp, and may eliminate the need for reinitiation by preventing an exceedance of the ITS.

As previously described, the stipulated settlement agreement and court order on May 4, 2018, states that NMFS may not increase the allowable incidental take of loggerhead turtles above the court-ordered hard cap limit of 17 loggerhead turtles except through a new regulation issued under applicable authority and after issuance of a new BiOp. The hard caps were established in 2004 under Regulatory Amendment 3 of the Pelagic FMP, and are not implemented as a requirement under the ESA. This amendment, developed pursuant to the Magnuson-Stevens Act, therefore provides the authority for establishing a revised hard cap limit for loggerhead turtles based on the new BiOp.

Individual Trip Limits

Alternatives 2-4 contain individual trip limits on the number of loggerhead and leatherback turtle interactions for the Hawaii limited entry permit vessels that declare their trips as a shallow-set trip. The individual trip limit would apply to all trips declared as shallow-set gear under the Hawaii limited entry permit program and all interactions counting toward the individual trip limit would also count toward the fleet-wide hard cap limit, if applicable. Upon determining that a vessel has reached either the loggerhead or leatherback turtle trip limit based on the data from NMFS observers, the vessel would be required to return to port without making additional sets. Conditions upon which the vessel may resume shallow-set fishing operations differ by alternative.

The Council may recommend different trip limits for the two sea turtle species. Once implemented, the limits would remain in place until such time that the Council makes a recommendation to NMFS to revise the specifications. The Council would conduct an annual review of fishery performance under the individual trip limits in the Annual SAFE Report, and may make recommendations to NMFS to revise the individual trip limits upon review of the effectiveness of the limits.

Individual trip limits are intended to mitigate a large proportion of loggerhead and leatherback turtle interactions from occurring in a single trip. Observed sea turtle interaction data since 2004 indicate that trips with loggerhead turtle interactions typically have 1-2 interactions per trip in years with low fleet-wide loggerhead turtle interactions. Conversely, trips with 3 or more loggerhead turtle interactions have been observed in years with high fleet-wide interactions. In 2018, when the highest number of loggerhead turtle interactions was observed, 16% of the trips contributed to 58% of the total fleet-wide interactions. Monitoring the number of loggerhead turtle interactions per trip would provide an early detection mechanism for higher fleet-wide interactions, and the individual trip limit would provide a “dampening” response by minimizing further interactions on those trips.

Leatherback turtle interactions in the shallow-set fishery have been less variable than loggerhead turtle interactions, with most trips with leatherback turtle interactions having 1-2 interactions per trip and only one trip having 3 interactions since 2004 (Table 5). Individual trip limits for leatherback turtle interactions may serve as a preventative measure if higher interaction rates are observed in the future, and if vessels are able to avoid additional interactions after encountering the first leatherback on a given trip.

Individual trip limits would provide an individual vessel incentive to avoid sea turtle interactions because shallow-set vessels may fish 500-1,000 nm from port and require considerable up-front costs for each trip, and thus a shortened trip duration may result in net loss for that trip. Given the economic disincentive of reaching the trip limit, vessel operators are more likely to employ additional avoidance strategies if they encounter multiple interactions in a trip, such as moving away from the area and avoiding areas with higher potential for interactions using information from NMFS’ TurtleWatch program. If vessels reach a trip limit once, that vessel is more likely to avoid fishing in the same area as the previous trip and employ additional avoidance strategies to

prevent further economic loss. Thus, conservation benefits are expected even before the individual trip limit is triggered.

The individual trip limit also has an inherent cooling-off period due to the distance between fishing grounds and ports in Honolulu and California where shallow-set vessels land their catch. The travel distance from port to the areas where the shallow-set vessels typically operate is at minimum 2-3 days and may take as long as 5-6 days one-way. If a vessel reaches a trip limit, the travel time back to port, time in port, and travel time to return to fishing grounds would result in a minimum of 7-10 day days of no fishing. The required time between trips differs by alternative. This time lag between the last set on the trip in which a vessel reaches a trip limit and the first set on the subsequent trip provides a cooling-off period that allows for the conditions contributing to the high interactions to dissipate and reduces the likelihood of additional interactions in that area in subsequent trips. The trip limit also places the accountability of interactions on individual vessels and ensures that the consequence burden remains with the vessel that reaches the individual trip limit.

Table 5. Number of loggerhead and leatherback turtle interactions per trip for trips with at least one interaction, 2004-2019.

Loggerhead turtles			Leatherback turtles		
Number of turtles per trip	**Number of trips**	**Percent of trips with ≥1 turtle interactions**	**Number of turtles per trip**	**Number of trips**	**Percent of trips with ≥1 turtle interactions**
1	100	74.1%	1	85	89.5%
2	24	17.8%	2	9	9.5%
3	6	4.4%	3	1	1.1%
4	2	1.5%	4	0	NA
≥5	3	2.2%	≥5	0	NA

Source: PIFSC unpublished data

Additional Restrictions on Vessels that Reach Trip Limits Twice in a Calendar Year

Alternatives 3-4 contain additional restrictions on vessels that reach individual trip limits twice in a calendar year as required under RPM 1 T&C 1b. Specifically, vessels that reach the trip limit for either leatherback or loggerhead sea turtles twice in a calendar year would be prohibited from shallow-set longline fishing for the remainder of the calendar year. In the subsequent calendar year, such vessels would be subject to an annual vessel limit equivalent to a single trip limit for that turtle species. If the vessel's cumulative number of interactions for the applicable turtle species reaches the conditional annual vessel limit in the year subsequent to reaching a trip limit twice, the vessel would be required to return to port without making additional sets, and would be prohibited from shallow-set longline fishing for the remainder of the calendar year. In the third calendar year, the vessel may resume shallow-set fishing under the regular individual trip limits, unless the vessel in its second year reaches the individual trip limit for the other species.

2.2.3 Alternative 1: No Action (Status Quo/Current Management)

Under the No Action Alternative, the Council would not recommend changes to the existing sea turtle mitigation measures, and the fishery would continue to operate under existing gear and

handling requirements, as well as the hard cap limits of 17 loggerhead sea turtles and 26 leatherback sea turtles that are codified in regulations at 50 CFR 665.813(b)(1).

Expected Fishery Outcomes

Under Alternative 1, the shallow-set fishery would continue to be managed under existing measures to minimize impacts to sea turtles, including gear and handling requirements, as well as the existing hard cap limits of 17 loggerhead turtles and 26 leatherback turtles. This alternative does not implement any measures for early response to higher interaction rates or fluctuations that may indicate a potential for higher impacts to sea turtle populations or a fishery closure early in the calendar year.

The court-ordered requirement to implement a loggerhead hard cap limit of 17 per year is based on the ITS in the 2004 BiOp. The ITS was based on predictive modeling of the anticipated level of interactions using 1994-1999 data (observer coverage of 3.3-5.8% annually for both shallow-set and deep-set longline fisheries) and applying the interaction reduction rates associated with circle hooks and mackerel bait from experimental results in the Atlantic (Kobayashi 2003). Since the shallow-set fishery's reopening in April 2004, the fishery has accumulated 15 additional years of operational data under 100% observer coverage. Additionally, improved information on loggerhead abundance and fishery impacts on population trends are available. Therefore, under the No Action Alternative, the fishery would operate under a loggerhead hard cap limit that does not reflect the best available scientific information for the species' conservation status or needs.

RPM T&C 1h of the 2019 BiOp states that, if T&C 1a and 1b have not been implemented by regulation by January 1, 2020, the shallow-set fishery may reopen under an annual interaction limit of 16 leatherback and 17 loggerhead sea turtles until such regulations are in place. Therefore, under Alternative 1, additional regulatory action would be necessary if the fleet-wide leatherback turtle interactions reach 16 to implement RPM T&C 1h of the 2019 BiOp and to ensure compliance with the ESA.

Under this alternative, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year). Sea turtle interactions are likely to fluctuate substantially between years and the fishery is likely to close early in the calendar year when loggerhead turtle interactions are higher than average due to the hard cap limit. When a hard cap is reached, the fishery remains closed until December 31 of the same calendar year, which may delay the start of the fishing season that typically starts around October.

2.2.4 Alternative 2: Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles

Under Alternative 2, the Pelagics FEP would be amended to modify mitigation measures for managing loggerhead and leatherback turtle interactions in the shallow-set fishery, consisting of annual fleet-wide hard cap limits on the number of loggerhead and leatherback turtle interactions and individual trip interaction limits. Based on the Council's recommended action at its 177th meeting, this alternative would:

1. Set an annual limit on the number of North Pacific loggerhead and leatherback turtle interactions that the Council would recommend to NMFS consistent with the anticipated level of annual interactions that is set forth in the current valid biological opinion. Once either one of these interaction limits is reached, the fishery would close for the remainder of the calendar year. The limits would initially be set at 36 loggerhead turtles consistent with the ITS in the 2019 BiOp, and 16 leatherback turtles consistent with RPM T&C 1a in the 2019 BiOp.

2. Establish individual trip limits for loggerhead and leatherback turtle interactions for the Hawaii limited entry permit vessels that declare their trips as a shallow-set trip as follows:
    i. Initially set trip limits of 5 loggerhead turtles and 2 leatherback turtles.
    ii. Upon determining that a vessel has reached either the loggerhead or the leatherback turtle trip limit based on data from NMFS observers, shallow-set vessels will be required to return to port without making additional sets.
    iii. The vessel may resume shallow-set fishing operations after returning to port and providing the required 72-hour notification under 50 CFR 665.803 prior to departure.
    iv. Annually review the shallow-set fishery's performance under the trip limits in the annual SAFE Report.
    v. The Council may make recommendations to NMFS to revise the trip limits upon periodic review of the effectiveness of the limits.

The Council's recommendation to set a loggerhead trip limit of 5 was based on the finding that it would provide a meaningful reduction in interactions in years with high interaction rates, such as those observed in 2017-2018. Observed sea turtle interaction data since 2004 indicate that most shallow-set longline trips with loggerhead turtle interactions have 1-2 interactions per trip, with a small proportion of trips having 4 or more interactions coinciding with years with the highest total fleet-wide interactions. Based on the PIFSC simulation applying different levels of trip limits to past observed interactions, a limit of 5 loggerhead turtles per trip could have reduced loggerhead turtle interactions in 2018 by 30% (see Table 21), even without accounting for avoidance behavior by the vessels. While setting the trip limit at 2, 3, or 4 loggerheads would have further reduced annual take by up to 55%, the Council determined that a trip limit of 5 would provide meaningful mitigation in light of the loggerhead's conservation status, while allowing for sustainable fishing operations.

The Council's recommendation to set a leatherback trip limit of 2 took into consideration the long-term declining trend in the population assessment conducted for the BiOp, and recognized the potential for reducing leatherback turtle interactions if vessels are able to avoid a second interaction after encountering the first leatherback on a given trip.

Alternative 2 does not require additional time in port after a vessel reaches a trip limit beyond the existing 72-hour notification requirement prior to departure under 50 CFR 665.803. The travel distance from port to the areas where the shallow-set vessels typically operate is at minimum 2-3 days and may take as long as 5-6 days one-way. If a vessel reaches a trip limit, the travel time

back to port, the required 72-hour notice, and travel time to return to fishing grounds would result in a minimum of 7-10 day days of no fishing by the applicable vessel.

This alternative would be partially consistent with RPM T&C 1b, as it would implement trip limits but does not implement additional restrictions on vessels that reach an individual trip limit twice in a calendar year. Additional action would be necessary to fully implement RPM T&C 1b and to ensure consistency with ESA.

Expected Fishery Outcomes

Under Alternative 2, the fishery would be managed under annual fleet-wide hard cap limits consistent with the best available scientific information in the current BiOp, and the additional individual trip limits that would provide an early response mechanism to higher interaction rates when the fleet-wide interaction levels are below the hard cap limit. The fleet-wide hard cap limits help ensure that loggerhead and leatherback sea turtle interactions do not exceed a threshold that triggers reinitiation of ESA consultation. The individual trip limits are expected to help ensure year-round operations of the shallow-set fishery.

This alternative would modify the loggerhead hard cap limit to be consistent with the anticipated level of annual interactions set forth in the current BiOp, and the leatherback hard cap limit to be consistent with RPM T&C 1a. This alternative would also allow the loggerhead hard cap to be revised consistent with the best available scientific information in the current BiOp, rather than being based on an outdated 2004 BiOp under the No Action Alternative. Both hard cap limits for the loggerhead and leatherback turtle would be set equal to or below the level authorized in the ITS and associated RPMs in the 2019 BiOp. This level is based on the anticipated number of interactions analyzed in the 2019 BiOp, which NMFS concluded would not jeopardize the continued existence of loggerhead and leatherback sea turtles.

The individual trip limits are expected to reduce the likelihood of reaching the loggerhead hard cap because it would prevent a large proportion of loggerhead turtles from being taken in a single trip, which are typically associated with years with high interaction rates. Under this alternative, the individual trip limit for loggerhead turtles would be initially set at 5. Based on the 2004-2018 simulation results, a limit of 5 loggerhead interactions per trip could have reduced interactions by 14% in 2017 and 30% in 2018 (see Section 4.2.2), even without accounting for avoidance behavior by the vessels. This level of reduction is expected to reduce the likelihood of reaching the annual fleet-wide loggerhead hard cap. Based on the 2004-2018 simulation results, 3% of trips with observed loggerhead interactions during that period would have been affected by a trip limit of 5 interactions, all of which would have contributed to additional reductions in interactions by returning to port.

Under this alternative, the individual trip limit for leatherback turtles would be initially set at 2, which is expected to have a limited amount of reduction in interactions based on the 2004-2018 simulation results showing a reduction of only 1 interaction over that period. Based on the simulation results, 11% of trips with observed leatherback interactions during that period would have been affected by a trip limit of 2 interactions, of which 90% of the trips affected would not have contributed to additional reductions in interactions by returning to port due to only having 2

interactions total on those trips. The leatherback trip limit provides an additional layer of protection to complement the leatherback hard cap, and may reduce or delay the likelihood that the leatherback hard cap will be reached in a given fishing year.

The individual trip limits are expected to provide an economic incentive for vessel operators to employ additional avoidance strategies if they encounter multiple interactions in a trip, such as moving away from the area and avoiding areas with higher potential for interactions using information from NMFS' TurtleWatch program. If vessels reach a trip limit once, that vessel is more likely to avoid fishing in the same area as the previous trip and employ additional avoidance strategies to prevent further economic loss. Thus, conservation benefits to loggerhead and leatherback turtles may be greater than described above based on the 2004-2018 simulation results.

Under this alternative, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year). Sea turtle interactions are likely to fluctuate substantially between years, but would be expected to remain well below the hard cap in most years and not exceed the anticipated level of loggerhead and leatherback sea turtle interactions authorized in the BiOp. Compared to the No Action Alternative, the fishery is likely to have a lower likelihood of closing early in the calendar year from reaching the hard cap due to the combination of individual trip limits and a higher loggerhead hard cap limit.

2.2.5 Alternative 3: Implement Annual Fleet-wide Hard Cap Limits and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles

Under Alternative 3, the Pelagic FEP would be amended to modify loggerhead and leatherback turtle mitigation measures for the shallow-set fishery consistent with RPM T&C 1a and 1b in the 2019 BiOp, and modify the loggerhead turtle hard cap limit equivalent to the ITS in the current BiOp. Specifically, this alternative would:

1. Set an annual fleet-wide hard cap limit on the number of leatherback turtle interactions at 16, consistent with RPM T&C 1a under the 2019 BiOp. Once this interaction limit is reached, the fishery closes for the remainder of the calendar year.

2. Set an annual fleet-wide hard cap limit on the number of North Pacific loggerhead turtle interactions that the Council would recommend to NMFS consistent with the annual number of loggerhead turtles expected to be captured in the shallow-set longline fishery, as indicated in the ITS of the current valid BiOp. Once this interaction limit is reached, the fishery closes for the remainder of the calendar year. The annual limit would be set at 36 loggerhead turtles annually, based on the 2019 BiOp.

3. Establish individual trip interaction limits for loggerhead and leatherback turtles for the Hawaii limited entry permit vessels that declare their trips as a shallow-set trip, consistent with RPM T&C 1b under the 2019 BiOp as follows:
    i. Set limits of 5 loggerhead turtles and 2 leatherback turtles per trip.

ii. Upon determining that a vessel has reached either the loggerhead or leatherback turtle trip interaction limit based on data from NMFS observers, shallow-set vessels will be required to return to port without making additional sets.
iii. The vessel will be prohibited from engaging in shallow-set longline fishing for 5 days after returning to port.
iv. Vessels that reach the trip limit for either leatherback or loggerhead sea turtles twice in a calendar year shall be prohibited from shallow-set longline fishing for the remainder of the calendar year. In the following calendar year, such vessels shall have an annual vessel limit equivalent to a single trip limit for that species in which two trip limits were reached.
v. The Council may make recommendations to NMFS to revise the individual trip limits upon periodic review of the effectiveness of the limits and consistent with the RPM of the current valid BiOp.

Alternative 3 modifies Alternative 2 (based on the Council's recommended action from the 177th Meeting) for consistency with RPM T&C 1a and 1b. The primary difference between Alternative 2 and 3 is the implementation of additional restrictions on vessels that reach an individual trip limit twice in a calendar year as required under RPM T&C 1b. Additional action would not be required under this alternative to ensure consistency with ESA.

Alternative 3 also prohibits vessels that reach an individual trip limit from engaging in shallow-set longline fishing for 5 days after returning to port, during which time NMFS is required under T&C 1b to evaluate vessel and turtle interactions to identify any problems and determine if guidance can be provided to the vessel to reduce the interactions.

RPM 1a requires setting the leatherback turtle hard cap limit at 16, but does not require a hard cap limit for loggerhead turtles. Thus, under this Alternative, the Council would go beyond what is required by the RPM. Unless otherwise required under the BiOp, the hard cap is a measure under the Pelagic FEP that the Council may recommend modifications to the limits. Under this alternative, the Council would recommend that the loggerhead hard cap limits be modified from the current limit of 17 to 36, consistent with the annual number of loggerhead turtles expected to be captured in the shallow-set longline fishery, as indicated in the ITS of the 2019 BiOp.

Expected Fishery Outcomes

Under Alternative 3, the fishery would be managed under annual fleet-wide hard cap limits consistent with RPM T&C 1a, and the additional individual trip limits that would provide an early response mechanism to higher interaction rates when the fleet-wide interaction levels are below the hard cap limit. The fleet-wide hard cap limits help ensure that loggerhead and leatherback turtle interactions do not exceed a threshold that triggers reinitiation of ESA consultation. The individual trip limits are expected to help ensure year-round operations of the shallow-set fishery.

The expected fishery outcomes of the fleet-wide hard cap limits and individual trip limits under Alternative 3 are similar to Alternative 2. The conservation benefits of the additional restrictions on vessels that reach an individual trip limit twice in a calendar year may be limited. Based on

data from 2004-2019, no Hawaii shallow-set longline vessel has had 5 or more loggerhead turtles on two separate trips in a calendar year, or 2 or more leatherback turtles on two separate trips in a calendar year, indicating that the likelihood of a vessel reaching a trip limit twice in a calendar year is very low. However, should a vessel reach a trip limit twice in a calendar year, that vessel would be prohibited from fishing in the shallow-set fishery for the remainder of the calendar year, and would be required to adhere to a vessel interaction limits of 5 loggerhead or 2 leatherback turtles in the subsequent calendar year. Under such circumstance, the vessel limit of 2 leatherbacks may deter the vessel from participating in the shallow-set longline fishery in the year that the vessel limit would apply, as the low limit may pose a high risk for entering into the fishery for the year.

Under this alternative, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year). Sea turtle interactions are likely to fluctuate substantially between years, but would be expected to remain well below the hard cap in most years and not exceed the anticipated level of loggerhead and leatherback turtle interactions authorized in the BiOp. Compared to the No Action Alternative, the fishery is likely to have a lower likelihood of closing early in the calendar year from reaching the hard cap due to the combination of individual trip limits and a higher loggerhead hard cap limit.

2.2.6 Alternative 4: Implement Annual Fleet-Wide Hard Cap Limit for Leatherback Turtles and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles (Preferred Alternative)

Under Alternative 4, the Pelagics FEP would be amended to modify loggerhead and leatherback turtle mitigation measures for the shallow-set fishery consistent with RPM T&C 1a and 1b in the 2019 BiOp, and would not set an annual fleet-wide hard cap limit for loggerhead turtles, which is not required under RPM T&C 1a. Specifically, this alternative would:

1. Set an annual fleet-wide hard cap limit on the number of leatherback turtle interactions at 16, consistent with RPMs and T&C 1a under the 2019 BiOp. Once this interaction limit is reached, the fishery closes for the remainder of the calendar year.

2. Do not set an annual fleet-wide hard cap limit on the number of North Pacific loggerhead turtle interactions. If the fishery exceeds the ITS in the current valid BiOp, Section 7 consultation would be reinitiated as required under the ESA. The authority for the Council to recommend an annual limit on the number of North Pacific loggerhead turtle interactions if necessary, would be retained in the Pelagic FEP.

3. Establish individual trip interaction limits for loggerhead and leatherback turtles for the Hawaii limited entry permit vessels that declare their trips as a shallow-set trip, consistent with RPMs and T&C 1b under the 2019 BiOp as follows:
    i. Set limits of 5 loggerhead turtles and 2 leatherback turtles per trip.
    ii. Upon determining that a vessel has reached either the loggerhead or leatherback turtle trip interaction limit based on data from NMFS observers, shallow-set vessels will be required to return to port without making additional sets.

iii. The vessel will be prohibited from engaging in shallow-set longline fishing for 5 days after returning to port.
iv. Vessels that reach the trip limit for either leatherback or loggerhead sea turtles twice in a calendar year shall be prohibited from shallow-set longline fishing for the remainder of the calendar year. In the following calendar year, such vessels shall have an annual vessel limit equivalent to a single trip limit for that species in which two trip limits were reached.
v. The Council may make recommendations to NMFS to revise the individual trip limits upon periodic review of the effectiveness of the limits and consistent with the RPM of the current valid BiOp.

Alternative 4 modifies Alternative 2 (based on the Council's recommended action from the 177th Meeting) for consistency with RPMs and T&C 1a and 1b, and thus additional action would not be required under this alternative to ensure consistency with the ESA. As previously described, T&C 1a requires setting the leatherback turtle hard cap limit at 16, but does not require a hard cap limit for loggerhead turtles. This alternative would remove the current fleet-wide loggerhead hard cap limit of 17 from existing regulations and would not replace it with a new limit. The hard caps were first implemented as a measure to control sea turtle interactions on the model shallow-set longline fishery while information was being gathered on the effectiveness of using circle hooks and mackerel-type bait in the Hawaii fishery. At the time, the best available scientific information indicated that the North Pacific loggerhead turtle population was projected to decline (WPFMC 2004). The current best available scientific information indicates that the North Pacific loggerhead population is increasing at an average rate of 2.3%, and the total population is estimated at approximately 340,000 turtles. The loggerhead hard cap would continue to be available as a management tool under the Pelagics FEP through future Council action if necessary, to conserve the species.

In the absence of a hard cap limit for loggerhead turtles, the fishery would not close if the fleet-wide number of interactions exceeds the ITS in a calendar year. However, vessels would still be constrained by the individual trip limit of 5 loggerheads as well as additional restrictions if the trip limit were reached twice in a calendar year. Consistent with the requirements of the ESA and the procedures followed for other sea turtle species and other species groups, NMFS would reinitiate consultation pursuant to ESA Section 7 if the ITS for loggerhead turtles is exceeded. The continuation of the fishery during reinitiated consultation would be evaluated under ESA Section 7(a)(2) and 7(d).

Expected Fishery Outcomes

Under Alternative 4, the fishery would be managed under an annual fleet-wide hard cap limit for leatherback turtles consistent with RPM T&C 1a, and individual trip limits for loggerhead and leatherback turtles. A fleet-wide hard cap limit of 16 for leatherback turtles represents an approximate 25% reduction in the anticipated level of take analyzed in the 2019 BiOp, and will ensure that interactions do not exceed a threshold that triggers reinitiation of ESA consultation. The expected fishery outcomes of the fleet-wide hard cap limits for leatherback turtles under Alternative 4 are similar to Alternative 2.

The fishery would not have an annual fleet-wide hard cap limit for loggerhead turtles. If the fishery exceeds the loggerhead ITS of 36 in the current BiOp, NMFS would reinitiate consultation pursuant to ESA Section 7, and the fishery may continue to operate during reinitiated consultation, subject to compliance with ESA Section 7(a)(2) and 7(d). While the ESA requires reinitiation of Section 7 consultation when an ITS is exceeded, it does not necessarily require that the fishery suspend operations upon reaching an ITS, or require hard caps or other mechanisms to close the fishery. Based on the predicted distribution of the anticipated level of loggerhead turtle interactions in the Hawaii shallow-set longline fishery (McCracken 2018), the probability that the observed number of interactions in any given 1-year period would be greater than the ITS of 36 is less than 5%. The predictions assumed that the fishery operated throughout the year for every year included in the analysis and did not truncate the predicted takes, indicating that they provide a reasonable prediction of future level of interactions in the absence of a loggerhead hard cap. The implementation of individual trip limits is expected to further reduce the probability that the fishery would exceed the ITS of 36.

The individual trip limits for loggerhead and leatherback turtles provide an early response mechanism to higher interaction rates when the fleet-wide interaction levels. The expected fishery outcomes of individual trip limits and the additional restrictions if the trip limit is reached twice in a calendar year under Alternative 4 are similar to Alternative 3.

Under this alternative, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year). Sea turtle interactions are likely to fluctuate substantially between years, but would be expected to remain well below the hard cap in most years and not exceed the anticipated level of loggerhead and leatherback turtle interactions authorized in the BiOp. Compared to the No Action Alternative, the fishery is likely to have a lower likelihood of closing early in the calendar year from reaching the hard cap due to the combination of individual trip limits and the lack of a loggerhead hard cap limit.

2.3 Alternatives Considered, but Rejected from Further Analysis

In the development of this action, the Council considered a broader range of options for measures that may be included in the management measures. Alternatives considered by the Council but not analyzed further in this document are described below.

Multi-Year Hard Cap Limits

This alternative would have modified the annual limits of loggerhead and leatherback sea turtles to a multi-year limit (2- or 3-year), consistent with the multi-year anticipated level of interactions provided in the BiOp for the shallow-set fishery. However, a multi-year limit, if implemented without an additional annual control, has the potential to close the fishery for more than one year if the fishery reaches the limit in the first year of the multi-year period. The alternative was rejected from further analysis due to the potential for an extended closure, which would be inconsistent with the purpose and need of the action to help ensure a continued supply of fresh swordfish to U.S. markets. The ESA does not necessarily mandate the use of hard caps to manage protected species interactions, and the Council does not see multi-year hard caps as necessary or appropriate to mitigate the fishery's impacts to loggerheads and leatherbacks.

In-season Temporary Closure upon Reaching a Specified Percentage of the Single-Year Hard Cap

This alternative would have implemented an additional in-season closure to the loggerhead and leatherback hard cap measure, whereby a temporary fishery closure would be implemented when a certain percentage of the fleet-wide loggerhead or leatherback turtle hard cap limits are observed during the first three quarters of the calendar year (January through September). The fishery would reopen on October 1 of the same calendar year. The percentage of the hard cap limits at which the in-season closure would be triggered would be based on observed interaction data since 2004. The Council did not select this alternative for inclusion in the management measures because the additional biological benefits from such closures would be minimal if fleet-wide hard cap limits or individual trip limits were implemented. This alternative was also rejected from further analysis as it could increase the number of closures in given year, which would be inconsistent with the purpose and need of the action to help ensure a continued supply of fresh swordfish to U.S. markets.

Individual Vessel Limits (as a Stand-Alone Measure)

This alternative would have implemented individual vessel limits on the number of loggerhead and leatherback turtle interactions that a vessel operating under the Hawaii limited entry permit vessels may have in a calendar year while fishing on trips declared as shallow-set. In other words, this measure would set a single maximum limit on the number of leatherback and loggerhead sea turtles an individual vessel could interact with in a calendar year. Upon reaching either of the limits, the vessel would be required to return to port without making additional sets and would be prohibited from shallow-set fishing for the remainder of the calendar year. The individual vessel limit would apply equally to all vessels that fish using shallow-set gear under the Hawaii limited entry permit program and all interactions by individual vessels would count toward the fleet-wide limit, if applicable.

This alternative was rejected from further consideration because the additional burden of prohibiting vessels from fishing shallow-set if vessels reached the individual vessel limits would not result in meaningful conservation gains compared to the individual trip limits included in this measure. The likelihood of vessels having multiple trips with a high number of turtle interactions in a given year is very low. For example, a simulation using available observer data from 2004-2018 to evaluate potential effects of the individual trip limits and individual vessel limits showed that an individual trip limit of 5 interactions per trip would have reduced loggerhead turtle interactions by 14-30 percent in 2017-2018, and an individual vessel limit of 5 interactions per vessel per year would have reduced interactions by 21-29 percent in 2017-2018 (See Table 21). Accordingly, the potential for interaction reductions between these two limits was quite similar.

Individual vessel limits also do not meet the action's Purpose and Need, which is to mitigate fluctuations in sea turtle interactions so as to help ensure year-round fishing operations. Individual vessel limits are likely to discourage vessels from participating in the shallow-set sector of the Hawaii longline fishery as the consequence of reaching an individual vessel limit. All vessels that participate in the shallow-set sector fish using deep-set gear for the remainder of

the year, and the vessels invest in the time and resources to seasonally switch to shallow-setting due to different requirements in gear and bait configuration. Therefore, a low leatherback turtle individual vessel limit (2 or 3 per year) would likely be perceived by fishery participants as substantial economic risk, and would likely discourage vessels from participating in the fishery.

For these reasons, the Council considered the individual vessel limits to be punitive by discouraging participation in the fishery without any conservation advantage over the individual trip limits, and thus inconsistent with the purpose and need of the action to help ensure year-round fishing operations and a continued supply of fresh swordfish to U.S. markets.

Real-Time Spatial Management Measures

This alternative would have established a process and mechanism to implement real-time spatial management measures to respond to unusually high loggerhead and leatherback interaction rates under anomalous oceanographic conditions or other unforeseen circumstances. The Council considered options at its 172nd and 173rd Meetings for establishing a monitoring mechanism utilizing observer data that would identify, on a real-time or near-real-time basis, interaction hotspots where interactions have exceeded a certain threshold. The identified hotspots would be closed to shallow-set longline fishing for a pre-determined period not exceeding 4 weeks.

Real-time spatial management measures were rejected from further consideration because they are neither practical nor feasible from a technical or management standpoint. The SSC found that information on real-time hotspots is not well known and that information is lacking on fishing behavior changes in response to sea turtle interactions. Although TurtleWatch provides useful information to fishermen on where interaction potential may be higher for loggerhead turtles based on past observer data and near real-time sea surface temperature data, the tool does not identify real-time interaction hotspots and does not inform decision-makers of the duration or size of potential hotspot closures. Data are also lacking on the effective size and duration of hotspot closures, as well as the potential for dispersed effort from such closures to areas of potentially higher sea turtle concentrations. For example, the original TurtleWatch temperature band between 17.5 and 18.5 degree Celsius is intended to encompass approximately 50 percent of the loggerhead turtle interactions, indicating that avoiding effort in that band would redistribute effort into areas where the remaining interactions have been historically observed, and may also displace effort into areas with higher interaction rates for other species of concern. We have insufficient data to conclude that actions to disperse fishing effort from a particular location will positively impact sea turtle conservation. Therefore, effectiveness of hotspot closures for loggerhead and leatherback turtles remain speculative.

Furthermore, identifying sea turtle interaction hotspots for possible closure raises significant notice and enforcement concerns. This is because NMFS, as a Federal agency, must provide the public sufficient notice on the specific geographic location and duration of any proposed closure. Similarly, law enforcement would also need this information to effectively monitor and prosecute violations of the time area closure. Because the location of the temperature band between 17.5 and 18.5 degree Celsius is dynamic and changes on a day-to-day basis, NMFS cannot predict in advance, the location of the temperature band or the location where the temperature will move from one day to the next. In summary, because there is insufficient data

to support real-time spatial management measures as an effective responsive tool to mitigate fluctuations in sea turtle interactions, this alternative was rejected from further analysis.

Time-Area Closures

This alternative would have considered static, pre-defined time-area closures for the shallow-set fishery to reduce loggerhead and leatherback turtle interactions, such as a January time-area closure previously considered in Amendment 18 to the Pelagic FMP. Observer data since 2004 indicate that there is considerable interannual variability in interactions even during peak interaction months for loggerhead and leatherback turtles. For example, January was previously selected for a time-area closure alternative in Amendment 18, but observer data indicates that eight of the years since 2004 had zero or one interaction in January, indicating that a closure in January would have provided little to no conservation benefit in those years. Pre-defined time-area closures do not meet the purpose and need for this action, which aims to develop measures intended to detect and respond to unusually high interaction rates and to minimize further interactions while helping to ensure year-round supply of swordfish to meet domestic demand. Static, pre-defined closures do not respond to current interaction data, and thus this alternative was rejected from further analysis.

Table 6. Comparison of Features of the Alternatives.

Topic	**Alternative 1:** No-action/Status Quo	**Alternative 2:** Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles	**Alternative 3:** Implement Annual Fleet-wide Hard Cap Limits and individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles	**Alternative 4 (Council Preferred Alternative):** Modify loggerhead and leatherback mitigation measures consistent with RPM T&C 1a and 1b, and do not set loggerhead fleet-wide hard cap limit
Measures included in the alternative	Status quo with hard cap limit of 17 loggerhead turtles (based on settlement agreement and court order) and 26 leatherback turtles	1) Annual fleet-wide hard cap limits for loggerhead and leatherback turtles 2) Individual trip interaction limits for loggerhead and leatherback turtles	1) Annual fleet-wide hard cap limits for loggerhead and leatherback turtles 2) Individual trip interaction limits for loggerhead and leatherback turtles with additional requirements for vessels that reach a trip limit twice in a calendar year	1) Annual fleet-wide hard cap limit for leatherback turtles 2) Do not set loggerhead turtle hard cap limit (retain as management tool under Pelagic FEP) 3) Individual trip interaction limits for loggerhead and leatherback turtles with additional requirements for vessels that reach a trip limit twice in a calendar year
Hard cap limits	Loggerhead = 17 Leatherback = 26	Loggerhead = 36 Leatherback = 16	Loggerhead = 36 Leatherback = 16	Loggerhead = no hard cap limit Leatherback = 16
Individual trip interaction limits	None	Loggerhead = 5 Leatherback = 2	Loggerhead = 5 Leatherback = 2	Loggerhead = 5 Leatherback = 2
Additional restrictions on vessels that reach trip limits twice in a calendar year	N/A	None	Vessels that reach the trip limit for either leatherback or loggerhead sea turtles twice in a calendar year shall be prohibited from shallow-set longline fishing for the remainder of the calendar year. In the following calendar year, such vessels shall have an annual vessel limit equivalent to a single trip limit for that species in which two trip limits were reached.	Vessels that reach the trip limit for either leatherback or loggerhead sea turtles twice in a calendar year shall be prohibited from shallow-set longline fishing for the remainder of the calendar year. In the following calendar year, such vessels shall have an annual vessel limit equivalent to a single trip limit for that species in which two trip limits were reached.
Expected fishery outcomes	Expected to operate within effort range observed since the reopening of the fishery in 2004 (approx. 650-1,850 sets per year).	Expected to operate within effort range observed since the reopening of the fishery in 2004 (approx. 650-1,850 sets per year).	Expected to operate within effort range observed since the reopening of the fishery in 2004 (approx. 650-1,850 sets per year).	Expected to operate within effort range observed since the reopening of the fishery in 2004 (approx. 650-1,850 sets per year).

Topic	**Alternative 1:** No-action/Status Quo	**Alternative 2:** Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles	**Alternative 3:** Implement Annual Fleet-wide Hard Cap Limits and individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles	**Alternative 4 (Council Preferred Alternative):** Modify loggerhead and leatherback mitigation measures consistent with RPM T&C 1a and 1b, and do not set loggerhead fleet-wide hard cap limit
Mechanism for early response to higher interaction rates	None. Response (fishery closure) only occurs when limit is reached.	Individual trip limits for loggerheads provide mechanism for early response to high interactions. Individual trip limits for leatherbacks may serve as a preventative measure if higher interaction rates are observed in the future.	Individual trip limits for loggerheads provide mechanism for early response to high interactions. Individual trip limits for leatherbacks may serve as a preventative measure if higher interaction rates are observed in the future.	Individual trip limits for loggerheads provide mechanism for early response to high interactions. Individual trip limits for leatherbacks may serve as a preventative measure if higher interaction rates are observed in the future.
Mechanism to help ensure year-round fishing operations	None. Occasional fleet-wide closure expected from reaching the hard cap limit.	Individual trip limits expected to reduce likelihood of reaching hard cap limits, providing a greater likelihood that the fishery maintains year-round operations.	Individual trip limits expected to reduce likelihood of reaching hard cap limits, providing a greater likelihood that the fishery maintains year-round operations. Additional requirements for vessels that reach trip limits twice in a calendar year may further prevent the fishery from reaching hard cap limits, although likelihood of a vessel reaching trip limits twice is low based on past data.	Individual trip limits are expected to reduce likelihood of reaching leatherback hard cap limit, providing a greater likelihood that the fishery maintains year-round operations. Additional requirements for vessels that reach trip limits twice in a calendar year may further prevent the fishery from reaching leatherback hard cap limit, although likelihood of a vessel reaching trip limits twice is low based on past data. Fleet-wide hard cap closure only applies to leatherback turtles. If the fishery exceeds the ITS of 36 loggerhead turtle interactions in the 2019 BiOp, NMFS would reinitiate consultation pursuant to ESA Section 7, and the fishery may continue to operate during reinitiated consultation, subject to compliance with ESA Section 7(a)(2) and 7(d).
Mechanism for addressing conservation needs of loggerhead and leatherback turtles	Hard cap limits help ensure that interactions remain below a fixed level analyzed in the BiOp.	Hard cap limits help ensure that interactions remain below a fixed level analyzed in the BiOp. Individual trip limits expected to reduce likelihood of reaching hard cap limits and consequently reduce the total fleet-wide number of interactions.	Hard cap limits help ensure that interactions remain below a fixed level analyzed in the BiOp. Individual trip limits expected to reduce likelihood of reaching hard cap limits and consequently reduce the total fleet-wide number of interactions.	Hard cap limit for leatherback turtles help ensure that interactions remain below a fixed level analyzed in the BiOp. Individual trip limits expected to reduce likelihood of reaching hard cap limits and consequently reduce the total fleet-wide number of interactions.

Topic	**Alternative 1:** No-action/Status Quo	**Alternative 2:** Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles	**Alternative 3:** Implement Annual Fleet-wide Hard Cap Limits and individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles	**Alternative 4 (Council Preferred Alternative):** Modify loggerhead and leatherback mitigation measures consistent with RPM T&C 1a and 1b, and do not set loggerhead fleet-wide hard cap limit
Consistency with RPM T&C 1a and 1b	Not consistent.	Partially consistent.	Fully consistent.	Fully consistent.

3 AFFECTED ENVIRONMENT

This section describes the baseline condition of resources in the action area under recent fishery conditions. The environmental resources that are potentially affected include target and non-target species and protected resources. This section also describes the socioeconomic and management setting, as well resources eliminated from detailed analysis. NMFS and the Council derive the information in this section primarily from the 2018 SAFE report (WPFMC 2019), 2019 BiOp (NMFS 2019), and other available information cited below.

3.1 Target and Non-Target Stocks

This section identifies the PMUS managed under the Pelagics FEP harvested in the shallow-set fishery. This includes several species of tunas, billfishes and sharks. This section also briefly summarizes the overfishing and overfished status of PMUS where known. For a comprehensive discussion of the biology and life history of PMUS, see the Pelagics FEP (Pelagics FEP).

The Pelagics FEP also includes criteria for overfishing and overfished status determinations. Overfishing occurs when the fishing mortality rate (F) for one or more years is greater than the maximum fishing mortality threshold (MFMT), which is the fishing mortality rate that produces maximum sustainable yield (FMSY). Thus, if the F/FMSY ratio is greater than 1.0, overfishing is occurring.

A stock is considered overfished when its biomass (B) has declined below the minimum stock size threshold (MSST), or the level that jeopardizes the capacity of the stock to produce maximum sustainable yield on a continuing basis (BMSY). Specifically, the BMSST = (1-M) BMSY, where M is the natural mortality rate of the stock, or one-half of BMSY, whichever is greater. For example, if the natural mortality rate of a stock is 0.35, BMSST = 0.65*BMSY. Thus, if the B/BMSY ratio for the stock falls below 0.65, the stock is overfished. If a stock has a natural mortality rate greater than 0.6, MSST is set at the default of 0.5*BMSY (because 1- 0.6 =.4, and 0.5 is greater than 0.4). For such a stock, the stock is overfished when the B/BMSY ratio falls below 0.5. It is important to note that NMFS' National Standard 1 guidelines at 50 CFR 665.310(e)(1)(i)(C) defines BMSY as the long-term average size of the stock measured in terms of spawning biomass (SB) or other appropriate measure of the stock's reproductive potential that would be achieved by fishing at BMSY. Thus, whenever available, NMFS uses estimates of SB in determining the status of a stock. When estimates of SB are not available, NMFS may use estimates of total biomass, or other reasonable proxies for determining stock status.

The following table, Table 7, shows the stock status determinations of PMUS under the Pelagics FEP as described in the 2018 SAFE report and other sources cited below. For a more comprehensive table of metrics, including the overfishing and overfished reference points respectively, natural mortality, and MSST, see the 2018 SAFE report (WPFMC 2019). Additional information on the status of stocks, where known, are described thereafter. Because U.S. landings by stock are reported as the "Hawaii longline fisheries", we use the combined deep-set and shallow-set fishery in our descriptions below.

Table 7. Stock status of PMUS under the Pelagics FEP.

PMUS Stock	Is overfishing occurring?	Is the stock overfished?	Assessment Results
Swordfish (WCNPO)	No	No	ISC 2018
Swordfish (EPO)	Yes, because F > MFMT	No	ISC 2014
Skipjack Tuna (WCPO)	No	No	McKechnie et al. 2016
Yellowfin Tuna (WCPO)	No	No	Tremblay-Boyer et al. 2017
Yellowfin Tuna (EPO)	Yes, because F>MFMT	No	Minte-Vera et al. 2018
Albacore (N. Pacific)	No	No	ISC 2017
Bigeye Tuna (WCPO)	No	No, because SSB>MSST	Vincent et al. 2018
Bigeye Tuna (EPO)	NA	NA	Maunder et al. 2018
Pacific Bluefin Tuna	Yes, because F>MFMT	Yes, because SSB<MSST	ISC 2018
Blue Marlin (Pacific)	No	No	ISC 2016
Striped Marlin WC (N. Pacific)	Yes, because F>MFMT	Yes, because SSB_{2017}<MSST	ISC 2019
Striped Marlin (NEPO)	No	No	Hinton and Maunder 2011
Blue Shark (N. Pacific)	No	No	ISC 2015
Oceanic White-tip Shark (WCPO)[1]	Yes	Yes	Tremblay-Boyer et al. 2019
Silky Shark (WCPO)	No	No	Clarke et al. 2018
Shortfin Mako Shark (N. Pacific)	No	No	ISC 2018
Common Thresher Shark (N. Pacific)	No	No	Teo et al. 2018
Other Billfishes[2]	Unknown	Unknown	--
Other Pelagic Sharks[3]	Unknown	Unknown	--
Other PMUS[4]	Unknown	Unknown	--

[1]Beacuse the oceanic whitetip shark is listed as endangered under the ESA, this species is described in more detail in section 3.2 and 3.2.6.
[2]Black Marlin (Pacific), Shortbill Spearfish (Pacific), Sailfish (Pacific)
[3]Silky Shark (EPO), Longfin Mako Shark (N. Pacific), Bigeye Thresher Shark (N. Pacific), Pelagic Thresher Shark (N. Pacific), Salmon Shark (N. Pacific)
[4]Skipjack Tuna (EPO), Dolphinfish (Pacific), Wahoo (Pacific), Oprah (Pacific), Pomfret (family *Bramidae*, W. Pacific), Kawakawa (Pacific), Oilfish (family *Gempylidae*, Pacific), other tuna relatives *(Auxis* spp., *Allothunnus* spp., and *Scomber* spp, Pacific), Squids (Pacific)

Swordfish (WCNPO)

Swordfish (*Xiphias gladius*) are the primary target species of the shallow-set fishery, typically comprising 90% of the landed catch. Swordfish are worldwide in distribution in all tropical, subtropical and temperate seas, ranging from around 50° N to 50° S (Nakamura 1985; Bartoo and Coan 1989). The adults can tolerate a wide range of water temperature, from 5°-27° C, but are normally found in areas with sea surface temperatures above 13° C (Nakamura 1985). Larvae and juveniles occur in warmer tropical and subtropical regions where spawning also occurs. Swordfish occur throughout the region and in the EEZs of neighboring countries and adjacent high seas.

In 2014, the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) completed a stock assessment for North Pacific swordfish using data through 2012 (ISC 2014). Based on the best scientific information available, the swordfish population in the North Pacific is comprised of two stocks, separated by a roughly diagonal boundary extending from Baja California, Mexico, to the Equator. These are the Western Central North Pacific Ocean (WCNPO) stock, distributed in the western and central Pacific Ocean, and the East Pacific Ocean (EPO) stock, distributed in the eastern Pacific Ocean (Fig 2). The shallow-set longline fishery predominately catches swordfish from the WCNPO stock.

The results of the most recent assessment support the conclusion that the WCNPO stock is not subject to overfishing because $F_{2013\text{-}2015}/F_{MSY} = 0.45$, and is not overfished because $SB_{2016}/SB_{MSY} = 1.87$ (ISC 2018). The 2018 stock assessment estimated MSY for the WCNPO stock at 14,941 t (ISC 2018b). In 2018, total landings of swordfish from the Hawaii longline fisheries (deep-set and shallow-set combined) in the North Pacific Ocean (NPO) was 590 t (WPFMC 2019), or nearly 4% of MSY.

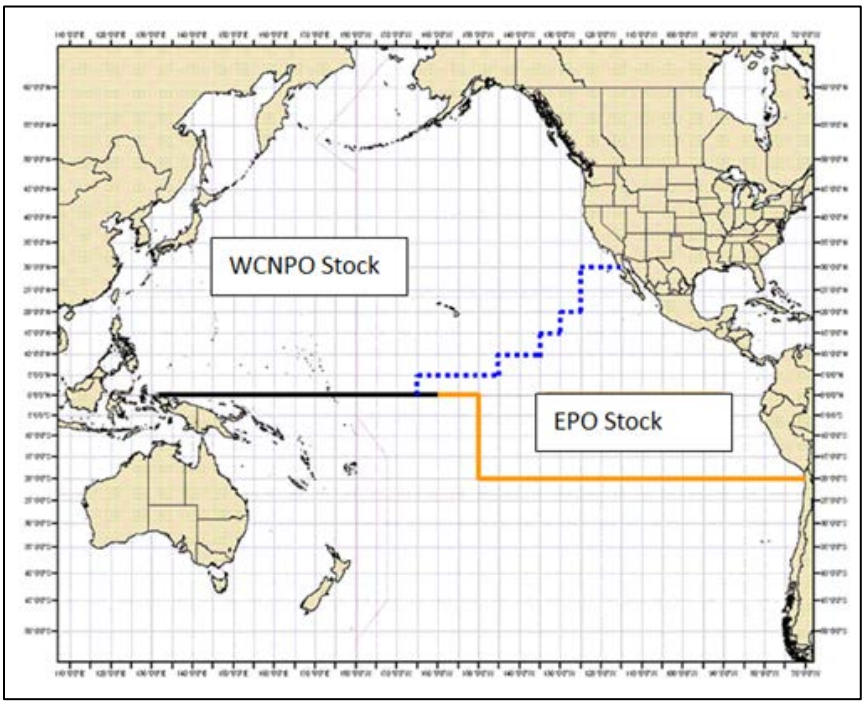

Figure 2. Geographic regions separating WCNPO and EPO swordfish stocks.

Swordfish (EPO)

The results of the most recent assessment (ISC 2014), using data through 2012, support a conclusion that the EPO stock is now subject to overfishing because F_{2012}/F_{MSY} = 1.11, but is not overfished because B_{2012}/B_{MSY} = 1.87. The 2014 stock assessment estimated MSY for the EPO stock at 5,490 t (ISC 2014). Based on federal logbook records, catch of swordfish by the U.S. longline vessels operating within the boundary of the EPO stock is less than 5 t annually in years 2004-2018 (NMFS unpublished data). This amount (< 5 t) is less than 1% of the estimated MSY; therefore, the relative impact of the U.S. longline fisheries on the stock is negligible.

Skipjack Tuna (WCPO)

McKechnie et al. (2016) conducted the most recent assessment of skipjack tuna in the Western and Central Pacific Ocean (WCPO) using data up to 2015. The median estimates of the ratio of current fishing mortality to fishing mortality at MSY (F_{2011}/F_{MSY}) = 0.48 indicate that overfishing of skipjack is not occurring in the WCPO. Nor is the stock in an overfished state with spawning biomass to spawning biomass at MSY (SB_{2011}/SB_{MSY}) = 2.15. Fishing pressure and recruitment variability (influenced by environmental conditions) will continue to be the primary influences on stock size and fishery performance (McKechnie et al. 2016). McKechnie et al. (2016) estimate MSY at 1,875,600 t. In 2018, total skipjack tuna landings by Hawaii longline fisheries was 150, or 0.01% of the estimated MSY t (WPFMC 2019).

Yellowfin Tuna (WCPO)

Tremblay-Boyer et al. (2017) conducted the most recent stock assessment for yellowfin tuna in the WCPO. Yellowfin is not subject to overfishing or overfished. Similar to the bigeye assessment, the Western and Central Pacific Fisheries Commission (WCPFC) Scientific Committee endorsed a weighted assessment model uncertainty grid to characterize stock status. Scientific Committee 13 noted that the central tendency of relative recent spawning biomass was median ($SB_{recen}t/SB_{F=0}$) = 0.33 with a probable range of 0.20 to 0.41 (80% probable range), and that there was a roughly 8% probability (4 out of 48 models) that the recent spawning biomass had breached the WCPFC limit reference point. The central tendency of relative recent fishing mortality was median (F_{recent}/F_{MSY}) = 0.74 with an 80% probability interval of 0.62 to 0.97, and there was a roughly 4% probability (2 out of 48 models) that the recent fishing mortality was above F_{MSY} (WCPFC 2017). In 2018, total yellowfin tuna landings by the Hawaii longline fisheries was 1,868 t or less than 1% of the estimated MSY (WPFMC 2019).

Yellowfin Tuna (EPO)

The Inter-American Tropical Tuna Commission (IATTC) assessed yellowfin tuna in the EPO in 2018 and found that the stock is subject to overfishing (F/F_{MSY} = 1.01) and is not overfished ($SB_{2015-2017}/SB_{MSY}$=1.08) (WPFMC 2019; Minte-Vera et al. 2018). In 2017, U.S. longline fisheries landed 530 t of yellowfin tuna in the EPO, or less than one percent of the estimated MSY of 264,283 t (Minte-Vera et al. 2018). The 2017 U.S. longline total is 0.25% of the 2017

total catch of yellowfin in the EPO (IATTC 2018). Therefore, the relative impact of the U.S. longline fisheries on the stock is negligible.

Albacore (N. Pacific)

The ISC in 2017 completed the most recent stock assessment of North Pacific albacore, which uses data through (ISC 2017b). The assessment indicates that the stock is likely not overfished relative to the limit reference point adopted by the WCPFC (20% $SSB_{current}$, F=0), and no F-based reference points have been adopted to evaluate overfishing, but stock status was evaluated against seven potential LRPs and current fishing intensity ($F_{2012-2014}$) is below six of the seven reference points except for $F_{50\%}$. In 2018, total albacore tuna landings in the North Pacific by the Hawaii longline fisheries was 59 t, or less than one percent of the estimated MSY (WPFMC 2019). The shallow-set fishery fleet does not operate in the south Pacific Ocean and they do not catch the South Pacific Albacore stock.

Bigeye Tuna (WCPO)

The Secretariat of the Pacific Community (SPC) prepared the most recent stock assessment for WCPO bigeye tuna in July 2017, updated August 2018, which covers bigeye tuna from Indonesia in the far western Pacific, to 150° W in the central Pacific Ocean (McKechnie et al. 2017; Vincent et al. 2018). The 2017 and 2018 assessment reports update the 2014 stock assessment by incorporating additional bigeye catch data from 2013-2015, and investigating alternative regional bigeye tuna stock structure in combination with a new bigeye tuna growth curve. The new growth model suggests bigeye tuna is more productive than previously assumed.

Based on the uncertainty grid adopted by Scientific Committee 14, the WCPO bigeye tuna spawning biomass is likely above the MSST of the Pelagics FEP and the WCPFC's biomass Limit Reference Point (LRP). Additionally, recent F is likely below F_{MSY} (MFMT). Therefore noting the level of uncertainties in the current assessment it appears that the stock is not experiencing overfishing (94% probability, 34 of 36 models) and it appears that the stock is not in an overfished condition (100% probability) with respect to WCPFC-adopted LRP in 2015 (SB_{latest}/SB_{MSY}). The central tendency of relative recent SB under the selected new and old growth curve model weightings in the absence of fishing was median ($SB_{recent}/SB_{F=0}$) = 0.42 with a range of 0.251 to 0.452 and (SB_{latest}/SB_{MSY} = 1.624) with a range of 1.146 and 2.187. There was a roughly 6% probability (2 out of 36 models) that the recent spawning biomass (SB_{recent}, 2012-2015) had breached the adopted LRP (WCPFC 2018).

In 2018, total WCPO bigeye tuna landings by the Hawaii longline fisheries was 3,392 t, or less than 3% of the estimated median MSY of 159,020 t (Vincent, Pilling et al. 2018). U.S. and U.S. participating territory longline catches make up 3% of the estimated total catch of WCPO bigeye tuna.

Bigeye Tuna (EPO)

The IATTC assessed bigeye tuna in the EPO in 2018 and the assessment results indicate F/F_{MSY} = 1.15 and $SB_{2014-2016}/SB_{MSY}$ = 1.02 (Xu, Minte-Vera et al. 2018). This substantial change in the

reference points from the previous year's assessment, which were $F/F_{MSY} = 0.87$ and $SB_{2014-2016}/SB_{MSY} = 1.23$ (Aires-da-Silva, Minte-Vera et al. 2017), triggered IATTC to investigate the cause of the change. The authors attribute the change in status to new data for the indices of relative abundance, based on longline catch-per-unit-effort (CPUE), which resulted in lower estimates of recent biomass. Such changes caused by the addition of new data indicate that the model is mis-specified (Maunder, Xu et al. 2018). There is substantial uncertainty in the estimate of current fishing mortality and in the model assumptions used (Xu, Minte-Vera et al. 2018) and the relative contribution of assessment uncertainty and variability in the relationship between fleet capacity and fishing mortality to the overfishing reference point are also unknown (Maunder, Xu et al. 2018). NMFS has not accepted the Xu, Minte-Vera et al (2018) assessment as suitable for making stock status determinations for EPO bigeye tuna (NMFS 2018a).

NMFS has noted that the EPO bigeye tuna stock is under increasing fishing pressure, especially from the purse seine fish aggregating device (FAD) fishery. The report on indicators for bigeye stock status, however, does not provide the information required by the Pelagics FEP for making a status determination (NMFS 2018a). In 2018, total bigeye tuna landings in the EPO by all U.S. longline vessels was 2,389 t or 2.8% of the estimated MSY of 95,491 t (WPFMC 2019; Xu et al. 2018). Therefore, the relative impact of the U.S. longline fisheries on the stock is negligible.

Pacific Bluefin Tuna

Scientists consider Pacific bluefin tuna as a single North Pacific-wide stock. The most recent assessment of the status of Pacific bluefin tuna used data through 2016, and concluded that the stock is still experiencing overfishing and is overfished (ISC 2018b). The ISC assessment estimated the $F/F_{MSY} = 1.17$ and SB/MSST= 0.21. Current spawning biomass is estimated at 21,000 t in 2016, up from near a near historical low in 2010 (ISC 2018a). In 2018, total North Pacific bluefin tuna landings by all U.S. longline fisheries was 0 t. The relative impact of the U.S. longline fisheries on the stock continues to be negligible, and overfishing of the stock is likely due to excessive international fishing pressure (WPFMC 2019). NMFS continues to work with the Pacific and Western Pacific Fishery Management Councils and the State Department to ensure that WCPFC and IATTC adopt effective management measures to end overfishing and rebuild the stock.

Striped Marlin (WCNPO)

The results of a 2019 stock assessment (ISC 2019) indicate the WCNPO stock of striped marlin continues to be subject to overfishing (F/F_{MSY} is =1.07) and overfished ($SB/SB_{MSY} = 0.38$). The 2015 stock assessment estimated MSY at 4,964 t. CMM 2010-01 for North Pacific striped marlin adopted by the WCPFC requires members and cooperating non-members to limit striped marlin landings by all gears from their highest catches from 2000-2003, and then further reduce catches by 10% in 2011, 15% in 2012, and 20% in 2013. The Small Island Developing States (SIDS) and Participating Territories (PTs) are exempt from catch limits under the measure. The highest striped marlin catch by U.S. fisheries between 2000 and 2003 was 571 t. Thus, a 20% reduction from 571 t is 457 t. Reported catches of WCNPO striped marlin in 2017 by all fishing nations totaled 2,487 t. Vessels in the Hawaii-based longline fishery account for nearly all of the U.S. domestic landings of WCNPO striped marlin, and approximately 13 percent of the total WCNPO

landings in 2017. On average from 2011 through 2017, U.S. catch was 15 percent of total WCPFC catch. In 2018, total WCNPO striped marlin landings by the Hawaii longline fisheries was 332 t, or about 7% of MSY. Thus, overfishing of the stock is due to excessive international fishing pressure and the IATTC and WCPFC have inadequate measures in place to address the issue. Nonetheless, NMFS continues to work with the Pacific and Western Pacific Fishery Management Councils and the State Department to ensure that the WCPFC and IATTC adopt effective management measures to end overfishing.

Striped Marlin (NEPO)

The results of the 2011 stock assessment (Hinton and Maunder 2011) indicate that the Northeastern Pacific Ocean (NEPO) striped marlin stock is not overfished or experiencing overfishing. The stock biomass has increased from a low of about 2,600 t in 2003, and was estimated to be about 5,100 t in 2009. There has been an increasing trend in the estimated ratio of the observed annual spawning biomass to the spawning biomass in the unexploited stock, which has doubled from about 0.19 in 2003 to about 0.38 in 2009. The estimated ratio of spawning biomass in 2009 to that expected to provide catch at the level of MSY, SB_{2009}/SB_{MSY}, was about 1.5, which indicates that the spawning biomass was above the level expected to support MSY. The estimated recent levels of fishing effort (average 2007-2009) were below those expected at MSY (Hinton and Maunder 2011). Between 2014 and 2018, Hawaii longline catches of NEPO striped marlin ranged between 69 and 90 t annually, which is no greater than two percent of the stock's biomass (WPFMC 2019).Therefore, the relative impact of the U.S. longline fisheries on the stock is negligible.

Blue Shark (N. Pacific)

The results of the 2017 assessment (ISC 2017a) indicate the North Pacific blue shark is not subject to overfishing ($F_{2012\text{-}2014}/F_{MSY} = 0.37$), and is not overfished ($SB_{2012\text{-}2014}/SB_{MSY} = 1.71$). The 2017 stock assessment estimated SB_{MSY} at 179,539 t. In 2018, total blue shark landings by the Hawaii longline fleet was 0 t (WPFMC 2019). The majority of blue sharks caught in US longline fisheries are returned to the sea alive, with some discarded dead as well.

Silky Shark (WCPO)

Silky sharks have a restricted habitat range compared to the other highly migratory species (HMS) but within this range, they dominate both longline and purse seine catches (Rice and Harley 2013). Research conflicts on stock boundaries of silky sharks, which complicates development of a pan-Pacific assessment model (Clarke, Langley et al. 2018). Additionally, CPUE indices from WCPO and EPO fisheries show correlations with oceanographic conditions, so may not represent reliable indices of abundance and may bias indicators of stock status (Clarke, Langley et al. 2018; Lennert-Cody et al. 2018). Based on apparent declines and in the absence of better scientific information, both the WCPFC and the IATTC implemented precautionary measures to prohibit vessels from retaining any part or carcass of a silky shark, except to assist WCPFC observers in collection of samples. A pan-Pacific assessment was completed in 2018, but the authors cautioned that estimates of stock status reference points for

determining whether the stock is experiencing overfishing or is overfished are unreliable and should not be used as the basis for management advice (Clarke, Langley et al. 2018).

The assessment by Rice and Harley (2013) for the WCPO concluded that catches at the time were higher than the MSY (5,331 t versus 1,994 t), and further catch at current levels of fishing mortality would continue to deplete the stock below MSY. Overfishing is occurring because $F/F_{MSY} = 4.32$ and stock is overfished because $SB/SB_{MSY} = 0.72$. Bycatch from the longline fishery accounts for the greatest impact to the stock, but there are also impacts from the associated purse seine fishery, which catches predominantly juvenile individuals. Given the bycatch nature of fishery impacts, mitigation measures provide the best opportunity to improve the status of the silky shark population (Rice and Harley 2013) and the Scientific Committee 9 recommended that the WCPFC also consider measures directed at targeted catch, such as from shark lines (WCPFC 2012). In 2018, total silky shark landings by the Hawaii longline fisheries in the WCPO was 0 t, demonstrating full compliance with requirements prohibiting the landing of silky sharks (WPFMC 2019).

Clarke, Langley et al. (2018) assessed silky sharks in the WCPO in 2018, given the difficulty of assessing a pan-Pacific stock. The assessment results were that $F_{2016}/F_{MSY} = 1.607$ and $SB_{2016}/SB_0 = 0.469$, with a 72% probability that current biomass is above biomass at MSY (Clarke, Langley et al. 2018).

Shortfin Mako Shark (N. Pacific)

In 2018, ISC concluded the first full stock assessment of shortfin mako shark in the NPO (ISC 2018c). Previous abundance indices showed conflicting trends from which stock status could not be determined (ISC 2018c). The new assessment used data through 2016, and assumed a single stock in the NPO (ISC 2018c). The results indicate that the stock is likely (> 50%) not subject to overfishing because $F_{2013\text{-}2015}/F_{MSY} = 0.62$, and is likely (> 50%) not overfished because $SA_{2016}/SA_{MSY} = 1.36$. Spawning abundance (SA) was used instead of spawning biomass because the size of mature female sharks does not appear to affect the number of pups produced (ISC 2018c).

ISC estimated the MSY at 3,127 t (ISC 2018c). In 2018, total mako shark landings Hawaii longline fisheries in the North Pacific Ocean was 60 t, or less than two percent of the MSY (WPFMC 2019).

Oceanic Whitetip Shark (WCPO)

In 2019, the Shark Working Group of the WCPFC completed a stock assessment for the portion of the oceanic white tip shark in the WCPO, using data through 2016 (Tremblay-Boyer et al 2019. The 2019 assessment provides an update of the previous stock assessment by Rice and Harley (2012), including seven years of additional data and a revised assessment model within the same modeling framework (Stock Synthesis v.3.30.08.03). This stock assessment included participation by NMFS scientists. This assessment was discussed, reviewed, and approved by the Scientific Committee of the WCPFC in August 2019, and by the WCPFC in December 2019. Based on this review, PIFSC determined on April 10, 2020 that this assessment meets

requirements under National Standard 2 of the Magnuson-Stevens Act as the best scientific information available. Subsequently, NMFS determined the stock is subject to overfishing and notified the Council to take steps required under the Magnuson-Stevens Act 304(i).

Although the WCPFC has not adopted SDC for determining stock status, the stock assessment considered the stock to be overfished and experiencing overfishing. This assessment also supports a domestic determination that the stock is subject to overfishing because F_{2016} (0.177) is greater than the MFMT (0.057) and overfished because the SB_{2016} (298 t) is less than the MSST of 2,661 t.

Since the WCPFC agreed upon CM-2011-04 to prohibit retention of oceanic whitetip sharks in 2013, preliminary estimates of average catch of this species from all commercial fisheries including interactional fisheries from 2013 through 2017 are 566 individuals per year in purse-seine fisheries (Peatman et al. 2018a), 16,920 individuals in shallow set fisheries, and 36,020 individuals in deep-set fisheries (Peatman et al. 2018b). For fisheries under Council jurisdiction, estimated average annual catch over this period in Hawaii shallow-set longline fishery, catch was 26 individuals, or 0.15 percent of shallow-set catch in the WCPO (WPFMC 2019). Therefore, the relative impact of the U.S. shallow-set longline fishery on the stock is negligible.

Summary of Hawaii Shallow-set Longline Catch Statistics

The following table, Table 8, summarizes the released catch, retained catch, and total catch for the shallow-set fishery in 2018. These and other catch statistics for the shallow set fishery can be found in the 2019 SAFE report (WPFMC 2019).

Table 8. Released catch, retained catch, and total catch (number of fish) for the Hawaii shallow- set longline fishery, 2018.

	Released Catch	Percent Released	Retained Catch	Total Catch
Tuna				
Albacore	1	0.7	136	137
Bigeye tuna	70	5.4	1,221	1,291
Bluefin tuna	0	0.0	2	2
Skipjack tuna	0	0.0	16	16
Yellowfin tuna	17	2.2	761	778
Other tuna	0	0.0	0	0
Total tunas	**88**	**4.0**	**2,136**	**2,224**
Billfish				
Swordfish	466	7.6	5,644	6,110
Blue marlin	3	60.0	2	5
Striped marlin	21	33.9	41	62
Spearfish	5	11.4	39	44
Other marlin	0	0.0	0	0
Total billfish	**495**	**8.0**	**5,726**	**6,221**
Other PMUS				
Dolphinfish	13	2.0	626	639
Wahoo	2	7.7	24	26
Moonfish	15	8.7	157	172
Oilfish	103	60.9	66	169
Pomfret	7	29.2	17	24
Total other	**140**	**13.6**	**890**	**1,030**

	Released Catch	Percent Released	Retained Catch	Total Catch
Non-PMUS fish	**0**	**0.0**	**0**	**0**
PMUS Sharks				
Blue shark	2,538	100.0	0	2,538
Mako shark	283	81.8	63	346
Thresher shark	24	96.0	1	25
Oceanic whitetip shark	0	0.0	0	0
Silky shark	0	0.0	0	0
Total PMUS sharks	**2,845**	**97.8**	**64**	**2,909**
Non-PMUS Sharks	**1**	**100.0**	**0**	**1**
Grand Total	**3,569**	**28.8**	**8,816**	**12,385**

Source: 2018 SAFE Report

3.2 Protected Resources

The shallow-set fishery has the potential to interact with a range of protected species (such as sea turtles, marine mammals, sharks and rays, and seabirds). Section 3.2.1 provides a summary of the 2019 BiOp (NMFS 2019). Sections 3.2.2 to 3.2.5 will describe in more detail those protected species most likely to be affected by the shallow-set fishery (sea turtles, marine mammals, sharks and rays, and seabirds respectively). We consider the analysis provided in the 2019 BiOp, along with recent interaction levels, to be the baseline condition for comparison of environmental effects of the alternatives in Section 4. NMFS monitors fishery interactions with protected species using at-sea observers, among other means, on 100% of shallow-set fishing trips (i.e., 100% observer coverage).

The following list identifies the valid BiOps under which the shallow-set fishery currently operates. These documents describe, in detail, the baseline conditions for listed species in the action area. For further information, including copies of these BiOps, contact NMFS using the contact information at the beginning of the document.

NMFS. 2019, Biological Opinion on the Continued Authorization of the Hawaii Pelagic Shallow-set Longline Fishery.

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.

3.2.1 Summary of the 2019 Biological Opinion on the Continued Authorization of the Hawaii Shallow-set Longline Fishery

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 (collectively known as the "Services"). The product of formal consultation is the Service's biological opinion. Federal agencies need not engage in formal consultation 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 of listed species except under limited circumstances. Western Pacific fisheries authorized under the Pelagics FEP operate in accordance with an ITS set by ESA consultations, including applicable T&Cs. The consultations consider the potential interactions of fisheries with listed species, the effects of interactions on the survival and recovery of listed species, and the protection of designated critical habitat.

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.

The following table, Table 9, provides a summary of ESA listed species, and critical habitat that overlap in the action area, and have the potential to interact with the shallow-set fishery as described in the 2019 BiOp (NMFS 2019). The 2019 BiOp also discusses the potential for coastal exposure for listed fish, marine invertebrates, and other critical habitat in vessel transiting areas of the shallow-set fishery primarily in California (Long Beach, San Francisco, and San Diego). However, NMFS has determined that for all the species in the category of potential coastal exposures, effects from all or any stressors related to vessel transiting to be highly unlikely and therefore discountable. For detailed information on these listed resources, see the 2019 BiOp (NMFS 2019).

Table 9. ESA listed marine species and critical habitat with the potential to interact with the Hawaii shallow-set longline fishery.

Species Common Name	Species Scientific Name	Listing Status	Date Listed	Federal Register Citation
Sea Turtles				
Loggerhead, North Pacific DPS	*Caretta*	Endangered	9/22/2011	76 FR 58868
Leatherback Turtle Population	*Dermochelys coriacea*	Endangered	6/2/1970	35 FR 8491
Olive Ridley Sea Turtle Populations	*Lepidochelys olivacea*	Threatened [1]	7/28/1978	43 FR 32800
East Indian-West Pacific Green Sea Turtle DPS	*Chelonia mydas*	Threatened	4/6/2016	81 FR 20058
Central West Pacific Green Sea Turtle DPS	*C. mydas*	Threatened	4/6/2016	81 FR 20058
Southwest Pacific Green Sea Turtle DPS	*C. mydas*	Threatened	4/6/2016	81 FR 20058
Central South Pacific Green Sea Turtle DPS	*C. mydas*	Threatened	4/6/2016	81 FR 20058

Species Common Name	Species Scientific Name	Listing Status	Date Listed	Federal Register Citation
Central North Pacific Green Sea Turtle DPS	*C. mydas*	Endangered	4/6/2016	81 FR 20058
East Pacific Green Sea Turtle DPS	*C. mydas*	Endangered	4/6/2016	81 FR 20058
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	7/28/1978	43 FR 32800
Marine Mammals				
Guadalupe Fur Seal	*Arctocephalus townsendi*	Threatened	12/16/1985	50 FR 51252
False Killer Whale, Main Hawaiian Island Insular DPS	*Pseudorca crassidens*	Endangered	11/28/2012	75 FR 70169
Humpback Whale, Mexico DPS	*Megaptera novaeangliae*	Threatened	9/8/2016	81 FR 62259
Fin Whale	*Balaenoptera physalus*	Endangered	12/2/2011	35 FR 18319
Blue Whale	*B. musculus*	Endangered	12/2/1970	35 FR 18319
North Pacific Right Whale	*Eubalaena japonica*	Endangered	3/6/2008	73 FR 12024
Sei Whale	*B. borealis*	Endangered	12/2/1970	35 FR 18319
Sperm Whale	*Physeter macrocephalus*	Endangered	12/2/1970	35 FR 18319
Hawaiian Monk Seal	*Neomonachus schauinslandi*	Endangered	11/23/1976	41 FR 51611
Sharks and Rays				
Scalloped Hammerhead Shark, Eastern Pacific DPS	*Sphyrna lewini*	Endangered	7/3/2014	79 FR 38213
Oceanic Whitetip Shark	*Carcharhinus longimanus*	Threatened	1/30/18	83 FR4153
Giant Manta Ray	*Manta birostris*	Threatened	1/22/18	83 FR 2916
Seabirds				
Hawaiian Dark-rumped Petrel	*Pterodroma phaeopygia sandwichensis*	Endangered	3/11/1967	32 FR 4001
Newell's Shearwater	*Puffinus auricularis newelli*	Threatened	10/28/1975	40 FR 44149
Short-tailed Albatross	*Phoebastria albatrus*	Endangered	6/2/1970	35 FR 8491
Critical Habitat				
Hawaiian Monk Seal	--	Designated	8/21/2015	80 FR 50926
False Killer Whale, MHI Insular DPS	--	Designated	7/24/2018	83 FR 35062
Leatherback (West Coast)	--	Designated	1/26/2012	77 FR4170

[1]The eastern Pacific population includes nesting aggregations on the coast of Mexico, which are listed under the ESA as endangered.

On April 20, 2018, NMFS requested reinitiation of formal consultation under ESA Section 7 for the continued authorization of the shallow-set fishery as currently managed under the existing regulatory framework of the Pelagics FEP and other applicable laws. Consistent with 50 CFR 402.16, NMFS reinitiated consultation because the shallow-set fishery met three of the four possible reinitiation triggers. The Hawaii shallow-set longline fishery exceeded the amount of incidental take for olive ridley sea turtles; new information revealed effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; and several new species were listed that may be affected by the action. Specifically, the following conditions met the reinitiation trigger:

- In 2015, for the first time the shallow-set fishery interacted with a Guadalupe fur seal. Three additional interactions occurred between November and December 2017. The Guadalupe fur seal is listed as threatened throughout its range (50 FR 51252, December 16, 1985).

- On April 6, 2016, NMFS and USFWS issued a final rule to list 11 DPSs of the green sea turtle under the ESA (81 FR 20058). This final rule removed the previous range-wide listing and, in its place, listed eight as threatened and three as endangered. Six green sea turtle DPSs occur in the Pacific Ocean and within range of the shallow-set fishery: The East Indian-West Pacific, Central West Pacific, Southwest Pacific, Central South Pacific, Central North Pacific, and the East Pacific green sea turtle. The shallow-set fishery interacted with nine green sea turtles between 2004 and 2017 (zero in 2018 and 2019).

- On December 27, 2017, a Ninth Circuit panel issued a split 2-1 opinion finding that NMFS's 2012 BiOp's no-jeopardy determination and associated ITS for the loggerhead turtle to be arbitrary and capricious.

- In January 2018, NMFS listed two new species, the giant manta ray and the oceanic whitetip shark, as threatened under the ESA (83 FR 2196 and 83 FR 4153, respectively), and both of which interact with the shallow-set fishery.

- In July 2018, NMFS designated critical habitat for the Main Hawaiian Island insular false killer whale (MHI IFKW; 83 FR 35062). The designated area encompasses waters from the 45 m depth contour to the 3,200 m depth contour around the main Hawaiian Islands from Niihau east to Hawaii, which is part of the action area for the shallow-set fishery.

- In 2018, NMFS exceeded the authorized take of olive ridley sea turtles as anticipated in the 2012 BiOp (NMFS 2012). NMFS anticipated and authorized a two-year ITS of four olive ridley sea turtles in the fishery. The ITS was effective on January 30, 2012. In 2017, fisheries observers documented four interactions with olive ridley sea turtles, and one interaction in 2018, for a total of five interactions in a two-year period.

Beyond the aforementioned reinitiation triggers, and to provide for a more comprehensive assessment, NMFS reinitiated consultation on all listed resources that occur where the shallow-set fishery operates (Table 9). In total, 49 listed resources comprised of 40 listed species and nine critical habitat designations occur within the area the shallow-set fishery operates, and were analyzed in the 2019 BiOp. These also include listed fish, marine invertebrates, and other critical habitat in vessel transiting areas of the shallow-set fishery primarily in California (Long Beach, San Francisco, and San Diego).

NMFS' approach to the assessment in the 2019 BiOp is divided into four sequential steps.

1. The first step in the sequence was identifying those physical, chemical, or biotic aspects of the shallow-set fishery that are known or are likely to have individual, interactive, or cumulative direct and indirect effects on the environment (i.e., "potential stressors"). As part of this step, NMFS also identified the spatial, or geographic, extent of any potential

stressors whilst recognizing that the spatial extent of those stressors may change with time (also known as the "action area").

2. The second step, the exposure analysis, identifies the listed species and designated critical habitat (collectively, listed resources) that are likely to co-occur with these potential stressors in space and time, as well as the intensity, duration, and frequency of those stressors on listed resources.

3. The third step, the response analysis, NMFS examined the best scientific and commercial data available to determine whether and how those listed resources are likely to respond given their exposure.

4. Lastly, step four, NMFS identified and analyzed the probable risks posed to listed individuals that are likely to be exposed to the shallow-set fishery's effects. Specifically, NMFS focused on three variables in the jeopardy definition that determine a species likelihood of survival and recovery in the wild: reductions in the species' *reproduction*, *number of individuals* in the population, and *distribution*.

The exposure analysis for the loggerhead sea turtle, leatherback sea turtle, green sea turtle, olive ridley sea turtle, Guadalupe fur seal, oceanic whitetip shark, and giant manta ray focuses on hooking and entanglements that have been observed and reported in the shallow-set fishery. The 2019 BiOp analyzes impacts based on the anticipated level of interactions in the shallow-set fishery derived from predictions generated by PIFSC using a Bayesian inferential approach (McCracken 2018). The predictions, described in Table 10 below, are based on observer data from 2005-2017 for all species except for loggerheads (PIFSC used data from 2005-2018 to account for the higher number of interactions observed in 2018). For each of these species, PIFSC generated a predicted anticipated level of interactions for the mean, 80th percentile, and 95th percentile values for a predicted distribution of interactions over 1-year and multi-year (i.e., 2 and 3 year) periods. The percentile values reflect the probability that the observed interactions for the predicted period (e.g., 1, 2 or 3 years) would be less than or equal to the value (e.g., we expect the fishery to take less than or up to 36 loggerhead sea turtles in a given year). These predicted anticipated levels of interactions generated by PIFSC have three major assumptions:

1. The predictions assume that the characteristics of the fishery do not change in the future compared to the observed period (i.e., 2004-2018);
2. The model assumes that the annual number of interactions is independent between years, given that insufficient information exists at this time to make informed predictions of future multi-year patterns in interactions[4].
3. The model assumes that the fishery has operated throughout the year for every year included in the analysis and did not truncate the predicted takes due to fishery closures (i.e., the analysis did not include annual fleet-wide interaction limits for either loggerheads or leatherbacks).

[4] While potential patterns in interactions (e.g., higher interactions tend to be observed in consecutive years) are seen for some species in the observed data since 2004, the data have not been assessed to evaluate the significance or to explore the underlying factors.

The multi-year prediction of anticipated level of take generated by the Bayesian inferential approach takes into account the inter-annual variability in the number of observed interactions over time. Statistically, the probability that observed interactions would be at the upper end of the 1-year predicted range over several consecutive years is low. The multi-year predictions reflect a distribution of predicted values that incorporate the inter-annual variability in the observed data and smooth out the uncertainty associated with the predictions over a longer period. As a result, the 95th percentile values of the predicted 2-year and 3-year total interactions are lower than the 1-year predictions at the same percentile level multiplied by two or three years.

Table 10. The number of sea turtles, oceanic whitetip shark, and giant manta ray, and Guadalupe fur seal interactions expected from the proposed action during one calendar year. The table also includes total mortalities (males and females, adults and juveniles) expected to result from this number of interactions.

Species	Annual	
	Number of Interactions	Number of Mortalities
Leatherback Sea Turtle	21	3
Loggerhead Sea Turtle	36	6
Olive Ridley Sea Turtle[1]	5	1
Green Sea Turtle (all DPSs)	5	1
Oceanic Whitetip Shark[2]	102	32
Giant Manta Ray[2]	13	4
Guadalupe Fur Seal	11	9

[1]The total number of interactions for the species and populations can be any combination from the listed populations for olive ridley sea turtles or green sea turtles. The anticipated number killed for green turtles is 0-1 annually, which we rounded to one.

[2]An ITS is not required to provide protective coverage for the Giant manta ray and oceanic whitetip shark because there are no take prohibitions under ESA section 4(d) for these species. Consistent with the decision in Center for Biological Diversity v. Salazar, 695 F.3d 893 (9th Cir. 2012), however, this ITS is included to serve as a check on the no-jeopardy conclusion by providing a reinitiation trigger if the level of take analyzed in the biological opinion is exceeded.

Source: 2019 BiOp

Based on the approach described above, the 2019 BiOp concluded that the shallow-set fishery may affect, but is not likely to adversely affect:

- The hawksbill sea turtle;
- The MHI IFKW;
- The humpback (Mexico DPS);
- The fin Whale;
- The blue whale;
- The North Pacific right whale;
- The sei whale;
- The sperm whale;
- The eastern Pacific scalloped hammerhead shark; or
- Listed fish and invertebrate species common to transiting areas off the coast of California (Central California coast Coho salmon, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, Central California coast steelhead, California coast steelhead, Southern North American green sturgeon, Black abalone, and White abalone).

Additionally, after reviewing the current status, the environmental baseline for the action area, the effects of the fishery and the cumulative effects, NMFS concluded in the 2019 BiOp that the continued authorization of the shallow-set fishery is not likely to jeopardize the continued existence of:

- The North Pacific loggerhead sea turtle;
- The leatherback sea turtle;
- The olive ridley sea turtle;
- The Eastern Pacific green sea turtle, Central North Pacific green sea turtle, East Indian-West Pacific green sea turtle, Central West Pacific green sea turtle, Southwest Pacific green sea turtle, Central South Pacific green sea turtle;
- The oceanic whitetip shark;
- The giant manta ray; and
- The Guadalupe fur seal.

Lastly, the 2019 BiOp also concluded that the shallow-set fishery is not likely to adversely modify designated critical habitat for:

- The leatherback sea turtle;
- The Hawaiian Monk Seal;
- The MHI IFKW;
- Steller sea lion; and
- Listed fish and invertebrate species common to transiting areas off the coast of California (Central California coast Coho salmon, Sacramento River winter-run Chinook salmon, California coast steelhead, Southern North American green sturgeon, and Black abalone).

3.2.2 Sea Turtles

This section describes the baseline conditions for all sea turtles in the action area. All Pacific sea turtles are listed under the ESA as either threatened or endangered except for the flatback turtle (*Natator depressus*). This species is native to Australia and does not occur in the action area, and thus is not addressed in this document. Sea turtles are vulnerable to longline fishing gear in the shallow-set fishery through both hooking and entanglement. The species, which occur in the area of operation of shallow-set fishery, are the North Pacific loggerhead, leatherback, and green and olive ridley sea turtle. More detailed information, including the range, abundance, status, and threats of the listed sea turtles can be found in the 2019 BiOp (NMFS 2019), the 2018 SAFE report (WPFMC 2019), NMFS status reviews and recovery plans at the following NMFS website: http://www.fpir.noaa.gov/PRD/prd_esa_section_4.html.

The Council and NMFS manage the shallow-set fishery through several measures that mitigate the potential for turtle interactions and injury if interactions occur. These measures include training and handling requirements for reducing the severity of interactions, the requirement to carry an observer on all fishing trips, and a requirement for owners and operators of longline vessels to attend a protected species education workshop annually. Additionally, federal regulations require the use of large circle hooks and mackerel-type fish bait when shallow-setting north of the Equator.

The following table, Table 11, summarizes the fleet-wide interactions with sea turtles with the shallow-set fishery from 2004-2019. Additional information for North Pacific loggerhead, leatherback, olive ridley, and green sea turtle are described thereafter.

Table 11. Annual number of observed interactions (based on interaction date) of loggerhead, leatherback, green and olive ridley sea turtles in the Hawaii shallow-set longline fishery, 2004-2019.

Year	Loggerhead Sea Turtle	Leatherback Sea Turtle	Olive Ridley Sea Turtle	Green Sea Turtle
2004	1	1	0	0
2005	12	8	0	0
2006	17[1]	2	0	0
2007	15	5	1	0
2008	0	2	2	1
2009	3	9	0	1
2010	7	8	0	0
2011	12	16[2]	0	4
2012	6	7	0	0
2013	6	10	0	0
2014	14	16	1	1
2015	13	5	1	0
2016	15	5	0	0
2017	21	4	4	2
2018	33[3]	6	1	1
2019[4]	20	0	2	0

[1]Fishery closed on March 20, 2006, as a result of reaching the loggerhead hard cap of 17.
[2]Fishery closed on November 18, 2011 as a result of reaching the leatherback hard cap of 16.
[3]Fishery closed on May 8, 2018, pursuant to the stipulated settlement agreement and court order.
[4]Showing interactions from January 1, 2019 through March 31, 2019; Fishery closed on March 19, 2019, as a result of reaching the loggerhead hard cap of 17.
Source: 2018 SAFE Report; NMFS Observer Program: https://www.fisheries.noaa.gov/pacific-islands/fisheries-observers/pacific-islands-longline-quarterly-and-annual-reports.

The 2019 BiOp analyzed the effects of the Hawaii shallow-set longline fishery on ESA listed sea turtles using predictions of the anticipated level of interactions in the shallow-set longline fishery based on a Bayesian inferential approach (McCracken 2018). The 1-year and 3-year mean and 95th percentile values of the predicted distributions are summarized in Table 11. The percentile values reflect the probability that the observed interactions for the predicted period will be equal to or less than the value for either a 1-year or a 3-year period. For example, at a 95% probability, the anticipated level of interactions for loggerhead turtles in any given year is expected to be equal to or less than 36 interactions, and equal to or less than 81 interactions over a three-year period.

Table 12. Anticipated level of sea turtle interactions in the Hawaii shallow-set longline fishery analyzed in the 2019 BiOp based on McCracken (2018).

	1-year prediction		3-year prediction	
Species	**Mean**	**95th Percentile**	**Mean**	**95th Percentile**
Loggerhead sea turtle	16	36	47	81
Leatherback sea turtle	10	21	30	48
Green sea turtle	1.4	5	4.1	10
Olive ridley sea turtle	1.4	5	4.3	11

After considering a range of potential effects to sea turtles, NMFS, in the 2019 BiOp, determined that the shallow-set fishery, operating in accordance with the Pelagic FEP and implementing regulations, would not jeopardize the survival or recovery of any listed sea turtles. The 2019 BiOp authorizes a certain level of incidental take for species which the fishery may adversely affect through an ITS for the fishery. Table 13 shows the ITS from the 2019 BiOp for sea turtles.

Table 13. Estimated sea turtle interactions and mortalities in the Hawaii shallow-set fishery over one calendar year in NMFS 2019 biological opinion.

Species	1-Year	
	Number Captured	Number Killed
Leatherback Sea Turtle	21	3
Loggerhead Sea Turtle	36	6
Olive Ridley Sea Turtle[1]	5	1
Green Sea Turtle[1]	5	1

[1]The total number of interactions for the species and populations can be any combination from the listed populations for olive ridley sea turtles or green sea turtles. The anticipated number killed for green turtles is 0-1 annually, which was rounded to one.

3.2.2.1 Loggerhead and Leatherback Sea Turtle Interactions in the Hawaii Shallow-set Fishery from 2004-2019

The average annual number of observed interactions in the Hawaii shallow-set longline fishery with loggerhead and leatherback sea turtles for the 2005-2018 period following the reopening of the fishery was 12.4 and 7.5 leatherback turtles per year respectively. Nearly all loggerhead turtles (99%) and all leatherback turtles observed hooked or entangled in the fishery have been released alive and in accordance with proper handling protocol to maximize post-hooking survival. For sea turtles released alive, a post-hooking mortality rate is estimated based on NMFS' established criteria (Ryder et al. 2006). NMFS estimates in the 2019 BiOp that the overall post-hooking mortality rate is 0.16 (95% CI = 0.11-0.22) for loggerhead turtles and 0.20 (95% CI = 0.14-0.29) for leatherback turtles. The higher mortality estimate for leatherback turtles can be attributed to the larger proportion of animals released alive with trailing gear compared to loggerhead turtles. Leatherback turtles that are incidentally captured in the Hawaii shallow-set longline fishery are typically estimated to be 4-6 feet long and cannot be brought on board, and thus attempts to remove gear are done vessel-side under varying ocean conditions while the animal is in the water. Whereas approximately 85% of observed loggerhead interactions (150 out of 177 total interactions from 2004-2018) resulted in removal of all gear, approximately 42% (44 out of 105 total interactions from 2004-2018) of leatherback interactions resulted in removal of all gear (NMFS 2019).

The fishery has reached the hard cap three times since its implementation in 2004:

1. In 2006 when the loggerhead hard cap of 17 turtles was reached (fishery closed on March 20, 2006);
2. In 2011 when the leatherback hard cap of 16 turtles was reached (fishery closed on November 18, 2011); and
3. In 2019 when the loggerhead hard cap of 17 turtles was reached (fishery closed on March 19, 2019).

In most years however, the annual observed interactions remained below 50% of the hard cap limit for both species (Fig 3).

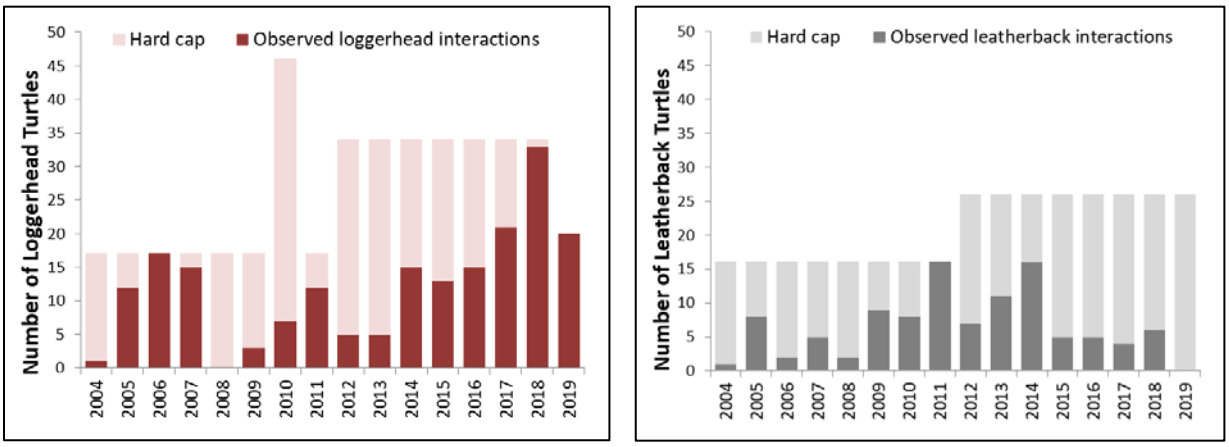

Figure 3. Annual number of observed loggerhead (left) and leatherback (right) and "unused" annual hard cap for each species. Dark colors in each figure indicate the observed interactions and light colors indicate the unused portion of the hard cap.

Loggerhead turtle interactions in the shallow-set fishery in 2017 and 2018 were higher than levels observed previously since the fishery reopened in 2004. The total number of loggerhead sea turtle interactions for 2017 was 21; and from January through May of 2018, 33 interactions with loggerhead sea turtles were observed. While these numbers were lower than the hard cap limit of 34 loggerhead turtles based on the 2012 BiOp, they demonstrated that the fishery has the potential to experience higher interaction levels than the long-term average (12.4 loggerhead turtles annually from 2005-2018) in a short period.

Juvenile loggerhead turtles are known to associate with fronts, eddies and geostrophic currents in the North Pacific Transition Zone (Polovina et al. 2004, Howell et al. 2008). Previous research has shown that over 50% of loggerhead turtle interactions in the Hawaii shallow-set longline fishery occur in a temperature band between 63.5°F and 65.5°F (Howell et al. 2008), which is an area tracked under NMFS' experimental product called TurtleWatch to help avoid interactions with loggerhead turtles[5]. Note, as described in section 2.3 above, TurtleWatch is a helpful experimental product for making predictions, but at this time neither practical nor feasible from a technical or management standpoint to be used in real-time spatial management. Most of the recent loggerhead turtle interactions were observed in December of 2017 and January of 2018, during which time a small number of vessels interacted with the majority of the observed loggerhead turtles, while the majority of the shallow-set fleet during the period also had at least one observed interaction.

NMFS PIFSC conducted a preliminary characterization of the recent loggerhead turtle interactions in the shallow-set fishery compared to the years prior (PIFSC unpublished data). The analysis indicated that the spatial distribution of the interactions in December 2017 and January 2018 when the interactions were highest were not anomalous for that time of the year. Approximately 50% of the loggerhead interactions occurred within the temperature band

[5] https://www.fisheries.noaa.gov/resource/map/turtlewatch

between 63.5-65.5°F, consistent with TurtleWatch. Fishing effort distribution inside and outside of the TurtleWatch temperature bands was also not anomalous in December 2017 and January 2018 compared to previous years. There was also no apparent change in other operational characteristics within the fishery (e.g., gear configuration, bait, timing, duration) to explain the higher loggerhead interaction rates. Additionally, the average size of individual turtles observed in December 2017 and January 2018 was consistent with the average size observed in those months in previous years (approximately 51 cm straight carapace length (SCL)).

Loggerhead turtle reproductive output at their source nesting beaches in Japan has been high since 2008. Loggerhead turtle nest counts in Japan increased steadily from 2,064 nests in 1997 to 5,167 nests in 2005, then increased substantially to over 10,000 nests in 2008, after which high nesting years continued through 2014 with a record of 15,396 nests in 2013 (NMFS 2017). The higher level of nesting since 2008 likely resulted in a substantially higher hatchling production compared to the decade prior. Most of the loggerhead turtles observed interacting in the Hawaii shallow-set longline fishery in December 2017 and January 2018 were in the range of 40-60 cm SCL, which is estimated to be approximately 3-10 years in age based on skeletochronology (Tomaszewicz et al. 2015) and consistent with the period of high nesting in Japan. PIFSC continues to explore the linkage of loggerhead turtle interactions in the shallow-set fishery to hatchling production as well as additional examination of the oceanographic environment and fishing behavior.

3.2.2.2 Population Assessments for the North Pacific Loggerhead and Western Pacific Leatherback Turtles

PIFSC conducted population assessments of the North Pacific loggerhead and Western Pacific leatherback turtles to support the ESA Section 7 consultation for the shallow-set fishery (NMFS 2019). The assessment utilized a Bayesian state-space population viability analysis (PVA) using nest counts as index of abundance to estimate population growth rate and to generate population projections (Fig 4). More complex demographic models were determined to be not suitable due to the lack of population-specific demographic data.

Nest count data from three nesting beaches representing approximately 52% of loggerhead turtle nesting in Japan were used for the North Pacific loggerhead turtle PVA. Modeling results, as described in the 2019 BiOp, estimated that the current mean total reproductive female abundance for the portion of the population included in the assessment is 3,632 (95% CI range = 2,976-4,468), and the mean long-term population growth rate (r) was estimated at 2.4% annually (95% CI range = -10.8%-5.6%). More recently, Martin et al. 2020 updated the current mean total reproductive female abundance to a 4,541 (95% CI range = 4074-4063), and the mean r to 2.3% annually (95% CI range = -11.1% – 15.6%). Projections show a low probability (less than 25% probability on average) that the North Pacific loggerhead turtle population would fall below 12.5% to 50% abundance thresholds within 100 years. Based on the estimates derived from the PVA model, NMFS estimates that the total number of nesting females in the population is 6,984 individuals, and the total estimated population of all age classes and both sexes is 341,071 individuals (NMFS 2019).

Nest count data from two nesting beaches representing approximately 75% of nesting for the Western Pacific leatherback population were used for the PVA. Due to missing count data, an auto-regressive time series model was used to fill in the missing data in the nest count time series prior to proceeding with the PVA model. Modeling results, as described in the 2019 BiOp, estimated that the current mean total reproductive female abundance for the portion of the population included in the assessment is 1,180 (95% CI range = 949-1,479), and the mean long-term population growth rate (r) was estimated at -5.3% annually (95% CI range = -16.4%-5.9%), and later updated by Martin et al. 2020 to -6.1% annually (95% CI range = -23.85-12.2%). Projections show a high probability (greater than 91% probability on average) that the Western Pacific leatherback turtle population would fall below 12.5% to 50% abundance thresholds within 100 years. In the 2019 BiOp, NMFS estimates that the total number of adult leatherback turtles in the Western Pacific population is 1,851 (range 1,488-2,320), and the total estimated population of all age classes and both sexes is 175,000 (range 68,000-360,000).

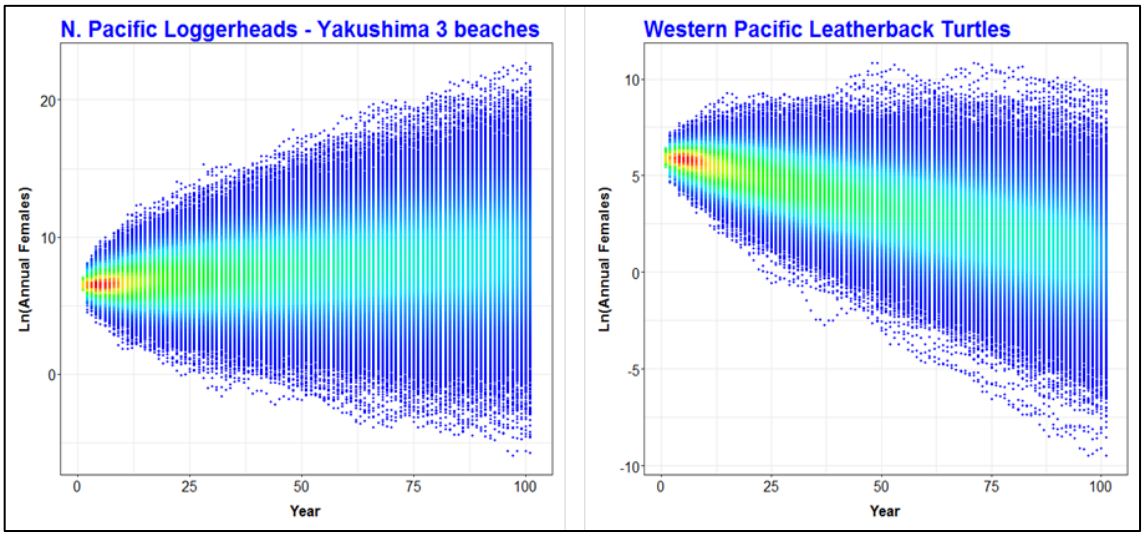

Figure 4. Population projection results for North Pacific loggerhead turtles (left) and Western Pacific leatherback turtles (right). Model projections are of annual females in natural log space. Figures show 10,000 model projection runs for 100 years into the future from the final data year.

Following the issuance of the 2019 BiOp, PIFSC completed a take model to assess the population level impacts of post-interaction mortality of loggerhead and leatherback turtle interactions in the shallow-set fishery (Martin et al. 2020). The model builds upon the PVA considered in the 2019 BiOp. For each species, the modeling framework shows the probability of the population being above or below abundance thresholds (50%, 25%, 12.5% of current annual nesters) within a 100-year simulation time frame, and the number of years (mean, median, & 95% credible interval) to reach each threshold for both “take” and “no take” scenarios (i.e., the population trends with and without the take associated with the fishery). The model is divided into three main components:

1. Data imputations for monthly nest counts for leatherback turtles nesting in Indonesia due to low, or no monitoring using a Bayesian state-space model;
2. A trend analysis of nest count data to estimate population growth rates and current abundance for both species; and

3. A population viability analysis including future projections of annual nester population size and assessment of the impacts of anticipated take levels on the projections of both species.

The take level evaluated in the model was derived from predictions generated by PIFSC using a Bayesian inferential approach (McCracken 2018) and analyzed in the 2019 BiOp. Results for both species suggest that the fishery's anticipated take would be negligible on the long-term population trends, with no discernable changes to the probabilities of the populations falling below abundance thresholds between the "no take" and "take" scenarios for the future (Martin et al. 2020).

For the North Pacific loggerhead turtle, the model suggests the population is increasing at 2.3% per year. When accounting for the anticipated level of take by the shallow-set longline fishery on this projection, the model shows no discernable difference in the population trend or the probability of the population falling below abundance thresholds within the 100-year projection period. For the leatherback turtle, the difference in the population trend only becomes apparent after the year 2060 and suggests the population would go extinct roughly 5 years sooner than in the "no take" scenario (around 2110 vs. 2115). However, this 5-year difference is statistically insignificant, and the actual population difference of the 5 year divergence represents less than 1 adult nester. Importantly, the difference seen between the "no take" and "take" scenarios in the 100-year projection is not seen in the 10-year projection (see Martin et al. 2020 Figure 22 and Figure 23). As described in Martin et al. 2020, projections out to 10 years into the future are more relevant biologically for management purposes than to 100 years given the estimated uncertainty in the population parameters. Specifically, the effects of the environmental or anthropogenic drivers on the population would be lagged; therefore, we think the first 10 years is largely based on the previously observed trend but after that we do not have sufficient information to account for uncertainty of the drivers that affect the populations.

Additionally, the trend was analyzed with historical impacts from the fishery removed (i.e., by adding back the adult nesters to the population); however, there was no difference between the trends for the "take" and "no take" scenarios for either species for the past.

At the 134th SSC and 180th Council Meetings, PIFSC summarized the external peer-review comments on the model, which indicated that the model approach was appropriate and adequate given the limited data available. The SSC further endorsed the model as the best scientific information available for evaluating the impacts of the fishery on loggerhead and leatherback turtle populations.

3.2.3 Marine Mammals

This section describes the baseline conditions for all marine mammals in the action area (both ESA listed, and non-ESA listed), and protected under the Marine Mammal Protection Act (MMPA). Marine mammals are primarily vulnerable to shallow-set fishery through hooking and entanglement. Detailed information on geographic range, abundance, bycatch estimates, and status for all marine mammals in the action area can be found in 2019 BiOp (NMFS 2019), the 2018 SAFE report (WPFMC 2019), the most recent stock assessment reports (SARs), available online at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-

stock-assessment-reports-region, and at the following NMFS website: http://www.fpir.noaa.gov/PRD/prd_esa_section_4.html.

The Council and NMFS manage the shallow-set fishery through several measures that mitigate the potential for marine mammal interactions and injury if interactions occur. These measures include training and handling requirements for reducing the severity of interactions, the requirement to carry an observer on all fishing trips, and a requirement for owners and operators of longline vessels to attend a protected species education workshop annually. Additionally, longline closed areas generally within 30 to 75 nm of each U.S. island archipelago serve as de facto protection for island-associated stocks of marine mammals.

The following table, Table 14, summarizes the fleet-wide interactions with marine mammals and the shallow-set fishery from 2010-2019. Additional information for ESA listed marine mammals, and non-ESA listed marine mammals are described thereafter.

Table 14. Observed annual marine mammal interactions (including mortalities, serious injuries, and non-serious injuries) with the Hawaii shallow-set longline fishery from 2010-2019.

Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Blackfish[1]	0	1	0	0	0	0	0	0	0	0
Short-beaked Common dolphin	0	1	0	0	1	0	0	0	0	0
Risso's dolphin	7	4	0	3	6	3	2	2	2	0
Blainville's beaked whale	0	1	0	0	0	0	0	0	0	0
Humpback whale	0	1	0	0	0	1	0	0	0	0
False killer whale	0	1	1	0	1	0	0	0	0	0
Striped dolphin	2	0	1	0	2	0	1	3	0	0
Bottlenose dolphin	2	2	1	2	4	2	1	0	1	0
Rough-toothed dolphin	0	0	0	1	0	0	0	0	0	0
Fin whale	0	0	0	0	0	1	0	0	0	0
Unidentified cetacean	1	0	1	0	0	1	0	0	0	0
Pygmy or dwarf sperm whale	0	0	0	0	0	0	0	0	0	0
Beaked whale, Mesoplodont	0	1	0	0	0	0	0	0	0	0
Ginkgo-toothed beaked whale	0	0	0	0	0	1	0	0	0	0
Unidentified beaked whale	0	1	0	2	0	1	0	0	0	0
Northern elephant seal	0	0	0	1	1	0	0	0	0	0
Guadalupe fur seal	0	0	0	0	0	0	1	3	0	0
Unidentified pinniped	0	0	0	0	0	3	0	0	0	0
Unidentified sea lion	0	0	0	0	1	2	0	0	0	1

[1]"Blackfish" include unidentified whales considered to be either false killer whales or short-finned pilot whales.
Source: 2018 SAFE Report; NMFS Observer Program: https://www.fisheries.noaa.gov/pacific-islands/fisheries-observers/pacific-islands-longline-quarterly-and-annual-reports.

ESA Listed Marine Mammals Occurring in the Action Area

ESA listed marine mammal species that have been observed or may occur in the area where Pelagics FEP fisheries operate include the following species:

- Blue whale (*Balaenoptera musculus*)
- North Pacific right whale (*Eubalaena japonica*)
- Sei whale (*Balaenoptera borealis*)
- Main Hawaiian Islands insular false killer whale (MHI IFKW) (*Pseudorca crassidens*)
- Fin whale (*Balaenoptera physalus*)

- Sperm whale (*Physeter macrocephalus*)
- Guadalupe fur seal (*Arctocephalus townsendi*)
- Mexico and Central American Humpback whale (*Megaptera novaeangliae*)
- Hawaiian monk seal (*Neomonachus schauinslandi*)

Although the blue whale, North Pacific right whale, and sei whale occur within the action area, and could potentially interact with the fishery, fishermen and observers have not reported any incidental hooking or entanglements of these species. Interactions with the MHI IFKW are only directly assigned if they are confirmed through genetic sampling, or an interaction with a false killer whale is within the range that NMFS has designated for the insular stock (currently closed to longline fishing). However, no known interactions from the MHI IFKW stock have been reported or observed in the shallow-set fishery. Also, NMFS assigns prorated interactions to the population of MHI IFKW based on interactions with pelagic false killer whales, and on interactions with false killer whales from unknown populations and unidentified blackfish. The NMFS 2019 BiOp has determined that the shallow-set fishery is not likely to adversely affect the blue whale, N. Pacific right whale, sei whale, or MHI IFKW (NMFS 2019).

On February 27, 2015, fishing gear from a shallow-set vessel entangled a fin whale slightly more than 200 miles from the coast of California. Fin whales do not depredate on baitfish or captured fish hooked longline gear, however, they can become entangled or foul hooked in fishing gear and may break through or carry gear away. From 1994 to February 2015, there were no observed or reported interactions with fin whales in the shallow or deep-set fisheries. The February 2015 interaction is unique and extremely rare. The observer aboard the shallow-set vessel documented the main line becoming entangled in a whale's mouth (no branch hooks or branch lines were involved). The crew was able to release the whale within approximately 5 minutes and watched it swim away with no gear attached and with only superficial wounds. NMFS determined that this injury was non-serious under the MMPA (Bradford and Forney 2017). Since the shallow-set fishery reopened in 2004 with 100% observer coverage, there has been only one interaction with a fin whale in nearly 17,244 sets, with an interaction rate of 0.000058 fin whales per set, so interactions are exceptionally uncommon. The NMFS 2019 BiOp has determined that the Hawaii shallow-set longline fishery is not likely to adversely affect the fin whale (NMFS 2019).

Likewise, sperm whales are present in the action area; however, interactions between the Hawaii-based longline fishery (deep and shallow combined) and sperm whales are rare and unpredictable events. Since 1994, there have been three observed interactions between sperm whales and the entire Hawaii longline fleet. Prior to the separation of the management of the longline fisheries, there was an interaction in 1999 with a vessel that was targeting swordfish, and one in 2002 with an experimental fishery that was testing sea turtle mitigation gear similar to what is used in the shallow-set fishery now. The 2002 interaction occurred on a control set and the sperm whale was entangled in the mainline. The mainline was cut and the animal escaped with no line attached (Boggs 2002). Sperm whales have been recorded depredating on catch in the longline sable fishery in the Gulf of Alaska. However, no incidents of depredation have been recorded in the Hawaii-based longline fishery and since the shallow-set fishery reopened in 2004 with 100% observer coverage, there have not been any interactions with sperm whales. The NMFS 2019 BiOp has determined that the shallow-set fishery is not likely to adversely affect the sperm whale (NMFS 2019).

The shallow-set fishery has had four interactions with the humpback whale, although, these interactions were attributed to the Hawaii DPS, which is not listed. Due to the northern migrations of Central America and Mexico humpback DPS there is a low probability that some individual animals could be exposed to the fishery. However, most animals from these two DPS are expected to migrate close to the coast (within the EEZ) and utilize the California/Oregon (OR/CA) feeding area rather than the higher latitude feeding areas (Wade et al. 2016). Given that the population of the Hawaii DPS is approximately 3.5 times greater than that of the Mexico DPS, the probability that the humpback whale is a member of the Hawaii DPS is significantly higher than that of the Mexico or Central American DPS. For these reasons, the NMFS 2019 BiOp has determined that the shallow-set fishery is not likely to adversely affect the Mexico or Central American DPS of humpback whales (NMFS 2019).

The Hawaii shallow-set longline fishery had observed interactions with ESA listed Guadalupe fur seals in 2016 and 2017. This species was previously not known to interact with the shallow-set fishery and was not included in previous BiOps. All Guadalupe fur seal interactions occurred outside of the U.S. EEZ off the coast of California. The NMFS 2019 BiOp has determined that the shallow-set fishery is likely to adversely affect, but not jeopardize, the continued existence of the Guadalupe fur seal (NMFS 2019). Under the 2019 BiOp ITS, NMFS anticipates 11 Guadalupe fur seal interactions in the shallow-set fishery during one calendar year, of which 9 are expected to be mortalities.

Section 7(b)(4) of the ESA provides that the Secretary may only issue an ITS for ESA listed marine mammals if such incidental take is authorized under MMPA Section 101(a)(5)(E). Accordingly, the terms of the ITS for any ESA listed marine mammal become effective only upon issuance of the MMPA authorization for those mammals. On October 16, 2014, NMFS authorized a permit under the MMPA section 101(a)(5)(E), addressing the shallow-set and deep-set fisheries' interactions with ESA listed species or depleted stocks of marine mammals (79 FR 62106). The permit authorizes the incidental, but not intentional, taking of ESA listed humpback whales (central North Pacific or CNP stock), sperm whales (Hawaii stock), and MHI insular false killer whales to vessels registered in the Hawaii deep-set and shallow-set fisheries. In issuing this permit, NMFS determined that incidental taking by the Hawaii longline fisheries would have a negligible impact on the affected stocks of marine mammals. Since the issuance of this permit, the CNP humpback whale was designated a DPS and is not a listed species under the ESA (81 FR 62259, September 8, 2016). NMFS is currently evaluating whether the requirements of MMPA Section 101(a)(5)(E) have been met for the Guadalupe fur seal, MHI IFKW, and sperm whale in order to issue an MMPA authorization.

Non-ESA Listed Marine Mammals Occurring in the Action Area

The 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 authorizes the Secretary of Commerce to protect and conserve all cetaceans (whales, dolphins, and porpoises) and pinnipeds (seals and sea lions, except walruses). Fishery impacts to marine mammal stocks are primarily assessed and monitored through the SARs prepared pursuant to the MMPA (16 U.S.C. § 1361, *et seq*.). The

SARs include detailed information on these species' geographic range, abundance, potential biological removal (PBR) estimates, bycatch estimates, and status.

The shallow-set fishery is a Category II under the MMPA 2020 List of Fisheries (LOF; 85 FR 21079, April 16, 2020), meaning that this fishery has occasional incidental mortality and serious injuries of marine mammals. 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 take incidentally, non-ESA listed marine mammals by registering with NMFS' marine mammal authorization program.

The 2020 LOF lists the following marine mammal stocks that are incidentally killed or injured in this fishery:

- Blainville's beaked whale, HI stock
- Bottlenose dolphin, HI Pelagic stock
- False killer whale, HI Pelagic stock
- Fin whale, HI stock
- Guadalupe fur seal, Isla Guadalupe stock
- Humpback whale, Central North Pacific stock
- Mesoplodon sp., unknown stock
- Northern elephant seal, CA breeding stock
- Risso's dolphin, HI stock
- Rough-toothed dolphin, HI stock
- Short-beaked common dolphin, CA/OR/WA stock
- Striped dolphin, HI stock

3.2.4 Seabirds

This section describes the baseline conditions for all seabirds in the action area. All seabirds are protected under the Migratory Bird Treaty Act (MBTA). ESA listed seabirds whose range overlap in the action area include the endangered short-tailed albatross, threatened Newell's shearwater, and endangered Hawaiian dark-rumped petrel. There have been no observed takes of any ESA listed seabirds. In addition to these ESA listed seabirds, there have also been four interactions with shearwaters (identified later as sooty shearwaters) and one with a northern fulmar, all of which were released injured, and one interaction with an unidentified gull that was released dead. The majority of observed interactions with the shallow-set fishery involve the Laysan albatross and black-footed albatross. Seabirds are primarily vulnerable to the shallow-set fishery through hooking and entanglement.

NMFS annually publishes the report Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries, which includes verified numbers of seabird interactions and information on fishing regulations and effort, interaction rates, and band recovery data for seabirds caught in the shallow-set and deep-set fisheries. Recent reports are available at https://www.fisheries.noaa.gov/pacific-islands/bycatch/seabird-interactionspelagic-longline-fishery.

The Council and NMFS manage the shallow-set fishery through several measures that mitigate the potential for seabird interactions and injury if interactions occur. These measures include

training and handling requirements for reducing the severity of interactions, the requirement to carry an observer on all fishing trips, and a requirement for owners and operators of longline vessels to attend a protected species education workshop annually. Additionally, shallow-set vessels must begin setting one hour after local sunset and 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. These measures resulted in a reduction of over 90% in total seabird interactions by 2006 in the deep-set and shallow-set fisheries combined (Fossen 2007).

The following table, Table 15, summarizes the fleet-wide interactions with seabirds and the shallow-set fishery from 2010-2019. Additional information for seabirds are described thereafter.

Table 15. Number of albatross interactions observed in the Hawaii shallow-set longline fishery, 2005- 2019.

Year	Laysan Albatross	Black-footed Albatross	Northern Fulmar	Unidentified Shearwater	Unidentified Gull	Short-tailed Albatross
2005	62	7	0	0	0	0
2006	8	3	0	0	0	0
2007	39	8	0	0	0	0
2008	33	6	0	0	0	0
2009	81	29	0	1[1]	0	0
2010	40	39	1	0	0	0
2011	49	19	0	0	0	0
2012	61	37	0	0	0	0
2013	46	28	0	2[1]	0	0
2014	36	29	0	1[1]	0	0
2015	45	41	0	0	0	0
2016	26	40	0	0	0	0
2017	6	51	0	0	1	0
2018	2	9	0	0	0	0
2019	15	19	0	0	0	0

[1]These birds were later identified as sooty shearwaters in the NMFS Seabird Annual Report.
Source: 2018 SAFE Report; NMFS Observer Program: https://www.fisheries.noaa.gov/pacific-islands/fisheries-observers/pacific-islands-longline-quarterly-and-annual-reports.

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 DPSs, as defined by the DPS policy (76 FR 62503). However, the U.S. FWS also found that neither DPS of the black-footed albatross warranted listing under the ESA. The U.S. FWS observed that Hawaii-based longline fisheries should continue to minimize black-footed albatross bycatch through implementing effective bycatch minimization measures, and concluded that Hawaii-based longline fishing is not a significant threat to the black-footed albatross.

NMFS consulted with the USFWS on effects to endangered species from the Hawaii longline fisheries in a 2012 BiOp (USFWS 2012). USFWS considered that the shallow-set fishery may adversely affect the short-tailed albatross and authorized the take of one short-tailed albatross every five years, even though there were no documented interactions with this species. The USFWS estimated 13.1 annual injuries and mortalities of black-footed albatrosses in the shallow-set fishery, which results in an estimated take of 0.034 short-tailed albatross per year or less than one (0.17) albatross over five years (USFWS 2012). This is 0.001% of the population (proportion of the population = 0.034/3,181 = .00001). The USFWS conducted a population viability assessment (PVA) in 1999, which found that an annual loss of about 82 subadults and 12 adults would lead to eventual extinction of the species based on a population size at that time of 1,362 birds. The population had increased to 3,181 birds at the time of the 2012 BiOp, and the current total annual estimated loss of reproductive contribution due to adverse effects by US fisheries fell short of 94 birds (three birds over five years in Hawaii fisheries and three per year in Alaska). Based on this information, USFWS concluded that the shallow-set longline fishery may slow population growth of short-tailed albatross, but is not anticipated to jeopardize the continued existence of the species (USFWS 2012). The shallow-set longline fishery has never caught a confirmed short-tailed albatross.

3.2.5 Sharks and Rays

This section describes the baseline conditions for all ESA listed shark and ray species (elasmobranchs) in the action area. Sharks and rays are vulnerable to longline fishing gear in the shallow-set fishery through both hooking and entanglement. The species, which occur in the area of operation of shallow-set fishery, are the scalloped hammerhead shark, oceanic whitetip shark, and giant manta ray. More detailed information, including the range, abundance, status, and threats of the listed elasmobranchs, can be found in the 2019 BiOp (NMFS 2019), the 2018 SAFE report (WPFMC 2019), and NMFS status reviews, and at the following NMFS website: https://www.fisheries.noaa.gov/national/endangered-species-conservation/esa-threatened-endangered-species.

The Council and NMFS manage the longline fisheries permitted under the Pelagic FEP through several measures that mitigate the potential for shark and ray interactions. These measures include the requirement to carry an observer on a fishing trip if requested, and a requirement for owners and operators of longline vessels to attend a protected species education workshop annually. Additionally, in accordance with 50 CFR 300.226, U.S. vessels release all oceanic whitetip and silky sharks incidentally caught in the WCPFC area of endorsement “Convention Area” in the WCPO. In the EPO, the IATTC has banned retention of oceanic whitetip shark and mobulid rays, including giant manta rays.

Table 16 shows the fleet-wide observed interactions of ESA listed sharks and rays for the shallow-set fishery from 2004-2019

Table 16. Total ESA listed shark and ray interactions with the Hawaii shallow-set longline fishery for 2004-2019.

Year	Eastern Pacific Scalloped Hammerhead	Oceanic Whitetip	Giant Manta Ray
2004	0	3	0

Year	Eastern Pacific Scalloped Hammerhead	Oceanic Whitetip	Giant Manta Ray
2005	0	348	0
2006	0	1	0
2007	0	98	5
2018	0	47	0
2009	0	54	0
2010	0	90	6
2011	0	78	3
2012	0	24	0
2013	0	27	0
2014	0	21	1
2015	0	22	0
2016	0	32	0
2017	0	29	2
2018	0	1	0
2019	0	0	0

Source: 2018 SAFE Report; NMFS Observer Program: https://www.fisheries.noaa.gov/pacific-islands/fisheries-observers/pacific-islands-longline-quarterly-and-annual-reports.

A portion of the shallow-set fishery falls within the range of the Eastern Pacific scalloped hammerhead shark DPS. However, there have been no recorded or observed takes of hammerhead sharks in the shallow-set longline fishery in the area of the Eastern Pacific DPS. The NMFS 2019 BiOp has determined that the shallow-set fishery is not likely to adversely affect the Eastern Pacific scalloped hammerhead shark DPS (NMFS 2019).

Of the three ESA-listed elasmobranchs the shallow-set fishery interacts with, oceanic whitetip sharks constitute the majority of the interactions (average takes/1,000 hooks = 0.0110) and the observed number of takes ranges between 1 and 348, although the observed number of takes have been less than 32 per year since 2012. Giant manta rays, however, are taken more rarely (0.0004) with takes ranging between 0 and 5. There were no observed interactions with scalloped hammerheads in the shallow-set fishery since 2004. Oceanic whitetip shark interactions have been observed throughout the time series, although substantially lower interactions occurred in 2006 and 2018. Spatial distribution of shallow-set fishing effort typically overlaps with oceanic whitetip shark distribution (south of 30° N) in the summer months. However, the fishery closed in March and early May in 2006 and 2018, respectively, thus likely minimizing the overlap and contributing to the lower number of interactions. Most of the oceanic whitetip sharks that are caught in the shallow-set fishery are released alive.

After considering a range of potential effects to oceanic whitetip shark and giant manta ray, NMFS, in the 2019 BiOp, determined that the shallow-set fishery, operating in accordance with the Pelagic FEP and implementing regulations, would not jeopardize the survival or recovery of oceanic whitetip shark and giant manta ray. The 2019 BiOp authorizes a certain level of interactions (incidental take) of species which the fishery may adversely affect through an ITS for the fishery. Currently there are no take prohibitions for oceanic white tip sharks or giant manta ray, thus an ITS is not required to provide an exemption to the prohibition of take under section 9 of the ESA for these two species. However, consistent with the decision in *Center for Biological Diversity v. Salazar*, 695 F.3d 893 (9th Cir. 2012), NMFS included an ITS to serve as a check on the no-jeopardy conclusion by providing a reinitiation trigger if the level of take

analyzed in the biological opinion is exceeded. Table 17 shows the ITS from the 2019 BiOp for these two species.

Table 17. Estimated oceanic whitetip shark and giant manta ray interactions and mortalities in the Hawaii shallow-set fishery over one calendar year in NMFS 2019 biological opinion.

Species	1-Year	
	Number Captured	Number Killed
Oceanic Whitetip Shark	102	32
Giant Manta Ray	13	4

3.3 Socioeconomic Setting

This section describes the socioeconomic setting for the shallow-set fishery. A detailed history and description of the fishery can be found in the Amendment 18 to the Pelagic FMP (WPFMC 2009b) and the 2018 SAFE report (WPFMC 2019). The discovery of a large swordfish resource around the Hawaiian archipelago in the 1980s prompted a revitalization of the Hawaii longline fishery. Catches grew from negligible amounts in the mid-1980s to 5.3 million pounds in 1990. Much of this fishery's growth was from the entry of new longline vessels from other parts of the U.S., as well as the development of a new local longline fleet in Hawaii. By 1993, catches of swordfish peaked at about 13.0 million pounds (WPFMC 2013), representing 30% of all the North Pacific swordfish production (19,672 mt or 43.6 million pounds) at the time. Subsequent catches declined after 1993 to around 6.4 million pounds until 2000, after which the fishery was closed due to litigation.

Since reopening of the shallow-set fishery in 2004, fishing effort peaked in 2010 at 114 trips and 1.8 million hooks set, and has since been on a declining trend. The number of vessels participating in the shallow-set fishery has declined over time from a high of 35 vessels in 2006 to a low of 11 vessels in 2018, whereas the numbers of trips and hooks have been more variable (Table 18). Total catch for the fishery has been on a declining trend since reaching a peak at 4.0 million pounds in 2009, and adjusted revenue has also declined since reaching a peak at $9.5 million in 2011 (Fig 6). The average trip cost (excluding labor cost) for the Hawaii shallow-set longline fishery based on the PIFSC Economic Cost Data Collection Program was $43,390 per vessel in 2018 with an average trip length of 32 days for the 2009-2018 period, and the net revenue (trip revenue minus trip cost) was $66,473 per vessel in 2018 (Fig 5). CPUE of swordfish declined from 19.1 fish per 1,000 hooks in 2006 to 9.3 in 2010, but has since remained relatively stable ranging from 9.8 to 12.4 fish per 1,000 hooks (Fig 7).

Table 18. Hawaii shallow-set longline fishery effort based on logbook data, 2004-2018.

Year	Active Vessels	Number of Trips	Number of Sets	Number of Hooks	1-Yr Percent Change
2009	28	112	1,762	1,721,346	▲ 15.04%
2010	28	108	1,833	1,803,432	▲ 4.77%
2011	20	82	1,468	1,489,243	▼ -17.42%
2012	18	81	1,355	1,453,234	▼ -2.42%
2013	15	58	962	1,060,341	▼ -27.04%
2014	20	81	1,338	1,483,809	▲ 39.94%
2015	22	65	1,110	1,235,703	▼ -16.72%
2016	13	40	670	719,385	▼ -41.78%
2017	18	61	949	1,027,013	▲ 42.76%

Year	Active Vessels	Number of Trips	Number of Sets	Number of Hooks	1-Yr Percent Change
2018	11	30	420	500,000	▼ -51.32%

Source: 2018 SAFE Report

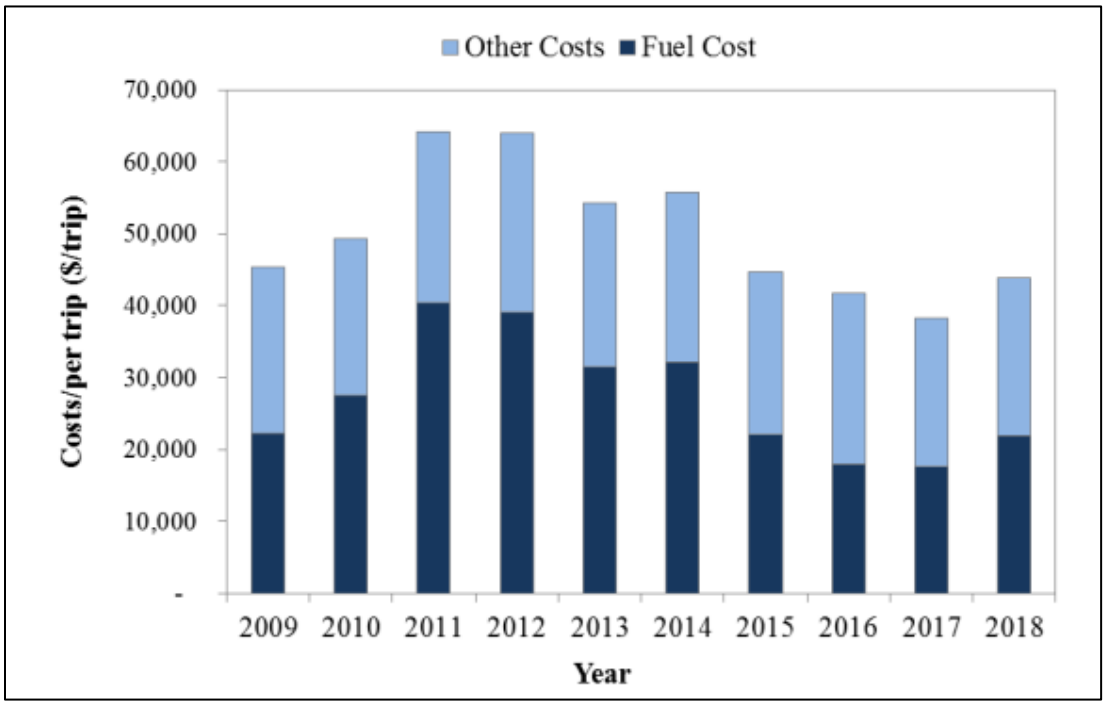

Figure 5. The trend of average trip costs with standard deviation for Hawaii longline shallow-set fishing from 2009-2018 adjusted for 2018.

Source: 2018 SAFE Report

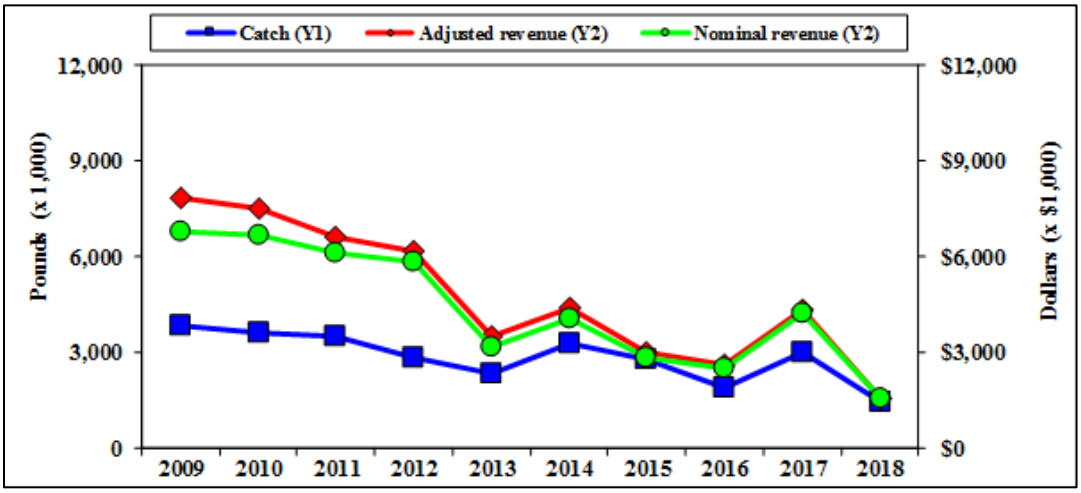

Figure 6. Catch and revenue for the Hawaii shallow-set longline fishery, 2005-2018.

Source: 2018 SAFE Report

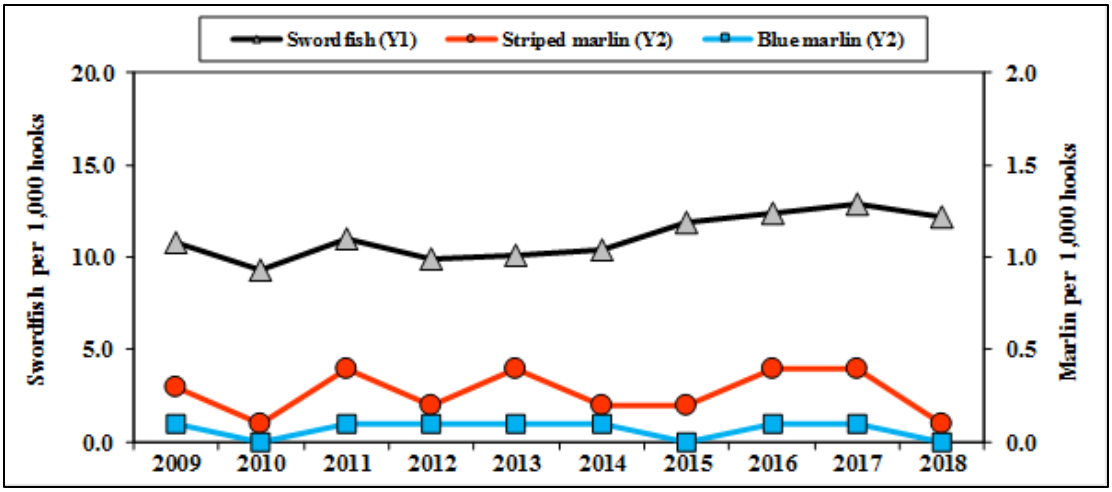

Figure 7. Billfish CPUE for the Hawaii shallow-set longline fishery, 2005-2018.
Source: 2018 SAFE Report

Available data shows that the removal of the effort limits in 2009, and the implementation of the higher sea turtle annual limit in 2012, did not result in increased shallow-set fishing effort approaching historical levels (1994-1999). This is likely attributed to the diminishing net returns for shallow-set vessels over the past decade, driven by a weakened swordfish market, CPUE declines in swordfish catch, fuel prices, and uncertainties associated with a sea turtle annual limit closure (WPFMC 2017). In addition, many vessels have switched to year-round deep-set longlining targeting bigeye tuna, which generally results in higher profits as compared to shallow-set fishing for swordfish.

Despite the poor economic performance of this fishery in recent years, fishing effort in future years may reasonably range within levels seen since 2004, as high global swordfish demand in combination with fresh sustainable swordfish from Hawaii fisheries could rapidly change effort levels due to market demand. Additionally, the largest component of the Hawaii longline fleet is comprised of Vietnamese-American ownership, which have a long-term history of targeting swordfish in the United States, and changes in bigeye tuna catch limits for the deep-set longline fishery could encourage more vessels to resume targeting swordfish as an alternative in the event of a bigeye tuna fishery closure.

The shallow-set fishery is highly seasonal due to peak market demand for Hawaii swordfish, with effort typically increasing in October and peaking in March, after which effort gradually declines through the summer months (Fig 8). The swordfish fishing season for the Hawaii shallow-set longline fishery corresponds to seasonally low levels of swordfish imports, indicating that the peak demand for Hawaii swordfish occurs in the winter months when swordfish imports are lowest (Fig 9). The swordfish catch in the shallow-set fishery accounts for nearly half of the U.S. commercial landings (Fig 10). In the five-year period of 2012-2016, the average swordfish catch in the combined Hawaii longline fisheries (shallow and deep) was approximately 3.1 million pounds, of which 2.3 million pounds were from the shallow-set fishery, and amounting to 44% and 33%, respectively, of the total US domestic commercial landing of swordfish during that same period (WPFMC 2017, NMFS Commercial Fisheries Statistics).

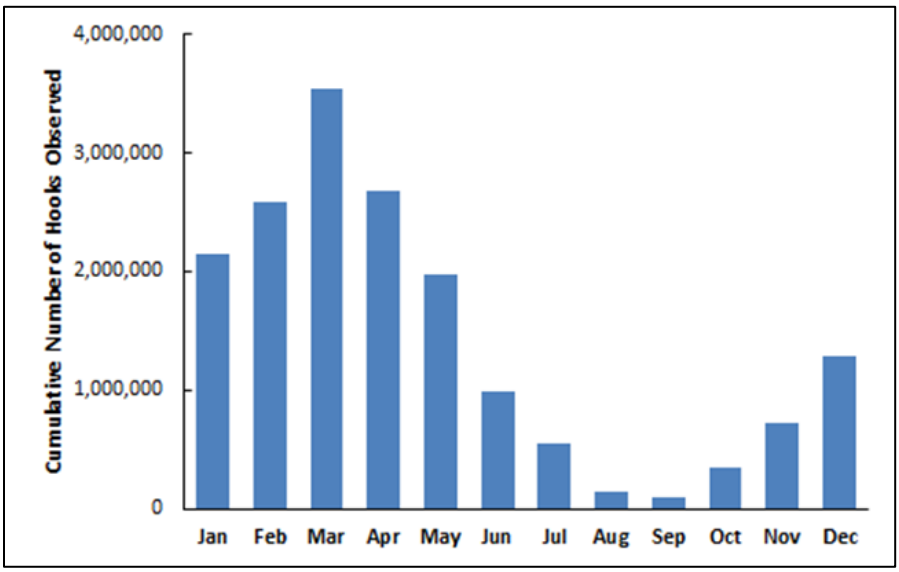

Figure 8. Cumulative observed monthly effort in hooks for the Hawaii shallow-set longline fishery (100% observer coverage), 2004-2017.
Source: NMFS Pacific Islands Regional Office Observer Program

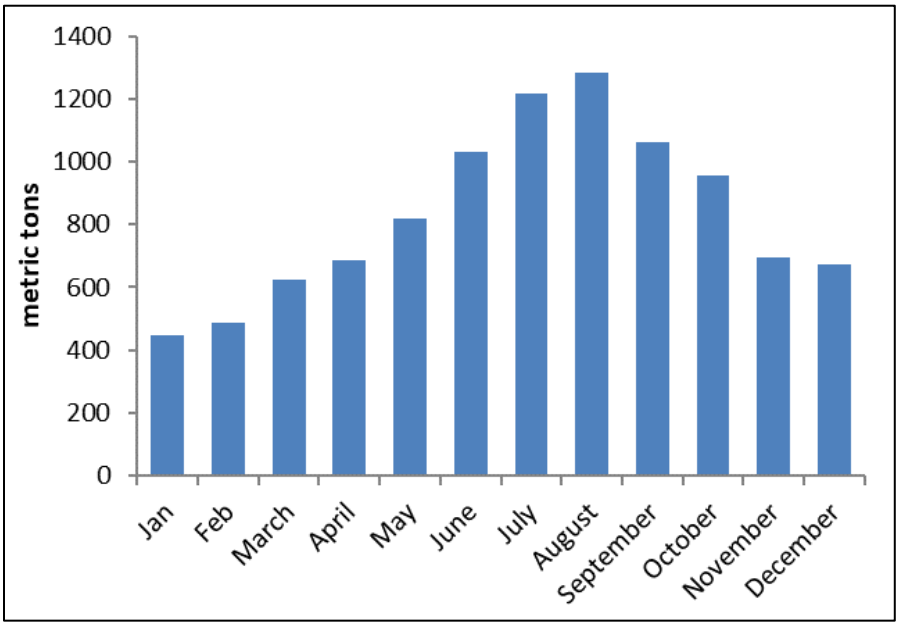

Figure 9. Average Monthly Swordfish Imports into the United States, 2013-2017
Source: Figure made from data available at: https://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/raw-data/imports-exports-annual#1

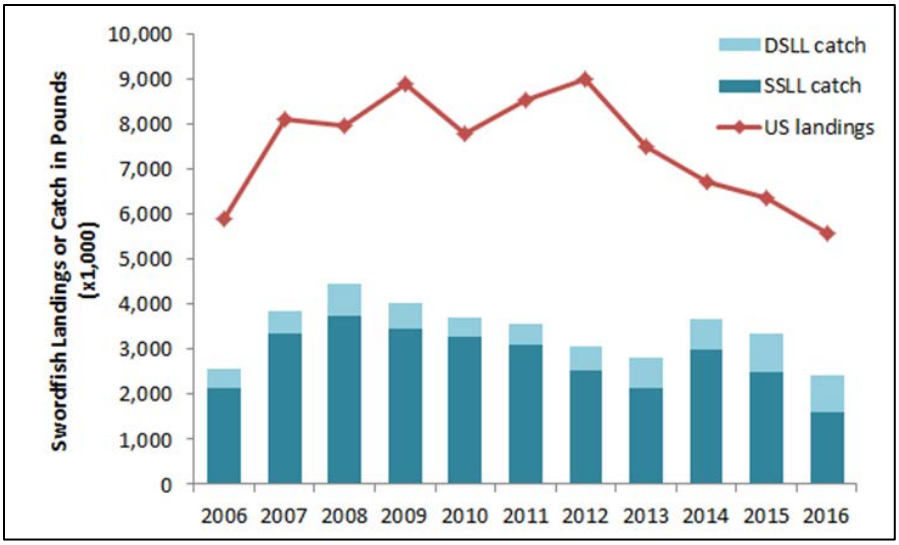

Figure 10. Hawaii shallow-set and deep-set longline fishery swordfish catch and total US domestic swordfish landings, 2006-2016.
Source: WPFMC 2017 and NMFS Commercial Fisheries Statistics (https://www.st.nmfs.noaa.gov/st1/commercial/index.html)

The shallow-set fishery has had four early closures since 2004 (see section 1.1): once in March 2006 from reaching the loggerhead limit of 17 turtles, another in November 201l from reaching the leatherback limit of 16, another in May of 2018 in compliance with court order (*TIRN v. NMFS* (9th Cir. 2017)), and lastly in 2019 from reaching the loggerhead annual limit of 17. The closure in March of 2006 during the peak fishing season resulted in a substantial reduction in effort, catch, and revenue compared to 1 year before and after (Table 19). The number of trips in 2006 was 42% lower than the average of the years before and after, and hooks set were 50% lower. Catch in 2006 was 37% lower than the average of the years before and after, and nominal revenue was 46% lower in the closure year. The impact of the leatherback annual limit closure in 2011 is less evident. This may be due to a November closure, and when compared with the average of 1 year before and after, may be confounded by the overall declining trend in effort and catch since 2010. The effects of the recent 2019 closure are still being analyzed.

Table 19. Difference in fishery performance between hard cap closure years (2006, 2011) and the average of 1 year before and after each closure.

2006 Loggerhead Hard Cap Closures				
Performance measure	**Closure year (2006)**	**Average of 1 year before and after**	**Difference**	**Percent Difference**
Trips	57	98.5	-41.5	-42%
Hooks (million)	0.7	1.4	-0.7	-50%
Catch (1,000 lbs.)	2,328	3,692	-1,364	-37%
Nominal Revenue ($1,000)	$3,985	$7,353	-$3,368	-46%
2011 Leatherback Hard Cap Closure				
Performance measure	**Closure year (2011)**	**Average of 1 year before and after**	**Difference**	**%**
Trips	82	98.5	-16.5	-17%
Hooks (million)	1.5	1.6	-0.1	-6%
Catch (1,000 lbs.)	3,500	3,214	+286	+9%
Nominal Revenue ($1,000)	$6,086	$6,232	-$146	-2%

3.4 Management Setting

The shallow-set and deep-set longline fisheries are managed under a single limited access fishery with a maximum of 164 vessel permits. The shallow-set fishery is monitored under 100% observer coverage. All Hawaii permitted vessels are required to provide 72-hour advance notification prior to leaving port on a fishing trip to declare trip type (shallow-setting or deep-setting) and to receive observer placement. Vessels may not switch gear type during a trip once a trip is declared and underway. NOAA Office of Law Enforcement (NOAA OLE) and U.S. Coast Guard (USCG) enforce these regulations for all Hawaii permitted vessels.

Swordfish is a highly migratory stock that is subject to management by WCPFC and IATTC. Current WCPFC measures for shallow-set longline fishing for swordfish include the use of large circle hooks or whole finish bait (CMM 2008-03). A summary of current management requirements are as follows:

Fishing Permits and Certificates on board the vessel:

- Hawaii Longline Limited Entry Permit.
- Marine Mammal Authorization Program Certificate.
- High Seas Fishing Compliance Act Permit (if fishing on the high seas).
- Western and Central Pacific Fisheries Convention (WCPFC) Area Endorsement (if fishing on the high seas in the convention area).
- Protected Species Workshop (PSW) Certificate.
- Western Pacific Receiving Vessel Permit, if applicable.
- State of Hawaii Commercial Marine License.

Reporting, Monitoring, and Gear Identification:

- Logbook for recording effort, catch, and other data.
- Transshipping Logbook, if applicable.
- Marine Mammal Authorization Program Mortality/Injury Reporting Form.
- Vessel monitoring system.
- Vessel and fishing gear identification.

Notification Requirement and Observer Placement:

- Notify NMFS before departure on a fishing trip to declare the trip type (shallow-set or deep-set).
- Each fishing trip is required to have a fishery observer on board if requested by NMFS; NMFS places observers on every shallow-set longline trip, resulting in 100% coverage.
- Fisheries observer guidelines are used.

Prohibited Longline Fishing Areas:

- NWHI Longline Protected Species Zone.
- Main Hawaiian Islands Longline Fishing Prohibited Area.
- Papahanaumokuakea Marine National Monument: Prohibited commercial fishing in the Monument, which has boundaries that align with the NWHI Longline Protected Species Zone.

- Pacific Remote Islands Marine National Monument: Prohibited commercial fishing in the Monument, which includes all U.S. EEZ waters out to 200 nm around Wake and Jarvis Island and Johnston Atoll and out to 50 nm around Howland, Baker, Jarvis Islands, Kingman Reef and Palmyra Atoll.

Protected Species Workshop (PSW):

- Each year, longline vessel owners and operators must complete a PSW and receive a certificate.
- The vessel owner must have a valid PSW certificate to renew a Hawaii longline limited entry permit.
- The vessel operator must have a valid PSW certificate on board the vessel while fishing.

Sea Turtle, Seabird, and Shark Handling and Mitigation Measures:

- Vessel owners and operators are required to adhere to regulations for safe handling and release of sea turtles and seabirds.
- Vessel owners and operators must have on board the vessel all required turtle handling/dehooking gear specified in regulations.
- Vessel owners and operators can choose between side setting and stern setting, with additional requirements to reduce seabird interactions.
- When shallow-set longline fishing north of the Equator:
    - Use 18/0 or larger circle hooks with no more than 10° offset.
    - Use mackerel-type bait.
    - Set at night for stern set vessels.
- Vessel owners, operators, and crew are required to release any oceanic whitetip shark or silky shark and take reasonable steps for its safe release. This measures also applies to giant manta rays in the IATTC Convention Area.

Marine Mammal Handing and Release:

- Vessel owners and operators must follow the marine mammal handling guidelines provided at the PSW.
- Vessel owners or operator must submit the Marine Mammal Authorization Program (MMAP) Mortality/Injury Reporting Form within 48 hours after the end of the fishing trip to NMFS to report injuries or mortalities of marine mammals (50 CFR 229.6).

Unless otherwise noted, most of the above regulations are at 50 CFR Part 665, and the WCPFC and IATTC derived regulations are found at 50 CFR Part 300. A summary of regulations for Hawaii longline fisheries (shallow-set and deep-set combined) is provided by the Summary of Hawaii Longline Fishing Regulations (NMFS 2018c). A detailed description of the management setting for the shallow-set fishery can also be found in the Pelagic FEP (WPFMC 2009a) and Amendment 18 to the Pelagic FEP (WPFMC 2009b).

3.5 Resources Eliminated from Detailed Analysis

There are presently no known districts, sites, highways, cultural resources, structures or objects listed in or eligible for listing in the National Register of Historic Places in the EEZ around American Samoa, Guam, CNMI, and Hawaii, or in adjacent areas of the high seas in international waters where pelagic longline fishing activities are conducted. Additionally,

longline fishing activities are not known to result in adverse effects to scientific, historic, archeological or cultural resources because fishing activities occur generally miles offshore. Shipwrecks would be the only known cultural objects potentially within the affected environment. The location of most shipwrecks is unknown. However, longline fishing operations do not come into contact with the seafloor, so the shallow-set fishery would not be expected to affect any material from shipwrecks, embedded in the ocean bottom. Therefore, the proposed action is not likely to affect historic resources.

The shallow-set fishery does not operate within estuarine waters or have the potential to affect wetlands. Because pelagic longline fishing activities authorized occur offshore and in deep oceanic waters away from land, populated areas, and marine protected areas such as marine national monuments, the alternatives considered would not have an effect on air/water quality, coral reefs, or benthic marine habitats.

Longline fishing is not known to be a potential vector for spreading alien species as most vessels fish far away from coastal areas offshore. The proposed action would not increase the potential for the spread of alien species into or within nearshore waters in Hawaii or any of the U.S. participating territories.

NMFS is not aware of studies that show effects from pelagic longline fisheries to species fecundity or negative predator/prey relationships that result in adverse changes to food web dynamics. Without management to ensure fishing is sustainable, the removal of top predator pelagic species such as swordfish and other billfish, as well as tuna species above natural mortality rates has the potential to cause major imbalances or wide-ranging changes to ecosystem functions, biodiversity, and habitats. However, both international and domestic fishery managers are controlling catches throughout the Pacific. NMFS expects such control to improve stock status and prevent imbalances or wide-ranging changes to ecosystem function. Therefore, NMFS does not analyze effects on biodiversity and/or ecosystem function in this assessment.

4 ENVIRONMENTAL EFFECTS OF THE ALTERNATIVES

This section describes the potential effects of each alternative on the components of the affected environment identified in Section 3 above.

This chapter describes the potential environmental consequences that could result from the Alternatives considered. The analysis relies on the information described in Chapter 3 as the baseline to evaluate the impacts of the management alternatives considered herein. The environmental resources that are potentially affected include the following: target and non-target species (including bycatch), protected resources, socioeconomic setting and management setting. Climate change impacts are discussed in the cumulative effects section. A summary of potential effects are presented in Table 23.

4.1 Potential Effects on Target and Non-target Stocks

This section describes the potential effects of the alternatives for managing loggerhead and leatherback turtle interactions in the shallow-set longline fishery on target and non-target stocks

identified in Section 3.1. Under all alternatives, NMFS, the Council, and RFMOs would continue to adjust fishery management measures based on the best available information to prevent overfishing. NMFS does not expect the shallow-set fishery catch of target and non-target stocks would influence stock status of these species, and the potential effects on target and non-target stocks of the alternatives are not substantial.

4.1.1 Alternative 1: No Action (Status Quo/Current Management)

Under Alternative 1, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year) if the loggerhead or leatherback turtle interactions do not exceed the hard cap limit and the fishery remains open throughout the year. In such years, this alternative is not expected to result in changes in effects to target and non-target stocks described in Section 3.1.

However, effort and catch by the shallow-set longline vessels is expected to be in the lower end of the range when the fishery closes early in the calendar year due to reaching a hard cap limit. As described in Section 4.2.1, the loggerhead hard cap limit of 17 is based on the ITS in the 2004 BiOp and is approximately half of the anticipated level of interactions estimated for the 2019 BiOp. The fishery is therefore expected to reach the loggerhead hard cap limit in some years. Of the years since 2004 when the fishery operated under a loggerhead hard cap of 17 (2004-2009; 2011; 2019), the fishery reached the limit in 2006 and 2019, both during March. The early closure in 2006 resulted in a 37% reduction in total catch by Hawaii shallow-set longline vessels compared to the average of the years before and after (Table 19). Catch statistics for 2019 are not yet available.

Given that the fishing effort and catch under Alternative 1 is not expected to increase, and that the North Pacific swordfish stock is currently healthy, the potential effects of this alternative on the target stock are not substantial. The fisheries impacts to other target and non-target species that are subject to international overfishing such as the eastern Pacific yellowfin, Pacific bluefin tuna, oceanic whitetip shark, and the north Pacific striped marlin are very small, and are not anticipated to exceed thresholds that would influence stock status of these species (see Section 3.1).

Because the Council and NMFS closely monitor catches based on landings data, we expect to detect changes in the catch of non-target stocks and develop additional management measures, as appropriate. Should NMFS determine that any other target and non-target stocks are overfished or subject to overfishing, and WCPFC management measures appear ineffective, the Council would consider recommending future management measures to the Secretary of Commerce to rebuild the stock or reduce fishing mortality in consideration of the relative impact of the U.S. fleet on the stock. For these reasons, the shallow-set fishery would not have a substantial effect on target and non-target stocks under Alternative 1.

4.1.2 Alternative 2: Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles

Under Alternative 2, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year) and is not expected to

result in changes in effects to target and non-target stocks described in Section 3.1. The loggerhead hard cap limit of 36 interactions is based on the 95th percentile value of the predicted distribution of the anticipated level of interactions in any given 1-year period (McCracken 2018). The 95th percentile value fully represents the possible range of takes, and thereby ensures we are not underestimating potential impacts to species over the full period of the action. In terms of take, this means that there is a 95 percent probability in any given year that the true number of animals captured or killed is within the credible interval. Although the fishery is unlikely to capture animals at the 95 percentile value year after year, the biological opinion accounts for this and examines take at both the 95 percent interval and mean in its jeopardy analysis. The leatherback hard cap limit of 16 interactions is approximately 25 percent lower than the ITS that is based on the 95th percentile value of the predicted distribution, and thus there is a higher probability that the fishery would reach the leatherback turtle hard cap limit in any given year than that of the loggerhead turtle.

Implementation of individual trip limits is expected to reduce the likelihood of reaching the hard cap limit and increase the likelihood for maintaining fishing operations throughout the calendar year when higher interaction rates are observed. Consequently, target and non-target catch by the shallow-set fishery may be higher than Alternative 1 in such years. However, increases in target and non-target catch as a result of the extended fishing year are likely to be within the range observed since 2004 and are not expected to result in adverse effects to target and non-target stocks. Given that the North Pacific swordfish stock is currently healthy, the potential effects of this alternative on the target stock are not substantial. The fishery's impacts to other target and non-target species that are subject to international overfishing such as eastern Pacific yellowfin, Pacific bluefin tuna, oceanic whitetip shark, and the north Pacific striped marlin are very small, and are not anticipated to exceed thresholds that would influence stock status of these species (see section 3.1).

Because the Council and NMFS closely monitor catches based on landings data, we expect to detect changes in the catch of non-target stocks and develop additional management measures, as appropriate. Should NMFS determine that any other target and non-target stocks are overfished or subject to overfishing, and WCPFC management measures appear ineffective, the Council would consider recommending future management measures to the Secretary of Commerce to rebuild the stock or reduce fishing mortality in consideration of the relative impact of the U.S. fleet on the stock. For these reasons, the shallow-set fishery would not have a substantial effect on target and non-target stocks under Alternative 2.

4.1.3 Alternative 3: Implement Annual Fleet-wide Hard Cap Limits and individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles

Under Alternative 3, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year) and is not expected to result in changes in effects to target and non-target stocks described in Section 3.1.

Implementation of individual trip limits under Alternative 3 is expected to have similar outcomes to Alternative 2 in reducing the likelihood of reaching the hard cap limit and increasing the likelihood for maintaining fishing operations throughout the calendar year when higher

interaction rates are observed. Consequently, target and non-target catch by the shallow-set fishery may be higher than Alternative 1 in such years. However, increases in target and non-target catch as a result of the extended fishing year are likely to be within the range observed since 2004 and are not expected to result in adverse effects to target and non-target stocks. The additional restrictions on vessels that reach a trip limit twice in calendar year is not expected to substantially affect the overall effort and catch of the fleet. Given that the North Pacific swordfish stock is currently healthy, the potential effects of this alternative on the target stock are not substantial. The fishery's impacts to other target and non-target species that are subject to international overfishing such as eastern Pacific yellowfin, Pacific bluefin tuna, oceanic whitetip shark, and the north Pacific striped marlin are very small, and are not anticipated to exceed thresholds that would influence stock status of these species (see Section 3.1).

Because the Council and NMFS closely monitor catches based on landings data, we expect to detect changes in the catch of non-target stocks and develop additional management measures, as appropriate. Should NMFS determine that any other target and non-target stocks are overfished or subject to overfishing, and WCPFC management measures appear ineffective, the Council would consider recommending future management measures to the Secretary of Commerce to rebuild the stock or reduce fishing mortality in consideration of the relative impact of the U.S. fleet on the stock. For these reasons, the shallow-set fishery would not have a substantial effect on target and non-target stocks under Alternative 3.

4.1.4 Alternative 4: Implement Annual Fleet-Wide Hard Cap Limit for Leatherback Turtles and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles (Preferred Alternative)

Under Alternative 4, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year) and is not expected to result in changes in effects to target and non-target stocks described in Section 3.1. As described in Section 4.2.4, the likelihood of the fishery exceeding the loggerhead turtle ITS of 36 in the absence of a hard cap limit is small (less than five percent in any given year), and thus the fishery outcome is expected to be similar to that of Alternative 3.

Given that the North Pacific swordfish stock is currently healthy, the potential effects of this alternative on the target stock are not substantial. The fishery's impacts to other target and non-target species that are subject to international overfishing such as eastern Pacific yellowfin, Pacific bluefin tuna, oceanic whitetip shark, and the north Pacific striped marlin are very small, and are not anticipated to exceed thresholds that would influence stock status of these species (See Section 3.1).

Because the Council and NMFS closely monitor catches based on landings data, we expect to detect changes in the catch of non-target stocks and develop additional management measures, as appropriate. Should NMFS determine that any other target and non-target stocks are overfished or subject to overfishing, and WCPFC management measures appear ineffective, the Council would consider recommending future management measures to the Secretary of Commerce to rebuild the stock or reduce fishing mortality in consideration of the relative impact of the U.S. fleet on the stock. For these reasons, the shallow-set fishery would not have a substantial effect on target and non-target stocks under Alternative 4.

4.2 Potential Effects on Protected Resources

This section describes the potential effects of the alternatives for managing loggerhead and leatherback turtle interactions in the shallow-set fishery on protected species identified in Section 3.2.

Under all alternatives considered, the shallow-set fishery will continue to be managed under existing gear and handling requirements to minimize impacts to sea turtles. These include the required use of 18/0 or larger circle hooks with no more than 10° offset and mackerel-type bait, adherence to regulations for safe handling and release of sea turtles, and sea turtle handling and dehooking gear onboard the vessel. These measures have successfully reduced loggerhead and leatherback turtle interactions by approximately 90% since their implementation in 2004 (Gilman and Kobayashi 2007, Swimmer et al. 2017). Under all alternatives considered, NMFS would continue to monitor the shallow-set fishery under 100% observer coverage and provide near real-time data on loggerhead and leatherback turtle interactions. Current NMFS observer data collection protocols instruct observers to report sea turtle interactions using a satellite phone after each observation. These call-in reports are used to monitor the existing hard caps in near real-time.

The disposition of the loggerhead and leatherback turtles incidentally captured in the shallow-set fishery is not expected to change as result of any of the alternatives considered, as the gear and other operational characteristics affecting the capture and release conditions of these species would not be affected under any of the alternatives considered. Over 99% of all observed loggerhead turtle interactions and all observed leatherback turtle interactions since 2004 have resulted in the animal being released alive following the required handling and gear removal procedures. For sea turtles released alive, a post-hooking mortality rate is estimated based on NMFS' established criteria (Ryder et al. 2006). NMFS estimates in the 2019 BiOp that the overall post-hooking mortality rate is 0.16 for loggerhead turtles and 0.20 for leatherback turtles.

Under all outcomes associated with the alternatives, the current and maximum foreseeable levels of fishing effort by longline fisheries managed under the FEP would continue to be subject to the level of take authorized under the ESA and regulations under other applicable laws. As noted in Section 3.2, NMFS is required to re-initiate consultation under ESA Section 7 if any ITS applicable to the shallow-set fishery is exceeded or another criterion for reinitiation is triggered. To meet management mandates, the Council, NMFS, and international fishery management organizations such as the WCPFC and IATTC would continue to develop protected species mitigation measures as resource issues are identified through reporting and monitoring.

4.2.1 Alternative 1: No Action (Status Quo/Current Management)

Under Alternative 1, the shallow-set fishery would continue to be managed under existing measures to minimize impacts to sea turtles, including gear and handling requirements, as well as the existing hard cap limits of 17 loggerhead turtles and 26 leatherback turtles that are codified in regulations at 50 CFR 665.813(b)(1). This alternative would not implement any measures for early response to higher interaction rates or fluctuations that may indicate a potential for higher impacts to sea turtle populations or a fishery closure early in the calendar year, and would not implement RPM T&C 1a and 1b.

Under this alternative, the shallow-set fishery would not operate in compliance with the 2019 BiOp, as RPM T&C 1a and 1b would not be implemented. If the fleet-wide leatherback turtle interactions exceed 16, the fishery would also not operate in compliance with RPM T&C 1h, which requires that the fishery operate under a leatherback hard cap limit of 16 leatherbacks and 17 loggerheads if RPM T&C 1a and 1b are not implemented by regulations.

Under Alternative 1, the fishery would operate under a loggerhead turtle hard cap limit of 17, pursuant to the final rule implementing the court order (83 FR 49495, October 2, 2018). The limit of 17 loggerhead turtles is based on the ITS in the 2004 BiOp. That ITS was based on predictive modeling of the anticipated level of interactions using 1994-1999 data (observer coverage of 3.3-5.8% annually for both shallow-set and deep-set longline fisheries) and applying the interaction reduction rates associated with circle hooks and mackerel bait from experimental results in the Atlantic (Kobayashi 2003).

Since the shallow-set fishery's reopening in April 2004, the fishery has accumulated 15 additional years of operational data under these mitigation measures and 100% observer coverage. Based on the observed interaction data since 2004, the future anticipated loggerhead turtle interactions in the shallow-set fishery, when assuming year-round fishery operations without fleet-wide hard cap closures, is expected to have a long-term average of 15.6 interactions per year, with an upper range (based on a 95th percentile value) of equal to or less than 36 interactions in a 1-year period, and equal to or less than 81 interactions in a 3-year period (McCracken 2018). This anticipated level of loggerhead turtle interactions was analyzed in the 2019 BiOp.

The current abundance estimate of the North Pacific loggerhead turtle population is approximately 341,071 individuals, of which an estimated 6,984 individuals are nesting females (NMFS 2019). PIFSC's PVA of the North Pacific loggerhead population using nest count data from three nesting beaches representing approximately 52% of the entire nesting population indicate that the population is exhibiting a long-term increasing trend at a mean estimated population growth rate of 2.3% (Martin et al. 2020). Projections from the PVA model show a low probability that the North Pacific loggerhead turtle population would fall below 12.5 to 50% abundance thresholds within 100 years. Based on the upper range of the anticipated level of interactions (36 interactions in any given 1-year period) and a post-hooking mortality rate estimate of 0.16, the upper range of the loggerhead turtle estimated mortality in any given year is equal to or less than 6 loggerhead turtles or any size or sex. This level of mortality represents 0.0018% of the total population, and a proportional impact of 0.001-0.003% when evaluated against the three subpopulations (Yakushima subpopulation comprising 40% of total population, mainland subpopulation comprising of 50% of total population, and Ryukyu subpopulation comprising of 9% of the total population). The 2019 BiOp concluded that this level of incidental take and resulting mortality associated with the continued authorization of the shallow-set fishery would not be expected to appreciably reduce the North Pacific loggerhead turtle population's likelihood of surviving and recovering in the wild. NMFS expects that the overall population will remain large enough to maintain genetic heterogeneity, broad demographic representation, and successful reproduction. Additionally, a PIFSC take model that evaluated the impact of the anticipated level of interactions analyzed in the 2019 BiOp on the North Pacific loggerhead turtle

population showed that this level of interactions showed no discernable difference in the population trend over the 100-year projection period as well as the probability of the population falling below abundance thresholds when compared to the no-take scenario (Martin et al. 2020).

The loggerhead turtle hard cap limit of 17 under Alternative 1 is approximately half of the upper bound of the anticipated level of interactions analyzed in the 2019 BiOp. The low loggerhead turtle hard cap limit compared to the anticipated level of interactions suggests that the shallow-set fishery would occasionally close from reaching the limit, preventing further interactions with this species as well as all other protected species for the remainder of the calendar year. The population-level effects of the shallow-set fishery under Alternative 1 on the loggerhead turtle population would be lower than the levels analyzed in the 2019 BiOp and the PIFSC take model described above. As such, the potential effects of Alternative 1 on loggerhead turtles are not expected to be substantial. Additionally, under the Alternative 1, the fishery would operate under a conservative loggerhead hard cap limit that does not reflect the best available scientific information for the species' conservation status or needs, and is expected to close in some years as a result of reaching the loggerhead hard cap.

Under Alternative 1, the leatherback turtle hard cap limit would be retained at the current regulatory limit of 26, which was set based on the ITS in the 2012 BiOp and is higher than the level analyzed in the 2019 BiOp. However, the anticipated level of leatherback turtle interactions based on observed data since 2004 is an average of 10 interactions per year, with an upper range of equal to or less than 21 interactions in any given year based on a 95th percentile predicted value (McCracken 2018). This level of interaction indicates that the likelihood of leatherback turtle interactions exceeding 21 in any given year is less than five percent, and that the likelihood of reaching 26 is extremely low. The predictions for the anticipated level of interactions assumed year-round fishery operations without fleet-wide hard cap closures, and provide a reasonable prediction of future level of interactions at a high leatherback hard cap limit under this alternative.

In the 2019 BiOp, NMFS analyzed the impacts of the anticipated level of interactions using the 1-year 95th percentile anticipated level of interactions of 21 leatherback turtles (3 estimated mortalities) and a long-term average of 10 interactions per year. For Western Pacific leatherback turtles, the current abundance estimate of all age classes and both sexes is approximately 175,000 (range 68,000-360,000) and the adult portion of the population is estimated at approximately 1,851 (range 1,488-2,320). PIFSC's PVA of the Western Pacific leatherback turtle population using nest count data from two nesting beaches representing approximately 75% of the total nesting in the Western Pacific indicate that the population is exhibiting a long-term declining trend at a mean estimated population growth rate of -6.1% (Martin et al. 2020). Projections show a high probability (greater than 91% probability on average) that the Western Pacific leatherback turtle population would fall below 12.5% to 50% abundance thresholds within 100 years. An estimated mortality of up to 3 leatherback turtles of any size or sex in any given year represents 0.004% of the total population based on the lower range of the abundance estimate. If the population falls to 12.5% of the current size, NMFS estimates that the estimated mortality of up to 3 leatherback turtles would represent less than 0.03% of the total population or 0.066% of the summer nester population.

NMFS concluded in the 2019 BiOp that this level of impact would be inconsequential and that the impacts from the fishery are not likely to appreciably reduce the species' likelihood of survival and recovery in the wild (NMFS 2019). NMFS expects that, despite evidence that suggest leatherback turtle populations in the Pacific are facing high risk of extinction, the number of leatherback turtles expected to be impacted as a result of the shallow-set fishery would not appreciably increase the extinction risk of the Western Pacific population, reduce its probability of recovering, or impede that recovery.

Additionally, since the completion of the 2019 BiOp, a PIFSC take model that evaluated the impact of the anticipated level of interactions analyzed in the 2019 BiOp on the Western Pacific leatherback turtle population showed that the difference in the population trend between the "no take" and "take" scenario is negligible over the 100-year projection period (Martin et al. 2020). The difference between the two scenarios slowly becomes apparent after the year 2060 and suggests the population would go extinct roughly 5 years sooner than in the "no take" scenario (around 2110 vs. 2115). Further, the model outputs show no difference in the probability of the population being above or below abundance thresholds for the "no take" and "take" scenarios, and a negligible difference in the mean number of years to reach each threshold for the "no take" and "take" scenarios. For example, the mean number of years to reach the 50% abundance threshold under the no take scenario is 12.71 years, whereas for the take scenario is 12.70 (or a difference of 0.01 year or 3.65 days). Similarly, the mean number of years to reach the 12.5% abundance threshold under the no take scenario is 35.71 years compared to 35.54 years in the take scenario (or a difference of 0.17 years or a difference of 62.05 days). Based on the analysis presented in the 2019 BiOp along with the PIFSC take model, the potential effects of the shallow-set fishery under Alternative 1 on the leatherback turtle population is not expected to be substantial.

Under Alternative 1, effects to the green and olive ridely sea turtle are expected to be similar to or lower than the baseline conditions described in Section 3.2. Green and olive ridley sea turtles rarely interact with shallow-set gear, and each, represent approximately three percent of the overall sea turtle interactions in the fishery (NMFS 2019). For the olive ridley, this is most likely because of a combination of deep-foraging and low density in temperate waters where fishing for swordfish occurs. In years when the fishery operates year-round, the fishery may interact with up to 5 olive ridley and 5 green sea turtles (all Pacific DPS) and result in 1 mortality of each in any given year, or 11 olive ridley and 10 green sea turtle interactions over a 3-year period (NMFS 2019). The 2019 BiOp analyzed the effects of 5 interactions and 1 mortality on the olive ridley and green sea turtle in any given year, and concluded that the fishery would not be expected to appreciably reduce the likelihood of survival and recovery in the wild for these two species. Like loggerhead and leatherback sea turtles, the fishery would be required to minimize impacts to olive ridley and green sea turtles using gear and handling requirements currently in regulations.

Under Alternative 1, effects to marine mammals are expected to be similar to or lower than the baseline conditions described in Section 3.2. For the ESA listed Guadalupe fur seal, a total of four confirmed interactions have occurred in the fishery since 2013 (there are no observed pinniped interactions in the shallow-set fishery prior to 2013). All of the pinniped interactions observed in the fishery have occurred outside of the EEZ off California. This may be due to a portion of the fleet that began operating out of ports on the West Coast of California starting in

2013. In years when the fishery operates year-round, the fishery may interact with up to 11 individuals and result in 9 mortalities (NMFS 2019). The 2019 BiOp concluded that 11 interactions and 9 mortalities would not be expected to appreciably reduce the likelihood of survival and recovery of the Guadalupe fur seal in the wild. For all other ESA listed marine mammals, the 2019 BiOp concluded that the shallow-set fishery may affect, but is not likely to adversely affect these species. For both ESA and non-ESA listed marine mammals where the PBR is available, the mean annual mortality and serious injury for the shallow-set longline fishery inside the EEZ around Hawaii is well below the corresponding PBR in the time period covered by the current SAR (refer to Table 58 in 2018 SAFE report). Under this alternative, vessel owners and operators must follow the marine mammal handling guidelines provided at the PSW, and must also submit the MMAP Mortality/Injury Reporting Form within 48 hours after the end of the fishing trip to NMFS to report injuries or mortalities of marine mammals (50 CFR 229.6).

Under Alternative 1, effects to the oceanic whitetip shark are expected to be similar to or lower than the baseline conditions described in Section 3.2. Of the 875 interactions that occurred between 2004 and 2018, 484 interactions (55%) occurred within the boundaries of the Monument that is now closed to longline fishing due to the expansion in 2016, and 391 were outside (45%). The majority of oceanic whitetip sharks incidentally caught in the fishery are also released alive (88%; NMFS 2019). In years when the fishery operates year-round, the fishery may interact with up to 102 oceanic whitetip sharks and result in 32 mortalities (NMFS 2019). The 2019 BiOp concluded that 102 interactions and 32 mortalities would not be expected to appreciably reduce the likelihood of survival and recovery of the oceanic whitetip shark in the wild. Under this alternative, the fishery will continue to be subject to conservation measures from regional fishery management organizations implemented in the U.S. domestic fisheries that require the non-retention of oceanic whitetip sharks (implemented in 2011 in the IATTC convention area and 2015 in the WCPFC convention area). Specifically, these conservation measures for the WCPFC prohibit U.S. fishing vessels from retaining any part or carcass of an oceanic whitetip shark, except to assist WCPFC observers in collection of samples (50 CFR 300.226). The regulations also require vessel operators to release any oceanic whitetip shark as soon as possible and take reasonable steps for safely releasing oceanic whitetip sharks. Similar conservation measures prohibiting retention and safe release of oceanic whitetip sharks are in place in the IATTC convention area (50 CFR 300.24). Additionally under this alternative, State and Federal regulations will continue to prohibit shark finning in the shallow-set fishery.

Under Alternative 1, the fishery will continue to be subject to required seabird mitigation measures found at 50 CFR 66.585. These measures include the use of side-setting or other techniques proven to reduce seabird bycatch (e.g., setting at night, strategic bait and offal discard, etc.). To date there are no observed interactions with the listed short-tailed albatrosses in the fishery. The short-tailed albatross ITS in the USFWS 2012 BiOp is 1 incidental take every 5 years. Exceeding this number will lead to reinitiating consultation of the impact of this fishery on the species.

Under Alternative 1, effects to the giant manta ray are expected to be similar to or lower than the baseline conditions described in Section 3.2. Interactions with giant manta rays in the shallow-set fishery are rare. This is most likely because giant manta rays are filter-feeding animals that may

represent a very low selectivity for shallow-set longline gear, and are much more likely to be entangled in gear as opposed to being hooked. In years when the fishery operates year-round, the fishery may interact with up to 13 giant manta rays and result in 4 mortalities (NMFS 2019). The 2019 BiOp concluded that 13 interactions and 4 mortalities would not be expected to appreciably reduce the likelihood of survival and recovery of the giant manta ray in the wild. In the coming months, as required under the ITS of the 2019 BiOp, NMFS and the Council will research and develop new minimizations measures to reduce incidental catch for both the oceanic whitetip shark and giant manta ray in the shallow-set fishery.

Effects of the fishery under Alternative 1 for all protected species may be reduced further (e.g., fewer oceanic whitetip shark interactions) if the fishery closes occasionally due to reaching the low loggerhead turtle hard cap, and prevents further protected species interactions for the remainder of the calendar year in such closure years. However, the extent to which the low loggerhead turtle hard cap may reduce leatherback turtle and other protected species interactions has not been quantified, and would depend on the timing of such closures.

4.2.2 Alternative 2: Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles

Under Alternative 2, the loggerhead annual fleet-wide hard cap limit for the shallow-set fishery would be set at 36 per year consistent with the ITS in the 2019 BiOp, and the leatherback hard cap limit would be set at 16 per year (below the ITS of 21) consistent with RPM T&C 1a in the 2019 BiOp. The fishery would additionally operate under individual trip limits of 5 loggerhead turtle interactions and 2 leatherback turtle interactions. Under this alternative, the shallow-set fishery would not operate in compliance with the 2019 BiOp, as RPM T&C 1b would not be implemented.

The annual fleet-wide hard caps provide assurance that the fishery's impacts to loggerhead and leatherback turtles remain below a fixed level of interactions analyzed in the 2019 BiOp. NMFS concluded in the 2019 BiOp that the analyzed level of incidental take would not jeopardize the continued existence of all ESA listed species in the action area, including the loggerhead and leatherback sea turtle. The ITSs in the 2019 BiOp are based on the 95th percentile value of the predicted distribution of the anticipated level of interactions in any given 1-year period (McCracken 2018). The percentile values reflect the probability that the observed interactions for the 1-year period would be equal to or less than the value, meaning that there is a low probability that the observed interactions would be at the upper end of the 1-year predicated range, especially over multiple years. The long-term average anticipated level of interactions is expected to be 15.6 loggerhead turtles and 10 leatherback turtles (McCracken 2018). Therefore, in most years the observed interactions are expected to be well below the ITS.

Furthermore, 99% of all observed loggerhead turtle interactions and all observed leatherback turtle interactions since 2004 have resulted in the animal being released alive following the required handling and gear removal procedures. For sea turtles released alive, a post-hooking mortality rate is estimated based on NMFS' established criteria (Ryder et al. 2006). NMFS estimates in the 2019 BiOp that the overall post-hooking mortality rate is 0.16 for loggerhead turtles and 0.20 for leatherback turtles. The estimated mortalities analyzed in the 2019 BiOp are

based on applying these post-hooking mortality rates to the total number of anticipated interactions.

As described under Section 4.2.1 (potential effects of Alternative 1), the 2019 BiOp analyzed the effects of the shallow-set fishery on loggerhead turtles using the anticipated level of interactions (McCracken 2019). The 2019 BiOp concluded that the level of incidental take and resulting estimated mortality associated with the continued authorization of the shallow-set fishery would not be expected to appreciably reduce the North Pacific loggerhead turtle population's likelihood of surviving and recovering in the wild. NMFS expects that the overall population of the North Pacific loggerhead turtles, which is increasing at a mean rate of 2.3% per year, will remain large enough to maintain genetic heterogeneity, broad demographic representation, and successful reproduction. Additionally, a PIFSC take model that evaluated the impact of the anticipated level of interactions analyzed in the 2019 BiOp on the North Pacific loggerhead turtle population showed that this level of interactions showed no discernable difference in the population trend over the 100-year projection period as well as the probability of the population falling below abundance thresholds when compared to the no-take scenario. The 2019 BiOp findings, together with the take model results, indicate that the shallow-set fishery's potential effects on the loggerhead turtle population, when operating with an annual fleet-wide hard cap limit of 36 loggerhead turtles under Alternative 2, are not substantial.

The 2019 BiOp and the PIFSC take model analyzed the effects of the shallow-set fishery on leatherback turtles at an anticipate level of interaction level equal to or less than 21 interactions (3 estimated mortalities) in any given year based on the 95th percentile value of the predicted distribution (see Section 4.2.1). While the Western Pacific leatherback turtle population is declining at a mean rate of -6.1% and facing a high risk of extinction, NMFS concluded in the 2019 BiOp that the number of leatherback turtles expected to be impacted by the shallow-set fishery would not appreciably increase the extinction risk of the Western Pacific population, reduce its probability of recovering, or impede that recovery. PIFSC's take model additionally showed that the difference in the population trend between the "no take" and "take" scenario is negligible over the 100-year projection period, the probability of the population being above or below abundance thresholds for the "no take" and "take" scenarios show no difference, and the difference in the mean number of years to reach each threshold for the "no take" and "take" scenarios are negligible.

Under Alternative 2, the leatherback turtle interactions would not be expected to exceed 16 due to the hard cap limit. Since 2004, the shallow-set fishery has had two years in which the total number of leatherback turtle interactions was 16 (2011 and 2014; Table 11), while in most other years there were less than 10 interactions, so the fishery may infrequently reach the hard cap limit and close, but remain well below the hard cap limit in most other years. Therefore, the impacts of the shallow-set fishery on the leatherback turtle population are expected to be lower than the levels analyzed in the 2019 BiOp and the PIFSC take model. The 2019 BiOp findings, together with the take model results, indicate that the potential effects of Alternative 2 on leatherback turtles are not substantial.

The number of loggerhead and leatherback turtle interactions under Alternative 2 is expected to be further reduced with the implementation of individual trip limits of 5 loggerhead and 2

leatherback turtle interactions. As described in section 2.2.2, the trip limits are expected to provide early detection of and response to higher interaction rates that may indicate a potential for higher impacts to sea turtle populations, and is expected to reduce loggerhead and leatherback turtle interactions in such years. Individual trip limits are intended to mitigate a large proportion of loggerhead and leatherback turtle interactions from occurring in a single trip. Observed sea turtle interaction data since 2004 indicate that trips with loggerhead turtle interactions typically have 1-2 interactions per trip in years with low fleet-wide loggerhead turtle interactions (Table 20). Conversely, trips with 3 or more loggerhead turtle interactions have been observed in years with high fleet-wide interactions. In 2018, when the highest number of loggerhead turtle interactions was observed, 16% of the trips contributed to 58% of the total fleet-wide interactions. Monitoring the number of loggerhead turtle interactions per trip would provide an early detection mechanism for higher fleet-wide interactions, and the individual trip limit is expected to provide a "dampening" response by minimizing further interactions on those trips.

Leatherback turtle interactions in the shallow-set fishery have been less variable than loggerhead turtle interactions, with most trips with leatherback turtle interactions having 1-2 interaction per trip and only one trip having 3 interactions since 2004 (Table 20). Individual trip limits for leatherback turtle interactions are expected to serve as a preventative measure if higher interaction rates are observed in the future, and may also reduce interactions if vessels are able to avoid additional interactions after encountering the first leatherback on a given trip.

Individual trip limits are expected to provide an individual vessel incentive to avoid sea turtle interactions because shallow-set vessels may fish 500-1,000 nm from port and require considerable up-front costs for each trip, and thus a shortened trip duration may result in net loss for that trip. Given the economic disincentive of reaching the trip limit, vessel operators are more likely to employ additional avoidance strategies if they encounter multiple interactions in a trip, such as moving away from the area and avoiding areas with higher potential for interactions using information from NMFS' TurtleWatch program. If vessels reach a trip limit once, that vessel is more likely to avoid fishing in the same area as the previous trip and employ additional avoidance strategies to prevent further economic loss. Thus conservation benefits are expected even before the individual trip limit is triggered.

Table 20. Number of loggerhead and leatherback turtle interactions per trip for trips with at least one interaction, 2004-2019.

Loggerhead turtles			Leatherback turtles		
Number of turtles per trip	**Number of trips**	**Percent of trips with ≥1 turtle interaction**	**Number of turtles per trip**	**Number of trips**	**Percent of trips with ≥1 turtle interaction**
1	100	74.1%	1	85	89.5%
2	24	17.8%	2	9	9.5%
3	6	4.4%	3	1	1.1%
4	2	1.5%	4	0	NA
≥5	3	2.2%	≥5	0	NA

Source: PIFSC unpublished data

The individual trip limit also has an inherent cooling-off period due to the distance between fishing grounds and ports in Honolulu and California where vessels fishing shallow-set gear under the Hawaii longline limited entry permit land their catch. The travel distance from port to the areas where the shallow-set vessels typically operate is at minimum 2-3 days and may take as long as 5-6 days one-way. If a vessel reaches a trip limit, the travel time back to port, the required 72-hour notice prior to departure under 50 CFR 665.803, and travel time to return to fishing grounds would result in a minimum of 7-10 day days of no fishing by the applicable vessel. This time lag between the last set on the trip in which a vessel reaches a trip limit and the first set on the subsequent trip provides a cooling-off period that may allow for the conditions contributing to the high interactions to dissipate and reduce the likelihood of additional interactions in that area in subsequent trips. The trip limit also places the accountability of interactions on individual vessels and ensures that the consequence burden remains with the vessel that reaches the individual trip limit.

In response to a recommendation from the Council's Pelagic Plan Team at its May 2018 meeting, PIFSC conducted a simple simulation using observer data since 2004 to evaluate the potential effects of the individual trip limits on the fleet-wide annual loggerhead and leatherback turtle interactions. A range of individual trip limits were applied to the historical interaction data and any trip that reached the limit were truncated at that point with the remaining turtle interactions from that trip removed. For trips spanning two calendar years, if the scenario limit was reached at the end of the first year, and the trip had additional interactions in the same trip after the year changed, the trip was removed from the second year to simulate the trip being terminated after reaching the limit. The results of this simulation are shown in Table 21. It should be noted that this simulation assumes all other factors contributing to the number of loggerhead or leatherback turtle interactions per trip remain the same. In other words, the simulation does not assume any voluntary sea turtle avoidance behaviors by vessel operators that may further reduce interactions, any changes to fishing behavior in vessels not affected by the limits, or any other changes to the fleet behavior that may result in no net reduction in the fleet-wide annual number of interactions. Such assumptions were not incorporated into the simulations because individual trip limits have not been previously implemented in the Hawaii longline fishery, and operational data are not available to inform potential changes in vessel behavior for the simulation.

The simulation results show that applying an individual trip limit of 2 interactions to past interaction data could have reduced the annual number of loggerhead interactions by at least 1 interaction in 5 out of the 16 years since 2004, and applying an individual trip limit of 2 interactions could have reduced the annual number of leatherback turtle interactions by at least 1 in 1 out of the 14 years since 2004 (Table 21). On the higher end of the simulated limits, 2.2% of trips since 2004 with at least one loggerhead turtle interaction had 5 or more interactions per trip, but truncating those trips with a limit of 5 loggerhead interactions per trip contributed to 14% and 30% lower interactions in 2017 and 2018, respectively (Table 21).

For leatherback turtles, truncating trips after 2 or more interactions could have had an effect on 1 year only when a limit of 2 per trip was applied, given that only 1 trip since 2004 had more than 3 interactions per trip since 2004. The individual trip limit for leatherback turtles is expected to serve as a preventative measure in the event that higher interaction rates are observed and if more

vessels experience multiple leatherback turtles in a trip, thereby preventing the increase in interactions from levels observed since 2004. Additionally, individual trip limits for leatherbacks may also help reduce interactions if vessels are able to avoid additional interactions after encountering the first leatherback on a given trip.

The years with the reductions based on the simulation results correspond to the years with the higher number of observed interactions for each species, suggesting that the individual trip limit may effectively reduce the potential of reaching the hard cap while reducing impacts to loggerhead and leatherback populations by preventing a large number of interactions from occurring in a small portion of the fleet. This would in turn help maintain opportunities to fish for swordfish throughout the year.

The extent to which the individual trip limits for loggerhead and leatherback turtle interactions may reduce annual number of interactions is difficult to predict due to the lack of operational data to inform potential changes in vessel behavior in response to the new limits. The simple simulation described above is informative in considering the potential reduction based on past data. Greater reduction in interactions may be possible if vessels successfully implement voluntary sea turtle avoidance behavior well before reaching the trip limit. Conversely, the potential reduction in interactions may be less if vessels attempt sea turtle avoidance behavior but are not successful in avoiding further interactions, or the individual trip limits allow for a longer fishing season and vessels continue to interaction with loggerhead or leatherback turtle interactions throughout the season. Under Alternative 2, the Council would annually review the performance of the trip limits and may make recommendations to NMFS to revise the trip limit determined to be necessary based on the review.

Under Alternative 2, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004, as the combination of the individual trip limits and the hard cap limits based on operational data since 2004 are expected help maintain opportunities to fish for swordfish throughout the year. As such, effects to other protected species are expected to be the same as those described under Alternative 1, and within the baseline level of interactions described in Section 3.2, which do not represent substantial effects on any species (NMFS 2019).

Table 21. Simulation results applying a range of individual trip limits to observed interaction data from 2004-2019.

	Loggerhead					Leatherback				
Year	**Obs.**	**lim=2**	**lim=3**	**lim=4**	**lim=5**	**Obs.**	**lim=2**	**lim=3**	**lim=4**	**lim=5**
2004	1	1	1	1	1	1	1	1	1	1
2005	12	12	12	12	12	8	8	8	8	8
2006	17	14 (-18%)	16 (-6%)	17	17	2	2	2	2	2
2007	15	15	15	15	15	5	5	5	5	5
2008	0	0	0	0	0	2	2	2	2	2
2009	3	3	3	3	3	9	9	9	9	9
2010	7	7	7	7	7	8	8	8	8	8
2011	12	12	12	12	12	16	16	16	16	16
2012	6	6	6	6	6	7	7	7	7	7
2013	6	6	6	6	6	11	11	11	11	11
2014	15	15	15	15	15	16	15 (-6%)	16	16	16

Year	Loggerhead					Leatherback				
	Obs.	lim=2	lim=3	lim=4	lim=5	Obs.	lim=2	lim=3	lim=4	lim=5
2015	13	13	13	13	13	5	5	5	5	5
2016	15	13 (-13%)	15	15	15	5	5	5	5	5
2017	21	14 (-33%)	16 (-24%)	17 (-19%)	18 (-14%)	4	4	4	4	4
2018	33	15 (-55%)	18 (-45%)	21 (-36%)	23 (-30%)	6	6	6	6	6
2019	20	19 (-5%)	20	20	20	0	0	0	0	0

Note: First column for each species (Obs.) is the actual number of observed interactions, and subsequent columns (lim=x) apply individual trip limits ranging from 2-5 to the actual observed interactions. Colored cells denote results that reduced the total fleet-wide interactions when trips were truncated after reaching the limit and the remaining interactions from the trip removed from the total.
Source: PIFSC unpublished data.

4.2.3 Alternative 3: Implement Annual Fleet-wide Hard Cap Limits and individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles

Under Alternative 3, the fishery is expected to operate in a similar manner to Alternative 2 under hard cap limits and individual trip limits for both loggerhead and leatherback turtles. Specifically, the fishery would operate under a loggerhead annual fleet-wide hard cap limit of 36 and a leatherback hard cap limit of 16, which are the same as Alternative 2. The fishery would additionally operate under individual trip limits of 5 loggerhead turtle interactions and 2 leatherback turtle interactions. The primary differences between Alternative 2 and 3 are the additional restrictions for the individual trip limits for vessels that reach two trip limits in a calendar year, and the required time between trips after reaching an individual trip limit the first time.

The additional restrictions on individual trip limits under Alternative 3 would prohibit vessels that reach either the loggerhead or leatherback trip limit twice in a calendar year from shallow-set longline fishing for the remainder of the calendar year. In the subsequent calendar year, such vessels would be subject to an annual vessel limit equivalent to a single trip limit for that turtle species. The conservation benefits of these additional restrictions on trip limit on loggerhead and leatherback turtle populations may be limited beyond the simple trip limit under Alternative 2. Based on data from 2004-2019, no Hawaii shallow-set longline vessel has had 5 or more loggerhead turtles on two separate trips in a calendar year, or 2 or more leatherback turtles on two separate trips in a calendar year, indicating that the likelihood of a vessel reaching a trip limit twice in a calendar year and triggering additional restrictions is very low. If the frequency of shallow-set vessels approaching or reaching 5 loggerhead turtles or 2 leatherback turtles over multiple trips increases in the future, NMFS anticipates that these additional restrictions would provide additional economic incentives to avoid further interactions, such as moving away from the high turtle interaction area. However, there currently are no operational data to inform the extent to which vessels may respond differently compared to the simple trip limits described under Alternative 2. Therefore, the potential reduction in fleet-wide loggerhead and leatherback turtle interactions resulting from individual trip limits with additional restrictions is expected to

be similar to the simulation results shown in Table 21 and described in Section 4.2.2. The additional restrictions on individual trip limits may serve as a preventative measure to provide further "dampening" effect if higher loggerhead or leatherback interaction rates are observed in the future.

Alternative 3 also prohibits vessels that reach an individual trip limit from engaging in shallow-set longline fishing for 5 days after returning to port, during which time NMFS is required under T&C 1b to evaluate vessel and turtle interactions to gather interaction details and identify any problems to determine if guidance can be provided to the vessel to reduce the interactions in the future. This requirement may extend the cooling-off period between the last set on the trip in which a vessel reaches a trip limit and the first set on the subsequent trip by a few days compared to Alternative 2. The extent to which an additional few days of the cooling-off period further reduces the potential for higher interactions is unknown. Interactions on subsequent trips may be reduced if NMFS is able to identify potential sources of the higher interactions and provide appropriate guidance prior to the vessel resuming shallow-set fishing.

Therefore, the potential effects of Alternative 3 on loggerhead and leatherback turtles are expected to be similar to Alternative 2 in most years. As described under section 4.2.2, loggerhead turtle interactions of up to 36 per year in the shallow-set fishery are not expected to have a substantial effect on the increasing population trend based on the analysis in the 2019 BiOp and the PIFSC take model. The individual trip limit of 5 loggerhead turtle interactions per trip would be expected to provide additional reductions, especially in years with higher number of interactions, although the extent of reduction expected from the trip limits is uncertain due to the lack of operational data.

Similarly, as described under section 4.2.2, NMFS concluded in the 2019 BiOp that the number of leatherback turtles expected to be impacted by the shallow-set fishery, analyzed at an anticipate level of interaction level equal to or less than 21 interactions (3 estimated mortalities) in any given year, would not be expected to appreciably increase the extinction risk of the Western Pacific population, reduce its probability of recovering, or impede that recovery. While the Western Pacific leatherback turtle population is declining at a mean rate of 6 % and facing a high risk of extinction, PIFSC's take model showed that the difference in the population trend between the "no take" and "take" scenario is negligible over the 100-year projection period, the probability of the population being above or below abundance thresholds for the "no take" and "take" scenarios show effectively no difference, nor does the difference in the mean number of years to reach each threshold for the "no take" and "take" scenarios (see section 3.2.2.2). Under Alternative 3, the leatherback turtle interactions would not be expected to exceed 16 due to the hard cap limit, and the individual trip limit of 2 leatherback turtles may help further reduce interactions, as described under Alternative 2 (section 4.2.2). Therefore, the impacts of the shallow-set fishery on the leatherback turtle population are expected to be lower than the levels analyzed in the 2019 BiOp and the PIFSC take model. The 2019 BiOp findings, together with the take model results, indicate that the potential effects of Alternative 3 on leatherback turtles are not substantial.

Under Alternative 3, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004, as the combination of the individual trip limits and the hard cap

limits based on operational data since 2004 are expected help maintain opportunities to fish for swordfish throughout the year. As such, effects to other protected species are expected to be the same as those described under Alternative 1, and within the baseline level of interactions described in Section 3.2, which do not represent substantial effects on any species (NMFS 2019).

4.2.4 Alternative 4: Implement Annual Fleet-Wide Hard Cap Limit for Leatherback Turtles and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles (Preferred Alternative)

Under Alternative 4, the fishery would operate under a leatherback hard cap limit of 16, no hard cap limit for loggerhead turtles, and individual trip limits for both species with the additional restrictions on vessels that reach a trip limit twice in a calendar. The primary difference between Alternative 3 and 4 is the removal of the current fleet-wide loggerhead hard cap limit of 17 from existing regulations without replacing it with a new limit. The individual trip limits under Alternative 4 remain the same as described under Alternative 3.

Under Alternative 4, if the fishery exceeds the loggerhead ITS of 36 in the current BiOp, NMFS would reinitiate consultation pursuant to ESA Section 7. While the ESA requires reinitiation of Section 7 consultation when an ITS is exceeded, it does not necessarily require that the fishery suspend operations upon reaching an ITS, or require hard caps or other mechanisms to close the fishery. In this regard, hard caps are only required if NMFS determines such measures are necessary or appropriate to mitigate the amount or extent of take. In the 2019 BiOp, NMFS determined that a leatherback hard cap was necessary and appropriate to minimize impacts of incidental take and required that a fleet-wide limit of 16 to be implemented under RPM T&C 1a, but did not require a hard cap limit or other mechanisms for closing the fishery for loggerhead turtle interactions.

The hard caps were first implemented in 2004 under Regulatory Amendment 3 of the Pelagic FMP as a measure to control sea turtle interactions on the model shallow-set longline fishery while information was being gathered on the effectiveness of using circle hooks and mackerel-type bait in the Hawaii fishery. At the time, the best available scientific information indicated that the North Pacific loggerhead turtle population was projected to decline (WPFMC 2004). The current best available scientific information indicate that the North Pacific loggerhead population is increasing at an average rate of 2.3%, and the total population is estimated at approximately 340,000 turtles (Martin et al. 2020). The loggerhead hard cap would continue to be available as a management tool under the Pelagic FEP through future Council action if necessary, to conserve the species.

The individual trip limits for loggerhead and leatherback turtles are expected to provide early detection of and response to higher interaction rates that may indicate a potential for higher impacts to sea turtle populations, as described under Alternative 2. The expected fishery outcomes of individual trip limits and the additional restrictions if the trip limit is reached twice in a calendar year under Alternative 4 are similar to Alternative 3. Furthermore, additional restrictions on the individual trip limits for vessels that reach the loggerhead trip limit twice in a calendar year provides an alternative means of a “backstop” to hard cap limits in preventing the fishery from accumulating interactions beyond the range anticipated and analyzed within the 2019 BiOp. As previously described, regulations for safe handling and release of sea turtles

including requirements to have on board turtle handling and dehooking gear will remain in place and will help ensure that the loggerhead and leatherback turtles captured in the shallow-set fishery are released alive with a higher probability of post-release survival.

In the absence of a loggerhead turtle hard cap limit under Alternative 4, the shallow-set fishery is expected to have a long-term average of 15.6 loggerhead turtle interactions per year and a 95% chance of being within 36 animals, based on the predicted distribution of the anticipated level of loggerhead turtle interactions in the shallow-set fishery (McCracken 2018). The predictions assumed that the fishery operated throughout the year for every year included in the analysis and did not truncate the predicted takes, thus provide a reasonable prediction of future level of interactions in the absence of a hard cap limit. Under Alternative 4, vessels would still be constrained by the individual trip limit of 5 loggerheads as well as additional restrictions if the trip limit were reached twice in a calendar year. As described under Alternative 2 and 3, the individual trip limit of 5 loggerhead turtle interactions per trip would be expected to provide additional reductions and prevent the fishery from approaching or reaching the ITS of 36, especially in years with higher number of interactions are expected, although the extent of reduction expected from the trip limits is uncertain due to the lack of operational data. Therefore, the potential effects of Alternative 4 on loggerhead turtles are expected to be similar to Alternative 2 and Alternative 3. As described under section 4.2.2 and 4.2.3, the anticipated level of loggerhead turtle interactions in the shallow-set fishery is not expected to have a substantial effect on the increasing population trend based on the analysis in the 2019 BiOp and the PIFSC take model.

The potential effects of Alternative 4 on leatherback turtles from the fishery operating with a hard cap limit of 16 leatherback interactions per year with the additional trip limit measure are expected to be the same as Alternative 3. As described under section 4.2.2 and 4.2.3, NMFS concluded in the 2019 BiOp that the number of leatherback turtles expected to be impacted by the shallow-set fishery, analyzed at an anticipate level of interaction level equal to or less than 21 interactions (3 estimated mortalities) in any given year, would not be expected to appreciably increase the extinction risk of the Western Pacific population, reduce its probability of recovering, or impede that recovery. While the Western Pacific leatherback turtle population is declining at a mean rate of 6 % and facing a high risk of extinction, PIFSC's take model showed that the difference in the population trend between the "no take" and "take" scenario is negligible over the 100-year projection period, the probability of the population being above or below abundance thresholds for the "no take" and "take" scenarios show no difference, and the difference in the mean number of years to reach each threshold for the "no take" and "take" scenarios are negligible. Under Alternative 4, the leatherback turtle interactions would not be expected to exceed 16 due to the hard cap limit, and the individual trip limit of 2 leatherback turtles may help further reduce interactions, as described under Alternative 2 (section 4.2.2). Therefore, the impacts of the shallow-set fishery on the leatherback turtle population are expected to be lower than the levels analyzed in the 2019 BiOp and the PIFSC take model. The 2019 BiOp findings, together with the take model results, indicate that the potential effects of Alternative 3 on leatherback turtles are not substantial.

As noted above, although the take model suggests that there is a difference between the "no take (PVA)" model and the "take" model for leatherbacks, the modeled differences are not detectable

for roughly 40 years (to 2060), and there was no discernible difference at all for loggerheads. The differences predicted by the PVA take model are only discernable at the point when the leatherback population reaches half its current abundance, though there is a minor observed difference as the population gets smaller (0.01 percent difference when the leatherback sea turtles population reaches 25 percent or 12.5 percent of its current size) and time considered is lengthened. The farther out the projection, the more uncertainty we have around the estimates. Both the take model and the analysis in the BiOp apply as a protective assumption, a consistent annual amount of take even though, as the population declines over time, the likelihood of take of individuals also declines. In other words, limitations in our predictive capabilities and changes in future management regimes would render predictions over a longer period increasingly speculative. This is true not only for the PVA with take and without take, but is also true of the analysis in the BiOp. In other words, shorter term estimates (e.g., 10 years) are expected to provide more accurate predictions of the effect of the action, but estimates at a longer time interval are more uncertain. In addition, an underlying caveat or assumption of the take model and the analysis in the BiOp is that as the population continues to decline (50 percent, 25 percent, and 12.5 percent of current size) the actual number of animals taken in the fishery would not change. This assumption is considered protective of the species, but highly unlikely to be true over an extended time.

For example, at the prediction point approximately 40 years in the future (2060), when the potential impacts of the shallow-set longline fishery appear to be detected, the mean number of nesting females in the absence of the shallow-set longline fishery is predicted to be 24, and the continued fishery take of up to two adult female per year therefore becomes detectable. However, as the population declines and a species becomes rarer, we would generally expect that the rate of interaction (take) would also tend to decline. Since we do not know how “rareness” would affect future interaction rates, we opted to assume that interactions would remain constant over time for the purposes of our jeopardy analysis. This assumption alone would tend to cause longer term evaluations to be less reliable, and would warrant careful consideration of perceived mathematical differences in predicted impacts resulting from the action.

To highlight this point, the “take” PVA model predicts that the population will become extinct 5 years earlier than the “non-take” model, however, in the year when the mean “take” model predicts extinction, the number of nesting females remaining in the “no-take” model is one nesting female and logically, maintaining the unrealistic same level of take at this point makes the population “appear” to reach extinction levels five years sooner under the “take” model when this is just a result of our assumption of constant fishery interaction numbers.

Under Alternative 4, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004, as the individual trip limits with the additional restrictions on vessels that reach a trip limit twice in a calendar and the absence of a loggerhead turtle hard cap limit are expected help maintain opportunities to fish for swordfish throughout the year. As such, effects to all other protected species are expected to be the same as those described under Alternative 1, and within the baseline conditions described in Section 3.2, which do not represent substantial effects on any species (NMFS 2019).

4.3 Potential Effects on Socioeconomic Setting

This section describes the potential effects of the alternatives for managing loggerhead and leatherback turtle interactions in the Hawaii shallow-set longline fishery on the socioeconomic setting identified in Section 3.3. Detailed calculations used to determine economic impacts to vessels can be found in Appendix B.

4.3.1 Alternative 1: No Action (Status Quo/Current Management)

Under Alternative 1, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year). This alternative would not provide for additional measures to reduce the potential for reaching the hard cap limit. As described in Section 4.2.1, the loggerhead hard cap limit of 17 is based on the ITS in the 2004 BiOp and is approximately half of the anticipated level of interactions estimated for the 2019 BiOp. The fishery is therefore expected to reach the loggerhead hard cap limit in some years. When a hard cap is reached, the fishery remains closed until January 1 of the subsequent calendar year and delays the start of the fishing season that typically starts around October. Of the years since 2004 when the fishery operated under a loggerhead hard cap of 17 (2004-2009, 2011, and 2019), the fishery reached the limit in 2006 and 2019, both during March. The early closure in 2006 resulted in a 46% reduction in nominal revenue by shallow-set longline vessels compared to the average of the years before and after (Table 19). Catch statistics for 2019 are not yet available.

During a fleet-wide hard cap closure, most shallow-set vessels are expected to convert to deep-setting gear to target bigeye tuna and continue to fish under the Hawaii longline limited entry permit. In the absence of the swordfish supply from the shallow-set fishery, it is possible that fish vendors could increase imports of foreign-caught swordfish to fill the market gap in meeting the demand for swordfish in the U.S. (see Chan and Pan 2016; Rausser et al. 2009). Scorse et al. (2017) suggests that factors other than the absence of U.S. caught fish in the market may cause foreign fleets to increase catch of target species. However, as described in the 2019 BiOp, the evidence available does not currently suggest that the continued operation of the fishery is reasonably certain to cause a change in the number of sea turtles captured and killed in foreign fisheries, and as a result, does not treat the number of sea turtles captured and killed in foreign longline fleets as an “indirect effect” of the proposed action.

4.3.2 Alternative 2: Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles

Under Alternative 2, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year) and is not expected to result in substantial changes in effects to the baseline conditions described in Section 3.3. This is because the proposed action is not anticipated to change the location of fishing, the number of fishery participants, type of gear, seasonality, or level of effort compared with the no-action alternative, to any large extent.

The loggerhead hard cap limit of 36 interactions is based on the 95th percentile value of the predicted distribution of the anticipated level of interactions in any given 1-year period

(McCracken 2018), and thus there is a low likelihood that the fishery will reach the loggerhead hard cap limit in any given year. The leatherback hard cap limit of 16 interactions is approximately 25% lower than the ITS that is based on the 95th percentile value of the predicted distribution, and thus there is a higher probability that the fishery will reach the leatherback turtle hard cap limit in any given year than that of the loggerhead turtle. Additionally, the individual trip limits are expected to prevent a large proportion of the loggerhead or leatherback limits from being taken in a single trip or by a single vessel. This would in turn allow the remaining vessels to continue fishing for swordfish throughout the peak season and continue to fish throughout the year, resulting in a minor to moderate positive benefits for most vessels and minimizing the fleet-wide impacts to catch and revenue from fleet-wide hard cap closures.

Any vessel that reaches the individual trip limit would be required to return to port without making additional sets, but may resume shallow-set fishing operations after returning to port and providing the required 72-hour notification prior to departure. The likelihood of a vessel reaching a trip limit is low based on past observer data. In the 2004-2019 period, 0.2% of all trips (3 trips out of 1,107 trips) and 2.2% of trips with at least one loggerhead turtle interaction (3 out of 135 trips) had 5 or more loggerhead turtle interactions in a trip. In the same period, 0.9% of all trips (10 trips out of 1,107 trips) and 10.6% of trips with at least one leatherback turtle interaction (10 out of 95 trips) had 2 or more leatherback turtle interactions in a trip. Based on available observer data from 2004-2019, the likelihood of a single vessel experiencing a high number of observed interactions in consecutive trips is very low. Therefore, the fleet-wide economic cost of vessels reaching a trip limit is likely to be negligible.

Vessels that reach a trip limit are expected to experience some loss in revenue, especially if a trip limit is reached earlier in the trip. Based on trip cost and revenue data in the 2018 SAFE Report (WPFMC 2019), the average trip cost excluding labor costs[6] for the recent five year period (2014-2018) is $44,764, and the average trip revenue for the same period is $103,074, resulting in an average net revenue of $58,310 per trip (all averages calculated with values adjusted for 2018). The average trip length is 32 days, and the average number of sets per trip is 16. The total number of fishing days can be estimated by adding one day to the number of sets per trip, resulting in an average transit time of 15 days to and from port, (half of which typically occur at the start of the trip, and the other half at the end of the trip). Of the trip cost, fuel cost accounted for 49%, bait was 19%, fishing gear 9%, provisions 8%, light sticks 10%, engine oil 2%, ice 1%, and communications 2% (WPFMC 2018). Trip cost, revenue, and percent reduction in revenue under three-trip limit scenarios were estimated by adjusting the average trip cost and revenue for the number of days fished (Table 22). These estimates allow for a rough comparison among scenarios. Based on these estimates, in a worst-case scenario in which a vessel reaches a trip limit on the first set, the vessel is estimated to have a 116% reduction in net revenue, resulting in a net loss of $9,575 before labor costs for that trip. If a vessel reaches a trip limit after 5 sets, the vessel is estimated to have an 85% reduction in net revenue, at a net revenue loss of $8,528 for that trip. A vessel that reaches a trip limit after 10 sets is estimated to have a 45% reduction in net revenue, at a net revenue loss of $32,009 for that trip.

[6] The source data for the trip cost and revenue data included in the 2018 SAFE Report (WPFMC 2019) is from the PIFSC Continuous Economic Data Collection Program, which does not collect labor cost.

The potential reduction in revenue from reaching a trip limit is expected to encourage vessel operators to employ additional avoidance strategies, as discussed in Section 4.2.2. The cost of employing additional avoidance strategies is unknown at this time. However, it is expected that the cost to vessels from employing additional avoidance strategies (e.g., moving away from areas with higher turtle interactions) is expected to be less than reaching a trip limit early in the trip, if those strategies are successful in avoiding further interactions and preventing reaching a trip limit.

Table 22. Comparison of trip cost, trip revenue, net revenue, and percent reduction in net revenue for full trips and three scenarios of reaching a trip limit (at 1st, 5th and 10th set of the trip). Trip cost excludes labor costs).

Scenarios	Trip Cost	Trip Revenue	Net Revenue	Percent reduction in Net Revenue
Full Trip[1]	$44,764	$103,074	$ 58,310	--
Trip Limit Set 1	$16,017	$6,442	$(9,575)	116%
Trip Limit Set 5	$23,683	$32,211	$8,528	85%
Trip Limit Set 10	$32,412	$64,421	$32,009	45%

[1]This scenario represents approximately 16 fishing sets and 32 sea days.

4.3.3 Alternative 3: Implement Annual Fleet-wide Hard Cap Limits and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles

Under Alternative 3, the fishery is expected to operate in a similar manner to Alternative 2 under hard cap limits and individual trip limits for both loggerhead and leatherback turtles. The primary difference between Alternative 2 and 3 is the additional restrictions for the individual trip limit on vessels that reach trip limits twice in a calendar year. As described under Section 4.3.2, the fishery is likely to have a lower likelihood of closing early in the calendar year from reaching the hard cap due to the combination of individual trip limits and a higher loggerhead hard cap limit. Potential loss in revenue that may occur from reaching a trip limit earlier in the trip under Alternative 3 is expected to be similar to that described for Alternative 2 in Section 4.3.2.

Based on data from 2004-2019, no Hawaii shallow-set longline vessel has had 5 or more loggerhead turtles on two separate trips in a calendar year, or 2 or more leatherback turtles on two separate trips in a calendar year, indicating that the likelihood of a vessel reaching a trip limit twice in a calendar year is very low. However, should a vessel reach a trip limit twice in a calendar year, that vessel would be prohibited from fishing in the shallow-set fishery for the remainder of the calendar year, and would be required to adhere to a vessel interaction limit of 5 loggerhead or 2 leatherback turtles in the subsequent calendar year. Under such circumstance, the vessel limit of 2 leatherbacks may deter the vessel from participating in the shallow-set longline fishery in the year that the vessel limit would apply, as the low limit may pose a high risk for entering into the fishery for the year.

4.3.4 Alternative 4: Implement Annual Fleet-Wide Hard Cap Limit for Leatherback Turtles and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles (Preferred Alternative)

Under Alternative 4, the fishery is expected to operate within the effort range observed since the reopening of the fishery in 2004 (approximately 650-1,850 sets per year) and is not expected to result in changes in effects to target and non-target stocks described in Section 3.3. As described in Section 4.2.4, The shallow-set fishery is expected to have a long-term average of 15.6 loggerhead turtle interactions per year and a 95% chance of being within 36 animals, based on the predicted distribution of the anticipated level of loggerhead turtle interactions in the shallow-set fishery (McCracken 2018. The effects of the individual trip limits with additional restrictions are expected to be similar to that of Alternative 3.

4.4 Potential Effects on Management Setting

None of the alternatives are anticipated to adversely impact the marine habitat, particularly critical habitat, EFH, HAPC, marine protected areas (MPAs), marine sanctuaries, or marine monuments. The Hawaii shallow-set longline fishery is not known to have large adverse impacts to habitats, thus none of the Alternatives are likely to lead to substantial physical, chemical, or biological alterations to the habitat. Fishing activity would not occur in identified critical habitat, so no critical habitat would be impacted by the alternatives considered. Longline fishing does not occur in MPAs, marine sanctuaries or marine monuments, so no marine protected areas would be impacted. Effects of the alternatives on administration are discussed in the following sections.

4.4.1 Alternative 1: No Action (Status Quo/Current Management)

Alternative 1 would not modify the administrative procedures for the shallow-set fishery. The fishery will continue to operate under a hard cap, which requires NMFS to publish a Federal Register notice upon the fishery reaching the annual loggerhead or leatherback limit to close the fishery for the remainder of the calendar year.

RPM T&C 1h of the 2019 BiOp states that, if T&C 1a and 1 b have not been implemented by regulation by January 1, 2020, the shallow-set fishery may reopen under an annual interaction limit of 16 leatherback and 17 loggerhead sea turtles until such regulations are in place. Therefore, under Alternative 1, additional action would be necessary if the fleet-wide leatherback turtle interactions reach 16 to implement RPM T&C 1h of the 2019 BiOp and to ensure compliance with ESA.

4.4.2 Alternative 2: Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles

The administrative burden of implementing fleet-wide hard cap limits for loggerhead and leatherback turtles under Alternative 2 would be similar to that of Alternative 1.

Implementation of the individual trip limits would result in some additional administrative burden to track the number of interactions by individual vessels or trips and to provide notice to vessels that reach a trip limit. These changes are likely to be minor, as the existing monitoring

data provided by the observer program can be tracked at the individual trip level without substantial changes to the monitoring protocol. If the individual trip limit reduces the likelihood of reaching the hard cap limit, there would be reduced administrative burden for implementing hard cap closures.

4.4.3 Alternative 3: Implement Annual Fleet-wide Hard Cap Limits and individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles

Administrative burden for Alternative 3 is expected to increase compared to Alternative 2, due to the notification and monitoring procedures needed to implement additional restrictions on vessels that reach a trip limit twice in a calendar year. In addition to tracking loggerhead and leatherback turtle interactions on a per trip basis, NMFS would track vessel performance throughout the calendar year to monitor the number of times a vessel reaches a trip limit, and for any vessel that reached a trip limit twice in the previous calendar year, the cumulative number of interactions for the applicable species. When a vessel reaches a trip limit or the conditional annual vessel limit, NMFS would provide notice to the applicable vessel to return to port without making additional sets and would notify them of the conditions upon which the vessel may resume shallow-set fishing. Additionally, under Alternative 3, NMFS would evaluate vessel performance for turtle interactions when an individual trip limit is reached, within five days of the vessel arriving into port to identify any problems and determine if guidance can be provided to the vessel to reduce interactions. If the individual trip limit reduces the likelihood of reaching the hard cap limit, there would be reduced administrative burden for implementing hard cap closures.

4.4.4 Alternative 4: Implement Annual Fleet-Wide Hard Cap Limit for Leatherback Turtles and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles (Preferred Alternative)

Administrative burden under Alternative 4 in implementing the leatherback hard cap limit and individual trip limits with additional restrictions for loggerhead and leatherback turtles is expected to be similar to Alternative 3. Administrative burden will be reduced for loggerhead turtle hard caps, as the fleet-wide limit will not be set and the fishery would not be closed when interactions exceed the ITS of 36. However, if the fishery exceeds the ITS for loggerhead turtles, NMFS would be required to reinitiate ESA consultation. However, as described previously, reaching the ITS for loggerhead turtles is low in any one given year considering the full range of the predicted distribution of the anticipated level of loggerhead turtle interactions in the Hawaii shallow-set longline fishery (McCracken 2018).

4.5 Potential Cumulative Effects of the Alternatives

Cumulative effects refer to the combined effects on the human environment that result from the incremental impact of the proposed action, and its alternatives, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Further, cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. The cumulative effects analysis examines whether the direct and indirect effects of the alternatives considered on

a given resource interacts with the direct and indirect effects of other past, present and reasonably foreseeable actions on that same resource to determine the overall, or cumulative effects on that resource.

The following cumulative effects analysis is organized by the following issues: target and non-target species, protected species, and fishery participants and communities. Because pelagic longline fishing activities authorized occur offshore and in deep oceanic waters away from land, populated areas, and marine protected areas such as marine national monuments, none of the Alternatives considered would have an effect on air/water quality, coral reefs, and benthic marine habitats. As such, these resources will not be considered in this cumulative effects analysis.

4.5.1 Cumulative Effects Related to Effects on Target and Non-Target Stocks

Past, Present and Reasonably Foreseeable Management Actions

The Council has recommended NMFS implement or authorize several actions, which are presently in various stages of development and/or review before approval by NMFS. These include the following actions:

- Modifications to the territorial catch and/or effort and allocation limits measure for bigeye tuna to allow for multi-year limits and establishing allocation limits without catch limits;
- American Samoa longline limited access permit program modifications to support fishery participation by small vessels (< 50ft) in the fishery and reduce program complexity;
- Exemption to the American Samoa Large Vessel Prohibited Area (LVPA);
- Establishing a framework for domestic catch and effort limits and specifying a striped marlin limit;
- Revising FEP management objectives and converting the FEPs to living documents;
- Modification to the American Samoa longline swordfish trip limit;
- Annual catch limits for American Samoa, Guam, and CNMI bottomfish and MHI Kona crab for fishing year 2019; and
- Annual catch limits for MHI non-deep seven bottomfish, deepwater shrimp, and precious corals for fishing years 2019-2021.

In general, the Alternatives considered would not have interactive effects with the proposed actions listed as they vary in management scope and impact, and the public will have an opportunity to review and comment on the actions at a later date.

Regardless of which alternative is selected and which fishery outcome occurs, both the WCPFC and IATTC will continue to review fishery performance, stock status, and adopt management measures that are applicable to fisheries that catch PMUS. To meet the conservation and management objectives of these Regional Fishery Management Organization (RFMOs), international cooperation is required. The United States will continue to participate in these organizations and implement conservation and management measures that apply to U.S. fisheries.

Five major exogenous factors were identified as having the potential to contribute to cumulative effects on pelagic target and non-target stocks, which are described in further detail in the Amendment 18 to the Pelagics FEP (WPFMC 2009b) and are incorporated here by reference. These include:

1. Fluctuations in the pelagic ocean environment focusing on regime shifts;
2. Ocean noise;
3. Marine debris; and
4. Ocean productivity related to global climate change.

Potential Cumulative Effects on Target and Non-Target Species

Given that North Pacific swordfish stocks are currently healthy, it is not anticipated that exogenous factors coupled with the impacts of the Alternatives considered would have significant cumulative impacts to target and non-target species. The Alternatives considered under this action are not expected to increase fishing effort beyond the range observed since 2004. The fishery's impacts to other target and non-target species that are subject to international overfishing such as eastern Pacific yellowfin, Pacific bluefin tuna, oceanic whitetip shark, and the north Pacific striped marlin are very small, and are not anticipated to exceed thresholds that would influence stock status of these species. Stocks of other target and non-target species are not subject to overfishing and the cumulative impacts including the impacts of the Alternatives considered are not believed to result in overfishing of these fish stocks (see Section 3.1).

4.5.2 Cumulative Effects Related to Protected Resources

Past, Present and Reasonably Foreseeable Management Actions

Through data collected from observer programs and other sources, the Council and NMFS will continue to monitor interactions between managed fisheries and protected species. 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. Due to the recent listing of oceanic whitetip shark and giant manta ray, NMFS has reinitiated ESA consultation on pelagic longline fisheries managed under the Pelagics FEP and has completed its consultation regarding the effects of the shallow-set fishery on these species. NMFS has also reinitiated ESA consultation on the U.S Pacific purse seine fishery.

NMFS and the Council are supporting several projects to address post-hooking mortality of leatherback turtles in the shallow-set fishery and to improve ecosystem-based fishery management. These include:

- Development of a tag head that would allow pole deployment of tags on leatherbacks from the vessel side without having to board the turtle using a direct attachment method. This project aims to improve species-specific post-hooking survivorship data for leatherback turtles observed in the shallow-set fishery, which are typically too large to board and do not allow for conventional method of tagging.

- Development of a line cutter that would allow for quick and safe removal of trailing gear on leatherback turtles. Leatherback turtles observed in the shallow-set fishery are frequently released with trailing gear in part due to the difficulty of handling animals vessel-side when they cannot be brought on board. Trailing gear remaining on leatherback turtles increase post-hooking mortality rates.
- Analysis of sea turtle and other protected species interactions to assess environmental and operational drivers of interaction patterns, including an evaluation of TurtleWatch recommendations for avoiding loggerhead and leatherback turtle interactions. The existing TurtleWatch does not consider effects of avoiding turtle interactions on target, non-target and other protected species, limiting the utility of avoidance recommendations.

NMFS PIRO annually provides competitive federal funding for sea turtle and fishery projects to understand, address and mitigate threats to sea turtles and address the needs of fishing communities, while maintaining sustainability. These activities are included in PIRO's Federal Programs Office Annual Grant Report. CNMI, Guam and Hawaii are current recipients of ESA Section 6 grant awards, which provides funds to establish and implement state and territorial programs for the conservation of threatened and endangered species.

Other past and present management actions, as well as exogenous factors affecting protected resources, are described in further detail in the Amendment 18 to the Pelagics FEP (WPFMC 2009b), and are incorporated here by reference. These include:

- Interactions in US and foreign fisheries;
- Sea turtle conservation projects;
- Human use and consumption of sea turtles;
- Marine debris;
- Fluctuations in the ocean environment; and
- Climate change (see also section 4.5.4).

Potential Cumulative Effects on Protected Resources

As previously described in section 3.2, the Council and NMFS have taken significant steps to reduce sea turtle, marine mammal, and seabird interactions in longline fisheries, and ongoing work is being conducted to further reduce interactions. Longline fisheries managed under the Pelagics FEP are held as the benchmark 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 (WCPFC Science Committee 2009 Report).

Under Alternatives 1 and 2, the shallow-set fishery would not operate in compliance with the 2019 BiOp as RPM T&C 1a and 1b would not be fully implemented. Under Alternative 1, the fishery would operate under a higher leatherback turtle hard cap limit (26) than the limit of 16 required under RPM 1a. If the fleet-wide leatherback turtle interactions reach 16 under Alternative 1, additional action would be necessary to ensure compliance with the ESA, such as through an emergency action to close the fishery. Under Alternative 2, additional action would be necessary to implement the additional restrictions on vessels that reach an individual trip limit twice in a calendar year as required under RPM T&C 1b to ensure consistency with ESA.

Under all alternatives, shallow-set longline vessels will continue to be subject to mitigation measures to avoid and reduce protected species interactions and to reduce the severity of interactions when they do occur. The potential effects of the alternatives on loggerhead and leatherback turtle populations are not expected to be substantial, and are described in detail under section 4.3. The alternatives considered under this action are not expected to increase fishing effort beyond the range observed since 2004, and impacts to protected species will be similar to current conditions described in section 3.2. The levels of interactions that are authorized in each U.S. fishery 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.

The potential effects of a shallow-set longline gear authorization in the West Coast highly migratory species fisheries on protected species are unknown at this time as details of the potential amendment action is still under early stages of scoping and largely undetermined. Any future development of the amendment would be done through the Pacific Fishery Management Council's public process under the Magnuson-Stevens Act with consideration provided under ESA, MMPA, and other applicable law, and the public will have an opportunity to review and comment on the action at a later date.

Projects addressing post-hooking survivorship of leatherback turtles as well as evaluation of the TurtleWatch tool may lead to beneficial effects to sea turtle species affected by the shallow-set fishery as well as longline fisheries operating in the U.S. and in foreign waters. A new line cutter tool to reduce trailing gear, combined with a direct attachment tag head that would allow estimation of leatherback-specific post-hooking mortality rates to evaluate the effects of removing trailing gear, could lead to improved guidance to fishermen on sea turtle handling approaches to improve post-hooking survivorship. A new line cutter tool may also be beneficial for other protected species such as ESA listed shark species that are released alive and cannot be brought on board for handling. Improvements to the TurtleWatch tool could result in better guidance to shallow-set fishermen for avoiding sea turtle interactions while maintaining target catch rates and minimizing impacts to other protected species, which may improve the effectiveness of individual trip limits considered under Alternatives 2, 3 and 4.

4.5.3 Cumulative Effects Related to Effects on the Socio-economic Setting

In accordance with the Magnuson-Stevens Act, 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.

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 amount of imported seafood is also increasing, where the U.S. now imports nearly 85% of consumed seafood. Increased seafood imports are significant as the level of imports relates to market competition, where an abundance of foreign fish products can flood the market and lower ex-vessel prices for U.S. fishermen. Once U.S. fish products lose market channels to imported seafood products, it may also be hard for U.S. fishermen to regain those channels.

In addition, a reliance on foreign imports in Hawaii 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;
6. Climate change; and
7. Labor and urban drift.

4.5.4 Climate Change

A climate change impact analysis is a difficult undertaking given its global nature and interrelationships among sources, causes, mechanisms of actions and impacts. We focus our analysis on whether climate change is expected to impact resources that are the focus of this analysis including target stocks, non-target stocks, and on protected species. However considerable uncertainty remain regarding the extent to which such climate change impacts may affect each target, non-target and protected species. We note that the impacts of climate change on these resources may be positive if climate change impacts benefit a species' prey base or otherwise enhance the species' ability to survive and reproduce, or impacts may be negative if the impacts reduce a species' ability to survive and reproduce. Impacts may also be neutral. Potential effects of climate change are described in further detail in Amendment 18 to the Pelagics FEP (WPFMC 2009b) and the 2019 BiOp (NMFS 2019), and are incorporated here by reference.

Implication of Climate Change for the Environmental Effects of the Alternatives

Environmental changes associated with climate change are occurring within the action area and are expected to continue into the future. Marine populations that are already at risk due to other threats are particularly vulnerable to the direct and indirect effects of climate change. The 2019 BiOp considered potential effects of climate change on ESA listed species—including alterations in reproductive seasons and locations, shifts in migration patterns, reduced distribution and abundance of prey, and changes in the abundance of competitors or predators—which informed all analysis developed throughout the BiOp. These include the status of listed resources and the PVA for loggerhead and leatherback sea turtles, the environmental baseline, and the exposure, response, and risk analyses.

The 2019 BiOp describes the potential impacts of climate change on sea turtles to include alterations to foraging habitats and prey resources, changes in phenology and reproductive capacity that correlate with fluctuations in SST and temperatures at nesting beaches, and potential changes in migratory pathways and range expansion, among others. Over the long-term, climate change-related impacts will likely influence biological trajectories in the future on a century scale (Paremsan and Yohe 2003). The study by Polovina et al. (2011), indicates that primary production in the southern biome and in the California current ecosystem are expected to increase by the end of the century (Rykaczewski and Dunne 2010), which may benefit leatherback sea turtles. Increases in their primary prey source, sea jellies, due to ocean warming and other factors are likely (Brodeur et al. 1999; Attrill et al. 2007; Richardson et al. 2009), although there is no evidence that any leatherback sea turtle populations are currently food-limited. Even though there may be a foraging benefit to leatherback sea turtles due to climate change influence on productivity, we do not know what impact other climate-related changes may have such as increasing sand temperatures, sea level rise, and increased storm events. However, a different picture is predicted for Eastern Pacific leatherback turtles. Modeling of climate projections and population dynamics resulted in an estimated 7% per decade decline in the Costa Rica nesting population over the twenty first century. Whereas changes in ocean conditions had a small effect on the population, the increase of 2.5º C warming of the nesting beach was the primary driver of the modeled decline through reduced hatching success and hatchling emergence rates (Saba et al. 2012). Furthermore, climate change may compound the effects of interannual climate variability, as governed by El Nino Southern Oscillation (ENSO). Saba et al. (2007) showed that nesting females in Costa Rica exhibited a strong sensitivity to ENSO whereas cool La Nina events correspond with a higher remigration probability and warm El Nino events correspond with a lower remigration probability. As a result, productivity at leatherback sea turtle foraging areas in the Eastern Pacific in response to El Nino/La Nina events result in variable remigration intervals and thus variable annual egg production. This phenomenon may render the Eastern Pacific leatherback sea turtle population more vulnerable to anthropogenic mortality due to longer exposure to fisheries than other populations (Saba et al. 2007). While NMFS cannot predict the exact impacts of climate change, sea level rise may present a more immediate challenge to the North Pacific loggerhead because of the proportion of beaches with shoreline armoring that prevents or interferes with the ability of nesting females to access suitable nesting habitat.

Because habitat for many shark and ray species is comprised of open ocean environments occurring over broad geographic ranges, large-scale impacts such as climate change may impact these species. Chin et al. (2010) conducted an integrated risk assessment to assess the vulnerability of several shark and ray species on the Great Barrier Reef to the effects of climate change. Scalloped hammerheads were ranked as having a low overall vulnerability to climate change, with low vulnerability to each of the assessed climate change factors (i.e., water and air temperature, ocean acidification, freshwater input, ocean circulation, sea level rise, severe weather, light, and ultraviolet radiation). In another study on potential effects of climate change to sharks, Hazen et al. (2012) used data derived from an electronic tagging project and output from a climate change model to predict shifts in habitat and diversity in top marine predators in the Pacific out to the year 2100. Results of the study showed significant differences in habitat change among species groups but sharks as a whole had the greatest risk of pelagic habitat loss.

Because giant manta rays are migratory and considered ecologically flexible (e.g., low habitat specificity), they may be less vulnerable to the impacts of climate change compared to other sharks and rays (Chin et al. 2010). However, as giant manta rays frequently rely on coral reef habitat for important life history functions (e.g., feeding, cleaning) and depend on planktonic food resources for nourishment, both of which are highly sensitive to environmental changes (Brainard et al. 2011; Guinder and Molinero 2013), climate change is likely to have an impact on the distribution and behavior of these animals. Decreased access to cleaning stations may negatively impact the fitness of the giant mantas by hindering their ability to reduce parasitic loads and dead tissue, which could lead to increases in diseases and declines in reproductive fitness and survival rates.

Recently, scientists at the PIFSC modeled the effects of climate change on bigeye tuna and other PMUS targeted by the Hawaii deep-set longline fishery, whose action area overlaps that of the shallow-set fishery (Woodworth-Jefcoats et al. 2019). This modeling effort used a size-based food web model that incorporates individual species and captures the metabolic effects of rising ocean temperatures. They found that, taken as individual stressors, climate change and increasing fishing mortality act to reduce fish biomass and size across all species. The effects of reduced fishing mortality are generally of the opposite sign. However, when modeled jointly, there were no scenarios in which yield increased. Results for the ecosystem supporting the fishery are slightly more optimistic, with reduced fishing mortality somewhat offsetting the negative effects of climate change. The findings of this study suggests that proactive fisheries management could be a particularly effective tool for mitigating anthropogenic stressors either by balancing or outweighing climate effects, albeit not completely offsetting those effects. The effect of climate change on the ecosystem depends primarily upon the intensity of fishing mortality. Management measures which take this into account can both minimize fishery decline and support at least some level of ecosystem resilience.

Climate change is expected to have similar impacts to the resources regardless of which Alternative is selected. In the coming years, the Council and NMFS will continue to monitor domestic catches of all pelagic MUS, and continue to consider information from scientifically-derived stock status reports as future catch and allocation limits are made, and as changes to fishery management are contemplated and implemented. Ongoing and future monitoring and research will allow fishery managers and scientists to consider impacts of climate change, fishing, and other environmental factors that are directly or indirectly affecting the resources.

Potential Effects on Climate Change in terms of Greenhouse Gas Emissions

The alternatives under consideration are not expected to substantially affect the level of fishing effort beyond the range observed since 2004. Neither NMFS, nor the Council controls where fishing vessels fish beyond existing restricted fishing areas, how long a fishing trip lasts, or other decisions that are made by individual fishermen. Some changes in fishing behavior may occur under individual trip limits implemented under Alternatives 2, 3, and 4 if vessels engage in sea turtle avoidance methods that involve moving away from hotspots. However, these changes to fishing operations are likely to be minor, as the overall effort level is not expected to be affected because of the alternatives under consideration. For these reasons, none of the alternatives are expected to result in a noteworthy change to greenhouse gas emissions.

Table 23. Summary of Effects of the Alternatives.

Topic	**Alternative 1:** No-action/Status Quo	**Alternative 2:** Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles	**Alternative 3:** Implement Annual Fleet-wide Hard Cap Limits and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles	**Alternative 4 (Council Preferred Alternative):** Implement Annual Fleet-Wide Hard Cap Limit for Leatherback Turtles and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles
Biological resource: target and non-target stocks	Baseline conditions as described in Section 3.	No additional or new impacts expected to target and non-target stocks.	No additional or new impacts expected to target and non-target stocks.	No additional or new impacts expected to target and non-target stocks.
Biological resource: protected resources	Loggerhead limit: 17 Leatherback limit: 26 Fishery would not operate in compliance with current BiOp if leatherback interactions exceed 16. Effects to all other protected species expected to be similar to baseline conditions as described in Section 3.	Fleet-wide loggerhead and leatherback turtle interactions will remain below levels analyzed in the current BiOp. Likely to have lower loggerhead and leatherback interactions in years with higher interaction rates. Effects to all other protected species likely to be similar to No Action.	Fleet-wide loggerhead and leatherback turtle interactions will remain below levels analyzed in the current BiOp. Likely to have lower loggerhead and leatherback interactions in years with higher interaction rates. Effects to all other protected species likely to be similar to No Action.	Fleet-wide loggerhead and leatherback turtle interactions likely to remain below levels analyzed in the current BiOp. Likely to have lower loggerhead and leatherback interactions in years with higher interaction rates. Effects to all other protected species likely to be similar to No Action.
Socio-economic setting	Fishery likely to occasionally close from reaching the loggerhead or leatherback hard cap limit. Frequency of reaching loggerhead limit likely to be higher than reaching leatherback limit. Catch and revenue likely to be lower in years with hard cap closure, and if closure	Fleet-wide impacts to catch and revenue from reaching the hard cap limit will be lower, as the individual trip limit is expected to lower the likelihood of reaching the fleet-wide hard cap. Vessel that reach the trip limit will be required to return to port without making additional sets, and may resume shallow-set fishing after providing the required 72-hour notification	Similar to Alternative 2. Vessel that reach the trip limit will be required to return to port without making additional sets, and may resume shallow-set fishing after 5 days. Vessels that do not reach the limit will continue to operate. Vessels that reach the trip limit twice in a calendar year will be subject to a vessel limit equivalent to the trip limits for	Similar to Alternative 3. Vessel that reach the trip limit will be required to return to port without making additional sets, and may resume shallow-set fishing after 5 days. Vessels that do not reach the limit will continue to operate. Vessels that reach the trip limit twice in a calendar year will be subject to a vessel limit equivalent to the trip limits for the applicable species in the following year. The low leatherback

Topic	**Alternative 1:** No-action/Status Quo	**Alternative 2:** Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles	**Alternative 3:** Implement Annual Fleet-wide Hard Cap Limits and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles	**Alternative 4 (Council Preferred Alternative):** Implement Annual Fleet-Wide Hard Cap Limit for Leatherback Turtles and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles
	occurs earlier in the calendar year.	under 50 CFR 665.803 prior to departure. Vessels that do not reach the limit will continue to operate.	the applicable species in the following year. The low leatherback limit may deter vessels from participating in the fishery during that year.	limit may deter vessels from participating in the fishery during that year.
Management setting	Baseline conditions as described in Section 3.	Minor changes to monitoring interactions will be required to track number of interactions per trip. Administrative burden may be reduced if frequency of hard cap closure is reduced.	Administrative burden is expected to increase due to notification and monitoring procedures for implementing additional restrictions on individual trip limits. Administrative burden may be reduced if frequency of hard cap closure is reduced.	Administrative burden is expected to increase due to notification and monitoring procedures for implementing additional restrictions on individual trip limits. Administrative burden may be reduced due to no hard cap limit for loggerhead turtles, although NMFS would be required to reinitiate ESA consultation if the loggerhead ITS is exceeded.

5 APPLICABLE LAWS

Section 303 of the Magnuson-Stevens Act requires that any fishery management plan prepared by any fishery management council or by the Secretary of Commerce contain conservation and management measures that are consistent with the National Standards of the Act, other provisions of the Act, regulations implementing recommendations by international fishery management organizations and any other applicable law. This section identifies provisions of the other applicable laws that the NMFS and the Council has identified the proposed action must comply with, and rational for why this action is consistent with each applicable law.

5.1 National Environmental Policy Act

In accordance with the National Environmental Policy Act (NEPA) and CEQ implementing regulations, and NOAA Administrative Order (NAO) 216-6A – Compliance with the National Environmental Policy Act, Executive Orders 12114, Environmental Effects Abroad of Major Federal Actions; 11988 and 13690, Floodplain Management; and 11990, Protection of Wetland, NMFS must consider the effects of its proposals on the environment before taking action. As part of this process, NMFS and the Council provide opportunities for the involvement of interested and affected members of the public before a decision is made. NMFS and the Council prepared this EA in accordance with NEPA and its implementing regulations, as well as NAO 216-6A. The Council and NMFS also developed the proposed action described in this EA in coordination with various federal and local government agencies that are represented on the Council.

On January 23, 2020, NMFS published the notice of availability for Amendment 10, including an environmental assessment, and request for public comments (85 FR 3889); the comment period ended March 23, 2020. On February 4, 2020, NMFS published a proposed rule that would implement the management measures described in Amendment 10 (85 FR 6131); that comment period ended on March 20, 2020. We received nearly 100 public comments, including a petition. Most of the comments generally supported most of the measures such as trip interaction limits and other accountability measures, but opposed removal of the hard cap on loggerhead turtles. Some comments were critical of the no-jeopardy analyses for the leatherback and loggerhead turtle in the supporting BiOp. NMFS considered public comments in finalizing Amendment 10 and the EA, and made several non-substantive technical clarifications and edits. However, NMFS did not change the proposed action. The NMFS Regional Administrator will use this EA to consider the effects of the proposed action on the human environment, taking into consideration public comments on the proposed action presented in this document, and to determine whether the proposed action would have a significant environmental impact requiring the preparation of an environmental impact statement.

5.2 Coastal Zone Management Act

The Coastal Zone Management Act requires a determination that a recommended management measure has no effect on the land, water uses, or natural resources of the coastal zone or is consistent to the maximum extent practicable with an affected state’s enforceable coastal zone management program. On September 4, 2019, NMFS submitted its determinations for review by

Hawaii Coastal Zone Management Program under section 307 of the CZMA, and received a concurrence from the State on October 30, 2019.

5.3 Endangered Species Act

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

On June 26, 2019, NMFS issued a biological opinion on the effects of the shallow-set fishery on ESA-listed marine species (2019 BiOp). NMFS concluded that the continued authorization of the fishery is not likely to jeopardize the continued existence of any of the following: North Pacific loggerhead sea turtle; leatherback sea turtle; Mexico breeding population of olive ridley sea turtle, and threatened (other) populations of olive ridley sea turtle; Eastern Pacific green sea turtle distinct population segment (DPS), Central North Pacific green sea turtle DPS, East Indian-West Pacific green sea turtle (DPS), Central West Pacific green sea turtle (DPS), Southwest Pacific green sea turtle (DPS), Central South Pacific green sea turtle (DPS); oceanic whitetip shark; giant manta ray; and the threatened Guadalupe fur seal. In its 2019 BiOp, NMFS issued an ITS for the loggerhead, leatherback, green, olive ridley, Guadalupe fur seal, oceanic whitetip shark, which were derived from interaction predictions generated by McCracken (2018) using a Bayesian inferential approach. These predictions are based on observer data from 2005-2017 for all species, except for loggerheads (2005-2018) where more recent data were available.

Additionally, the 2019 BiOp concluded that the shallow-set fishery may affect, but is not likely to adversely affect the following: hawksbill sea turtle; MHI IFWK; humpback (Mexico DPS); fin whale; blue whale; North Pacific right whale; sei whale; sperm whale; Eastern Pacific scalloped hammerhead shark; or Listed fish and invertebrate species common to transiting areas off the coast of California (Central California coast Coho salmon, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, Central California coast steelhead, California coast steelhead, Southern North American green sturgeon, black abalone, and white abalone).

The 2019 BiOp also concluded that the shallow-set fishery is not likely to adversely modify designated critical habitat for the following: leatherback sea turtle; Hawaiian monk seal; MHI insular false killer whale; steller sea lion; and listed fish and invertebrate species common to transiting areas off the coast of California (Central California coast Coho salmon, Sacramento River winter-run Chinook salmon, California coast steelhead, Southern North American green sturgeon, and black abalone).

NMFS has no information to believe that proposed action would result in a material change in the future conduct of the fishery that would affect ESA-listed species to an extent not considered in the USFWS 2012 BiOp and NMFS 2019 BiOp. NMFS will continue to manage the shallow-set fishery under existing regulations to minimize impacts to ESA-listed species. These include gear and handling requirements such as 18/0 or larger circle hooks with no more than 10° offset and mackerel-type bait, adherence to regulations for safe handling and release of sea turtles and

oceanic white-tip sharks, handling and dehooking gear onboard the vessel, and the requirement for vessel owners and operators to attend a protected species education workshop annually. NMFS will continue to monitor the shallow-set fishery through its observer program and provide near real-time data on interactions with ESA-listed species. The shallow-set fishery will continue to be subject to the level of take authorized under the ESA and regulations under other applicable laws. NMFS is required to re-initiate consultation under ESA Section 7 if any ITS applicable to the shallow-set fishery is exceeded or another criterion for reinitiation is triggered. To meet management mandates, the Council, NMFS, and international fishery management organizations such as the Western and Central Pacific Fisheries Commission (WCPFC) and Inter-American Tropical Tuna Commission (IATTC) would continue to develop protected species mitigation measures as resource issues are identified through reporting and monitoring.

Implementation of Amendment 10 will ensure consistency with the RPM and T&C of the 2019 BiOp. Where an endangered or threatened marine mammal species is involved, section 7(b)(4) of the ESA requires that any incidental take be authorized pursuant to section 101(a)(5)(E) of the MMPA in order to also provide take exemption under the ESA. Thus, the ITS for Guadalupe fur seal will only become operative once the taking is authorized pursuant to the MMPA. NMFS has determined that the proposed action would not change the conduct of the fishery that would affect endangered and threatened species or critical habitat in a manner not considered in the prior ESA consultations.

5.4 Marine Mammal Protection Act

The MMPA prohibits, with certain exceptions, the take of marine mammals in the U.S. 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 NMFS as delegated by the Secretary of Commerce, the authority and duties for all cetaceans (whales, dolphins, and porpoises) and pinnipeds (seals and sea lions, except walruses). With this responsibility, NMFS required to prepare and periodically review stock assessments of marine mammal stocks.

Under Section 118 of the MMPA, NMFS must publish, at least annually, a List of Fisheries (LOF) that classifies U.S. commercial fisheries into one of three categories. These categories are based on the level of serious injury and mortality of marine mammals that occurs incidental to each fishery. Specifically, the MMPA mandates that each fishery be classified according to whether it has frequent, occasional, or a remote likelihood of or no known incidental mortality or serious injury of marine mammals. A Category 1 fishery is one with frequent incidental morality and serious injury of marine mammals. A Category 2 fishery is one with occasional incidental morality and serious injury of marine mammals. A Category 3 fishery is one with a remote likelihood or no known incidental morality and serious injury of marine mammals. On May 16, 2019, NMFS published the final 2019 LOF, which classifies the Hawaii shallow-set longline fishery as Category 2 (84 FR 22051). On April 16, 2020, NMFS published the final 2020 LOF, which maintains the Hawaii shallow-set longline fishery as Category 2 (85 FR 21079). Under MMPA Section 118, vessel owners and crew that are engaged in Category 1 or 2 fisheries may incidentally take non-ESA-listed marine mammals after registering or receiving an Authorization Certificate under the MMPA, but they are required to: 1. Report all incidental mortality and injury of marine mammals to NMFS; 2. Immediately return to the sea with minimum of further injury any incidentally taken marine mammal; 3. Allow vessel observers if

requested by NMFS; and 4. Comply with guidelines and prohibitions under the MMPA when deterring marine mammals from gear, catch, and private property (50 CFR 229.4, 229.6, 229.7).

The MMPA registration process is integrated with existing state and Federal licensing, permitting, and registration programs. Therefore, individuals who have a state or Federal fishing permit or landing license are currently not required to register separately under the MMPA, and all participants in the longline fisheries managed under the Pelagic FEP are required to have a Federal permit. In addition, fishermen participating in a Category 1 or 2 fishery are required to accommodate an observer onboard their vessel(s) upon request (50 CFR 229.7); and fishermen participating in a Category 1 or 2 fishery are required to comply with any applicable take reduction plans. NMFS may develop and implement take reduction plans for any Category 1 or 2 fishery that interacts with a strategic stock.

In addition, under MMPA Section 101 (a)(5)(E), the Secretary of Commerce allows the incidental, but not intentional, taking of individuals from marine mammal stocks that are designated as depleted because of listing as threatened or endangered under the Endangered Species Act (ESA) in the course of commercial fishing operations, if it is determined that three criteria are met: 1. Incidental mortality and serious injury will have a negligible impact on the affected species or stock; 2. A recovery plan has been developed or is being developed; and 3. Where required under Section 118 of the MMPA, a monitoring program has been established, vessels engaged in such fisheries are registered in accordance with section 118 of the MMPA, and a take reduction plan has been developed or is being developed for such species or stock.

On October 16, 2014, NMFS issued a permit under the MMPA Section 101(a)(5)(E), addressing the Hawaii deep-set and shallow-set longline fisheries' interactions with depleted stocks of marine mammals (79 FR 62105). The permit authorizes the incidental, but not intentional, taking of ESA-listed humpback whales, sperm whales, and main Hawaiian insular false killer whales. Since the date of that permit, the Central North Pacific humpback whale was designated a DPS and is not a listed species under the ESA (81 FR 62259, September 8, 2016). In authorizing this permit, NMFS determined that incidental taking by the Hawaii longline fisheries would have a negligible impact on the affected stocks of marine mammals. NMFS has prepared a draft negligible impact determination to update the prior MMPA permit, but the permit under MMPA Section 101(a)(5)(E) remains valid and effective until replaced in accordance with 5 U.S.C. § 558(c). Note, the fishery has known interactions with Guadalupe fur seals. A draft analysis suggest the fisheries anticipated level of take, 11 interactions and 9 mortalities, would have a negligible impact on this stock with a PBR of 542 individuals. Therefore, the criteria for issuance of a permit under section 101(a)(5)(E) appear to be met.

NMFS has no information to believe that proposed action would result in a material change in the future conduct of the fishery that would affect marine mammals to an extent not considered in the 2019 BiOp, by the LOF classification, or the Section 118 commercial fishery take authorization. NMFS will continue to monitor interactions between Hawaii shallow-set longline fishery and marine mammals through its observer program and fishing logbooks. NMFS and other scientists will continue to collect biological samples to refine stock definitions as well as conduct surveys to monitor populations. NMFS will continue to conduct mandatory annual protected species workshops for all longline permit holders and vessel captains that teach how to

identify marine mammals and how to reduce interactions and minimize harm to marine mammals. Based on the above, NMFS has determined that the proposed action would not modify fishery operations in any manner affecting marine mammals not previously considered or authorized under Sections 101(a)(5)(E) and 118 of the MMPA.

5.5 National Historic Preservation Act

The National Historic Preservation Act requires federal agencies undergo a review process for all federally funded and permitted projects that will affect sites listed on, or eligible for listing on, the National Register of Historic Places. There are presently no known districts, sites, highways, cultural resources structures or objects listed in or eligible for listing in the National Register of Historic Places in the EEZ around American Samoa, Guam, CNMI, Hawaii, and the Pacific Remote Island Areas, or in adjacent areas of the high seas in international waters where pelagic longline fishing activities are conducted. Because Hawaii shallow-set longline fishing is conducted in deep waters far offshore and do not affect bottom features, neither current nor future longline fishing activities would be expected to affect submerged resources such as shipwrecks that could occur in offshore areas.

5.6 Executive Order 12866 (Regulatory Impact Review)

A “significant regulatory action” means any regulatory action that is likely to result in a rule that may: 1. have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal government or communities; 2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; 3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or 4. Raise novel legal or policy issues arising out of legal mandates, the President’s priorities, or the principles set forth in the Executive Order. Based on the costs and benefits discussed in Amendment 10 and the above criteria, none of the alternatives have the potential to constitute a “significant” action under EO 12866.

5.7 Executive Order 1312 (Federalism)

The objective of Executive Order 13132 is to guarantee the Constitution's division of governmental responsibilities between the federal government and the states. Federalism Implications (FI) is defined as having substantial direct effects on states or local governments (individually or collectively), on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. This action does not contain policies with FI under E.O. 13132, as it does not affect or alter the relationship between the federal government and the governments of the Territory of American Samoa, the Territory of Guam, the CNMI, or the State of Hawaii.

5.8 Information Quality Act

The information in this document complies with the Information Quality Act and NOAA standards (NOAA Information Quality Guidelines, September 30, 2002) that recognize

information quality is composed of three elements: utility, integrity, and objectivity. National Standard 2 of the Magnuson-Stevens Act states that an FMP's conservation and management measures shall be based upon the best scientific information available. In accordance with this national standard, the information product (i.e., this EA) incorporates the best biological, social, and economic information available to date, including the most recent biological information on, and assessment of, the pelagic fishery resources and protected resources, and the most recent information available on fishing communities, including their dependence on pelagic longline fisheries, and up-to-date economic information (landings, revenues, etc.). The policy choices, i.e., proposed management measures, contained in the information product are supported by the available scientific information. The management measures are designed to meet the conservation goals and objectives of the Pelagic FEP and the Magnuson-Stevens Act, and other applicable laws.

The data and analyses used to develop and analyze the measures contained in the information product are presented in Amendment 10 and the associated EA. Furthermore, all reference materials utilized in the discussion and analyses are properly referenced within the appropriate sections of Amendment 10 and the associated EA. The information product was prepared by Council and NMFS staff based on information provided by NMFS PIFSC and NMFS PIRO. The information product was reviewed by PIRO and PIFSC staff, and NMFS Headquarters (including the Office of Sustainable Fisheries). Legal review was performed by NOAA General Counsel Pacific Islands and General Counsel for Enforcement and Litigation for consistency with applicable laws, including but not limited to the Magnuson-Stevens Act, National Environmental Policy Act, Administrative Procedure Act, Paperwork Reduction Act, Coastal Zone Management Act, Endangered Species Act, Marine Mammal Protection Act, and Executive Orders 13132 and 12866.

5.9 Paperwork Reduction Act

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

5.10 Administrative Procedures 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 waiting period from the time a final rule is published until it becomes effective, with certain exceptions.

The proposed action complies with the provisions of the APA. In developing the proposed action, the Council holds public meetings, provides opportunities for the public to comment on

the action and alternatives, information and considers comments from the public and advisory bodies in making its recommendations.

On January 23, 2020, NMFS published the notice of availability for Amendment 10, including an environmental assessment, and request for public comments (85 FR 3889); the comment period ended March 23, 2020. On February 4, 2020, NMFS published a proposed rule that would implement the management measures described in Amendment 10 (85 FR 6131); that comment period ended on March 20, 2020. We received nearly 100 public comments, including a petition. Most of the comments generally supported most of the measures such as trip interaction limits and other accountability measures, but opposed removal of the hard cap on loggerhead turtles. Some comments were critical of the no-jeopardy analyses in the supporting BiOp. NMFS considered public comments in finalizing Amendment 10 and the EA, and made several non-substantive technical clarifications and edits. However, NMFS did not change the proposed action.

NMFS finds that the need to implement these measures in a timely manner to bring the ongoing Hawaii shallow-set longline fishery into compliance with the ESA, constitutes good cause under the authority contained in 5 U.S.C. 553(d)(3), to make the rule effective immediately upon filing with the Office of the Federal Register. This final rule implements the reasonable and prudent measures, and terms and conditions of the June 26, 2019, BiOp NMFS completed for the fishery. Reasonable and prudent measures are action that are necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take of loggerhead and leatherback sea turtles in the Hawaii shallow-set longline fishery. The associated terms and conditions set out the specific methods by which the reasonable and prudent measures are to be accomplished. Together, these measures are non-discretionary, and they must be implemented by NMFS for the take exemption in ESA section 7(o)(2) to apply to the Hawaii shallow-set longline fishery.

In addition, because this rule, in part, relieves a restriction by removing the annual hard cap for North Pacific loggerhead sea turtles, it is not subject to the 30-day delayed effectiveness provision of the APA pursuant to 5 U.S.C. 553(d)(1). Since 2005, NMFS has required an annual hard cap for the fishery as a measure to control sea turtle interactions on the model shallow-set longline fishery while NMFS gathered information on the effectiveness of using circle hooks and mackerel-type bait in reducing sea turtle interactions in the fishery. The current limit is 17. However, in light of the current abundance and increasing trend of the population, the individual vessel trip limit, and the accountability measure for vessels that might reach a trip limit twice in a calendar year, NMFS has determined that a hard cap is not necessary at this time for the conservation of the North Pacific loggerhead turtle and removing the limit would help ensure a continued supply of fresh domestic swordfish to U.S. markets. While this rule would not require an annual loggerhead hard cap, this measure would continue to be available to NMFS and the Council as a management tool under the Pelagics FEP if necessary, to conserve the species.

5.11 Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.) requires government agencies to assess and present the impact of their regulatory actions on small entities including small businesses, small organizations, and small governmental jurisdictions. The assessment is done by preparing a Regulatory Flexibility Analysis and Final Regulatory Flexibility Analysis (FRFA) for each

proposed and final rule, respectively. Under the RFA, an agency does not need to conduct an IRFA or FRFA if a certification can be made that the proposed rule, if adopted, would not have a significant adverse economic impact on a substantial number of small entities.

Based on the available information presented in Amendment 10 and the associated EA, NMFS has determined that all vessels federally permitted under Pelagic FEP are small entities under the SBA's definition of a small entity, i.e., they are engaged in the business of fish harvesting (NAICS Code: 114111), are independently owned or operated, are not dominant in their field of operation, and have annual gross receipts not in excess of $11 million.

Even though this action would apply to a substantial number of vessels, the implementation of this action would not result in significant adverse economic impact to individual vessels. Furthermore, there would be little, if any, disproportionate adverse economic impacts from the rule based on gear type, or relative vessel size. The final rule also would not place a substantial number of small entities, or any segment of small entities, at a significant competitive disadvantage to large entities.

NMFS does not expect the proposed action to have a significant economic impact on a substantial number of small entities. As such, a final regulatory flexibility analysis is not required, and none has been prepared.

5.12 Executive Order 12898 (Environmental Justice)

On February 11, 1994, President 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. [7]

The Hawaii shallow-set longline fishery is not known to have a large adverse environmental effect on stocks of fish that may be caught by subsistence fisherman, or on other marine resources that may be targeted for subsistence consumption. The fishery does not pollute marine waters and so does not have adverse effects to human health or on marine life. NMFS and the Council manage fisheries through federal regulations that are intended to conserve marine

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

resources and habitats to enhance the economic and social well-being of fishing communities, including members of minority populations and low-income populations.

NMFS does not expect the proposed action to have large effects to the environment that would result in a disproportionately large and adverse effect on minority or low-income populations. Therefore, there would not be a disproportionately high and adverse impact to minority or low-income populations with respect to the availability of fish, other environmental effects, or health effects if NMFS implements the proposed action.

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7 REGULATIONS

For the reasons set out in the preamble, NMFS proposes to amend 50 CFR part 665 as follows:

PART 665 -- FISHERIES IN THE WESTERN PACIFIC

1. The authority citation for 50 CFR part 665 continues to read as follows:

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

2. In § 665.802 revise paragraphs (ss) and (tt) to read as follows:

§ 665.802 Prohibitions.

* * * * *

(ss) Engage in shallow-setting from a vessel registered for use under a Hawaii longline limited access permit after the shallow-set longline fishery has been closed, or upon notice that that the vessel is restricted from fishing, in violation of §§ 665.813(b) and 665.813(i).

(tt) Fail to immediately retrieve longline fishing gear upon notice that the shallow-set longline fishery has been closed, or upon notice that that the vessel is restricted from fishing, in violation of § 665.813(b).

* * * * *

3. In § 665.813 revise paragraphs (b) and (i) to read as follows:

§ 665.813 Western Pacific longline fishing restrictions.

* * * * *

(b) *Limits on sea turtle interactions in the shallow-set longline fishery.* (1) *Fleet Limits*. There are limits on the maximum number of allowable physical interactions that occur each year between leatherback sea turtles and vessels registered for use under Hawaii longline limited access permits while engaged in shallow-set fishing.

(i) The annual fleet limit for leatherback sea turtles (*Dermochelys coriacea*) is 16.

(ii) Upon determination by the Regional Administrator that the shallow-set fleet has reached the limit during a given calendar year, the Regional Administrator will, as soon as practicable, file for publication at the Office of the **Federal Register** a notification that the fleet reached the limit, and that shallow-set fishing north of the Equator will be prohibited beginning at a specified date until the end of the calendar year in which the limit was reached.

(2) *Trip limits*. There are limits on the maximum number of allowable physical interactions that occur during a single fishing trip between leatherback and North Pacific loggerhead sea turtles and individual vessels registered for use under Hawaii longline limited

access permits while engaged in shallow-set fishing. For purposes of this section, a shallow-set fishing trip commences when a vessel departs port, and ends when the vessel returns to port, regardless of whether fish are landed. For purposes of this section, a calendar year is the year in which a vessel reaches a trip limit.

(i) The trip limit for leatherback sea turtles is 2, and the trip limit for North Pacific loggerhead sea turtles (*Caretta caretta*) is 5.

(ii) Upon determination by the Regional Administrator that a vessel has reached either sea turtle limit during a single fishing trip, the Regional Administrator will notify the permit holder and the vessel operator that the vessel has reached a trip limit, and that the vessel is required to immediately retrieve all fishing gear and stop fishing.

(iii) Upon notification, the vessel operator shall immediately retrieve all fishing gear, stop fishing, and return to port.

(iv) A vessel that reaches a trip limit for either turtle species during a calendar year shall be prohibited from engaging in shallow-set fishing during the 5 days immediately following the vessel's return to port.

(v) A vessel that reaches a trip limit a second time during a calendar year, for the same turtle species as the first instance, shall be prohibited from engaging in shallow-set fishing for the remainder of that calendar year. Additionally, in the subsequent calendar year, that vessel shall be limited to an annual interaction limit for that species, either 2 leatherback or 5 North Pacific loggerhead sea turtles. If that subsequent annual interaction limit is reached, that vessel shall be prohibited from engaging in shallow-set fishing for the remainder of that calendar year.

(vi) Upon determination by the Regional Administrator that a vessel has reached an annual interaction limit, the Regional Administrator will notify the permit holder and the vessel

operator that the vessel has reached the limit, and that the vessel is required to immediately stop fishing and return to port.

(vii) Upon notification, the vessel operator shall immediately retrieve all fishing gear, stop fishing, and return to port.

* * * * *

(i) A vessel registered for use under a Hawaii longline limited access permit may not be used to engage in shallow-setting north of the Equator any time during which shallow-set fishing is prohibited pursuant to paragraphs (b)(1) or (b)(2) of this section.

* * * * *

APPENDIX A: COUNCIL ACTIONS

In response to the relatively stable loggerhead and leatherback turtle interactions from 2004-2016 and the lack of growth in fishing effort in the Hawaii shallow-set longline fishery (shallow-set fishery), the Western Pacific Regional Fishery Management Council (Council), at its 171st Meeting in October 2017, reviewed whether the continuation of sea turtle fleet-wide annual limits, "hard caps", is necessary to achieve the management objectives of Western Pacific Regional Fishery Management Council's Pelagic Fishery Ecosystem Plan (Pelagic FEP). The Council reviewed information on the history of the hard cap measure, effectiveness of the gear requirements implemented in 2004, interaction data since the implementation of hard caps, and the performance of the fishery. The Council recommended development of a draft amendment to the Pelagic FEP considering management options for hard caps and selecting as its preliminary preferred alternative the removal of the hard cap measure. Following the 171st Meeting, Council staff initiated development of the draft amendment, including additional alternatives that would establish a framework to implement more responsive measures that would ensure year-round operations of the shallow-set fishery while minimizing impacts to sea turtle populations.

Following the higher loggerhead turtle interaction rates in late 2017 and early 2018, and the Ninth Circuit Court decision in *Turtle Island Restoration Network v. NMFS & FWS*, 13-17123 (9th Cir. 2017), the Council at its 172nd Meeting in March 2018 considered a revised set of options that includes the development of a framework for managing loggerhead and leatherback turtle interactions in the shallow-set fishery. The Council recommended development of a framework that may include, among other measures:

a. Specification of hard caps;
b. In-season measures to implement a temporary closure when a certain proportion of the loggerhead or leatherback limit is reached;
c. Real-time spatial management measures to monitor and manage interaction hotspots and fluctuations; and
d. Establishment of a fleet communication program to facilitate implementation of real-time spatial management measures and dissemination of interaction information to the fleet.

The Council also directed staff to work with the shallow-set fishery participants to consider an industry-implemented cooperative framework where industry has discretion to manage fleet-wide sea turtle interactions based on hard caps identified by the Council and NMFS, and to identify communication pathways that may be implemented to provide more timely information to the fleet on sea turtle interactions.

In response to the Council directive at its 172nd Meeting, Council staff worked with the Scientific and Statistical Committee (SSC) members and Pacific Islands Regional Office (PIRO) Sustainable Fisheries Division (SFD) to review examples of industry-led bycatch management programs implemented in Alaska, West Coast and Atlantic fisheries. Additionally, the Council and the Hawaii Longline Association (HLA) convened an industry workshop on May 4, 2018, on the management of sea turtle interactions in the shallow-set fishery to review examples from other fisheries, and discuss potential application of industry-led programs to the shallow-set fishery. Workshop discussions suggested that participants of the fishery could start by entering into an information sharing agreement that would set up a data sharing and fleet communication platform. Under the agreement, the vessels could provide data related to sea turtle interactions

and other relevant information to a third-party and for that third-party to provide data summaries back to the fleet in accordance with the terms of the agreement. The agreement could specify the types of data the participants would be willing to share with other vessels so that information that would assist vessels with sea turtle avoidance would be shared among the participants to the agreement while protecting proprietary fishing information. The agreement could be further developed in subsequent years to incrementally implement bycatch avoidance strategies (e.g., rolling hotspots) as more information is gathered through the data sharing platform. The review of examples from other fisheries and workshop discussions also identified potential regulatory structures to incentivize development and encourage participation in industry-implemented sea turtle avoidance strategies, such as through two-tiered interaction limits in which a lower limit would be established for vessels that do not participate in those initiatives.

The Council, at its 173rd Meeting in June 2018, considered measures to include in the framework for managing loggerhead and leatherback turtle interactions in the shallow-set fishery. The Council recommended an amendment to the Pelagics FEP to establish a management framework for the shallow-set fishery that consists of:

1. Annual fleet-wide hard cap limits on the number North Pacific loggerhead and leatherback turtle interactions consistent with the anticipated level of annual interactions that is set forth in the current valid BiOp; and
2. Individual trip interaction limits for loggerhead and leatherback turtles.

The Council also recommended specifications under the framework as follows:

1. Annual hard cap limit of 37 North Pacific loggerhead and 21 leatherback turtles; and
2. Individual trip interaction limit of 5 North Pacific loggerhead turtles.

The Council's recommendation for the loggerhead and leatherback turtle annual limits was based on the anticipated level of interactions analyzed in the Biological Evaluation (BE) that reinitiated consultation of the fishery under the ESA Section 7 consultation process on April 20, 2018. At the time of the 173rd Meeting, the Council anticipated that NMFS would complete a new BiOp no later than October 31, 2018. As part of its recommendation, the Council noted that it would review its recommendation if the new BiOp from the consultation resulted in a jeopardy decision or otherwise resulted in a different ITS for North Pacific loggerheads or leatherbacks turtles.

The Council at its 173rd Meeting additionally established a three-year timeline for monitoring the development, implementation, and review of a sea turtle interaction avoidance pilot program utilizing fleet communication to be implemented by the industry. If the pilot program is successful in establishing an information sharing agreement and fleet communication platform, it may provide an additional tool for vessels to minimize impacts to loggerhead and leatherback turtles while maintain fishing opportunities throughout the fishing season. After a three-year period, the Council would review the development and implementation to determine whether the program may be further improved by establishing incentives as part of the management measures for mitigating sea turtle impacts in the shallow-set fishery under the Pelagics FEP.

At its 174th Meeting in October 2018, the Council received new information on a population viability analysis (PVA) for loggerhead and leatherback turtles prepared for the ongoing Section 7 consultation. PVA results indicate that the North Pacific loggerhead turtle population exhibits a

long-term increasing trend at a mean estimated population growth rate of 2.4 (later updated to 2.3%), while the Western Pacific leatherback turtle population exhibits a long-term declining trend at a mean estimated population growth rate of -5.3% (later updated to -6.1%). The Council recommended convening an interim Council meeting, if needed, to review the draft BiOp and consider any revisions to the June 2018 recommendations based on the BiOp, and stated that it would reconsider a specification of leatherback individual trip limits if necessary.

At its 175th Meeting on December 17, 2018, the Council considered final action on additional mitigation measures for the Western Pacific leatherback turtle in advance of the draft BiOp completion, taking into consideration the results of the PVA model indicating a continuing long-term declining trend of the population. The Council deferred action until the draft BiOp and more complete information on the impacts of the fishery on the Western Pacific leatherback turtles are available to fully inform the Council decision.

At its 177th Meeting on April 12, 2019, the Council reviewed its recommendations on the management framework from the 173rd Meeting for consistency with the draft BiOp made available to the Council on March 28, 2019, and considered final action on the management framework. The draft BiOp contained reasonable and prudent measures (RPM) different than those measures previously recommended by the Council. Nonetheless, the Council maintained its recommendation from the 173rd Meeting, and additionally recommended setting an individual trip limit of 2 leatherback turtles, and recommended an annual review of the shallow-set fishery's performance under the individual trip limits in the Annual Stock Assessment and Fishery Evaluation (SAFE) Report. The Council further requested that NMFS consider revising the RPMs in the draft BiOp for consistency with the Council recommended action.

NMFS delivered the final BiOp for the shallow-set fishery on June 26, 2019, during the 178th Council meeting. The final BiOp incorporates the Council's recommended individual trip limit, but some differences remain between the Council's recommended action from the 177th meeting and the RPMs and associated T&Cs. For example, the BiOp individual trip limit measure includes additional restrictions on vessels that reach the trip limit twice in a calendar year, and does not require a fleet-wide hard cap limit for loggerhead turtles. The Council deferred final action at the 178th meeting to allow adequate time for the Council and the SSC to review the final BiOp, and recommended convening a teleconference meeting to consider final action. The Council additionally directed staff to work with PIRO SFD to prepare necessary analysis, incorporating the final BiOp and associated RPMs, to inform final action on the management of loggerhead and leatherback turtle interactions in the shallow-set fishery at its 179th Meeting and to ensure timely review and transmittal of the amendment package following the meeting.

At its 179th Meeting on August 8, 2019, the Council reviewed the revised draft amendment and Environmental Assessment (EA) incorporating the final BiOp and associated RPMs. The Council took final action and recommended amending the Pelagic FEP to modify loggerhead and leatherback turtle mitigation measures for the shallow-set fishery as follows:

1. Set an annual fleet-wide hard cap limit on the number of leatherback turtle interactions at 16, consistent with RPMs and Terms and Conditions 1a under the 2019 BiOp;
2. Do not set an annual fleet-wide hard cap limit on the number of North Pacific loggerhead turtle interactions, but retain the authority for setting an annual fleet-wide hard cap limit

on the number of North Pacific loggerhead turtle interactions under the Pelagic FEP if necessary; and

3. Establish individual trip interaction limits for loggerhead and leatherback turtles for the Hawaii limited entry permit vessels that declare their trips as a shallow-set trip, consistent with RPMs and Terms and Conditions 1b under the 2019 BiOp, and set limits of 5 loggerhead turtles and 2 leatherback turtles per trip.

APPENDIX B: DETAILED CALCULATION METHODS FOR SECTION 4.3

Based on trip cost and revenue data in the 2018 SAFE Report (WPFMC 2019), the average trip cost excluding labor costs for the recent five year period (2014-2018) is $44,764, and the average trip revenue for the same period is $103,074, resulting in an average net revenue of $58,310 per trip (Table 24; all averages calculated with values adjusted for 2018 and exclude labor costs). The average of the recent five years was used because fluctuation of total trip cost is dependent on fuel cost, and the last five years provide a more representative trip cost for recent years.

Table 24. Average trip cost, revenue, and net revenue per trip for Hawaii longline shallow-set trips from 2009-2018, adjusted to 2018 dollars. (Data source: 2018 SAFE Report Figure 152 and Data Table A-129.)

Year	Trip costs ($)	Trip costs adjusted ($)	Trip revenue ($)	Revenue adjusted ($)	Net revenue adjusted ($)	CPI Adjustor
2009	37,617	45,329	69,182	83,364	38,035	1.205
2010	41,754	49,270	72,601	85,669	36,399	1.18
2011	56,508	64,250	103,466	117,641	53,391	1.137
2012	57,602	63,996	102,568	113,953	49,957	1.111
2013	49,739	54,265	106,305	115,979	61,713	1.091
2014	51,829	55,769	86,970	93,580	37,811	1.076
2015	41,966	44,694	78,048	83,121	38,427	1.065
2016	39,912	41,668	112,978	117,949	76,281	1.044
2017	37,584	38,298	108,788	110,855	72,557	1.019
2018	43,390	43,390	109,863	109,863	66,473	1
2009-2018 Average	*45,790*	*50,093*	*95,077*	*103,197*	*53,104*	--
2014-2018 Average	*42,936*	*44,764*	*99,329*	*103,074*	*58,310*	--

The average trip length is 32 days, and the average number of sets per trip is 16 (Table 24; WPFMC 2019). The total number of fishing days can be estimated by adding one day to the number of sets per trip, resulting in an average transit time of 15 days to and from port, (half of which typically occur at the start of the trip, and the other half at the end of the trip).

Table 25. Average number of sets per trip. (Data source: 2018 SAFE Report Figure 94 and Data Table A-95.)

Year	Vessels	Trips	Sets	*Sets/trip*
2009	28	112	1,762	*15.7*
2010	28	115	1,873	*16.3*
2011	20	82	1,447	*17.6*
2012	18	82	1,351	*16.5*
2013	15	58	962	*16.6*
2014	20	81	1,338	*16.5*
2015	22	69	1,130	*16.4*
2016	13	46	727	*15.8*

Year	Vessels	Trips	Sets	*Sets/trip*
2017	20	70	994	*14.2*
2018	11	30	420	*14.0*
Average	19.5	74.5	1,200.40	*16.0*

Of the trip cost, fuel cost accounted for 49%, bait was 19%, fishing gear 9%, provisions 8%, light sticks 10%, engine oil 2%, ice 1%, and communications 2% (WPFMC 2018). Daily costs for these items can be estimated by dividing the total trip cost for each item by the number of days used on the trip (Table 26). Fuel, provision, communication, and engine oil were assumed to be items used daily, and bait, gear, and light sticks are items used only on fishing days. Shallow-set vessels have ice machines on board (Pan 2018), so it was assumed that the ice included in the trip cost are ice purchased at the start of the trip.

Table 26. Estimated daily trip cost by item. Breakdown of trip cost is based on 2018 SAFE Report.

Items	2018 Percentage	Trip Total Cost (14-18 adj. average)	Days Used Out of the Average 32 Day Trip	Cost Per Day Used
Cost items used in transit and during fishing days				
Fuel	49%	$21,934	32	$685
Provision	8%	$3,581	32	$112
Communication	2%	$895	32	$28
Engine oil	2%	$895	32	$28
Cost items used only on fishing days				
Bait	19%	$8,505	16	$532
Gear	9%	$4,029	16	$252
Light sticks	10%	$4,476	16	$280
Cost item not reusable on subsequent trips				
Ice	1%	$448	N/A	N/A

Lastly, daily revenue was estimated to be $6,422 by dividing the average trip revenue ($103,074; 2014-2018 adjusted) by the average number of sets per trip (16). Trip cost, revenue, and percent reduction in revenue under three trip limit scenarios (reaching trip limit on first, fifth and tenth set of the trip) were estimated by adjusting the average trip cost and revenue for the number of days fished (Table 27). Trip cost for each scenario was estimated by multiplying daily cost of each trip cost item by the number of days used. Trip revenue was estimated by multiplying the average daily revenue by the number of sets for each scenario.

Table 27. Estimated trip cost, revenue, and net revenue under three trip limit scenarios.

Items	cost per day used	Scenario 1: trip limit reached on 1st set		Scenario 2: trip limit reached on 5th set		Scenario: trip limit reached on 10th set	
		Days used[1]	Est. trip cost	Days used[1]	Est. trip cost	Days used[1]	Est. trip cost
Fuel	$685	17	$11,653	21	$14,394	25	$17,136

Items	cost per day used	Scenario 1: trip limit reached on 1st set		Scenario 2: trip limit reached on 5th set		Scenario: trip limit reached on 10th set	
		Days used[1]	Est. trip cost	Days used[1]	Est. trip cost	Days used[1]	Est. trip cost
Provision	$112	17	$1,902	21	$2,350	25	$2,798
Communication	$28	17	$476	21	$588	25	$699
Engine oil	$28	17	$476	21	$588	25	$699
Bait	$532	1	$532	5	$2,658	10	$5,316
Gear	$252	1	$252	5	$1,259	10	$2,518
Light sticks	$280	1	$280	5	$1,399	10	$2,798
Ice	$448 (one-time cost)	N/A	$448	N/A	$448	N/A	$448
Trip cost total			$16,017		$23,683		$32,412
Trip revenue			$6,442		$32,211		$64,421
Net revenue			-$9,575		$8,528		$32,009

[1]Days used for cost items used in transit and during fishing days was calculated by adding the number of transit days (15 days) and number of fishing days (number of sets + 1 day).
[2]Trip revenue was estimated by multiplying the average daily revenue (2014-2018 adjusted) by the number of sets.

APPENDIX C: REGULATORY IMPACT REVIEW

1. Introduction

To meet the requirements of Executive Order 12866 (EO 12866), "Regulatory Planning and Review," the National Marine Fisheries Service (NMFS) requires preparation of Regulatory Impact Review (RIR) for all proposed regulatory actions that are of public interest. The review provides an overview of the problem, policy objectives, and anticipated impacts of the action, and ensures that management alternatives are systematically and comprehensively evaluated so that the public welfare can be enhanced in the most efficient and cost-effective way. This document examines the costs and benefits of the proposed action for the Hawaii-based shallow-set longline fishery (shallow-set fishery) under the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific (FEP).

2. Management Goals and Objectives

The Hawaii shallow-set longline fishery, under Amendment 3 to the Pelagics Fishery Management Plan (currently Fishery Ecosystem Plan (FEP)) implemented in 2004, had reduced loggerhead and leatherback sea turtle interactions by approximately 90% through the establishment of annual fleet-wide interaction limits ("hard caps") among other measures. These hard caps, which, if reached, would trigger the closure of the fishery for the remainder of the calendar year. But the hard caps, as currently implemented, do not provide a mechanism to respond earlier in the year when higher interaction rates indicate both higher impacts to sea turtle population as well as higher potential for shallow-set longline fishermen reaching hard caps before the end of the fishing season.

In addition, on April 20, 2018, NMFS reinitiated ESA Section 7 consultation on the fishery due to 1) the fishery's first documented interaction with a Guadalupe fur seal, which is listed as threatened under the Endangered Species Act (ESA), 2) issuance of a final rule listing 11 new green sea turtle distinct population segments, 3) listing of oceanic whitetip shark and giant manta ray as threatened under the ESA, 4) the fishery's exceedance of the incidental take statement (ITS) for olive ridley sea turtles, and 5) a Ninth Circuit Court of Appeals 2-1 opinion finding that NMFS 2012 BiOp no-jeopardy determination and associated ITS for the loggerhead turtle to be arbitrary and capricious. . The final biological opinion (BiOp) was issued on June 26, 2019. The ITS in the 2019 BiOp sets forth reasonable and prudent measures (RPMs) and associated terms and conditions (T&Cs) necessary to minimize the impacts of incidental take, which must be taken by NMFS. Of the six RPMs in the 2019 BiOp, RPM 1 and associated T&C 1a and 1b requires immediate implementation of measures to reduce the incidental capture and mortality of loggerhead and leatherback sea turtles in the shallow-set fishery.

The purpose of this action is to implement Amendment 10 to the Pelagics FEP. This would modify sea turtle mitigation measures for effectively managing impacts to leatherback and loggerhead sea turtles from the shallow-set fishery, consistent with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and RPM 1 T&C 1a and 1b of the 2019 BiOp pursuant to the ESA, while maintaining fishing opportunities. This action would provide managers and fishery participants with the necessary tools to respond to and mitigate fluctuations in loggerhead and leatherback interactions, to ensure

the continued supply of fresh swordfish to U.S. markets, consistent with the conservation needs of these sea turtles.

3. Description of the Alternatives

Alternative 1: No Action (Status Quo/Current Management)

Under the No Action/Status Quo Alternative, the Council would not recommend changes to the existing sea turtle mitigation measures, and the fishery would continue to operate under existing gear and handling requirements, as well as the hard cap limits of 17 loggerhead sea turtles and 26 leatherback sea turtles that are codified in regulations at 50 CFR 665.813(b)(1).

RPM T&C 1h of the 2019 BiOp states that, if T&C 1a and 1b have not been implemented by regulation by January 1, 2020, the shallow-set fishery may reopen, but under an annual interaction limit of 16 leatherback and 17 loggerhead sea turtles (which would be implemented under separate rulemaking) until such regulations are in place.

See Section 2.2.3 of the EA for more details on Alternative 1.

Alternative 2: Implement Annual Fleet-Wide Hard Cap Limits and Individual Trip Limits for Loggerhead and Leatherback Turtles

Under Alternative 2, annual limit on the number of North Pacific loggerhead and leatherback turtle interactions would be set to 36 and 16 respectively. Once either of these hard cap limits is reached, the fishery would close for the remainder of the calendar year. Alternative 2 would also establish individual trip limits of five loggerhead and two leatherback turtle interactions for the Hawaii limited entry permit vessels that declare their trips as a shallow-set trip. Once a vessel has reached either the loggerhead or the leatherback turtle trip limit, that vessel must cease setting longline gear for the duration of the trip and is required to return to port. The vessel may resume shallow-set fishing operations after returning to port and providing the required 72-hour notification. Alternative 2 also would call for annual review of the shallow-set fishery's performance under the trip limits in the annual SAFE Report and may make recommendations to NMFS to revise the trip limits upon periodic review of the effectiveness of the limits.

Alternative 2 does not require additional time in port after a vessel reaches a trip limit beyond the existing 72-hour notification requirement prior to departure under 50 CFR 665.803. The travel distance from port to the areas where the shallow-set vessels typically operate is at minimum 2-3 days and may take as long as 5-6 days one-way. If a vessel reaches a trip limit, the travel time back to port, the required 72-hour notice, and travel time to return to fishing grounds would result in a minimum of 7-10 days without fishing by the vessel.

This alternative would be partially consistent with RPM T&C 1b, as it would implement trip limits but does not implement additional restrictions on vessels that reach an individual trip limit twice in a calendar year.

See Section 2.2.4 of the EA for more details on Alternative 2.

Alternative 3: Implement Annual Fleet-wide Hard Cap Limits and individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles
Under Alternative 3, annual limit on the number of North Pacific loggerhead and leatherback turtle interactions would be set to 36 and 16 respectively. Once either of these hard cap limits is reached, the fishery would close for the remainder of the calendar year. Alternative 3 would also establish individual trip limits of five loggerhead and two leatherback turtle interactions for the Hawaii limited entry permit vessels that declare their trips as a shallow-set trip. Once a vessel has reached either the loggerhead or the leatherback turtle trip limit, that vessel cannot make additional sets and is required to return to port. The vessel would also be prohibited from engaging in shallow-set longline fishing for five days after returning to port. Any vessel that reaches the trip limit for either leatherback or loggerhead sea turtles twice in a calendar year would be prohibited from shallow-set longline fishing for the remainder of the calendar year. These vessels would also have an annual vessel limit equivalent to a single trip limit for the following calendar year.

Alternative 3 modifies Alternative 2 for consistency with RPM T&C 1a and 1b. The primary difference between Alternative 2 and 3 is the implementation of additional restrictions on vessels that reach an individual trip limit twice in a calendar year as required under RPM T&C 1b as well as the prohibiting from engaging in shallow-set longline fishing for five days after returning to port upon reaching either trip limit.

See Section 2.2.5 of the EA for more details on Alternative 3.

Alternative 4: Implement Annual Fleet-Wide Hard Cap Limit for Leatherback Turtles and Individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles (Preferred Alternative)

Under Alternative 4, annual limit on the number of leatherback turtle interactions would be set to 16, while loggerhead turtles would not be subject to an annual fleet-wide hard cap limit. Once the leatherback hard cap limits is reached, the fishery would close for the remainder of the calendar year. Alternative 4 would also establish individual trip limits of five loggerhead and two leatherback turtle interactions for the Hawaii limited entry permit vessels that declare their trips as a shallow-set trip. Once a vessel has reached trip limit for either the loggerhead or the leatherback turtle, that vessel cannot make additional sets and is required to return to port. The vessel would also be prohibited from engaging in shallow-set longline fishing for five days after returning to port. Any vessel that reaches the trip limit for either leatherback or loggerhead sea turtles twice in a calendar year would be prohibited from shallow-set longline fishing for the remainder of the calendar year. These vessels would also have an annual vessel limit equivalent to a single trip limit for the following calendar year.

Alternative 4 modifies Alternative 2 for consistency with RPMs and T&C 1a and 1b as well as remove the current fleet-wide loggerhead hard cap limit of 17 from existing regulations and without replacing it with a new limit. Alternative 4 is similar to Alternative 3, except that the fishery would not be subject to the loggerhead hard cap. In the absence of a hard cap limit for loggerhead turtles, the fishery would not close if the fleet-wide number of interactions exceeds

the ITS in a calendar year. However, vessels would still be constrained by the individual trip limit of five loggerheads or two leatherbacks, the five-day cessation from shallow-set longline fishing after reaching port upon reaching either trip limit, as well as additional restrictions if the trip limit were reached twice in a calendar year.

See Section 2.2.6 of the EA for more details on Alternative 4.

4. Environmental and Economic Background

This section describes the socioeconomic setting for the shallow-set fishery. A detailed history and description of the fishery can be found in the 2018 SAFE Report (WPFMC 2019) as well as Section 3.3 of the EA.

The shallow-set and deep-set longline fisheries are managed under a single limited access fishery with a maximum of 164 vessel permits with active vessel participation increasing in recent years. As of October 2019, 148 vessels are actively fishing. Longline fishermen can choose to shallow-set or deep-set, but not both during the same trip due to the different requirements for each fishery. The shallow-set fishery is monitored under 100% observer coverage. All Hawaii permitted vessels are required to provide 72-hour advance notification prior to leaving port on a fishing trip to declare trip type (shallow-setting or deep-setting) and to receive observer placement.

The shallow-set longline fishery targets swordfish, which is a highly migratory stock subject to management by WCPFC and IATTC. Current WCPFC measures for shallow-set longline fishing for swordfish include the use of large circle hooks or whole finfish bait (WCPFC Conservation and Management Measure (CMM) 2008-03). Section 4.4 of the EA provides a summary list of current management requirements, which include permit, reporting, gear requirements, observer requirements, and protected species handling and mitigation requirements. Catches of swordfish around the Hawaiian archipelago grew from negligible amounts in the mid-1980s to 5.3 million pounds in 1990. By 1993, catches of swordfish peaked at about 13.0 million pounds (WPFMC 2013), representing 30% of all the North Pacific swordfish production (19,672 mt or 43.6 million pounds) at the time and then began declining until 2000, after which the fishery was closed due to litigation for several years.

Since the 2004 reopening of the shallow-set fishery, fishing effort peaked in 2010 at 114 trips and 1.8 million hooks set, and has since been on a declining trend. The number of vessels participating in the shallow-set fishery has declined over time from a high of 35 vessels in 2006 to a low of 11 vessels in 2018. Table 1 provides a summary of fishing effort from 2009-2018. Revenue has generally trended downward as well, whereas trip costs have been more variable, increasing from 2009-2011 then trending downward since 2011. In 2018, the average trip cost (excluding labor cost) for the Hawaii shallow-set longline fishery was $43,390 per vessel with an average trip length of 32 days and the net revenue (trip revenue minus trip cost) was $66,473 per vessel.

Table 1. Hawaii shallow-set longline fishery effort based on logbook data, 2004-2018.

Year	Active Vessels	Number of Trips	Number of Sets	Number of Hooks	1-Yr Percent Change

2009	28	112	1,762	1,721,346	▲ 15.04%
2010	28	108	1,833	1,803,432	▲ 4.77%
2011	20	82	1,468	1,489,243	▼ -17.42%
2012	18	81	1,355	1,453,234	▼ -2.42%
2013	15	58	962	1,060,341	▼ -27.04%
2014	20	81	1,338	1,483,809	▲ 39.94%
2015	22	65	1,110	1,235,703	▼ -16.72%
2016	13	40	670	719,385	▼ -41.78%
2017	18	61	949	1,027,013	▲ 42.76%
2018	11	30	420	500,000	▼ -51.32%

Source: 2018 SAFE Report

The shallow-set fishery is highly seasonal due to peak market demand for Hawaii swordfish, with effort typically increasing in October and peaking in March, after which effort gradually declines through the summer months. The swordfish catch in the Hawaii longline fishery accounts for nearly half of the U.S. commercial swordfish landings. In the five-year period of 2012-2016, the average swordfish catch in both the Hawaii shallow-set and deep-set longline fisheries was approximately 3.1 million pounds, of which 2.3 million pounds were from the shallow-set fishery, and amounting to 44% and 33%, respectively, of the total US domestic commercial landing of swordfish during that same period (WPFMC 2017, NMFS Commercial Fisheries Statistics). In 2017, the last year in which the shallow-set fishery was open throughout the whole year, the shallow-set fleet earned $6,857,656 ($4,280,631from catch landed and sold in Hawaii and $2,577,024 from catch landed and sold on the West Coast). Fleet-wide swordfish revenue was $6,206,422. In 2018, with the closure of the fishery in May, the shallow-set fleet earned $3,045,971 ($1,453,032 from catch landed and sold in Hawaii and $1,592,939 from catch landed and sold on the West Coast). Fleet-wide revenue from swordfish catch in 2018 was $2,313,912 (data sourced from the Pacific Islands Fisheries Science Center: Fishery Economic Performance Measures (Tier 1 Indicators); https://inport.nmfs.noaa.gov/inport/item/46097). The majority of the swordfish landed in Hawaii is exported to the U.S. mainland where it competes with Atlantic swordfish catch and imported swordfish from other countries.

The shallow-set fishery has been subject to four early closures since 2004: once in March 2006 from reaching the loggerhead limit of 17 turtles, another in November 2011 from reaching the leatherback limit of 16, another in May of 2018 in compliance with court order (*TIRN v. NMFS* (9th Cir. 2017)), and lastly in 2019 when the fishery reached the loggerhead hard cap of 17 turtles. Table 2 summarizes the differences in fishery performance measures for 2006 and 2011 closure years and the year immediately before and after each closure. The closure in March of 2006 during the peak fishing season resulted in a substantial reduction in effort, catch, and revenue compared to one year before and after. The number of trips in 2006 was 42% lower than the average of the years before and after, and the number of hooks set were 50% lower. Catch in 2006 was 37% lower than the average of the years before and after, and nominal revenue was 46% lower in the closure year.

The impact of the leatherback annual limit closure in November 2011 is less pronounced. This is likely due to the fact that the closure occurred late in the year. The effects of the recent 2018 and 2019 closures are still being analyzed.

Table 2. Difference in fishery performance between hard cap closure years (2006, 2011) and the average of 1 year before and after each closure.

2006 Loggerhead Hard Cap Closures				
Performance measure	**Closure year (2006)**	**Average of 1 year before and after**	**Difference**	**Percent Difference**
Trips	57	98.5	-41.5	-42%
Hooks (million)	0.7	1.4	-0.7	-50%
Catch (1,000 lbs.)	2,328	3,692	-1,364	-37%
Nominal Revenue ($1,000)	$3,985	$7,353	-$3,368	-46%
2011 Leatherback Hard Cap Closure				
Performance measure	**Closure year (2011)**	**Average of 1 year before and after**	**Difference**	**%**
Trips	82	98.5	-16.5	-17%
Hooks (million)	1.5	1.6	-0.1	-6%
Catch (1,000 lbs.)	3,500	3,214	+286	+9%
Nominal Revenue ($1,000)	$6,086	$6,232	-$146	-2%

With regard to the regional economy in Hawaii, tourism and defense dominates Hawaii's economy, with tourism, by far, the leading industry in terms of employment and expenditures. Federal defense expenditures in 2017 is an estimated $5.1 billion (DBEDT 2019), while the Hawaii Tourism Authority estimated total spending by visitors arriving by air or cruise ships in 2018 to be $17.6 billion (HTA 2019). Hawaii's Gross Domestic Products for 2017 and 2018 were $89 billion and $92 billion, respectively (DBEDT 2019).

5. Analysis of Impacts of Alternatives

Alternative 1: No action (status quo/current management)

Under Alternative 1, the shallow-set fishery would continue to be managed under existing measures to minimize impacts to sea turtles, which include the existing hard cap limits of 17 loggerheads and 26 leatherback turtles and other gear and handling requirements. This alternative does not implement any measures for early response to higher interaction rates or fluctuations that may indicate a potential for higher impacts to sea turtle populations or a fishery closure early in the calendar year. RPM T&C 1h of the 2019 BiOp states that, if T&C 1a and 1b have not been implemented by regulation by January 1, 2020, the shallow-set fishery may reopen under annual hard caps of 16 leatherback and 17 loggerhead sea turtles until such regulations are in place.

Under status quo, with sea turtle interactions likely to fluctuate substantially among years, the fishery is likely to close early in the calendar year when loggerhead or leatherback sea turtle interactions are higher than average, and remain closed until the end of the year. Because the fishing season typically starts around October, reaching the hard cap early would delay potential start of the fishing season until January of the following year. An early closure would reduce net revenues earned by shallow-set fishery participants as was the case in 2006 when the fishery closed in March (see Table 1). Of note, under Alternative 1, if T&C 1a and 1b have not been implemented by regulation by January 1, 2020, the shallow-set fishery can still reopen but would be subject to annual hard caps of 16 leatherback and 17 loggerhead sea turtles under a separate temporary measure until regulations implementing T&C 1a and 1b are in place. As a result, from

January 1, 2020, the hard cap for leatherback turtles would drop from 26 to 16 (while the loggerhead turtle hard cap would remain at 17) as of January 1, 2020, until the new regulations are implemented. The temporary reduction in the leatherback hard cap could potentially result in an early fishery closure in 2020.

During a fleet-wide hard cap closure, shallow-set vessels have the option of switching to deep-set longline fishing to target bigeye tuna and continue to fish under the Hawaii longline limited entry permit. However, these vessels would be subject to regulations associated with deep-set longline fishing (NMFS 2018).

With regard to impacts to markets and consumers, if the shallow-set fishery closed early as a result of reaching the hard cap, in the absence of the swordfish supply from the shallow-set fishery, swordfish caught by deep-set longline fishery as well as the U.S. Atlantic swordfish can continue to be sources of domestically supplied swordfish for U.S. consumers. In addition, imports of foreign-caught swordfish would likely increase to fill any market gap in meeting the demand for swordfish in the U.S.

Alternative 1 would not modify the administrative procedures for the shallow-set fishery. The fishery will continue to operate under a hard cap, which requires NMFS to publish a Federal Register notice upon the fishery reaching the annual loggerhead or leatherback limit to close the fishery for the remainder of the calendar year. RPM T&C 1h of the 2019 BiOp states that, if T&C 1a and 1 b have not been implemented by regulation by January 1, 2020, the shallow-set fishery may reopen under an annual interaction limit of 16 leatherback and 17 loggerhead sea turtles until such regulations are in place. Therefore, under Alternative 1, additional action would be necessary if the fleet-wide leatherback turtle interactions reach 16 in order to implement RPM T&C 1h of the 2019 BiOp and to ensure compliance with ESA.

Alternative 2: Implement annual fleet-wide hard cap limits and individual trip limits for Loggerhead and Leatherback Turtles

Under Alternative 2, the fishery would be managed under annual fleet-wide hard cap limits consistent with the best available scientific information in the 2019 BiOp, this alternative would set an annual limit on the number of North Pacific loggerhead and leatherback turtle interactions to 36 and 16 respectively. Alternative 2 would also establish individual trip limits of five loggerhead and two leatherback turtle interactions for the Hawaii limited entry permit vessels that declare their trips as a shallow-set trip. The individual trip limits would provide an early response mechanism to higher interaction rates when the fleet-wide interaction levels are below the hard cap limit and are expected to help ensure year-round operations of the shallow-set fishery.

The individual trip limits are expected to reduce the likelihood of reaching the loggerhead and leatherback hard cap because it would prevent a large proportion of turtles from being taken in a single trip, which are typically associated with years with high interaction rates, especially for loggerhead turtles. Any vessel that reaches the individual trip limit would be required to return to port without making additional sets, but may resume shallow-set fishing operations after returning to port and providing the required 72-hour notification prior to departure. The

likelihood of a vessel reaching a trip limit is low based on past observer data. From 2004 to 2019 period, 0.2% of all trips (3 trips out of 1,107 trips) and 2.2% of trips with at least one loggerhead turtle interaction (3 out of 135 trips with at least loggerhead turtle interaction) had 5 or more loggerhead turtle interactions in a trip. In the same period, 0.9% of all trips (10 trips out of 1,107 trips) and 10.6% of trips with at least one leatherback turtle interaction (10 out of 95 trips) had 2 or more leatherback turtle interactions in a trip. Based on available observer data from 2004-2019, the likelihood of a single vessel experiencing a high number of observed interactions in consecutive trips is very low. Therefore, the fleet-wide economic cost of vessels reaching a trip limit is likely to be negligible. However, with a trip limit in place, the potential reduction in revenue from reaching a trip limit, especially if the trip limit is reached earlier in the trip, would likely encourage vessel operators to take measures to avoid having the trip cut short by additional interactions once one interaction occurs during a trip. Additional avoidance strategies could include moving away from the area and avoiding areas with higher potential for interactions using information from NMFS' TurtleWatch program. The cost of employing additional avoidance strategies is unknown at this time. However, the cost to vessels from employing additional avoidance strategies (e.g., moving away from areas with higher turtle interactions) is expected to be less than reaching a trip limit early in the trip if those strategies are successful in avoiding further interactions and preventing reaching a trip limit. If vessels reach a trip limit once, that vessel is more likely to avoid fishing in the same area as the previous trip and employ these additional avoidance strategies to prevent further loss in trip revenue. The individual trip limits are expected to prevent a large proportion of the loggerhead or leatherback limit to be taken in a single trip or by a single vessel. This would in turn allow the remaining vessels to continue fishing for swordfish throughout the peak season and continue to fish throughout the year, resulting in a minor to moderate positive benefits for most vessels and minimizing the fleet-wide impacts to catch and revenue from fleet-wide hard cap closures.

Compared to the No Action Alternative, under Alternative 2, the fishery is likely to have a lower likelihood of closing early in the calendar year from reaching the hard cap due to the combination of individual trip limits and a higher loggerhead hard cap limit. Because of this, target and non-target catch as well as revenue by the shallow-set fishery may be higher than Alternative 1 in years where interaction rates are higher than usual.

In terms of potential loss in revenue from reaching the trip interaction limit, vessels that reach a trip limits are expected to experience some loss in revenue, especially if a trip limit is reached earlier in the trip. Based on trip cost and revenue data in the 2018 SAFE Report (WPFMC 2019), the average trip cost excluding labor costs for the recent five year period (2014-2018) is $44,764, and the average trip revenue for the same period is $103,074, resulting in an average net revenue of $58,310 per trip (all averages calculated with values adjusted for 2018). The average trip length is 32 days, and the average number of sets per trip is 16. The total number of fishing days can be estimated by adding one day to the number of sets per trip, resulting in an average transit time of 15 days to and from port, (half of which typically occur at the start of the trip, and the other half at the end of the trip). Of the trip cost, fuel cost accounted for 49%, bait was 19%, fishing gear 9%, provisions 8%, light sticks 10% engine oil 2%, ice 1%, and communications 2% (WPFMC 2018). Trip cost, revenue, and percent reduction in revenue resulting under different scenarios of reaching trip limits were estimated by adjusting the average trip cost and revenue for the number of days fished (Table 3). These estimates allow for a rough

comparison among scenarios. Based on these estimates, in a worst-case scenario in which a vessel reaches a trip limit on the first set, the vessel is estimated to have a 116% reduction in net revenue, resulting in a net loss of $9,575 before labor costs for that trip. If a vessel reaches a trip limit after 5 sets, the vessel is estimated to have an 85% reduction in net revenue, at a net revenue of $8,528 for that trip. A vessel that reaches a trip limit after 10 sets is estimated to have a 45% reduction in net revenue, at a net revenue of $32,009 for that trip.

Table 3. Comparison of trip cost, trip revenue, net revenue, and percent reduction in net revenue for full trips and three scenarios of reaching a trip limit (at 1st, 5th and 10th set of the trip). Trip cost excludes labor costs).

Scenarios	Trip Cost	Trip Revenue	Net Revenue	Percent reduction in Net Revenue
Full Trip[1]	$44,764	$103,074	$ 58,310	--
Trip limit reached in first set	$16,017	$6,442	$(9,575)	116%
Trip limit reached in fifth set	$23,683	$32,211	$8,528	85%
Trip limit reached in tenth set	$32,412	$64,421	$32,009	45%

[1]This scenario represents approximately 16 fishing sets and 32 sea days.

Alternative 2 would likely have a small positive effect on markets and consumers of domestically caught swordfish compared to the No Action/Status Quo Alternative, since the fishery is generally likely to remain open throughout the year for most years under Alternative 2. Alternative 2 is likely to have little to no impact on the regional and national economy. Swordfish landed by Hawaii-based longline fishermen are generally sent to the U.S. mainland, where they compete with Atlantic swordfish as well as that imported from other countries. In years when the shallow-set fishery would be allowed to continue for a greater part of the year under the proposed action, the additional swordfish landed through the remainder of the year enhances benefits to those U.S. consumers who prefer to consume fresh domestic swordfish, rather than imported swordfish

In terms of administrative burden of implementing fleet-wide hard cap limits for loggerhead and leatherback turtles this would be similar under Alternative 2 to that of Alternative 1. Implementation of the individual trip limits would result in some additional administrative burden to track the number of interactions by individual vessels or trips and to provide notice to vessels that reach a trip limit. These changes are likely to be minor, as the existing monitoring data provided by the observer program can be tracked at the individual trip level without substantial changes to the monitoring protocol. If the individual trip limit reduces the likelihood of reaching the hard cap limit, there would be reduced administrative burden for implementing hard cap closures.

Alternative 3: Implement Annual Fleet-wide Hard Cap Limits and individual Trip Limits with Additional Restrictions Consistent with RPM T&C 1b for Loggerhead and Leatherback Turtles

Under Alternative 3, the fishery is expected to operate in a similar manner to Alternative 2 under hard cap limits and individual trip limits for both loggerhead and leatherback turtles. The

primary difference between Alternative 2 and 3 is the additional restrictions for the individual trip limit on vessels that reach trip limits twice in a calendar year as well as the additional time spent at port between trips. The fishery is likely to have a lower likelihood of closing early in the calendar year from reaching the hard cap due to the combination of individual trip limits and a higher loggerhead hard cap limit compared to Alternative 1.

The expected fishery outcomes of the fleet-wide hard cap limits and individual trip limits under Alternative 3 are similar to Alternative 2 in reducing the likelihood of reaching the hard cap limit and increasing the likelihood for maintaining fishing operations throughout the calendar year when higher interaction rates are observed. Consequently, target and non-target catch by the shallow-set fishery may be higher than Alternative 1 in such years. While historical observer data suggests low likelihood that vessels reach trip limits twice in the same year (as discussed under Alternative 2), if a vessel does interact with at least one loggerhead or leatherback turtle, the vessel operator is more likely to take measures to avoid additional interactions. Should a vessel reach a trip limit twice in a calendar year, that vessel would be prohibited from fishing in the shallow-set fishery for the remainder of the calendar year, and would be required to adhere to vessel interaction limits of five loggerhead or two leatherback turtles in the subsequent calendar year. This multi-year limit may serve as an additional deterrent for that vessel participating in shallow-set fishery that year. Compared to the No Action Alternative, the fishery is likely to have a lower likelihood of closing early in the calendar year from reaching the hard cap due to the combination of individual trip limits and a higher loggerhead hard cap limit, and have a higher catch of swordfish and other non-target catch. Compared to Alternative 2, Alternative 3 would subject a vessel reaching the trip limit to a lengthier wait before being allowed to fish with shallow-set longline gear with the required five-day time in port. Alternative 3 would also subject any vessel that reaches the trip limit twice in one year, by imposing an annual vessel limit the following year, which is an additional measure that is not required under Alternative 2.

Alternative 3 would likely have a small positive effect on markets and consumers of domestically caught swordfish compared to the No Action/Status Quo Alternative, since the fishery is generally likely to remain open throughout the year for most years under Alternative 2, and likely to have similar impacts as Alternative 2. Alternative 3 is likely to have little to no impact on the regional and national economy compared to all other alternatives. Swordfish landed by Hawaii-based longline fishermen are generally sent to the U.S. mainland, where they compete with Atlantic swordfish as well as that imported from other countries. In years when the shallow-set fishery would be allowed to continue for a greater part of the year under the proposed action, the additional swordfish landed through the remainder of the year enhances benefits to those U.S. consumers who prefer to consume fresh domestic swordfish, rather than imported swordfish

Administrative burden for Alternative 3 is expected to increase slightly compared to Alternative 2, due to the notification and monitoring procedures needed to implement additional restrictions on vessels that reach a trip limit twice in a calendar year. In addition to tracking loggerhead and leatherback turtle interactions on a per trip basis, NMFS would track vessel performance throughout the calendar year to monitor the number of times a vessel reaches a trip limit, and for any vessel that reached a trip limit twice in the previous calendar year, the cumulative number of interactions for the applicable species. When a vessel reaches a trip limit or the conditional

annual vessel limit, NMFS would provide notice to the applicable vessel to return to port without making additional sets and would notify the conditions upon which the vessel may resume shallow-set fishing. Additionally, under Alternative 3, NMFS would evaluate vessel performance for turtle interactions when an individual trip limit is reached, within five days of the vessel arriving into port to identify any problems and determine if guidance can be provided to the vessel to reduce interactions. If the individual trip limit reduces the likelihood of reaching the hard cap limit, there would be reduced administrative burden for implementing hard cap closures.

Alternative 4: Implement Annual Fleet-Wide Hard Cap Limit for leatherback Turtles and Individual Trip Limits with additional restrictions consistent with RPM T&C 1b for loggerhead and leatherback turtles (Preferred Alternative)

Under Alternative 4, the fishery would be managed under an annual fleet-wide hard cap limit of 16 leatherback turtles consistent with RPM T&C 1a; the fishery would not be subject to loggerhead hard cap limits. Individual trip limits for loggerhead and leatherback turtles of five loggerheads and two leatherbacks would apply. The expected fishery outcomes of individual trip limits and the additional restrictions if the trip limit is reached twice in a calendar year under Alternative 4 are similar to Alternative 3, although without loggerhead hard cap limit, the potential for the fishery to remain open longer is slightly higher under Alternative 4 compared to all of the other alternatives. Compared to the No Action Alternative, the fishery is likely to have a lower likelihood of closing early in the calendar year from reaching the hard cap due to the combination of individual trip limits and the lack of a loggerhead hard cap limit. This would provide greater fishing opportunities for longline fishermen participating or potentially participating in the shallow-set fishery. Not only would there be increased likelihood of fishing with shallow-set gear throughout the year and, thereby, increasing swordfish and other landings for those fishermen who solely fish using shallow-set gear, it also would allow fishermen who primarily fish using deep-set gear greater flexibility to opt into the shallow-set fishery for a greater part of the year. In addition, the proposed action would reduce the uncertainty regarding the potential for early closure of the shallow-set fishing, and allow more operational certainty regarding where, when, and how to fish, especially in the presence of other unforeseen operational issues such as fluctuating fuel costs.

Alternative 4 would likely have a small positive effect on markets and consumers of domestically caught swordfish compared to the No Action/Status Quo Alternative, since the fishery is generally likely to remain open throughout the year for most years under Alternative 4, and likely to have similar impacts as Alternative 2 and 3. Alternative 4 is likely to have little to no impact on the regional and national economy compared to the other alternatives. The shallow-set fishery landings revenues are less than 0.1% of the Hawaii Gross Domestic Product for Hawaii. Swordfish landed by Hawaii-based longline fishermen are generally sent to the U.S. mainland, where they compete with Atlantic swordfish as well as that imported from other countries. In years when the shallow-set fishery would be allowed to continue for a greater part of the year under the proposed action, the additional swordfish landed through the remainder of the year enhances benefits to those U.S. consumers who prefer to consume fresh domestic swordfish, rather than imported swordfish

Administrative burden under Alternative 4 in implementing the leatherback hard cap limit and individual trip limits with additional restrictions for loggerhead and leatherback turtles is expected to be similar to Alternative 3. Administrative burden will be reduced as a result of the lack of loggerhead turtle hard caps. However, if the fishery exceeds the ITS for loggerhead turtles, NMFS would be required to reinitiate ESA consultation as described in the EA.

6. Impacts of the Proposed Action on Net National Benefits

Due to limited data availability, as well our limited understanding of the biological, economic, and social linkages of Hawaii's shallow-set longline fishery and associated economic sectors, it is difficult to predict how fishery participants and other stakeholders would respond to the proposed action and how production operations and markets would be affected. It is also difficult to predict how the proposed action would affect the total future stream of national benefits and costs (to both producers and consumers). However, overall this action is anticipated to have positive net national benefits as it is designed to optimize domestic harvests of Pacific swordfish by Hawaii-based longline vessels, without jeopardizing the existence of any protected species or their habitats, compared to the No Action/Status Quo Alternative and other action alternatives..

7. Distributional Changes in Net Benefits

NMFS expects the proposed action to have little distributional effects among different fisheries. It is not likely that the catch of swordfish in other domestic fisheries would be noticeably lower as a result of the occasional and potential increase in the duration of fishing year for the shallow-set fishery. NMFS does not expect the proposed action to increase Hawaii-based swordfish catches to the point of affecting the harvests or profits of other domestic fisheries, such as the tuna-targeting deep-set fishery and commercial troll and handline fisheries.

8. Changes in Income and Employment

The proposed action is likely to have little positive impact for those who work with shallow-set fishermen. Specifically, the number of shallow-set longline trips were small relative to deep-set longline trips, so the potential expansion of the fishing opportunities by this fishery under the higher sea turtle interaction limits is likely to have negligible, if any, beneficial impact to businesses providing fuel, supplies, equipment and provisioning services and well as to crew.

9. Cumulative Impacts

The proposed action is not expected to result in cumulatively significant adverse impacts when considered in conjunction with other existing or future conservation and management measures that affect the Hawaii-based longline fishery.
Cumulative effects refer to the combined effects on the human environment that result from the incremental impact of the proposed action, and its alternatives, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Further, cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. The cumulative effects analysis examines whether the direct and indirect effects of the alternatives considered on

a given resource interacts with the direct and indirect effects of other past, present and reasonably foreseeable actions on that same resource to determine the overall, or cumulative effects on that resource. More details on other present and reasonably foreseeable future actions and their effects on the human environment are provided in Sections 4.5.1, 4.5.2, and 4.5.3 of the EA.

10. Determination of Significance under Executive Order 12866

In accordance with E.O. 12866, NMFS has made the following determinations:

1. This rule is not likely to have an annual effect on the economy of more than $100 million or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or state, local, or tribal governments or communities.
2. This rule is not likely to create any serious inconsistencies or otherwise interfere with any action taken or planned by another agency.
3. This rule is not likely to materially alter the budgetary impact of entitlements, grants, user fees or loan programs or the rights or obligations of recipients thereof.
4. This rule is not likely to raise novel or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in E.O. 12866.

Based on these determinations, this rule is determined not to be a significant regulatory action for the purposes of E.O. 12866.

11. References

DBEDT (The State of Hawaii Department of Business, Economic Development, and Tourism). 2019. 2018 The State of Hawaii Data Book: A Statical Abstract. http://files.hawaii.gov/dbedt/economic/databook/db2018/DB2018_final.pdf. 1,140p.

HTA (Hawaii Tourism Authority) 2019. 2018 Annual Visitor Research Report. State of Hawaii Dept. of Business, Economic Development, and Tourism. http://files.hawaii.gov/dbedt/visitor/visitor-research/2018-annual-visitor.pdf 196 p.

NMFS (National Marine Fisheries Service). 2018. Regulation Summary - Hawaii Pelagic Longline Fishing. Revised November 2018.

WCPFC (Western and Central Pacific Fisheries Commission). 2017. Summary Report. 13th Regular Session of the Scientific Committee of the WCPFC. Busan, South Korea: 307 p.

WPFMC (Western Pacific Regional Fishery Management Council). 2019. Annual Stock Assessment and Fishery Evaluation Report for U.S. Pacific Island Pelagic Fisheries Ecosystem Plan, 2018. Honolulu HI: 512 p.