Modification of Seabird Interaction Mitigation Measures in the Hawaii Deep-set Longline Fishery

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

Including a Final Environmental Assessment and Regulatory Impact Review

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Abstract

In an effort to reduce interactions with seabirds, the National Marine Fisheries Service (NMFS) is proposing to amend the seabird mitigation rules for the Hawaii deep-set longline (DSLL) fishery operating under the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region (FEP) to:

1. Replace blue-dyed thawed bait and offal (fish, fish parts, spent bait) discharge measures required for stern-setting DSLL vessels with a new tori line requirement; and
2. In lieu of a regulatory requirement for offal discharge, implement best practices training on offal management.

From 2019-2021, a cooperative research project by the Western Pacific Fishery Management Council (Council), the Hawaii Longline Association, NMFS Pacific Islands Fisheries Science Center, and NMFS Pacific Islands Regional Office conducted two field studies to design and test tori lines (also known as bird scaring lines or streamer lines) in the Hawaii DSLL fishery. The studies show that tori lines are significantly more effective in preventing longline gear interactions with black-footed albatross and Laysan albatross than blue-dyed bait, which is currently required as part of the seabird interaction mitigation measures implemented under the FEP. Discharging offal is also required under the existing measures, but available information

suggests that, rather than distracting seabirds while setting our hauling, this practice may increase interactions over time by attracting more seabirds to the fishing vessels.

At its 189th meeting in December 2021, the Council recommended this rule change to improve the overall operational practicality and mitigation efficacy of seabird mitigation measures for the Hawaii DSLL fishery. This draft environmental assessment (EA) evaluates the potential environmental effects of the following alternatives (see section 2.2):

> **Alternative 1**, the no action or status quo alternative, would not make any changes to existing seabird mitigation requirements for longline fisheries operating under the FEP.
>
> **Alternative 2** would replace blue-dyed thawed bait and offal discharge measures required for stern-setting vessels with a new tori line requirement (Council preferred alternative).
>
> **Alternative 3** would replace the blue-dyed, thawed bait requirement with a new tori line requirement, and modify the offal discharge requirement to an offal management requirement.

All other existing seabird mitigation and release requirements would remain in place under all three alternatives.

On October 17, 2023, NMFS published the proposed rule, draft EA, and request for public comments in the Federal Register (88 FR 71523). The comment period ended on October 16, 2023, and NMFS received a comment from one organization generally supporting the action.

If you need assistance with this document, please contact NMFS at 808-725-5000.

ACRONYMS AND ABBREVIATIONS

ACAP	The Agreement on the Conservation of Albatrosses and Petrels
ANE	Adult nesting equivalency
BE	Biological Evaluation
BFAL	Black-footed Albatross
BiOp	Biological Opinion
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CEQ	Council on Environmental Quality
Council	Western Pacific Fishery Management Council
CFR	Code of Federal Regulations
CMM	Conservation and Management Measure
CNP	Central North Pacific
COVID-19	Coronavirus Disease 2019
DOI	US Department of Interior
DPS	Distinct Population Segment
DSLL	Deep-set Longline
EM	Electronic Monitoring
EEZ	Exclusive Economic Zone
ESA	Endangered Species Act
EFH	Essential Fish Habitat
EPO	Eastern Pacific Ocean
F	Fishing Mortality Rate
F_{MSY}	Fishing Mortality Rate that Produces Maximum Sustainable Yield
FEP	Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region
FR	Federal Register
HAPC	Habitat Areas of Particular Concern
HLA	Hawaii Longline Association
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
LAAL	Laysan Albatross
LRP	Limit Reference Point
MBTA	Migratory Bird Treaty Act
MHI	Main Hawaiian Islands
MMPA	Marine Mammal Protection Act
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
M&SI	Mortality and Serious Injury
MSY	Maximum Sustainable Yield
MUS	Management Unit Species
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service

NOAA	National Oceanic and Atmospheric Administration
OLE	Office of Law Enforcement
PBR	Potential Biological Removal
PDO	Pacific Decadal Oscillation
PIFSC	Pacific Islands Fisheries Science Center
PIR	Pacific Islands Region
PIRO	Pacific Islands Regional Office
PMUS	Pelagic Management Unit Species
PRIA	U.S. Pacific Remote Island Area
RFMO	Regional Fishery Management Organization
RPM	Reasonable and Prudent Measures
SAFE	Stock Assessment and Fishery Ecosystem
SAR	Stock Assessment Report
SC16	Western and Central Pacific Fisheries Commission WCPFC Science Committee Sixteenth Regular Session
SDC	Status Determination Criteria
SEZ	Southern Exclusion Zone
SPC	Secretariat of the Pacific Community
SSC	Scientific and Statistical Committee
SSLL	Shallow-set Longline
STAL	Short-tailed Albatross
USFWS	United States Fish and Wildlife Service
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean
WCNPO	Western and Central North Pacific Ocean
WPRFMC	Western Pacific Regional Fishery Management Council

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1 INTRODUCTION

1.1 Background Information

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

The Hawaii longline fishery is composed of two fishing methods. The shallow-set longline (SSLL) fishery targets swordfish and sets hooks at depths above 100m, while the deep-set longline (DSLL) fishery targets bigeye tuna and sets hooks at depths below 100m. Seabird interactions in the Hawaii longline fishery, composed mostly of black-footed albatross (BFAL) and Laysan albatross (LAAL), have been monitored through the Pacific Islands Region Observer Program since 1994. Starting in 2001, implementation of seabird mitigation measures including the use of blue-dyed bait, weighted branch lines, and side-setting gear resulted in reductions in seabird interactions by 70-90% (Van Fossen 2007; Gilman et al. 2008). However, LAAL and BFAL interactions in the Hawaii DSLL fishery have gradually risen in subsequent years with significant increases since 2015 for BFAL.

The Council started considering modifications to the seabird mitigation measures in the Hawaii DSLL fishery because of this increasing trend in observed BFAL interactions. Based on a 2018 workshop to review seabird mitigation measures, the Council, at the 174th meeting in October 2018 identified blue-dyed bait as a measure for potential removal and tori lines (also known as bird scaring lines or streamer lines, Figure 1) as a potential alternative to blue-dyed bait for stern-setting DSLL vessels. They recommended research and development to identify suitable tori line designs for the Hawaii DSLL fishery.

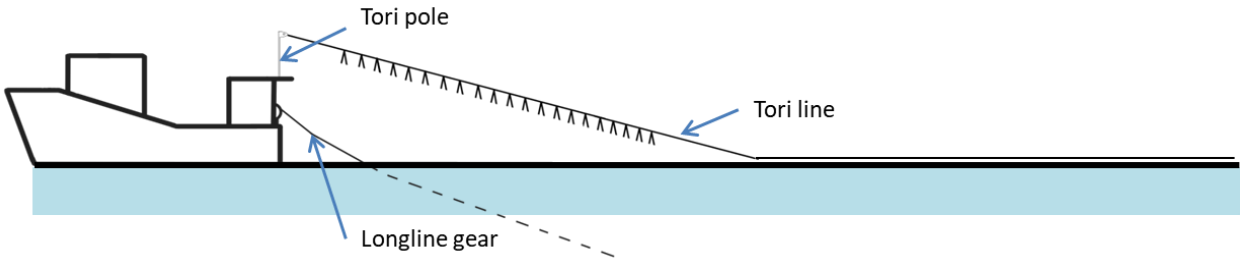

Figure 1: Tori line concept.

A joint cooperative research effort by the Council, Hawaii Longline Association (HLA), and NMFS Pacific Islands Fisheries Science Center (PIFSC) and PIRO in 2019-2021 resulted in a lightweight short-streamer design that was practical and safe to deploy in the DSLL fishery, and found to be significantly more effective at deterring seabirds than blue-dyed bait. The 2020 field trials showed seabird interaction risk was higher on sets with offal discards (e.g., discarding fish, fish parts, or spent bait), but results were inconclusive due to confounding factors (Gilman et al. 2021a, 2021b). In 2021, the research team conducted a direct comparison of blue-dyed bait and

tori lines on Hawaii DSLL trips, with offal withheld during the set. The results showed that albatross attempts are 1.5 times less likely, contacts are 4 times less likely, and captures are 14 times less likely on tori line sets compared to blue-dyed bait sets (Chaloupka et al. 2021).

At its 189th meeting on December 7-9, 2021, the Council recommended a regulatory amendment under the FEP to improve the overall operational practicality and mitigation efficacy of required seabird mitigation measures for the Hawaii DSLL fishery. Specifically, the Council recommended replacing blue-dyed, thawed bait, and strategic offal discharge measures with a new tori line requirement for stern-setting DSLL vessels. In lieu of a regulatory requirement for a strategic offal discharge measure, the Council recommended implementing best practices training on offal management as part of the annual protected species workshop, based on the best practices as presented, or any update thereof. The Council additionally recommended tori line regulatory specifications. These actions are the focus of this document.

1.2 Proposed Action

The proposed action would amend the FEP implementing regulations for required seabird mitigation measures as follows:

1. Replace the blue-dyed, thawed bait and strategic offal discharge measures required for stern-setting DSLL vessels fishing N of 23° N with a new tori line requirement; and
2. In lieu of a regulatory requirement for a strategic offal discharge measure, implement best practices training on offal management as part of the annual protected species workshop, based on the best practices as presented, or any update thereof.

1.3 Purpose and Need for Action

The purpose of this action is to improve the overall operational practicality and mitigation efficacy of the required seabird mitigation measures in the Hawaii DSLL fishery.

The action is needed to address the increased albatross interactions observed in the deep-set fishery since 2015 and to minimize seabird bycatch and bycatch mortality to the extent practicable, consistent with Magnuson-Stevens Act National Standard 9[1] and other applicable laws. The action is also needed to provide relief from the time and cost burden of less effective, existing mitigation measures and to reflect the results of the recent cooperative research and the best available scientific information into the management program.

1.4 Action Area

The Hawaii deep-set fishery operates primarily within 300-400 nm around the main Hawaiian Islands (MHI) and between the Equator and 35° N (Figure 2). In general, DSLL vessels operate out of Hawaii ports, with the vast majority based in Honolulu and a few in Hilo. Some deep-set trips originate from other ports such as Long Beach or San Francisco, California, or Pago Pago, American Samoa. Fishermen departing from California begin fishing on the high seas, outside

[1] National Standard 9 requires that conservation and management measures shall, to the extent practicable, minimize bycatch, and, to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

the U.S. EEZ. Fishermen departing from American Samoa and landing in Hawaii usually begin fishing near the Equator or in the North Pacific where they expect higher catch rates of bigeye tuna.

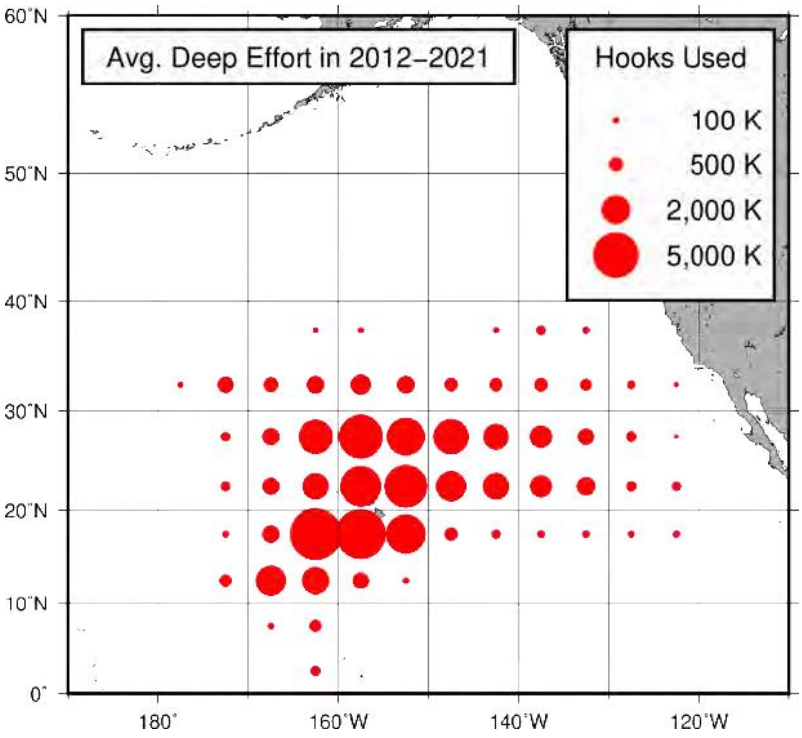

Figure 2: Spatial distribution of the average number of deep-set hooks set by vessels in the Hawaii deep-set longline fishery in 2012-2021 (NMFS 2023)

1.5 Existing Seabird Mitigation Measures in the Hawaii DSLL Fishery

Current gear-based seabird mitigation measures required in the Hawaii DSLL (50 CFR 665.815) are summarized in Table 1. This set of seabird measures was implemented in 2006, amending requirements that were implemented in 2001. DSLL vessels, when fishing north of 23° N, have the option to either side-set or stern-set, with each option having additional required measures. Side-setting involves deploying the gear from the side of the vessel, as compared to the conventional approach of setting from the stern. The 23° N lat. boundary for the deep-set component of the fishery conforms to a 2000 U.S. Fish and Wildlife Service (FWS) Biological Opinion as revised in 2002 (BiOp; USFWS 2002) that analyzed the effects of the Hawaii longline fleet on the endangered short-tailed albatross, and found that 95% of the seabird interactions occurred north of this boundary. DSLL vessels that choose to side-set are required to use a bird curtain and weighted branch lines (≥45 g weight within 1m of hooks). DSLL vessels that stern-set are required to use thawed blue-dyed bait (typically fish); weighted branch lines; a line shooter; and strategic offal discharge. The existing regulatory requirements for stern-setting vessels, when fishing north of 23° N are described in further detail below.

Blue-dyed thawed bait: Vessel owners and operators are required to use completely thawed bait that has been dyed blue to an intensity level specified by a color quality control card

issued by NMFS, and to maintain a minimum of two cans (each sold as 0.45kg or 1lb size) containing blue dye on board the vessel.

≥45 g weight within 1m of hooks: Vessel owners and operators are required to attach a weight of at least 45g (1.6 oz) to each branch line within 1 m (3.3 ft) of the hook.

Line shooter: Vessel owners and operators are required to employ a line shooter[2].

Strategic offal discharge: When seabirds are present, vessel owners and operators are required to discharge fish, fish parts, or spent bait (together known as offal) while setting or hauling longline gear, on the opposite side of the vessel from where the longline gear is being set or hauled. To strategically discharge in accordance with this requirement, owners and operators are also required to 1) retain sufficient quantities of offal between the setting of longline gear, 2) remove all hooks from offal prior to discharge, and 3) remove the bill and liver of any swordfish that is caught, sever its head from the trunk, cut it in half vertically and periodically discharge the butchered heads and livers.

In addition to the gear-based measures, the Hawaii longline vessel owners and operators are required to handle live seabirds in a manner that maximizes the chances of long-term survival after release and annually attend a protected species workshop conducted by NMFS. The management action under consideration focuses on the stern-setting DSLL measures.

Table 1. Summary of current seabird mitigation measures required in the Hawaii DSLL fishery (50 CFR 665.815).

When side-setting north of 23° N:	When stern-setting north of 23° N:
1. Use a specified bird curtain aft of the setting station during the set 2. Attach a ≥45g weight within 1m of each hook 3. If a line shooter is used, mount it least 1m forward from stern corner	1. Use blue-dyed, thawed bait 2. Attach a ≥45g weight within 1m of each hook 3. Use a line shooter 4. Perform strategic offal discharge when seabirds are present

1.5.1 Background on development of and current stern- and side-setting fishing practices

In 2021, 113 out of the 133 (85%) observed DSLL vessels chose stern-setting over side-setting (NMFS 2022c). Decades of stern-setting practices have proven it an effective and efficient fishing method in the DSLL fishery. It is the standard practice in the longline fishery and some nominal effort would be required to change industry's longstanding practices of stern-setting (Gilman et al. 2003). Side-setting has been shown to have lower seabird catch rates than stern-setting with blue-dyed bait (Gilman et al. 2016) and, for vessels of a certain configuration, side-setting can provide operational and safety benefits (Gilman et al. 2003). However, this option is not practical for all vessels in the fishery due to space and structural requirements needed to configure the vessel to side-setting. Some boat owners would need to reconfigure the entire deck of their vessels before they could employ side-setting, including moving the mainline spool.

[2] The use of a line shooter during setting accelerates the sink rate of the fishing gear so that it will reach the depths needed to target bigeye tuna and reach depths that are beyond the diving range of seabirds more quickly.

Such a reconfiguration could entail substantial expenses for labor and materials as well as lost fishing time. Smaller vessels, in particular, may find it costly to convert to side-setting because of structural limitations (WPRFMC 2007).

Additionally, some DSLL vessels switch to target swordfish in the SSLL fishery for part of the year. Stern-setting is the preferred method in the SSLL fishery because, in order to keep their mainline at the appropriate depth, crew place weights halfway between the branch line and the hook, and this setup would create a greater risk of injury when side-setting versus stern-setting (NMFS 2006). Operationally, SSLL vessels also find it more practical to use the tension of the mainline to drag the line off the spool rather than using a mainline line shooter that is used when side-setting. There could also be some operational inefficiencies created in training and requiring crew to switch between two different fishing methods (Gilman et al. 2003). For the reasons also described in the preceding paragraph, it is not economical or practical to switch between the side-setting and stern-setting configuration during the fishing year (WPRFMC 2007; Gilman and Ishizaki 2018).

Furthermore, when developing seabird mitigation measures in 2005, the Council found that those alternatives which mandated the use of side-setting had high initial costs and preferred to gather more performance data under actual fleet operating conditions before mandating its universal application (WPRFMC 2005). Because reconfiguring some vessels for side-setting may be expensive, the WPRFMC also recommended that NMFS provide low-interest loans or State of Hawaii Fisheries Disaster Relief Program funds to fishermen to reduce costs when seabird mitigation measures were implemented in 2006 (WPRFMC, 123rd Meeting, June 21-24, 2004). In 2005, a project funded by the Pacific Islands Fisheries Science Center (PIFSC) and the Hawaii Longline Association (HLA), converted 28 vessels to side-setting (NMFS 2007). In 2006, PIRO funded the conversion of three more vessels (NMFS 2007).

Because of the cost and deviation from standard practices, there was limited long-term uptake of side-setting among the DSLL fleet after the initial financial assistance. Some of the vessels that were outfitted for side-setting never used the measure and many reverted back to stern-setting in a relatively short time. By the end of 2005, 44 vessels in the Hawaii longline fishery were converted to side-setting. In 2006, 35 vessels were configured for side-setting. In 2007, 25 DSLL vessels with observers used the technique when fishing above 23° N latitude and no SSLL vessels were observed using the technique (NMFS 2007). In 2021, only 20 vessels in the DSLL fishery continued to use side-setting and no SSLL vessels chose to side-set in 2021(NMFS 2022C).

1.5.2 Timeline of Implementation for Existing Seabird Mitigation Measures

The Council began addressing seabird interactions in the Hawaii longline fishery in the mid-1990s, with a series of workshops conducted in conjunction with the USFWS to inform fishermen of seabird interaction issues and provide information on mitigation measures. The Council and NMFS in 1998-1999 conducted at-sea trials of various mitigation measures, including blue-dyed bait, thawed bait, towed deterrents, night setting, weighted branch lines, and offal discharge (McNamara et al. 1999; Boggs 2001).

In October 1999, the Council recommended that Hawaii longline vessel operators fishing north of 25° N[3] employ two or more of the following seabird deterrent techniques: 1) blue-dyed bait; 2) strategic offal discharge; 3) towed deterrents (e.g., tori lines or towed buoy); 4) line-setting machine with weighted branch lines; 5) weighted branch lines; and 6) night setting. The Council's recommendation was intended to allow fishermen to select a combination of methods to find the most effective combination so that seabird measures may be amended based on their operational experience and data.

In July 2000, NMFS published a proposed rule based on the October 1999 Council recommendation (65 FR 41424). In November 2000, USFWS issued a BiOp analyzing the impacts of the Hawaii longline fishery on short-tailed albatrosses (STAL), which was listed under the Endangered Species Act (ESA) as endangered in July 2000. The BiOp concluded that the fishery was not likely to jeopardize the endangered STAL, but estimated that the fishery would take 15 STALs during a 7-year period (for the purpose of the BiOp, USFWS defined "take" to include injury, mortalities, and any STAL striking at baited hooks or gear). Based on this estimate, the 2000 BiOp included Reasonable and Prudent Measures (RPMs) and Terms and Conditions that required:

1) all Hawaii longline vessels to use thawed, blue-dyed bait and strategic offal discharge when operating north of 23° N;
2) DSLL vessels to additionally use line-setting machines with weighted branch lines when operating north of 23° N;
3) all Hawaii longline vessels to follow seabird handling techniques; and
4) operators to attend an annual protected species workshop.

These measures were implemented by NMFS in June 2001[4] through an Emergency Interim Rule (66 FR 31561) and later finalized through a Framework Amendment to the Pelagic Fishery Management Plan which became effective in June 2002 (67 FR 34408).

The USFWS issued a revised BiOp in November 2002 because a 2001 court-ordered SSLL fishery closure (due to sea turtle interactions) modified the federal action subject to ESA Section 7 consultation (NMFS 2002). In reinitiating the consultation, NMFS included an experiment to test the efficacy of blue-dyed fish bait as part of the proposed action. The revised BiOp recognized the limited data available on the effectiveness of blue-dyed fish bait and required that interim and final reports of the experiments be submitted to USFWS.

Following a series of cooperative research trials that tested blue-dyed fish bait, side-setting, and underwater setting chutes, the Council took initial action in June 2004 to develop a regulatory amendment to modify the seabird measures. In October 2004, the Council took final action recommending 1) the addition of side-setting as an alternative to stern-setting with blue-dyed

[3] Prior to 2002, NMFS did not distinguish between the management of DSLL and SSLL vessels so this recommendation was not specific to DSLL vessels.

[4] The USFWS BiOp also included a Terms and Condition that required SSLL vessels fishing north of 23°N to set at least one hour after sunset and completed by sunrise using only the minimum vessel lights necessary. This Term and Condition was made moot due to the SSLL fishery closure north of 23°N implemented in the same emergency interim rule but was implemented when the fishery reopened in 2004.

bait and strategic offal discards and 2) the addition of tori lines to the existing blue-dyed bait measure for stern-setting vessels. The Council also indicated in its action that it would use the period of the regulatory process to collect supplementary data on bird behavior and coordinate with the USFWS to remove the requirement for blue-dyed, thawed bait and offal discharge, if appropriate. A letter from the US Department of Interior (DOI) to NMFS dated October 15, 2004, received after the Council Meeting, stated that blue-dyed thawed bait and strategic offal discharge should be retained as mitigation measures. DOI agreed that there is limited data on effectiveness of blue-dyed fish bait and acknowledged that trials in New Zealand show that mackerel-type bait hold dye less well than squid. However, DOI argued that blue-dyed thawed bait should be retained in the mitigation measures unless replaced by a demonstrably more effective deterrent, given that thawed bait has some deterrent effect due to its faster sink rate compared to frozen bait and that the blue dye has unclear but "perhaps neutral or positive deterrent effect". The letter further suggested that strategic offal discharge should be used only when seabirds were present. DOI also recommended that tori lines not be included as an optional seabird deterrent unless they are used in addition to more effective deterrents, as results of Hawaii-based studies using tori lines at that time indicated tori lines were not as effective as other deterrent measures.

Following the publication of the proposed rule (70 FR 40302), the Council modified its recommendation to remove tori lines when stern-setting from the regulatory amendment in November 2005. In addition to the reasons described in Section 1.5.1, the decision was due to information that seabird interactions had already been significantly reduced and construction and operating performance standards of using tori line systems in the Hawaii longline fishery had not been thoroughly studied. Additionally, tori lines were originally included in the recommendations as an incentive for stern-setting vessels to convert to side-setting, but in 2005, 40 out of the approximately 125 active vessels had converted to side-setting and, it was believed at that time, that more would convert their operations, given NMFS financial assistance. The final regulatory amendment only added side-setting as an alternative seabird mitigation measure option for deep-set vessels and was implemented in January 2006 (70 FR 75075).

The USFWS issued a revised BiOp in 2012 on the effects to endangered STAL from the Hawaii longline fisheries (FWS 2012). The STAL population was growing and had successfully nested on Midway Island National Wildlife Refuge in 2010 and 2011. Because of the increasing population in both numbers and rage, NMFS concluded that there was an increased chance for the fishery to interact with endangered STAL and requested formal consultation. After considering a range of potential effects to seabirds, USFWS determined that the DSLL fishery might affect STAL and authorized the take of two STAL, even though there were no documented interactions with this species. The 2012 BiOp also consolidated and updated the previously separate opinions covering the SSLL and DSLL fisheries to enable effective administration, monitoring, and implementation of ESA requirements to protect short-tailed albatross.

1.5.3 Background and Available Scientific Information on Blue-dyed Bait

To comply with blue-dyed bait requirements fishers must first purchase two cans of blue dye to have on board for every fishing trip. Before setting their gear, crew must thaw out any bait they will use, dilute the dye, and set up a dye station. Then, thawed bait must be soaked in the blue dye until it reaches a dye saturation that matches a blue color card provided by NMFS (Figure 3).

Once the bait is dyed to the right saturation, crew can then begin baiting hooks. This process is not only time consuming before the haul, but thawed bait increases bait loss from hooks, and the messy dye process necessitates additional cleaning and maintenance for the crew.

The use of dyed bait in pelagic longline fisheries was trialed in East Coast fisheries as early as the mid-1970s to increase catch rates of target species. Fishermen found that a variety of different colored squid baits were effective in targeting swordfish, but found that blue-dyed bait reduced bait losses to seabirds (McNamara et al. 1999). It was not known whether the blue dye creates a camouflage effect against the ocean that prevents seabirds from seeing dyed bait well, or if seabirds do not consider blue-dyed bait as food.

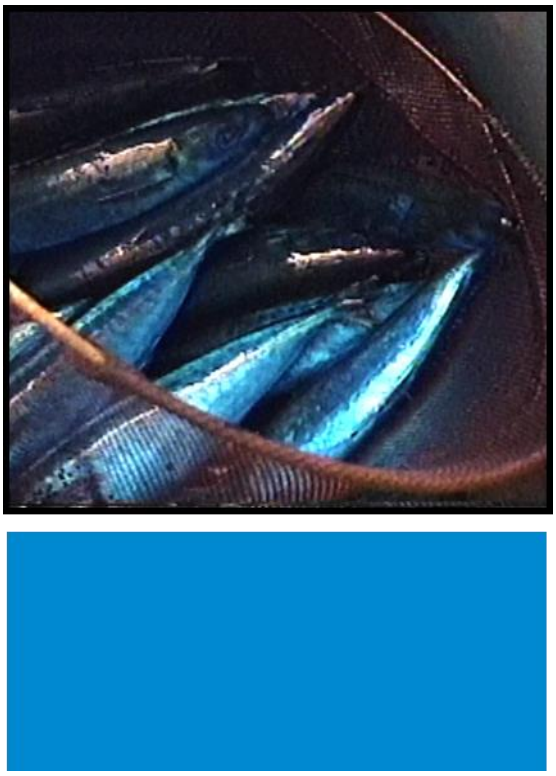

Figure 3: Blue-dyed bait in the HI longline fishery and the color reference provided by NMFS.

Blue-dyed bait was first tested in the Hawaii longline fishery in the late 1990s. McNamara and colleagues (1999) tested blue-dyed bait, tori lines, a towed buoy system, and offal management on both SSLL and DSLL trips, with night setting additionally evaluated for SSLL. Of the five trips observed for the study, one trip targeted tuna using DSLL gear and fish bait, and four trips targeted swordfish using SSLL gear and squid bait. Results from the SSLL trips indicated that blue-dyed squid bait was the most effective measure among the mitigation strategies tested, reducing seabird gear contacts by 77% and capture rates by 95%. Experimental treatments on the DSLL trip had a small sample size in the study. Only two sets tested blue-dyed fish bait, during which there were no gear contacts with seabirds on hooks with blue-dyed fish bait, whereas birds attempted to pick up baited hooks on 10.7 hooks per 1,000 hooks on control hooks. In this study, seabirds that were actively pursuing natural-colored baits were observed to ignore dyed baits that were within view and range, and their foraging behavior toward dyed baits was greatly reduced during setting and hauling operations. The authors recommended that different combinations of mitigation measures be considered for DSLL and SSLL vessels due to operational and gear characteristics unique to each component, and only recommended blue-dyed bait for SSLL vessels using squid for bait.

A second experiment testing blue-dyed squid bait, tori lines and weighted branch lines was conducted in 1999 on a research vessel using SSLL gear (Boggs 2001). Though also limited in sample size, this study found that blue-dyed squid bait reduced the number of albatross contacts with baits by approximately 90% compared to the control treatment and tori lines reduced contacts between baits and albatrosses by about 70%. These two studies (McNamara et al. 1999; Boggs 2001) provided the basis for both the Council's 1999 recommendation that would have required vessels in the Hawaii longline fishery use two out of six mitigation measures including

blue-dyed bait and the USFWS' 2000 BiOp that first required blue-dyed bait to be used on all Hawaii longline vessels.

Following implementation of the seabird measures, Gilman and colleagues (2007) tested the effectiveness of blue-dyed bait along with underwater setting chutes and side-setting on both DSLL and SSLL gear. The study found that stern-setting with blue-dyed bait had higher seabird catch rates than side-setting on both DSLL and SSLL sets, and that blue-dyed bait was impractical due to the amount of time required to dye the bait and the need to fully thaw the bait, which increases bait loss from hooks. An analysis of DSLL observer data from 2004 to 2014 showed that stern-setting with blue-dyed bait had a significantly higher seabird catch rate than side-setting. Seabird catch rates for January-June, when albatross densities are higher, were estimated at 0.061 interactions per 1,000 hooks when fishing with blue-dyed bait, whereas catch rates were estimated at 0.024 interactions per 1,000 hooks when fishing under the same conditions with side-setting and untreated bait (Gilman et al. 2016).

Studies of blue-dyed bait effectiveness on seabird interaction rates outside of Hawaii have had mixed results. An experiment testing blue-dyed squid and fish bait effectiveness on wedge-tailed shearwaters showed that dyed fish bait had higher bird strike rates compared to dyed squid bait, and that habituation to dyed fish bait was observed with bird strike rates increasing from 48% to 90% over the trial period (26 longline sets) (Cocking et al. 2008). In contrast, a trial of blue-dyed squid and fish baits on Japanese longline research vessels targeting Southern Ocean bluefin tuna showed that blue-dyed fish bait was effective in reducing albatross interactions at levels similar to blue-dyed squid bait, although blue-dyed bait also reduced target catch in this study (Ochi et al. 2011). Ochi and colleagues (2011) speculated that the blue-dyed fish bait effectiveness may vary by seabird species, as their study focused on interaction rates with albatrosses and petrels rather than shearwaters.

In addition to the study by Cocking and colleagues (2008), a study conducted in New Zealand also suggests that seabirds are able to detect blue-dyed bait but may not pursue them due to preference for non-dyed bait over dyed bait (Lydon and Starr 2005). In the New Zealand study where albatrosses, petrels, and shearwaters were observed, seabird behavior appeared to change when blue-dyed bait was deployed after non-dyed control bait. Whereas seabirds actively pursued and fought over non-dyed bait, seabird behavior in six of the seven observed blue-dyed bait sets during the trial changed to making only brief landings on the surface and fewer seabirds were present. However, in the final set during the trial, seabirds actively attacked the blue-dyed bait, even though setting conditions (e.g., time of day, water color, and cloud cover) remained similar to the first six sets, and thus the contrast between dyed bait and the water would have been similar. Blue-dyed bait remained visible to the human eye in various sea conditions, thus Lydon and Starr (2005) concluded that seabirds preferred controlled bait over blue-dyed when given a choice, and that the lack of interest was not likely due to detection failure. Behavior observed in the New Zealand study is supported by available information on avian eyesight and color vision, which indicate that avian eyes are more morphologically complex than mammalian eyes.

Early studies primarily testing blue-dyed squid bait in the Hawaii longline fishery indicated that albatrosses showed little interest in dyed bait compared to non-dyed bait. It is unknown whether albatross behavior toward blue-dyed fish bait in the Hawaii fishery has changed over time.

In the 2018 Council workshop, participants identified priority mitigation measures suitable for the Hawaii longline fishery, potential changes to seabird measures, and research needs to inform future changes to seabird measures (Gilman and Ishizaki 2018). Specifically, workshop participants identified blue-dyed bait as a candidate for removal from the existing suite of seabird mitigation measures because of concerns with efficacy and practicality and identified deterrents such as tori lines to be a high priority for further research and development as an effective alternative to blue-dyed bait. Participants discussed that the requirement for using blue-dyed bait was intended to be used for squid bait, but that only fish are used for bait in both Hawaii longline fisheries, and that blue-dyed fish bait may be less effective at mitigating seabird catch risk than blue-dyed squid bait. Industry members who participated in the workshop indicated that blue-dyed bait is not favored by fishermen as the dye is messy and thawing bait reduces its retention on hooks.

1.5.4 Background and Available Scientific Information on Strategic Offal Discharge

This strategic offal discharge requirement was first implemented in 2001 (66 FR 31561) as a technique to distract seabirds away from baited hooks. Vessels are required to retain sufficient quantities of offal between setting operations, remove all hooks from fish, fish parts, or spent bait prior to discharge as well as remove the bill and liver of any swordfish that is caught, sever its head from the trunk, cut it in half vertically, and periodically discharge the butchered heads and livers. The original regulations implemented in 2001 required the discharge of offal while setting or hauling longline gear on the opposite side of the vessel from where gear is being set or hauled, in conjunction with the use of blue-dyed thawed bait, a line shooter, and weighted branch lines. Seabird mitigation requirements for the deep-set fishery were modified in 2006 (70 FR 75075) to add the side-setting option. Vessels selecting to side-set are required to use a bird curtain and weighted branch lines, but strategic offal discharge is not included as a requirement for side-setting vessels. For stern-setting vessels, the 2006 regulation changes modified the strategic offal discharge requirement to include the language “when seabirds are present”.

The use of strategic discharge in the Hawaii DSLL fishery is a practice that was started by SSLL vessels which halved swordfish heads to attract seabirds away from fishing gear and bait. The swordfish heads provide a large attractant that stays afloat until seabirds are well astern of the vessel and less likely to resume pursuit of the baited hooks. Swordfish heads are not readily available on the tuna-targeting DSLL vessels and vessels lands tuna intact. Therefore, smaller pieces of offal may be used as strategic discharge. Vessels are required to retain offal and spent bait during hauling operations so that discharge material is available during setting operations, as there is usually little to no offal generated during the set. However, these smaller pieces may be consumed more quickly by seabirds, allowing them to resume pursuit of the vessel (McNamara et al. 1999).

The Hawaii longline fishery may be unique in requiring ‘strategic’ offal discharge during setting or hauling as the only option for managing offal discharge. The seabird measures of the two Pacific Ocean tuna Regional Fishery Management Organizations (RFMOs) define ‘management of offal discharge’ as either (a) not discharging offal during setting or hauling, or (b) discharging offal only from the opposite side of the vessel from where setting or hauling is occurring (IATTC, 2012; WCPFC, 2018), and we are not aware of domestic fisheries management systems that implement option b other than in the Hawaii longline fisheries. The Agreement on the

Conservation of Albatrosses and Petrels (ACAP) discourages discharge during line setting, and recommends retention or strategic discharge during hauling (ACAP, 2019). The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) (2018) prohibits offal and discard discharging during setting in longline fisheries, consistent with the ACAP recommendations.

Prior to the regulatory requirement in 2001, strategic offal discharge was tested in a controlled experiment only on a SSLL vessel during the setting operation (McNamara et al. 1999). The study tested several seabird mitigation measures individually, with strategic offal discharge tested on one of four SSLL trips. During the SSLL experimental trial, crew removed and retained swordfish heads from fish processing during hauls, and used the swordfish heads during the set by tossing them in plain view of the seabirds. Each observation period with strategic offal discharge lasted 30 minutes, and a total of 880 hooks were observed for the strategic offal discharge treatment during the set, out of the total 8,023 hooks observed in all four SSLL trips. Based on this experiment, strategic offal discharge was shown to reduce contact with SSLL gear by 51% (McNamara et al. 1999). However, strategic offal discharge was not tested in the DSLL fishery in which swordfish heads are not readily available, nor was it tested during hauling operations in the SSLL or DSLL fishery. The study did test the effect of retaining offal during hauling operations in the SSLL fishery. The authors found that seabird interactions significantly increased when no offal or bait was discarded during the hauling operations. Seabirds followed closer to the vessel and attempting to forage on the baited hooks remaining in the water because they were the only food available (McNamara et al. 1999). This study provided the basis for the Council's 1999 recommendation that would have required that vessels in the Hawaii longline fishery use two out of six mitigation measures, including strategic offal discharge, as well as the the USFWS' 2000 BiOp that first required strategic offal discharge to be used in both SSLL and DSLL fisheries.

Discharging offal away from setting and hauling operations may draw scavenging seabirds' attention away from where baited hooks are available and reduce seabird catch rates during that fishing operation, but this may be a short-term effect (Cherel et al., 1996; McNamara et al., 1999). Based on research conducted in trawl fisheries, increased time between offal discharge events and retention of offal reduces the number of seabirds attending vessels (Abraham et al., 2009; Pierre et al., 2010, 2012), indicating that offal discharge may be attracting more seabirds to the vessels. Studies have shown that the lower the seabird density attending vessels, the lower the seabird catch risk (Gilman et al., 2005; Abraham et al., 2009). Retention (i.e., no discards) might also reduce competitive seabird scavenging behavior and foraging intensity, reducing capture risk (Delord et al., 2005; Gilman et al., 2016), or may increase capture risk by making the baited hooks the only available food around the vessel for attending seabirds (McNamara et al. 1999).

An analysis of observer data from 2004-2014 found that strategic offal discharge in the DSLL fishery, used in 39% of observed sets and 65% of observed hauls, did not significantly affect seabird catch rates (Gilman et al. 2016). An analysis of observer data for SSLL hauling operations also indicated that employing strategic offal discharge did not significantly affect seabird interaction rate compared to when discards were not made on the opposite side of the vessel (Gilman at al. 2014). In the 2019-2020 DSLL Cooperative Research Project, analysis showed that seabird attempts and contacts were more likely to occur when offal discharge was

used during the set, although the effect of offal on seabird capture risk from this study was inconclusive due to the lack of a standardized procedure for strategic offal discharge during the field trials and the potential that crew utilized strategic offal discharge when attempts and contacts were actively observed (Gilman et al. 2021a, 2021b). In the 2021 study conducted under the EFP, participating vessels were instructed to withhold offal during the set to eliminate the potential confounding factor of offal discharge and to allow a robust comparison of the effects of blue-dyed bait and tori lines in the DSLL (Chaloupka et al. 2021). The two recent studies in the DSLL fishery did not test the effect of strategic offal discharge during hauling operations.

1.6 Seabird Interaction Trends

Seabird interactions in the Hawaii longline fishery have been monitored through the PIR Observer Program since 1994. The observer coverage rate was initially low at around 5% from 1994 to 1999. The DSLL fishery has been monitored at a minimum of 20% coverage since 2001 with the exception of 2020 and 2021. Prior to 2004, there was no regulatory distinction between the DSLL and SSLL sectors of the Hawaii longline fishery, and separate seabird interaction estimates by sector are not available.

Most seabird interactions in the Hawaii longline fishery are with BFAL and LAAL. Between 1994 and 1999, fleet-wide BFAL interactions were estimated to range from 1,134 to 1,830 annually, and LAAL interactions were estimated to range from 844 to 2,067 annually (McCracken 2000). Implementation of seabird mitigation measures in 2001 resulted in reductions in interactions by 70-90% (Figure 4, left panel; Van Fossen 2007; Gilman et al. 2008). To date, no STAL interactions have been observed in the DSLL fishery.

Since the successful implementation of seabird mitigation measures, the DSLL fishery has seen a gradual increasing trend in LAAL and BFAL interactions (Gilman et al. 2016), with higher rates of BFAL interactions seen since 2015 (WPRFMC 2021**;** Figure 4, right panel). Interactions are highest in the first and second quarters of the calendar year (January-June) due to fishing effort overlapping with the BFAL and LAAL foraging distribution during breeding season in the northwestern Hawaiian Islands. Albatross interactions in the DSLL fishery peak in February and May. Most interactions on DSLL vessels occur during the setting operations, as indicated by the high proportion of observed dead interactions (over 90% on average, see section 3.2.5).

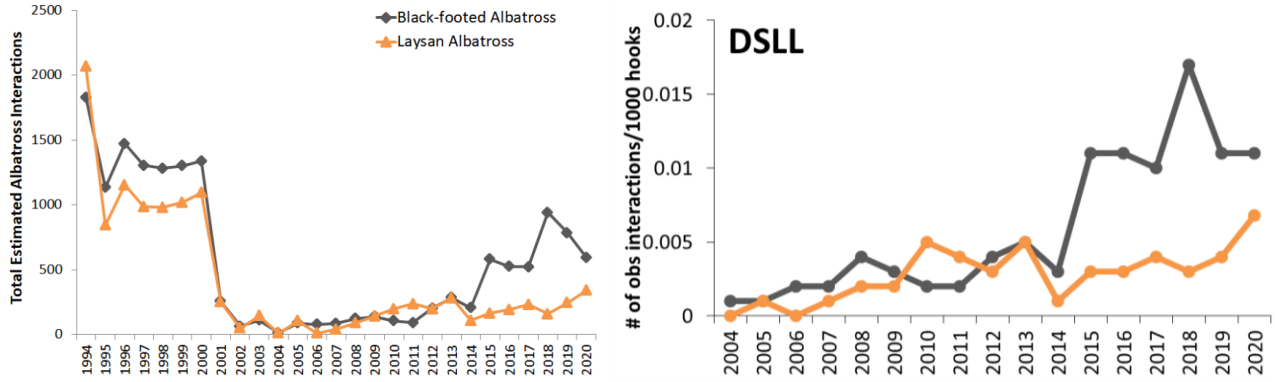

Figure 4: BFAL and LAAL interactions in the Hawaii longline fishery as presented to the Council at the time of Final Action in December 2021. Left panel shows total estimated BFAL and LAAL interactions in the DSLL and SSLL fishery combined, 1994-2020. Right panel shows BFAL and LAAL interaction rates in the DSLL fishery. Source: WPRFMC 2021

The gradual increase of albatross interactions over time and recent elevated levels of interactions in the DSLL appear to be driven by a combination of factors. First, albatross interaction rates significantly increased during El Niño years, suggesting that oceanographic changes may have contributed to the increasing trend in albatross catch rates (Gilman et al 2016). Additionally, there has been an increasing trend in the number of albatrosses observed around fishing vessels, which may have contributed to the increasing catch rates (Gilman et al 2016). The Council's 2017 Workshop further examined the potential environmental factors affecting higher BFAL interactions observed in the Hawaii longline fishery in 2015-2016. While fleet dynamics (month, fishing location) explained much of the variation over the years, extended El Nino events, strong westerly winds, and cooler sea surface temperatures explained the increase in BFAL sightings in recent years (Wren and Polovina 2018; Wren et al. 2019). Exploratory analyses and information presented at the workshop suggested that the higher albatross interaction rates in 2015–2016 are largely explained by environmental conditions associated with the El Niño Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO). During quarter 1 of years with positive PDO and ENSO conditions (2015, 2016), winds north of 25° N latitude switch from trades to westerlies, resulting in more productive surface waters in the fishing grounds during quarters 1 and 2 (Bakker and Finkelstein 2021). In particular, these stronger westerly winds, as opposed to normal trade winds conditions, may drive BFAL foraging grounds into the DSLL fishing grounds and also cause more birds to transit through the fishing grounds to reach their nesting grounds (Wren et al. 2019). Other potential factors influencing higher interaction rates in recent years include unique captain effect (i.e., the probability that albatross interaction rates differed amongst individual vessel operators) (Fitchett and Ishizaki 2018) and increased attraction to vessels through albatross learning behavior over time (Hyrenbach et al. 2021), although data are lacking to test the latter hypothesis.

The BFAL population increased from 1996 to 2019, with a breeding population of approximately 70,524 pairs in 2019 (ACAP 2021). The LAAL population was stable from 1996 to 2016 and

increased from 2016 to 2019, with a breeding pair population of 806,693 pairs in 2019 (ACAP 2021). In 2021, with 18% observer coverage, observers documented interactions with 38 Laysan albatrosses, 87 black-footed albatrosses, and 2 unidentified shearwaters in the deep-set fishery. Based on this information, the entire DSLL fishery was estimates to interact with 536 BFAL, 244 LAAL, and 9 shearwaters.

BFAL population modeling updated for the 2017 Workshop indicated that the increased rate of interactions in 2015-2016 in the Hawaii longline fishery, whether temporary or stabilized at the higher level, is likely to have an undetectable difference on the population growth (Bakker and Finkelstein 2021). If the elevated interaction rates are applied consistently throughout North Pacific fisheries (U.S. and international fleets) with BFAL bycatch, the population is projected to decline. While data on BFAL interactions in non-U.S. fisheries are limited and the total BFAL interactions in the North Pacific are unknown, available information on Alaska fisheries bycatch suggest that the 2015-2016 increase in BFAL interactions is unlikely to be basin-wide (Hyrenbach et al. 2021). However, because the PDO operates on decadal time scales, the high levels of BFAL sightings at Hawaii longline vessels and fishery interactions documented in 2015–2016 may persist for many years (Bakker and Finkelstein 2021).

1.7 Council Actions

In response to the higher BFAL interactions in the DSLL fishery beginning in 2015, the Council convened two workshops in 2017 and 2018. The 2017 workshop explored the causes of higher BFAL interactions (Hyrenbach et al. 2021), and the 2018 workshop reviewed seabird mitigation requirements and the best scientific information available for the Hawaii longline fishery (Gilman and Ishizaki 2018). As discussed in further detail in section 1.8, the 2018 workshop identified blue-dyed bait as a candidate for removal from the existing suite of seabird mitigation measures, and identified deterrents such as tori lines to be a high priority for further research as a potential alternative to blue-dyed bait.

Following the 2018 workshop, the Council at its 174th meeting in October 2018 recommended 1) enhancing outreach and training efforts to ensure proper application of existing seabird mitigation requirements; 2) NMFS provide support for research and development of alternative measures with potential to replace blue-dyed bait, with high priority placed on identifying suitable designs for tori lines; and 3) submission of an Experimental Fishing Permit (EFP) application for testing alternative measures without the use of blue-dyed bait to compare the effectiveness of measures with and without blue-dyed bait. The Council additionally directed staff to prepare a discussion paper for the March 2019 Council Meeting to evaluate the potential effect of removing of blue-dyed bait without additional replacement measures on seabird interaction rates.

The Council at its 176th meeting in March 2019 reviewed the discussion paper and determined that removal of blue-dyed bait without replacement measures would likely increase seabird interactions. The Council additionally endorsed strategies for identifying alternative mitigation measures and improving seabird measure effectiveness for the Hawaii longline fishery, including addressing “captain effects” (i.e., the probability that albatross interaction rates differed amongst individual vessel operators) through strategic outreach, identifying tori line designs suitable for the Hawaii fishery, encouraging trials for making minor modifications to existing required

measures, and progressing international bycatch assessments for North Pacific albatross species. To further address the priority for identifying suitable tori line designs, the Council directed staff to work with industry, NMFS, the Pelagic Plan Team and other experts as appropriate to identify draft minimum standards for tori lines, taking into consideration existing standards established for other fisheries, designs used voluntarily by Hawaii longline vessel operators, and diversity of vessel sizes and configurations in the Hawaii longline fishery. The Council at the 178th meeting reviewed a working paper on considerations for developing draft minimum standards for tori lines in the Hawaii longline fishery.

At the 183rd Council meeting in September 2020, the Council received a presentation on the results of the first field trials that the joint cooperative research project by the Council, HLA, PIFSC, and PIRO conducted in 2019-2020. The Council recommended additional at-sea trials for winter 2020/spring 2021 under an EFP to inform development of options for revising mitigation measures. The Council concurrently recommended development of an options paper to consider inclusion of tori lines in the seabird mitigation measures, including an option to allow the use of tori lines without blue-dyed bait.

The Council at its 184th meeting in December 2020 reviewed the options paper, and directed staff to form an Action Team, initiate development of a regulatory amendment to evaluate options for allowing the use of tori lines in lieu of blue-dyed bait and removing the strategic offal discharge requirement in the DSLL fishery, and schedule further action when the results of EFP study are available. The Council also directed staff to work with the Action Team to develop draft regulatory specifications for tori lines in the DSLL fishery for Council review. The Council at the 186th meeting in June 2021 reviewed the draft regulatory specifications and concurred with the approach of focusing the regulatory requirements on tori line length, attachment point height, and streamer design, and having additional design and safety recommendations as non-regulatory guidelines. The Council directed staff to refine the draft specifications and non-regulatory design guidance for inclusion in the Council action to revise seabird mitigation measures at a future meeting.

HLA applied for an EFP to test tori lines in lieu of blue-dyed bait and NMFS issued the approved EFP on January 27, 2021 (86 FR 8341; February 5, 2021). Field trials were conducted from February to June 2021. The Council at the 187th meeting in September 2021 received a presentation on the second field trial results, and considered initial action on the regulatory amendment. The Council recommended as preliminary preferred alternatives 1) replacing blue-dyed bait with use of a tori line; and 2) removing strategic offal discharge from the regulatory requirement, with the addition to include best practices training on offal management as part of the required annual protected species workshop. The Council directed staff to consider a contingency that would allow vessels to continue fishing if a tori pole breaks during a trip. Additionally, the Council directed staff to work with the Action Team to develop the necessary documentation including draft regulations for consideration of final action at the December 2021 meeting.

The Council at its 189th meeting on December 7-9, 2021, took final action and recommended a regulatory amendment under the FEP to improve the overall operational practicality and mitigation efficacy of required measures for the Hawaii DSLL fishery. Specifically, the Council recommended replacing blue-dyed thawed bait and strategic offal discharge measures required

for stern-setting DSLL vessels with a new tori line requirement. In lieu of a regulatory requirement for a strategic offal discharge measure, the Council recommended implementing best practices training on offal management as part of the annual protected species workshop, based on the best practices as presented, or any update thereof. The Council additionally recommended tori line regulatory specifications.

In addition to the regulatory changes, the Council at its 189th meeting directed staff to convene a tori line implementation team comprising Council, PIRO, PIFSC, industry, and other appropriate expertise to support the transition from blue-dyed bait to tori lines. The implementation team was to develop additional design guidance for fishery participants to build lines that meet regulatory specifications and coordinate distribution of tori lines and poles at no cost to fishery participants. Additionally, the Council directed the implementation team to develop a process for periodically reviewing the minimum standards for tori line design or materials, and report back to the Council for its consideration at a future meeting, if appropriate.

1.8 Summary of the Tori Line Cooperative Research Project

Tori lines were previously tested in the Hawaii longline fishery in the late 1990s, which showed that the deterrents were effective in reducing seabird contact rates with bait and gear (McNamara et al. 1999, Boggs 2001). However, these early studies also identified issues with practicality and crew safety resulting from tori line entanglement with gear. As described in section 1.5.2, the Council considered inclusion of tori lines in the seabird mitigation measures in 1999, and again in 2004, but did not end up including tori lines as a regulatory measure for the Hawaii longline fishery.

In 2019, a joint cooperative research project by the Council, HLA, PIFSC, and PIRO was initiated to conduct 1) demonstrations and trials of new tori line designs on board stern-setting vessels in the Hawaii DSLL fishery to inform minimum standards specific to this fishery, and 2) field trials of tori lines to collect data on operational practicality and effectiveness in using tori lines under commercial DSLL fishing operations.

The project was divided into two phases. Phase 1 goals were to identify potential tori line designs based on industry input, expert advice, existing international standards and guidelines, land trials, and sea trials. Emphasis was placed on light-weight, streamlined designs with minimal potential for tangles to improve the practicality and safety of tori line use during commercial fishing operations over that of previously tested designs. Five different tori line prototype designs were tested during at-sea demonstrations with the goal of determining operational practicality and design preferences based on interviews with vessel operators.

The final design selected for field trials under commercial fishing operations was a short streamer design with a 50-meter aerial extent when mounted on a pole 5 meters from the water surface. The design used a light material backbone and 55-meter drag section of braided rope (Figure 5, Figure 6). The aerial section used a thin braided rope made of ultra-high molecular weight polyethylene, sold under brand names such as Dyneema or Spectra, which is light-weight, water resistant, low stretch, and floats on water. The drag section used a braided rope thicker than the aerial section and made of material that is water resistant and floats on water. The short streamer design, which had streamers spaced 1 m apart on the aerial section, was most favored

by captain and crew due to its ease of deployment and retrieval, and sufficient amount of streamers to deter seabirds from going after the sinking, baited hooks. The 50 meter aerial extent provided sufficient distance to cover the area over the sinking, baited hooks (approximately 40 m from vessel stern) with additional buffer length to account for rough seas that may affect the amount of the aerial section above water or hook sink rate[5], and meets existing tori line specifications for the Western and Central Pacific Fisheries Commission (WCPFC) and the Inter-American Tropical Tuna Commission (IATTC). During testing, this design took approximately 2.2 minutes to deploy, and 3.1 minutes to retrieve (Gilman et al. 2021a).

During Phase 2 field trials, the tori lines' effectiveness were evaluated by collecting data on seabird strike attempts and contacts throughout each setting operation, using stern video cameras connected to the vessel's Electronic Monitoring (EM) system. The trials involved four stern-setting DSLL vessels deploying a total of 175 sets over 17 trips.

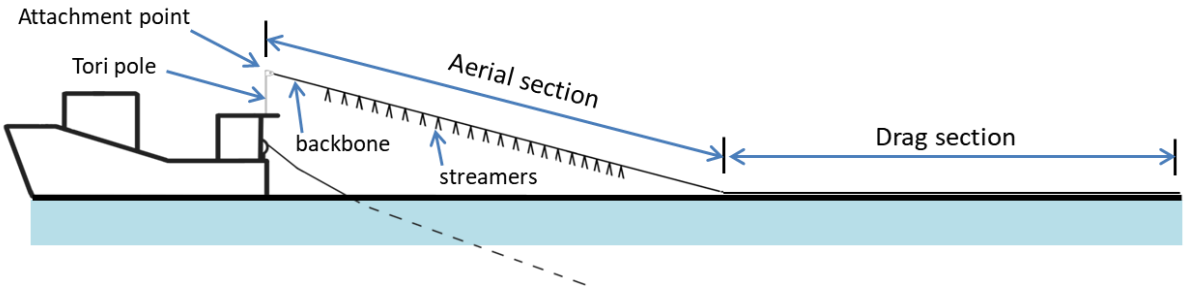

Figure 5. Components of a tori line.

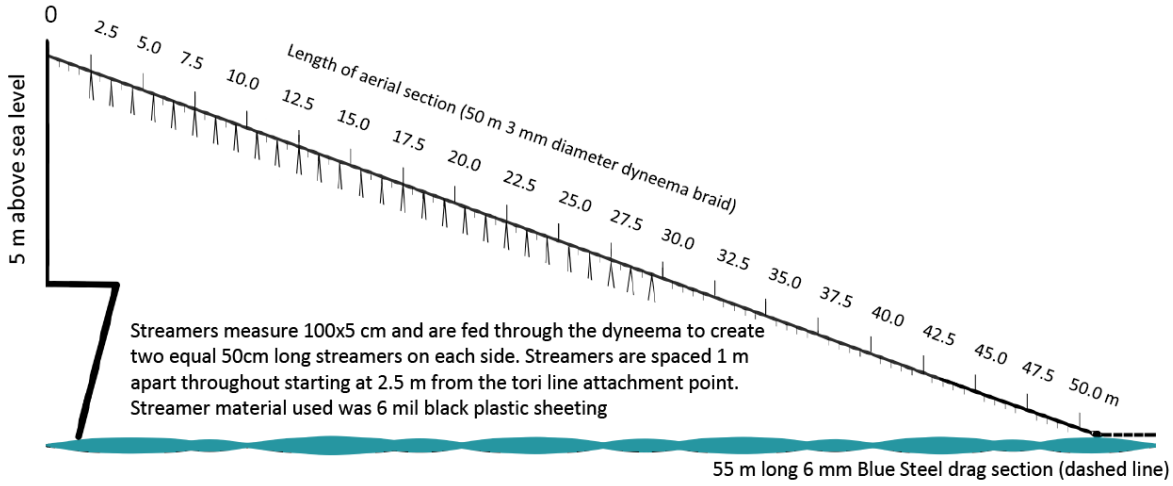

Figure 6. Schematic diagram showing the tori line design developed in the 2019-2020 cooperative research project (source: Gilman et al. 2021a).

[5] BFAL and LAAL, the primary species that have incidental interactions with the Hawaii longline fishery are not diving birds, thus the project team determined that an aerial extent which covered the area in which baited hooks sink to 2m would be sufficient to prevent primary attacks on baited hooks from these species. Secondary attacks by deeper diving seabirds that bring baited hooks to the surface and make them available to other seabirds are not common in the Hawaii longline fishery.

The results from the field trials concluded that tori lines are effective in reducing albatross attempts and contacts on baited hooks. Specifically, the results indicate that albatrosses attempts are about two times less likely and contacts about three times less likely when tori lines are used (Gilman et al. 2021a, 2021b). However, this initial study did not provide an evaluation of the tori line effectiveness if used in lieu of blue-dyed bait. Additionally, the results showed that seabird attempts and contacts were more likely to occur when offal discharge was used during the set, although results were inconclusive due to the lack of standardized procedure for strategic offal discharge during the field trials and the potential that crew utilized strategic offal discharge when attempts and contacts were actively observed (see Section 1.5.4 for additional discussion on offal discharge).

The Council at its 183rd meeting recommended additional at-sea trials for winter 2020/spring 2021 to test tori line efficacy without the use of blue-dyed bait when fishing north of 23° N under an EFP to inform development of options for revising mitigation measures. HLA applied for an EFP to test tori lines without the use of blue-dyed bait or strategic offal discharge (discharging offal when seabirds are present), both of which are normally required while deploying DSLL gear north of 23° N. NMFS issued the approved EFP on January 27, 2021 (86 FR 8341; February 5, 2021).

Field trials for the 2021 EFP study were conducted from February to June 2021. The trials involved three DSLL vessels, 7 total trips, and 87 sets. The vessels alternated sets between two treatments: 1) blue-dyed bait used in conjunction with branch line weights and hydraulic line shooters; and 2) tori line used in conjunction with untreated bait, branch line weights, and hydraulic line shooters. On all sets, crew were instructed not to discharge offal or spent bait during setting operations. Data on seabird strike attempts and contacts were collected throughout each setting operation using stern video cameras connected to the vessel's EM system. The results show that albatross attempts are 1.5 times less likely, contacts are 4 times less likely, and captures 14 times less likely on tori line sets compared to blue-dyed bait sets (Chaloupka et al. 2021).

The DSLL tori line studies conducted in 2019-2021 provide statistically significant evidence that tori lines are more effective in mitigating seabird interactions on stern-setting vessels in the DSLL than the existing blue-dyed bait measure.

1.9 Decision(s) to be Made

This document will support a decision by the Regional Administrator (RA) of the NMFS Pacific Island Region, on behalf of the Secretary of Commerce, whether to approve, disapprove, or partially approve the Council's recommendation. The RA will use the information in this EA 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. 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.

1.10 NEPA compliance

This Environmental Assessment (EA) is being prepared using the 2020 Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020, and reviews begun after this date are required to apply the 2020 regulations unless there is a clear and fundamental conflict with an applicable statute. 85 Fed. Reg. at 43372-73 (50 CFR §§ 1506.13, 1507.3(a)). This EA began after June 30, 2021 and accordingly proceeds under the 2020 regulations.

1.11 Public Involvement

Council meetings and meetings of the Council's advisory bodies are open to the public and are noticed in the Federal Register, 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 184th meeting (December 2-4, 2020, 85 FR 73029);
- The 185th meeting (March 23-25, 2021, 86 FR 11505);
- The 186th meeting (June 22-24, 2021, 86 FR 29251);
- The 187th meeting (September 21-23, 2021, 86 FR 47626); and
- The 189th meeting (December 7-9, 2021, 86 FR 63340).

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

- The 138th meeting (November 30 – December 1, 2020, 85 FR 73029);
- The 139th meeting (March 16-18, 2021, 86 FR 11505);
- The 140th meeting (June 15-17, 2021, 86 FR 29251);
- The 141st meeting (September 14-16, 2021, 86 FR 47626); and
- The 142nd meeting (November 30 – December 2, 2021, 86 FR 63340).

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

- The Pelagic Plan Team meetings
    - November 19, 2020 (85 FR 70132)
    - March 3-4, 2021, (86 FR 9910)
- The Hawaii Archipelago FEP Advisory Panel meetings
    - November 20, 2020 (85 FR 70131)
    - March 12, 2021 (86 FR 12175)
    - June 11, 2021 (86 FR 28080)
    - September 3, 2021 (86 FR 45710)
    - November 19, 2021 (86 FR 60218)
- The Fishing Industry Advisory Committee meetings
    - March 11, 2021 (86 FR 12175)
    - June 10, 2021 (86 FR 28080)
    - September 9, 2021 (86 FR 45710)
    - November 16, 2021 (86 FR 60218)

On October 17, 2023, NMFS published the proposed rule, draft EA, and request for public comments in the Federal Register (88 FR 71523). The comment period ended on October 16, 2023, and NMFS received a comment from one organization generally supporting the action. The comment also included a list of recommendations as further steps NMFS could take to increase protections to seabirds. These recommendations included requiring a restriction for offal discharge during setting operations (Alternative 3), encouraging the use of tori lines south of 23° N latitude, increasing observer coverage beyond 20% in the subject fishery, and hastening the rulemaking process to implement new seabird mitigation methods more expeditiously. The commenter also advocated for NMFS's continued support for the Agreement for the Conservation of Albatrosses and Petrels. NMFS considered all comments in finalizing the EA. None of the comments resulted in a change to the alternatives or a substantive change to the environmental effects analysis.

1.12 List of Preparers

Preparers

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2 DESCRIPTION OF THE ALTERNATIVES CONSIDERED

2.1 Development of the Alternatives

At the 184th meeting in December 2020, the Council considered a broad range of preliminary seabird mitigation options. In addition to using tori lines in place of blue-dyed bait, the Council broadened the scope to consider modification of other aspects of the Hawaii longline seabird measures, such as modification of the strategic offal discharge requirement, inclusion of SSLL fishery measures, converting to a "menu" approach used under RFMOs, and addressing cross-taxa impacts associated with weighted branch lines. The Council considered additional range of options for the SSLL fishery at 185th meeting in March 2021. Through these two meetings, the Council determined that the regulatory amendment should focus on the modification of seabird mitigation measures for the Hawaii DSLL fishery, with a focus on allowing the use of tori lines in lieu of blue-dyed bait, and removing the strategic offal discharge requirement. The broader set of alternatives that the Council considered at this stage but did not recommend for further analysis are described in Section 2.3.

At the 187th meeting in September 2021, the Council considered initial action on the regulatory amendment for modifying seabird mitigation measures in the Hawaii DSLL fishery. The Council

considered an options paper that evaluated the addition of tori lines as a third suite of measures, replacement of blue-dyed bait with tori lines, and modification of the strategic offal discharge requirement (either to remove the requirement or to refine the regulatory language to prohibit discards during setting when seabirds are most active). The Council also considered recommendations from the Hawaii FEP Advisory Panel, Fishing Industry Advisory Committee, and the Scientific and Statistical Committee, all of which supported the replacement of blue-dyed bait with tori lines and removal of the strategic offal discharge requirement. The SSC additionally recommended that the Council consider either an option for an additional regulation for not discharging fish waste immediately before and during setting, or incorporate best practices training to the currently required annual protected species training workshop. Taking into account these advisory body recommendations, the Council recommended as a preliminary preferred alternative the following:

- Replace blue-dyed bait with tori line; and
- Remove offal discharge from the regulatory requirement, and include best practices training on offal management as part of the required annual protected species workshop.

The Council additionally directed staff to consider a contingency that would allow vessels to continue fishing if a tori pole breaks during a trip.

The alternatives presented in this draft regulatory amendment are those considered by the Council at the time of its final action at the 189th meeting. The Council recommended as final action Alternative 2, replacing blue-dyed, thawed bait and strategic offal discharge measures required for stern-setting DSLL vessels with a new tori line requirement. In lieu of a regulatory requirement for a strategic offal discharge measure, the Council recommended that best practices training on offal management to be implement as part of the annual protected species workshop, based on the best practices as presented, or any update thereof. The Council additionally recommended tori line regulatory specifications as follows:

1. A minimum of 50m length for the aerial section and a minimum total length of 100m
2. Material types:
    a. Aerial section: Ultra high molecular weight polyethylene or other similar material that is light-weight, water resistant, low stretch, and floats in water
    b. Drag section: 6mm or larger braided material that is water resistant and floats in water
    c. Prohibit the use of monofilament nylon in the aerial or drag sections of the tori line
3. Two lines meeting specifications must be present on the vessel at the start of every trip
4. Aerial section streamers must be at least 30cm in length and spaced less than 1m apart. No streamers are required for the last 20m of the aerial section
5. Tori lines must be attached to the vessel or a fixed structure on the vessel made of rigid material at a minimum height of 5m above the water if located within 2m from vessel stern (or additional 0.5m height for every 5m distance from stern).
6. A breakaway point must be included at the point of the tori line attachment
7. An attachment point height exemption that allows the operator to use an alternative attachment at the highest possible point on the vessel if the structure used to attach the tori line breaks during a trip (exemption only applies for that trip).

Further details on the Council's considerations for the development of tori line regulatory specifications and revised best practices for offal management are described in the following sections.

2.1.1 Development of the Tori Line Specifications

The Council considered draft regulatory specifications for tori lines at the 186th, 187th, and 189th meetings. At the 186th meeting in June 2021, the Council considered the preliminary draft tori line specifications described in Table 2 based on the short-streamer design developed during the 2019-2021 field trials in the Hawaii deep-set fishery (see section 1.8 and existing international standards (see Appendix A in Gilman et al. 2021a). At the time, the Council supported the approach of focusing the regulatory requirements on tori line length, attachment point height, and streamer design, and having additional design and safety recommendations as non-regulatory guidelines. The intent of the draft approach was to keep the regulatory specifications similar to international specifications applicable to the Hawaii DSLL fishery (WCPFC and IATTC), while maintaining flexibility for fishermen to further improve their lines and for updating non-regulatory design and safety guidance as new information or material become available.

The preliminary draft specifications did not include requirements for the materials used to construct tori lines, because review of available literature and guidance indicated that the most important part of the tori line design is the ability to maintain a consistent aerial extent that covers the distance astern where baited hooks are available to seabirds (WPRFMC 2019; Gilman et al. 2021a). The tori line design developed under the DSLL cooperative research project was based on extensive review of available literature, expert input, and input from participating fishermen. Various designs and materials were considered in the design phase and five designs were selected by the project team for the initial at-sea demonstrations to determine operational practicality and design preferences of vessel operators and crew and to select one design for use in the experimental trials under commercial fishing operations. However the project did not exhaust potential material options due to the project timeline and priority was placed on finding materials that were both effective and available through local retailers.

Following the 187th meeting, PIRO recommended that the Council consider some material specifications as part of the regulatory requirements to ensure that tori lines used in the fishery maintain similar effectiveness to the light-weight design tested during the 2019-2021 studies (Gilman et al. 2021a, Chaloupka et al. 2021). These additional specifications described in Table 2 below are intended to ensure that fishermen do not use materials that are known to be ineffective, cause entanglements, or affect crew and observer safety, and to reduce the chances of attachment point failure resulting from tori line entanglement with longline gear. The Council at the 189th meeting incorporated these additional specifications in its final recommendation after considering recommendations from the FEP Advisory Panel and Fishing Industry Advisory Committee, which supported the additional material specification with some flexibility retained for practical purposes that allows for the use of other similar materials with certain properties.

Further, the Council at the time of initial action taken at the 187th meeting in September 2021 directed staff to consider a contingency that would allow vessels to continue fishing if a tori pole breaks during a trip, which the Council also included in its final recommendation at the 189th

meeting. An exemption for the attachment point height would allow vessels to continue fishing north of 23° N if the attachment point breaks during a fishing trip. Under the draft regulations, a vessel may use an existing structure (such as a mast or outrigger) or mounting a dedicated pole to attach the tori line (tori pole) that may be welded or affixed to the vessel. These structures may be difficult to repair at sea if they break and can no longer function as a safe attachment point for the tori line. Such an instance is expected to be rare, but could result in an economic loss to the vessel for that trip if the vessel is fishing well north of 23° N when fish catch rates are high. This contingency under regulatory specifications would only be considered for the structure to attach the tori line, and is not considered for the tori line itself, because the vessels can store backup tori lines on board.

The Council's preliminary draft tori line specifications considered at the 186th meeting and final recommended specifications at the 189th meeting are shown in Table 2.

Table 2. Preliminary draft and final recommended tori line specifications.

Preliminary draft specification endorsed by the Council at the 186th meeting	Final recommended specifications at the 189th meeting
Tori line length • The tori line must have a minimum aerial section length of 50m, *AND* • A minimum total length of three times the total length of the vessel	**Total minimum length** • 100m (instead of 3x vessel length) **Add material specifications for aerial section:** • Ultra high molecular weight polyethylene or other similar material that is light-weight, water resistant, low stretch, and floats in water **Add material specifications for drag section** • 6mm or larger braided material that is water resistant and floats in water **Prohibit use of certain materials** • Prohibit use of monofilament nylon in the aerial or drag sections of the tori line **Require number of tori lines maintained on board** • Two tori lines meeting these specifications must be present on the vessel at the start of every trip
Streamers • Streamers must be 30cm minimum length and must be spaced less than 1m apart; *AND* • Streamers are not required for the last 20m of aerial section to minimize entanglements with buoys and fishing gear	**Streamers** (*no modifications from the preliminary draft)* • Streamers must be 30cm minimum length and must be spaced less than 1m apart; *AND* • Streamers are not required for the last 20m of aerial section to minimize entanglements with buoys and fishing gear
Attachment point specifications • Tori line must be attached to the vessel at a point a minimum of 5m above the water if attachment point is within 2m of vessel stern. • If the attachment point is more than 2m from the stern, the attachment point height should be increased by 0.5m for every 5m distance from the stern.	**Add material specification for attachment point** • Tori line must be attached to the vessel or a fixed structure on the vessel made of rigid material **Add breakaway point requirement** • A breakaway point for the tori line must be included at the point of attachment **Attachment point exemption** • In the event that the structure normally used on the vessel to attach the tori line breaks during a

Preliminary draft specification endorsed by the Council at the 186th meeting	Final recommended specifications at the 189th meeting
	trip, the operator may use an alternative attachment at the highest possible point on the vessel that is lower than the height required in regulations to continue fishing north of 23° N. The exemption is only valid during the trip in which the structure broke.

2.1.2 Development of Revised Best Practices for Offal Management

Detailed description of the offal measure modifications were refined by the Action Team following the 187th meeting with input from the PIR Observer Program and NOAA Office of Law Enforcement personnel. At the 189th meeting, the Council considered the following information to inform its recommendation on the modification of the existing strategic offal discharge requirement.

Characteristics of seabird interaction risk in the DSLL fishery associated with offal discards differ by setting and hauling operations. Setting operations in the DSLL occur during daylight hours when seabirds are actively foraging, and over 90% of the seabird interactions (hooking or entanglements) in the DSLL occur on the set. Additionally, seabirds incidentally hooked or entangled during the setting operations have a high mortality rate because they drown if they do not escape from the gear before the branch line sinks to depth. Little to no offal is generated during the setting operations, so fishermen are required to retain offal from hauling operations to comply with the existing strategic offal discharge requirement during the set. In the absence of a strategic offal discharge requirement for the set, it is unlikely that DSLL fishers would retain offal from the haul to discard during the set. As described in section 1.5.4, the effect of the existing strategic offal discharge requirement (which requires offal to be retained from the hauling operations to be discarded during the set) on seabird interaction risk during the setting operations is inconclusive. However, it may not effect seabird interaction rates (Gilman et al. 2016) or may increase risk over the long-term by attracting more seabirds (Abraham et al., 2009; Pierre et al., 2010, 2012).

Hauling operations in the DSLL occur primarily at night when seabirds are not actively foraging. Less than 10% of all seabird interactions in the DSLL occur during the haul. Seabird interactions during the haul typically occur near the vessel as seabirds are attracted to baited hooks that come to the surface as gear is being hauled, and thus any seabirds that become hooked or entangled during this time would be within sight of the vessel and are usually released alive after removing gear pursuant to existing handling requirements. Post release mortality rates for seabirds released alive are unknown. During the haul, interaction risk is highest when the hauling operations overlap with daylight hours at the start or end of the set. Where interactions occur during the hauling operations in the DSLL, they tend to occur on the side of the vessel where gear is being hauled. Fish parts (from gilling and gutting) are typically discarded on the opposite side of where gear is hauled by preference and as general practice in this fleet, because fish cleaning typically happens away from the fish door, and discarding fish parts on the side of the vessel where gear is being hauled could result in those fish parts becoming snagged on hooks that are being hauled. Fish parts are generated when a fish is landed (and there could be some time, sometimes a couple

of hours between fish being landed), whereas spent bait is generated throughout the hauling operation as hooks with remaining bait are retrieved. Spent bait, if discarded on the hauling side, could further attract birds to the hooks still in the water if birds are actively pursuing baited hooks, although the extent to which this increases interaction risk overall in the DSLL is unknown. As described in section 1.5.4 there is little empirical evidence that strategic offal discharge during the hauling operations reduces seabird interaction risk, whereas retaining offal (i.e., no discharge) during hauling operations may increase seabird capture risk (McNamara et al. 1999).

Several additional management issues warranted consideration for modifying the existing strategic offal discharge requirement. The existing regulatory language that requires strategic offal discharge to be used "when seabirds are present" has created monitoring, enforcement and compliance burdens. Specifically, seabirds present in the vicinity of the fishing vessel do not immediately lead to interaction risk if seabirds are flying by and not actively foraging, and crew may not spot all seabirds present if they are focused on the hauling operation occurring on deck. This language is also problematic in the DSLL fishery because most of the hauling operations take place at night, and seabirds cannot be seen flying in the vicinity. Additionally, the regulations do not specify the amount or frequency of offal discharge, thus a small amount of offal or bait discarded during setting or hauling would meet the requirement. As described in McNamara et al. (1999), effective use of strategic offal discharge would require a dedicated crew to observe seabirds and discharge offal accordingly. However, most vessels do not have crew available to be assigned to such a task, and thus it is likely that the strategic offal discharge is not a practical measure that can be utilized in a manner that is effective.

Based on the above information, the Council considered the proposed best practices for modifying the strategic offal discharge requirement in the DSLL fishery as follows (Table 3):

- *During setting operations*: No offal discharge. This would be consistent with the lack of offal generated during setting operations.
- *During hauling operations*: When seabirds are actively pursuing baited hooks, discharge offal from the opposite side of the vessel from where gear is being hauled. This would focus the use of strategic offal discharge when interaction risk is highest during the DSLL hauling operations, which is likely to be when hauling operations overlap with daylight hours and when seabirds are actively pursuing baited hooks.

For practical purposes, fishermen may need to keep a bin in the vicinity of where gear is being hauled so that spent bait may be accumulated when seabirds are actively pursuing hooks, and discharged to the opposite side. When seabirds are not actively pursuing baited hooks, offal may be discharged in a manner most practical for crew. If offal remains on deck when there is limited time between the end of hauling operations and the start of next setting operations, and if seabirds are observed in the area, the remaining offal may be retained rather than discharged before the setting operations to avoid further attracting seabirds to the vessel. If no seabirds are observed in the area, offal may be discharged prior to the start of the next set.

Table 3. Summary of relevant fishery and seabird interaction characteristics for modifying offal management best practices in the DSLL fishery.

Characteristic	Set	Haul
Time of day	During the day when seabirds are actively foraging.	Primarily at night when seabirds are not actively foraging, with some overlap with daylight hours when foraging activity is higher at the start and end of set.
Fishing operation	Gear deployed.	Gear retrieved and catch processed as fish are hauled on deck.
Offal generated	Typically little to no offal generated. In rare cases, fish may still be processed after setting operations begin due to high catch on the previous haul.	Fish parts (from gilling and gutting) generated as fish are landed. Processing of catch typically occurs away from the fish door, and fish parts from gilling and gutting are typically discarded from opposite side of vessel from where gear is hauled. Spent bait generated throughout the haul as hooks with remaining bait are retrieved, and may be discarded on the same side as the vessel from where gear is hauled, if not required to retain for purposes of strategic offal discharge.
Proportion of seabird interactions under status quo	>90% of all interactions.	<10% of all interactions.
Current offal requirements	Strategically discharge offal during setting on opposite side of vessel when seabirds present. Retain sufficient quantities of offal between setting.	Discharge offal during hauling on opposite side of vessel when seabirds present. Remove all hooks from offal prior to discharge. Remove bill and liver of any swordfish, sever head from trunk and cut in half to discharge.
Issues associated with effectiveness of current offal requirement	Effect of strategic offal discharge on seabird interactions is inconclusive but may increase risk by attracting more seabirds. Any amount of discharge satisfies the requirement therefore making the effectiveness variable from vessel to vessel.	Effect of strategic offal discharge on seabird interactions is inconclusive, but when haul overlaps with daylight hours, may increase risk by attracting more seabirds. Any amount of discharge satisfies the requirement therefore making the effectiveness variable from vessel to vessel. Swordfish, which generates more effective offal for strategic offal discharge, are rarely caught in the DSLL fishery.
Enforcement Issues associated with current offal requirement	Birds present that are not interacting with fishing gear trigger the requirement, while crew may not see birds that are not actively pursuing the baited line.	Birds present that are not interacting with fishing gear trigger the requirement, while crew may not see birds that are not actively pursuing the baited line.

Characteristic	Set	Haul
Operational Issues associated with current offal requirement	No offal is generated during the set so it must be retained from a previous haul. No offal is available for the first set of the trip. The vessel may not have retained enough offal for effective strategic discard.	Discard of fish parts from gilling and gutting is not a concern due to discharge occurring on opposite side of where gear is being hauled due to practicality reasons. Keeping spent bait to discharge on the opposite side of the vessel when birds are present is not efficient if birds are not actively pursuing the baited hooks (at night).
Proposed best practices for offal management	No offal discharge during the set.	Discharge offal during hauling on opposite side of vessel when seabirds are actively pursuing baited hooks.

2.2 Description of the Alternatives

Alternative 1 is the No Action (status quo) alternative; Alternative 2 would replace blue-dyed, thawed bait and strategic offal discharge measures required for stern-setting vessels with a new tori line requirement and implement offal management best practices into the required, annual protected species workshop training; and Alternative 3 would replace blue-dyed, thawed bait with a new tori line requirement and modify strategic offal discharge requirement to an offal management requirement. Alternative 2 is the Council's preferred alternative recommended at the 189th meeting in December 2021.

The primary difference between Alternatives 2 and 3 is whether the updated offal management measure would be implemented through a non-regulatory best practices training (Alternative 2) or a regulatory requirement (Alternative 3). The removal of blue-dyed thawed bait and addition of the tori line requirement is the same between the two action alternatives.

Features common to all alternatives are described in section 2.2.1, and a summary of the alternatives is described in Table 6.

2.2.1 Features Common to All Alternatives

Under all alternatives considered, requirements for owners and operators of Hawaii DSLL vessels to use seabird mitigation techniques will continue to apply when fishing north of 23° N. An analysis of observer data indicates that seabird interaction rates north of 23° N are an order of magnitude higher than to the south (Gilman et al. 2016), even with the use of required seabird mitigation measures. No new information is available that suggest additional protections are warranted to the south. Additionally, owners and operators of all Hawaii longline vessels will continue to be required to follow existing seabird handling and release requirements (50 CFR 665.815(b)-(c)) regardless of where they fish to maximize the chances of post-release survival of any seabirds that are caught alive, as well as attend and be certified for completion of an annual protected species workshop conducted by NMFS (50 CFR 665.814).

These alternatives focus on seabird mitigation requirements for deep-set vessels that stern-set, and none of the alternatives considers modifications to the measures required for vessels that side-set because side-setting has been shown to have lower seabird catch rates than the blue-dyed bait measures currently required for stern-setting vessels (Gilman et al. 2016).

Under all alternatives considered, NMFS would continue to monitor the Hawaii DSLL fishery under statistically reliable observer coverage. The deep-set fishery has had consistent coverage of approximately 20% of all trips since 2001, with the exception of 2020 and 2021, when public health and travel restrictions resulted in a reduced annual coverage to approximately 15% and 18% respectively. NMFS collects data on seabird sightings, mitigation measures used, and interactions: species caught; capture and release location, date and time, and condition; hooking and/or entanglement location; recovered bands, injuries, and handling techniques used. This information is documented in an annual report (e.g. NMFS 2021) required by the Terms and Conditions of the USFWS 2012 BiOp for the operation of Hawaii-based pelagic longline fisheries.

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

Under the No Action Alternative, no changes would be made to management measures intended to mitigate seabird interactions in the Hawaii DSLL fishery. All existing measures to mitigate interactions with seabirds would be maintained, including blue-dyed thawed bait and strategic offal discharge, and no new measures would be required.

Expected Fishery Outcomes

Under Alternative 1, the Hawaii DSLL fishery would continue to be managed under the existing seabird mitigation measures under the FEP, and fishery participants would be required to use blue-dyed bait and strategic offal discharge when stern-setting north of 23° N. This alternative would not implement any measures to improve the operational practicality and mitigation efficacy of seabird measures for the Hawaii DSLL fishery. The blue-dyed bait measure for stern-setting vessels is known to be less effective than the alternative side-setting measure (Gilman et al. 2016), yet most Hawaii DSLL fishermen currently stern-set using blue-dyed bait instead of side-setting due to the operational consideration discussed in section 1.5.1 (82.1% of observed deep-set vessels in 2019; NMFS 2021). Additionally, offal discharge may be contributing to long-term increase in albatross interactions in the Hawaii DSLL fishery by attracting more birds to the vessels (Abraham et al., 2009; Pierre et al., 2010, 2012).

If vessel operators in the Hawaii DSLL fishery prefer to use a tori line as a seabird mitigation measure, they would need to use it in addition to the existing suite of required measures. While some vessels may voluntarily add another mitigation measure, tori lines are not likely to be widely adopted in the fleet without additional incentives. Additionally, voluntary adoption of tori lines by Hawaii DSLL vessels would lack the implementation of minimum standards, and effectiveness of tori lines would likely vary widely between vessels.

Therefore under Alternative 1, BFAL and LAAL albatross interactions would be expected to remain at the higher levels observed since 2015 as no regulatory changes would be made to improve the effectiveness of the required mitigation measures and oceanographic patterns and

fishery effort are expected to continue on the same trajectory. Additionally, NMFS would continue to experience administrative burden to monitor and enforce the blue-dye bait and strategic offal discharge measures, both of which require observer program staff resources to consistently review and provide information on potential violations to the NOAA Office of Law Enforcement. The Hawaii DSLL fishery's effort, target and non-target catch, and other protected species interactions would be expected to remain similar to the historical baseline under Alternative 1.

2.2.3 Alternative 2: Replace blue-dyed, thawed bait and offal discharge measures required for stern-setting vessels with a new tori line requirement (*Council preferred alternative*)

Under Alternative 2, seabird mitigation measures for the Hawaii DSLL vessel owners and operators that stern-set would be modified as follows (Table 4):

- Replace existing requirements to use blue-dyed, thawed bait and strategically discharge offal with a new requirement to use a tori line that meets minimum required specifications during the setting operation; and
- As a non-regulatory measure, include best practices training on offal management as part of the annual protected species workshop that is already required for Hawaii longline vessel owners and operators.

This alternative would not modify the other existing seabird mitigation requirements for deep-set vessels that stern-set (i.e., weighted branch lines and line shooter). The modifications under this alternative are described in further detail below.

Table 4. Comparison of existing seabird mitigation measures required for stern-setting DSLL vessels when fishing north of 23° N with modification under Alternative 2.

Stern-setting deep-set vessels must use:	
Existing Requirements[1]	**Modified Requirements under Alternative 2**
Blue-dyed thawed bait Strategic offal discharge (when seabirds present) ≥45g weight within 1m of each hook Line shooter	Tori line >45g weight within 1m of each hook Line shooter

[1] See full details of the existing requirements in section 1.5.

Tori line

Owners and operators of Hawaii DSLL vessels, when stern-setting and fishing north of 23° N, would be required to use a tori line throughout the duration of each setting operation. Tori lines would only be required for use during setting operations because over 90% of DSLL seabird interactions occur during the set, and the use of a tori line is considered to be an impractical and untested measure during the haul in the DSLL fishery (Gilman and Ishizaki 2018). The tori line must meet regulatory specifications as recommended by the Council at the 189th meeting and described in section 2.1.1.

In addition to the regulatory specifications, NMFS would make available and provide information on non-regulatory guidelines on tori line design and safety recommendations through the annual protected species workshops required for Hawaii longline vessel owners and operators. This non-regulatory guidance may include recommendation on additional materials and design configurations for constructing tori lines and tori poles, suitable attachment points, alternative streamer designs, and design guidance for crew safety.

Offal management best practice training (non-regulatory)

The regulatory requirement to strategically discharge offal during setting or hauling when seabirds are present would be removed under Alternative 2. Best practices training on offal management would become part of the required annual protected species workshop. Hawaii longline vessel owners and operators are required to annually attend a NMFS protected species workshop where they receive training on interaction mitigation techniques for sea turtles, seabirds, and other protected species.

The proposed best practices for managing offal discharge in the Hawaii DSLL fishery are described in section 2.1.2, and focus on the following:

- *During setting operations*: No offal discard; and
- *During hauling operations*: When seabirds are actively pursuing baited hooks during hauling operations, discharge offal from the opposite side of the vessel from where gear is being hauled.

Expected Fishery Outcomes

Under Alternative 2, Hawaii DSLL fishery participants who stern-set would be required to use tori lines that meet regulatory specifications in lieu of the existing blue-dyed, thawed bait and strategic offal discharge requirements, when fishing north of 23° N. Fishery participants who currently use blue-dyed bait while stern-setting would be required to switch to tori lines or to side-setting. This alternative is expected to improve the operational practicality and mitigation efficacy of seabird measures in the Hawaii DSLL fishery.

Many DSLL fishery participants have expressed interest in using tori lines in lieu of blue-dyed bait, citing the operational burdens of using blue dye (see section 1.5.1). Dying the bait is a time-consuming process, which may increase the time of a set, and fishers cite it as one of the most difficult to follow Hawaii longline protected species regulations (Ayers and Leong 2020). Dying bait blue is also a messy process with associated cleaning and maintenance costs. The bait must be fully thawed to absorb the dye to the level that reaches the regulatory-required darkness, which reduces retention on hooks and is more difficult for crew to handle than partially thawed bait (Gilman and Ishizaki 2018). A small portion of participants may initially favor blue-dyed bait over tori lines due to its familiarity and perceived uncertainty associated with a new measure. Most fishery participants who currently side-set (17.9% of observed deep-set vessels used side-setting in 2019; NMFS 2021) are expected to continue using that measure, because those captains are likely to be using that method by preference and consider it to be practical and safe for their fishing operation and vessel configuration (Gilman and Ishizaki 2018). Therefore, a

majority of the DSLL participants are expected to use tori lines with stern-setting as the primary mitigation measure over side-setting under Alternative 2.

Albatross interactions are expected to be reduced on stern-setting vessels that convert to tori lines from blue-dyed bait, based on the results of the 2019-2021 cooperative research project conducted in the Hawaii DSLL fishery (see section 1.8). The tori line regulatory specifications recommended by the Council at the 189th meeting (see section 2.1.1) are also expected to help ensure that tori lines used by fishermen will perform similar to the designs tested in the field trials. The regulatory exemption for the attachment point height to provide contingency for a potential tori pole breakage at sea is not expected to affect the fleet-wide effectiveness of the modified seabird measures, because such breakage are likely to be rare and the exemption is only provided for the trip in which the breakage occurs. The removal of blue-dyed bait from the DSLL seabird mitigation measures is expected to have a small effect on the number of seabird interactions during hauling operations, given that the fish-bait used by the DSLL does not strongly hold blue dye for long periods and hauling operations primarily occur at night when seabirds are not actively foraging. The administrative and enforcement burdens would remain about the same. Information collection on vessel compliance with the blue-dyed bait requirement and any resulting enforcement would be replaced with information collection on vessel compliance and possible resulting enforcement with the tori line requirement.

Under Alternative 2, the existing strategic offal discharge requirement would be replaced with best practice training on offal management as part of the annual protected species workshop. As described in section 2.1.2, in the absence of a strategic offal discharge requirement in the DSLL fishery, there would be limited overlap between the time when seabirds are actively foraging and when fish waste is being generated and discarded. For setting operations, the best practices training would focus on discouraging any offal discharge, which represents a change in practice for fishermen compared to the status quo that requires strategic offal discharge when seabirds are present. For hauling operations, the best practices training would focus on situations when offal should be discharged from the opposite side from where the gear is being hauled to prevent seabirds from being further attracted to the surfacing hooks and exacerbating capture risk. Disseminating this information through the workshops would help update the fishermen's knowledge and practice of discharge practices.

The recommended best practice to not discharge offal during setting would remove fishery participants' burden of retaining offal from the haul to discharge during the set. The recommended best practice of discharging offal from the opposite side of the vessel from where gear is being hauled when seabirds are actively pursuing the baited hooks, as opposed to when seabirds are present, would also remove fishery participants' burden of strategically discarding when it is unnecessary. Removing the regulatory requirement for strategic offal discharge would eliminate the administrative and enforcement burden associated with the existing requirement. The adoption of best practices in the fishery may be slow or inconsistent without enforcement and, therefore, Alternative 2 has the potential to result in slightly higher seabird interaction rates. However, seabird interaction rates are not expected to be significantly higher compared to the no action alternative because offal is not typically generated or discharged when setting gear and hauling occurs primarily at night when seabirds are not actively foraging. Further, providing the offal management as a non-regulatory guidance allows for this information to be updated based

on best scientific information available without the administrative burden and process of a regulatory amendment.

Under Alternative 2, the Hawaii DSLL fishery's effort, target and non-target catch, and other protected species interactions would be expected to remain similar to the historical baseline. Blue-dyed bait compared to untreated bait have been shown to have no significant effects on target and non-target fish and shark catch rates (Yokota et al. 2009). Additionally, bait color is not known to affect sea turtle capture rates (Swimmer et al. 2005; Yokota et al. 2009) or other protected species.

2.2.4 Alternative 3: Replace blue-dyed, thawed bait with a new tori line requirement, and modify offal discharge requirement to an offal management requirement

Under Alternative 3, seabird mitigation measures for the Hawaii DSLL vessel owners and operators that stern-set would be modified as follows (Table 5):

- Replace existing requirement to use blue-dyed thawed bait with a new requirement to use a tori line that meets minimum required specifications during the setting operation; and
- Modify the existing requirement for strategic discharge of offal to an offal management requirement as follows:
    - Prohibit offal discard during set; and
    - Refine haul requirement to discharge offal on the opposite side from where gear is hauled when "any seabirds are actively pursuing baited hooks."

This alternative would not modify the other existing seabird mitigation requirements for deep-set vessels that stern-set (i.e., weighted branch lines and line shooter). The main difference between Alternatives 2 and 3 is whether the updated offal management measure would be implemented through a non-regulatory best practices training (Alternative 2) or a regulatory requirement (Alternative 3). The removal of blue-dyed thawed bait and addition of the tori line requirement is the same between the two action alternatives. The modifications to be made under this alternative are described in further detail below.

Table 5. Comparison of existing seabird mitigation measures require for stern-setting DSLL vessels when fishing north of 23° N with modification under Alternative 3.

Stern-setting deep-set vessels must use:	
Existing Requirements[1]	**Modified Requirements under Alternative 3**
Blue-dyed thawed bait	Tori line
Strategic offal discharge (when seabirds present)	Offal management (prohibit discharge during set; discharge on opposite side of the vessel as the haul when seabirds are actively pursuing baited hooks; remove all hooks from fish, fish parts, or spent bait prior to its discharge)
>45g weight within 1m of each hook	>45g weight within 1m of each hook
Line shooter	Line shooter

[1] See full details of the existing requirements in section 1.5

Tori line

The tori line regulatory requirements and non-regulatory design and safety guidelines described under Alternative 3 would be identical to those described above under Alternative 2. See section 2.2.3 for further details.

Offal management requirement

The existing regulatory requirement to strategically discharge offal during setting or hauling when seabirds are present would be modified under Alternative 3 to reflect current best practices for offal management, as described in section 2.1.2. The modified requirement would address offal management separately for setting and hauling operations, and address enforcement issues associated with the existing language "when seabirds are present."

Expected Fishery Outcomes

The expected outcomes for Alternative 3 in terms of replacing blue-dyed bait with tori lines would be the same as described for Alternative 2 in section 2.2.3 above.

The offal discharge regulations would be revised in accordance with the current best practices for the deep-set fishery. For setting operations, the modified offal measure would prohibit fishermen from discharging offal to prevent seabirds from becoming more attracted to the vessel and exacerbating seabird capture risk. This prohibition would apply regardless of seabird presence. This would be a change from the current measure, which requires that fishermen strategically discharge offal on the other side of the vessel from where gear is being deployed when seabirds are present. If any fish waste is generated during the setting operations, fishermen would need to retain that waste until setting operations are completed. This could result in an operational burden to fishery participants in the rare occurrence that catch is still being processed from the previous haul when setting operations start.

For hauling operations, fishermen would be required to discharge offal and spent bait on the opposite side from where the gear is hauled, but the trigger for this requirement would be changed from the current "when seabirds are present" to be more specific to "when seabirds are actively pursuing baited hooks." This change is intended to clarify the existing language regarding presence of seabirds that has created monitoring and compliance burdens as described under Alternative 1. The modified language would focus the requirement to strategically discharge offal during the haul by only requiring it when seabirds are actively pursuing baited hooks, and then it must be on the opposite side of the vessel from the haul. Offal discharge on the side where the gear is being hauled could exacerbate capture risk by attracting more seabirds into the area or causing seabirds to more aggressively pursue baited hooks as a result of increased food availability where baited hooks are surfacing. Discharging offal on the opposite side could distract birds away from the hooks and reduce capture risk.

The difference between Alternatives 2 and 3 in terms of how the best practices would be implemented is not expected to substantially affect seabird capture risk because the recommended best practices for offal management would be consistent with how offal would be generated and discarded in the DSLL in the absence of the existing strategic offal discharge requirement, especially during the setting operations when seabird capture risk is higher due to

the temporal overlap with albatross foraging. During the haul, retaining the regulatory requirement for strategic offal discharge and clarifying the language on when this measure is required would likely provide greater compliance with this proposed best practice. Spent bait, which may be discarded on the side of the vessel where gear is being hauled, does have the potential to slightly increase interaction rates. However, improved compliance may only provide a marginal conservation benefit in reducing seabird interaction risk, considering that seabird interactions during hauling operations represent less than 10% of all DSLL interactions, and available evidence on the effect of offal measures during hauling operations are inconclusive, as described in sections 1.5.4 and 2.1.2.

Compared to the No Action Alternative, Alternative 3 is expected to reduce administrative burden on the observer program by clarifying the language on when offal and spent bait should be discharged on the other side of the vessels from where gear is being hauled. However, some administrative burden to monitor and enforce would remain in place as Alternative 3 would implement the modified offal management measure through regulations.

Table 6. Comparison of features of the alternatives.

Topic	Alternative 1 (Status quo[1])	Alternative 2 (*Council preferred alternative*)	Alternative 3
Overview of Alternatives	Status quo with stern-setting vessels required to use blue-dyed, thawed bait, strategic offal discharge, weighted branch lines and line shooter	Replace blue-dyed, thawed bait and strategic offal discharge requirements for stern-setting vessels with a new tori line requirement	Replace blue-dyed, thawed bait and strategic offal discharge requirements for stern-setting vessels with a new tori line requirement, and modify strategic offal discharge requirement to an offal management requirement
Blue-dyed, thawed bait	Required	Not required	Not required
Tori line	Not required	Required • Tori line regulation specifications as recommended by the Council at the 189th meeting • Provide additional non-regulatory design guidance	Required (same as Alt 2) • Tori line regulation specifications as recommended by the Council at the 189th meeting • Provide additional non-regulatory design guidance
Strategic offal discharge	Required (require discharge from opposite side of vessel from where gear is being set or hauled, when seabirds are present)	Remove from regulations, and provide best practice training for offal management in annual protected species workshop	Modify regulations to prohibit offal discard during set and refine haul requirement to discharge offal on the opposite side of the vessel from where gear is being hauled when any seabirds are actively pursuing hooks

Topic	Alternative 1 (Status quo[1])	Alternative 2 (*Council preferred alternative*)	Alternative 3
Other seabird mitigation requirements	• Weighted branch lines • Line shooter • Handling requirements • Annual protected species workshop	• Weighted branch lines • Line shooter • Handling requirements • Annual protected species workshop	• Weighted branch lines • Line shooter • Handling requirements • Annual protected species workshop

[1] See full details of the existing requirements in section 1.5.

2.3 Alternatives Considered, but Rejected from Further Analysis

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

Require side-setting in the Hawaii DSLL fishery

This alternative would require the entire Hawaii DSLL fishery to convert to side-setting. As described in section 1.5.1, decades of stern-setting practices have proven it an effective and efficient fishing method in the DSLL fishery. Requiring the fleet to convert to side-setting, would necessitate costly reconfiguration of fishing vessels and changes to fishing practices- both of which could affect the safety of vessel operators. Furthermore, requiring DSLL vessels to side-set may limit their participation in the SSLL fishery. It is believed that the use of tori lines will not only mitigate the increasing trend in seabird interactions in the DSLL fishery, but also to do so in a way that is operationally feasible and efficient for the DSLL fleet. Also, while data are not directly comparable, the results of the Tori Line Cooperative Research Project suggest that the use of tori lines while stern-setting may be a more effective mitigation method for seabird deterrence than side-setting. Analysis of observer data indicated that side-setting is up to 2-3 times less likely to catch seabirds than stern-setting with blue-dyed bait in the DSLL fishery (Gilman et al. 2016) however the Tori Line Cooperative Research Project results indicated that seabird captures were 14 times less likely when stern-setting using tori lines as compared to blue-dyed bait (Chaloupka et al. 2021). For these reasons, this alternative was eliminated from further analysis for the purpose of the Council's consideration of final action and this EA.

Optional use of tori lines in the Hawaii DSLL fishery

This alternative would have created a third suite of seabird mitigation measures allowing fishermen to choose between stern-setting with tori lines, stern-setting with blue-dyed bait, or side-setting, but still requiring all other mitigation measures (i.e., weighted branch lines, line shooter, and strategic offal discharge when seabirds are present). Based on the results from the 2021 study, tori lines were found to be significantly more effective than blue-dyed bait for seabird bycatch mitigation (Chaloupka et al. 2021). Additionally, available evidence based on an analysis of observer data has shown that stern-setting with the blue-dyed bait is less effective than side-setting (Gilman et al. 2016). For these reasons, this alternative was eliminated from further analysis for the purpose of the Council's consideration of final action and this EA.

Including the Hawaii SSLL fishery in this action

The Council at the 184th meeting directed staff to work with NMFS and fishing industry representatives to further develop options for the SSLL fishery for Council consideration at the March 2021 meeting. The options paper presented at the 185th meeting in March 2021 included considerations for removing blue-dyed bait and strategic offal discharge from the SSLL seabird mitigation measures, allowing flexibility in setting time by requiring additional mitigation measures, and exploring a broader set of potential modifications. Based on input from Council advisory bodies and industry representatives and because conditions differ in the SSLL fishery as compared to the DSLL fishery, the Council will consider management action on the Hawaii SSLL fishery separately from this action at a later time.

Conversion of requirements to mirror international measures

This alternative was considered by the Council in the initial options paper prepared for the 184th meeting in December 2020. The menu approach implemented under the conservation measures for Western and Central Pacific Fisheries Commission (WCPFC) and the Inter-American Tropical Tuna Commission (IATTC) provides more flexibility for vessel operators to select mitigation methods that work best for their fishery. However, this approach may also allow vessel operators to use a combination of methods that may not be as effective as other combinations. Therefore, applying the WCPFC and IATTC menu approach may reduce the fleet-wide effectiveness of seabird mitigation measures in the Hawaii longline fishery. A limited set of menu options that eliminates the less effective measures is similar to what was considered by the Council at the 187th meeting in September 2021, with the exception of measures that are not considered practical for the deep-set fishery (i.e., night setting) or have not been tested in the fishery (i.e., hook pods).

Addressing cross-taxa impacts associated with weighted branch lines

This alternative was considered by the Council in the initial options paper prepared for the 184th meeting in December 2020. The intent of this alternative was to consider the impacts that the weighted branch line requirement may have on sharks and other protected species, as the Hawaii DSLL fishery has adapted to use wire leaders to reduce the risk of gear flyback, and to consider alternative weighting techniques or flyback prevention to reduce cross-taxa impacts resulting from seabird mitigation measures. Wire leaders may make it difficult to cut trailing gear from protected species and sharks when attempting to release the animal, and branchlines are often cut above the wire leader and animals released with the wire leader attached. Wire leaders also prevent sharks from biting off the leader line and releasing itself compared to when monofilament leaders are used. The HLA has since announced the voluntary conversion of wire leaders to monofilament nylon to reduce impacts to oceanic whitetip sharks, and the Council took final action at the 186th meeting in June 2021. NMFS developed regulations to prohibit wire leaders in the DSLL fishery (87 FR 25153, 04/28/2022) which became effective on May 31, 2022. Therefore, this alternative is no longer a priority for meeting the purpose and need of this action and was not considered further by the Council.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section describes the baseline condition of resources in the action area under recent fishery conditions. 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 2021 Pelagic FEP Stock Assessment and Fishery Ecosystem (SAFE) Report (WPRFMC 2022), the FEP (WPRFMC 2009), the NMFS species directory, the NMFS Stock SMART webpage (summaries of NMFS approved stock assessment reports), and other available information cited below.

3.1 Target and Non-Target Stocks

Pelagic management unit species (MUS) managed under the FEP that the Hawaii DSLL fishery harvests include several species of tuna, billfish, and sharks shown in Table 7. Released catch, retained catch, and total catch for the Hawaii DSLL fishery in 2021 are summarized in Table 8. These and other catch statistics for the DSLL longline fishery can be found in the 2021 SAFE report (WPRFMC 2022).

Action alternatives 2 and 3 focus entirely on gear and practices specifically associated with mitigating seabird interactions and would not affect the fishing gear and fishing operations associated with catching or avoiding target and non-target species other than seabirds. Therefore, much of the detailed information regarding these species is incorporated here by reference. For a comprehensive discussion of the biology, life history, factors that affect distribution and abundance of pelagic MUS, and other information, see the FEP (WPRFMC 2009) or search the NMFS species directory for a summary of species-specific information. Recent target and non-target catch data for the DSLL longline fishery is available in the 2021 Annual SAFE Report, along with a detailed summary of the environment affected by this action (WPRFMC 2022).

3.1.1 Status of the MUS in the DSLL fishery

Many of the MUS, or fish managed under the FEP are also managed under the international agreements governing the WCPFC and/or IATTC, to which the U.S. is a party. Both the WCPFC and IATTC have adopted criteria for ‘overfishing’ and ‘overfished’ designations for certain species that differ from those under the FEP. For the purposes of stock status determinations, NMFS determines stock status of pelagic MUS using the Status Determination Criteria (SDC) also known as limit reference points (LRPs) for overfishing and overfished conditions described in detail in the FEP and briefly below (WPRFMC 2009).

Overfishing occurs when fishing mortality (F) or the rate of fish killed by fishery harvest is higher than the level at which fishing produces maximum sustainable yield (MSY). MSY is the maximum long-term average yield that can be produced by a stock on a continuing basis. There is an ideal proportion of fish to catch that will produce MSY—this is called FMSY. In other words, if the proportion of fish caught (F) is greater than FMSY, overfishing is happening. Overfished designations refer to the biomass (B) of a population, or stock, of fish. This is the amount of fish in the water. A stock is overfished when B has fallen to a level substantially below what is necessary to produce MSY. So there are two aspects that managers must monitor to determine the status of a fishery: the level of F in relation to F at MSY (FMSY), and the level

of B in relation to B at MSY (BMSY). For more information on SDC and LRPs see section 5.4 of the FEP.

Table 7 shows the stock status of pelagic MUS measured against the SDCs of the FEP, based on the most recent stock assessment at the time of this publication. The current status of the stock represents the best scientific information available regarding the effects of past and present actions on the target and non-target stocks.

Table 7. Stock status of pelagic management unit species under the FEP.

Stock	Is overfishing occurring?	Is the stock overfished?	Assessment results
Skipjack Tuna; Western and Central Pacific Ocean (WCPO)	No	No	Vincent et al. (2019)
Skipjack Tuna; Eastern Pacific Ocean (EPO)	No	No	Maunder (2018)
Yellowfin Tuna (WCPO)	No	No	Vincent, et al 2021
Yellowfin Tuna (EPO)	No	No	Minte-Vera et al. (2020)
Albacore (S. Pacific)	No	No	Tremblay-Boyer et al. (2022)
Albacore (N. Pacific)	No	No	ISC (2020)
Bigeye Tuna (WCPO)	No	No	Ducharme-Barth et al. (2020)
Bigeye Tuna (EPO)	No	No	Minte-Vera et al. (2020a)
Pacific Bluefin Tuna	Yes	Yes	ISC (2020a)
Blue Marlin (Pacific)	No	No	ISC (2021)
Swordfish; Western and Central North Pacific Ocean (WCNPO)	No	No	ISC (2018)
Swordfish (EPO)	Yes	No	ISC (2014)
Striped Marlin WC (N. Pacific)	Yes	Yes	ISC (2019)
Striped Marlin; North East Pacific Ocean	No	No	Hinton and Maunder (2011)
Blue Shark (N. Pacific)	No	No	ISC (2019a)
Oceanic white-tip shark (WCPO)	Yes	Yes	Tremblay-Boyer et al. (2019)
Silky shark (WCPO)	Yes	No	Clarke et al. (2018)
Silky Shark (EPO)	Yes	No	Lennert-Cody et al. (2018)
Shortfin mako shark (N. Pacific)	No	No	ISC (2018a)
Common thresher shark (N. Pacific)	No	No	Teo et al. (2018)
Other Billfishes[1]	Unknown	Unknown	--
Other Pelagic Sharks[2]	Unknown	Unknown	--
Other PMUS[3]	Unknown	Unknown	--

[1]Black Marlin (Pacific), Shortbill Spearfish (Pacific), Sailfish (Pacific)
[2]Longfin Mako Shark (N. Pacific), Bigeye Thresher Shark (N. Pacific), Pelagic Thresher Shark (N. Pacific), Salmon Shark (N. Pacific)
[3]Dolphinfish (Pacific), Wahoo (Pacific), Opah (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)

For summary information on individual stock assessment results, as reported to the NOAA Fisheries Office of Science and Technology through the Species Information System, see the Stock SMART webpage and browse by stock. This information is based on the best scientific information available but does not represent all aspects of each individual stock assessment, status, or management situation. For the full final stock assessment report for each species see the downloadable .pdf under "Final Assessment Report" on the same webpage. More information on the status, life history, biology, and management for each species can be found by searching the NMFS species directory or by clicking on the hyperlink for each species in Table 7 above.

3.1.2 Summary of Hawaii Longline Fisheries Catch Statistics

Released catch, retained catch, and total catch for the Hawaii DSLL fishery in 2021 are summarized in Table 8. The information in this table is based on information reported in the NMFS Western Pacific Daily Longline Fishing Logs. These and other catch statistics for the DSLL fishery can be found in the 2021 SAFE report (WPRFMC 2022).

Table 8. Released catch, retained catch, and total catch for the Hawai`i-permitted DSLL fishery, 2021.

	Deep-set longline fishery			
	Released catch	**Percent released**	**Retained catch**	**Total Catch**
Tuna				
Albacore	301	2.4	12,231	12,532
Bigeye tuna	3,462	1.9	183,600	187,062
Bluefin tuna	0	0.0	7	7
Skipjack tuna	177	1.0	17,825	18,002
Yellowfin tuna	2,512	3.1	78,774	81,286
Other tunas	0	0.0	1	1
Tuna PMUS Subtotal	**6,452**	**2.2**	**292,438**	**298,890**
Billfish				
Swordfish	79	1.9	4,034	4,113
Blue marlin	63	1.0	6,184	6,247
Striped marlin	109	1.1	9,538	9,647
Shortbill spearfish	260	2.2	11,313	11,573
Other billfishes	11	1.6	684	695
Billfish PMUS Subtotal	522	1.6	31,753	32,275
Other PMUS				
Mahimahi	250	0.8	29,575	29,825
Wahoo	125	0.4	32,615	32,740
Moonfish	27	0.3	8,305	8,332
Oilfish	2,149	22.2	7,552	9,701
Pomfret	429	1.3	33,686	34,115
Other PMUS Subtotal	**2,980**	**2.6**	**111,733**	**114,713**

Non-PMUS fish	**8,935**	**96.9**	**289**	**9,224**
Total non-shark	**18,889**	**4.2**	**436,213**	**455,102**
PMUS Sharks				
Blue shark	100,076	100.0	0	100,076
Mako sharks	3,192	98.9	37	3,229
Thresher sharks	9,959	99.7	28	9,987
Oceanic whitetip shark	478	100.0	0	478
Silky shark	270	100.0	0	270
Shark PMUS Subtotal	**113,975**	**99.9**	**65**	**114,040**
Non-PMUS sharks	**194**	**100.0**	**0**	**194**
Grand Total	**133,058**	**23.4**	**436,278**	**569,336**

Source: WPRFMC (2022).

The estimated released catch, or bycatch, for the top 10 bycaught species of fish the Hawaii DSLL fishery in 2016-2020 are summarized in Table 9. The information in this table is based on the PIR Observer Program reporting for DSLL fishery. The top 10 species comprised 92.58% of total bycatch in 2020. These and other catch statistics for the DSLL fishery can be found in the 2021 SAFE report (WPRFMC 2022).

Table 9: Total estimated bycatch in number of fish for the top 10 bycatch species from the PIR Observer Program for the Hawaii deep-set longline fishery.

Species	2016	2017	2018	2019	2020
Longnose Lancetfish	229,791	230,048	309,551	275,802	288,339
Blue Shark	102,250	123,166	119,306	134,067	139,284
Snake Mackerel	110,655	120,432	79,308	49,481	43,862
Escolar	37,860	35,052	44,873	47,973	50,556
Bigeye Tuna	20,723	20,800	24,053	19,481	20,596
Bigeye Thresher Shark	11,639	9,551	6,519	10,399	9,754
Pelagic Stingray	6,958	6,608	7,234	10,949	9,357
Shortfin Mako Shark	6,205	8,184	8,834	7,362	7,052
Dagger Pomfret	6,464	7,443	8,188	8,929	5,667
Yellowfin Tuna	5,615	9,455	5,201	7,434	6,138

3.2 Protected Resources

The Hawaii DSLL fishery has the potential to interact with a range of protected species (such as sea turtles, marine mammals, sharks and rays, and seabirds). Action alternatives 2 and 3 address gear and practices specifically associated with mitigating seabird interactions, and would not affect the fishing gear and fishing operations associated with avoiding or mitigating interactions with other marine protected species. As such, this section focuses on seabird species and provides background on management authorities and associated monitoring, trends in species status, the recent annual estimated or observed interactions of the longline fisheries with seabird

species, and a summary of the effects of the standard operation of the deep-set fishery with a comparison to incidental take statements (ITS) where relevant. We will consider trends in species status and recent interaction levels to be the baseline condition for comparison of environmental effects of the alternatives in section 4.

For a comprehensive discussion of the biology, life history, factors that affect distribution and abundance of protected species, and other information, see the current NMFS BiOp for each species, the FEP (WPRFMC 2009), or search the NMFS species directory for a summary of species specific information. More detailed information on protected species interactions in the Hawaii DSLL fishery is in the 2021 Annual SAFE Report (WPRFMC 2022), incorporated here by reference.

3.2.1 Species Protected under the Endangered Species Act

The purpose of the Endangered Species Act (ESA) is to protect and recover imperiled species and the ecosystems upon which they depend. Section 7(a)(2) of the ESA requires each federal agency to insure 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 USFWS (for terrestrial, freshwater, and certain marine species including seabirds, or their designated critical habitat). The product of formal consultation is the relevant service's BiOp.

The ESA also prohibits the taking of listed species without a special exemption. "Take" as defined under the ESA means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Taking that is incidental to and not intended as part of a federal action is not considered to be prohibited taking under the ESA, provided that such taking is in compliance with the reasonable and prudent measures and terms and conditions of an ITS. An ITS is the part of a BiOp that specifies the extent to which a proposed action will result in the incidental taking of a threatened or endangered species and includes the measures that minimize the incidental taking's impact, as well as terms and conditions that implement the measures. The reasonable and prudent measures are nondiscretionary and must be undertaken by the federal agency for the take exemption to apply. For BiOps reaching a jeopardy or adverse modification conclusion, NMFS develops reasonable and prudent alternatives that would avoid the likelihood of jeopardy or adverse modification of critical habitat. Western Pacific fisheries authorized under the FEP operate in accordance with ITSs set by ESA consultations, including applicable reasonable and prudent measures, and their associated terms and conditions, intended to minimize the potential effects of incidental take.

The ESA species that occur in the action area of the DSLL fishery with the potential to interact with DSLL fishing operations are listed in Table 10. Detailed information and reports such as status reviews, 5-year reviews, and recovery plans for each species can found on the NMFS species directory, the FWS environmental conservation online system (ECOS) or by clicking on the hyperlink for each species in Table 10.

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

Species	ESA status
Sea Turtles	
Central North Pacific green turtle distinct population segment (DPS) (*Chelonia mydas*)	Threatened
East Pacific green turtle DPS (*Chelonia mydas*)	Threatened
Central South Pacific green turtle DPS (*Chelonia mydas*)	Endangered
Central West Pacific green turtle DPS (*Chelonia mydas*)	Endangered
East Indian-West Pacific green turtle DPS (*Chelonia mydas*)	Threatened
Southwest Pacific green turtle DPS (*Chelonia mydas*)	Threatened
Hawksbill turtle (*Eretmochelys imbricata*)	Endangered
Leatherback turtle (*Dermochelys coriacea*)	Endangered
North Pacific loggerhead turtle DPS (*Caretta caretta*)	Endangered
South Pacific loggerhead turtle DPS (*Caretta caretta*)	Endangered
Olive ridley turtle *(Lepidochelys olivacea*)	Threatened
Olive ridley turtle Mexico Pacific nesting population (*Lepidochelys olivacea*)	Endangered
Marine Mammals	
Blue whale (*Balaenoptera musculus*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Hawaiian monk seal (*Neomonachus schauinslandi*)	Endangered
Main Hawaiian Islands insular false killer whale (MHI IFKW) DPS (*Pseudorca crassidens*)	Endangered
North Pacific right whale (*Eubalaena japonica*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Sperm whale (*Physeter macrocephalus*)	Endangered
Guadalupe fur seal (*Arctocephalus townsendi*)	Threatened
Seabirds	
Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*)	Endangered
Newell's shearwater (*Puffinus auricularis newelli*)	Threatened
Short-tailed albatross (*Phoebastria albatrus*)	Endangered
Sharks and Rays	
Scalloped hammerhead Indo-West Pacific DPS (*Sphyrina lewini*)	Threatened
Scalloped hammerhead Eastern Pacific DPS (*Sphyrina lewini*)	Endangered
Oceanic white tip (Carcharhinus longimanus)	Threatened
Giant manta ray (*Manta birostris*)	Threatened
Marine Invertebrates	
Chambered nautilus (*Nautilus pompilius*)	Threatened

Source: https://www.fisheries.noaa.gov/species-directory and https://ecos.fws.gov/ecp/ accessed October 27, 2022.

This section summarizes much of the information contained in the following current BiOps to describe baseline conditions. NMFS previously evaluated the potential impacts of the fishery on

all ESA-listed species under NMFS jurisdiction, and any relevant designated critical habitat, and documented its determinations in the following list of BiOps under which the DSLL fishery currently operates:

- 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;

- NMFS. 2023. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion for the Authorization of the Hawaii Deep-Set Longline Fishery.

These documents can be found by clicking on the hyperlinks, by searching the following website, or by contacting NMFS using the contact information at the beginning of the document.

NMFS is required to reinitiate formal ESA Section 7 consultation under any of the following conditions:

- The amount or extent of the incidental take authorized in the current BiOp is exceeded;
- New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
- The agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in previous consultations; or
- A new species is listed or critical habitat designated that may be affected by the action.

NMFS Pacific Islands Regional Office Suitable Fisheries Division and USFWS met on October 4, 2021, to discuss the proposed action and whether it would warrant the reinitiation of consultation for the short-tailed albatross. Both agencies agreed that because the use of tori lines is considered as a potential take deterrent in the 2012 BiOp (USFWS 2012) and use of tori lines is expected to reduce potential impacts to short-tailed albatross relative to the current take mitigation methods (Chouloupka et al. 2021), this action did not warrant reinitiation of consultation.

NMFS reinitiated consultation for the DSLL fishery on October 4, 2018, due to reaching several reinitiation triggers including:

- Listing of the giant manta ray (83 FR 2916, January 22, 2018) and oceanic whitetip shark (83 FR 4153, January 30, 2018) as threatened species;
- Designation of critical habitat for the MHI IFKW; 83 FR 35062, July 24, 2018);
- and exceedance of the 2017 Supplement ITS for the East Pacific green sea turtle distinct population segment (DPS).

On May 18, 2023, NMFS issued a no-jeopardy BiOp (2023 BiOp) for the continued operation of the Hawaii deep-set pelagic longline fishery. NMFS determined that the fishery is not likely to jeopardize the continued existence of the threatened giant manta ray, threatened Indo-West Pacific DPS scalloped hammerhead shark; threatened oceanic whitetip shark; threatened Central North Pacific, East Indian-West Pacific, East Pacific, and Southwest Pacific DPSs of green sea turtles; endangered Central West Pacific and Central South Pacific DPSs of green sea turtles;

endangered leatherback sea turtles and North Pacific DPS loggerhead sea turtles; threatened and endangered populations of olive ridley sea turtles, endangered sperm whale, and endangered main Hawaiian Islands insular DPS false killer whale.

The 2023 BiOp also determined that following species and critical habitat are not likely to be adversely affected by the action: the black abalone, white abalone, Southern Resident killer whale, Central California coast coho salmon, Central Valley spring-run chinook salmon, Sacramento River winter-run Chinook salmon, Hawaiian monk seal, hawksbill sea turtle, Eastern Pacific scalloped hammerhead shark, California coast steelhead, California Central Valley steelhead, southern California coast steelhead, southern North American green sturgeon, blue whale, fin whale, Mexico humpback whale, North Pacific right whale, and sei whale, black abalone critical habitat, white abalone critical habitat, leatherback sea turtle critical habitat, Hawaiian monk seal critical habitat, and MHI IFKW critical habitat.

3.2.2 Species Protected under the Marine Mammal Protection Act

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). The MMPA requires NMFS to prepare and periodically review marine mammal stock assessments. See 16 U.S.C. § 1361, et seq.

Pursuant to the MMPA, NMFS has promulgated specific regulations that govern the incidental take of marine mammals during commercial fishing operations (50 CFR 229). Under Section 118 of the MMPA, NMFS must publish, at least annually, a List of Fisheries that classifies U.S. commercial fisheries into three categories, based on relative frequency of incidental mortality and serious injury to marine mammals in each fishery.

According to the 2023 List of Fisheries (88 FR 16899, March 21, 2023), the Hawaii DSLL fishery is a Category I fishery. Among other requirements, owners of vessels or gear engaging in a Category I fishery are required under 50 CFR 229.4 to obtain a marine mammal authorization to lawfully, incidentally take non-ESA listed marine mammals by registering with NMFS' marine mammal authorization program.

Section 118 of the MMPA requires NMFS to prepare a take reduction plan for each strategic marine mammal stock that interacts with a Category I or Category II fishery. NMFS established the False Killer Whale Take Reduction Team in 2010 (75 FR 2853) and implemented the False killer whale take reduction plan (FKWTRP) in 2012 (72 FR 71260) to reduce mortalities and serious injuries (M&SI) of false killer whales in the Hawaii DSLL fishery.

Section 101(a)(5)(E) of the MMPA requires the Secretary of Commerce to allow the incidental, but not intentional, taking in the course of commercial fishing operations of individuals from marine mammal stocks that are designated as depleted because they are listed as threatened or endangered under the ESA in the course of commercial fishing operations if certain criteria are met.

On May 6, 2021, NMFS issued a permit under the MMPA Section 101(a)(5)(E), addressing the Hawaii deep-set fishery's interactions with ESA-listed species or depleted stocks of marine mammals (86 FR 24384). The permit authorizes the incidental, but not intentional, taking of ESA-listed humpback whales (central North Pacific or CNP stock) and MHI insular false killer whales to vessels registered in the Hawaii DSLL fishery. In issuing the permit, NMFS determined that incidental taking by the deep-set fishery will have a negligible impact on the affected stocks of marine mammals. The humpback whale CNP stock delineation under the MMPA includes both ESA-listed and non-ESA-listed distinct population segments. However, any potential overlap of the deep-set fishery with humpback whales is with the Hawaii distinct population segment, which is no longer listed under the ESA (81 FR 62259, September 8, 2016).

Additional information on the marine mammals that interact with FEP fisheries are described in section 3.2.7, below.

3.2.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) makes it illegal to intentionally take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid Federal permit. On January 7, 2021, the USFWS published a final rule (effective February 8, 2021) defining the scope of the MBTA as it applies to conduct resulting in the injury or death of migratory birds protected by the MBTA (86 FR 1134). In that January 2021 rule, USFWS determined that the MBTA's prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same, apply only to actions directed at migratory birds, their nests, or their eggs. On October 4, 2021, USFWS published a final rule (effective December 3, 2021) revoking the January 2021 rule, and returning the implementation of the MBTA as prohibiting incidental take and applying enforcement discretion consistent to USFWS practice prior to 2017 (86 FR 54642). NMFS and the Council continue to monitor interactions with seabirds and have implemented take mitigation measures.

Additional information on the seabirds that interact with FEP fisheries are described in section 3.2.5, below.

3.2.4 Monitoring

NMFS monitors fishery interactions with protected species using at-sea observers, among other means. NMFS PIR Observer Program monitors interactions on approximately 20% of all Hawaii DSLL trips. PIFSC generates fleet-wide estimates of interactions for each longline fishery using data collected on observed trips (see WPRFMC 2022 and McCraken and Cooper 2021). When these estimates are not available, NMFS estimates fleet-wide interactions by expanding observed takes using an expansion factor based on the observer coverage rate. For example, if the Hawaii DSLL fishery was observed at a 20.4 percent coverage rate, NMFS would multiply each observed interaction by 4.9 to estimate interactions at a 100 percent coverage rate.

3.2.5 Seabirds

The endangered short-tailed albatross, threatened Newell's shearwater, and endangered Hawaiian dark-rumped petrel have ranges that overlap the fishing grounds of the Hawaii DSLL

fishery. Since NMFS initiated the observer programs in the Hawaii longline fishery in 1994, there have been no observed interactions between ESA-listed seabird species and the fishery. A comprehensive description of the species' distribution, population status, threats, and recovery strategy can be found in the species' recovery plans at USFWS ECOS. As described in section 3.2.3, all seabirds are also protected under the MBTA.

In addition to the ESA-listed seabirds, the Hawaii longline fisheries occasionally interact with other seabirds such as albatrosses (BFAL and LAAL), Northern fulmar, sooty shearwaters, and gulls. International status of both BFAL and LAAL is monitored by the ACAP, and currently BFAL and LAAL populations' trends continue to be positive. The BFAL population exhibited an increasing trend from 1996 to 2019, with a breeding population of approximately 70,524 pairs in 2019 (ACAP 2021). The LAAL population was stable from 1996 to 2016, and increasing from 2016 to 2019 with a breeding pair population of 806,693 pairs in 2019 (ACAP 2021). The Hawaii DSLL fishery has a low level of interactions with the BFAL and LAAL species compared to the number of breeding pairs. Based on the population estimates, the fisheries likely have very little effect on these populations.

On October 7, 2011, in response to a petition to list the BFAL under the ESA, the FWS found that the Hawaiian Islands breeding population and the Japanese Islands breeding population of the BFAL are separate DPS, as defined by the DPS policy (76 FR 62503). However, the USFWS also found that neither DPS of the BFAL warranted listing under the ESA. The USFWS observed that fisheries should continue to minimize BFAL bycatch through implementing effective bycatch minimization measures, and concluded that Hawaii-based longline fishing is not a significant threat to the BFAL.

NMFS consulted with the USFWS on effects to endangered short-tailed albatross from the Hawaii longline fisheries in a 2012 BiOp (FWS 2012). FWS had conducted a population viability analysis in 1999, which found that an annual loss of about 82 sub-adult and 12 adult short-tailed albatross 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. After considering a range of potential effects to seabirds, FWS determined that the DSLL fishery might affect short-tailed albatross and authorized the take of two short-tailed albatrosses, even though there were no documented interactions with this species.

For purposes of the analysis, USFWS used the BFAL as a proxy species for the short-tailed albatross, modeling annual take based on the average 2004-2010 rate of BFAL interactions. USFWS estimated 76.9 annual injuries and mortalities of BFALs. Accounting for a fall-off rate (seabirds that are observed hooked during gear setting but are not present upon retrieval) of 31% (Gilman et al. 2008), USFWS converted the average interactions to a proportion of the overall BFAL population. USFWS adjusted this proportion for the short-tailed albatross population using the fraction of the short-tailed albatross range that overlaps with the Hawaii-based longline fishery and the most recent population assessment comparable to BFAL data. The estimated take of short-tailed albatrosses based on historical data, scaled to the area of overlap between the species' range and the fishery, is 0.21 albatross per year or more than one (1.07) albatross over five years (FWS 2012). This is 0.0066 percent of the population (proportion of the population = 0.21/3181 = .000066). Based on this information, USFWS concluded that the DSLL fishery in Hawaii may slow population growth of short-tailed albatross, but is not anticipated to jeopardize

the continued existence of the species (USFWS 2012). More recently, the short-tailed albatross population was estimated at 7,365 individuals in 2019 (FWS 2020). NMFS PIRO SFD and USFWS met on October 4, 2021, and determined that the proposed action does not warrant the reinitiation of consultation for the short-tailed albatross (Section 3.2.1).

Seabirds are vulnerable to fisheries through hooking and entanglement, which may result in injury or mortality. Seabirds are likely to drown if the interaction occurs during gear deployment (setting), but seabirds may be released alive when fishermen promptly apply seabird handling and release techniques during gear retrieval (hauling). Albatrosses that forage by diving are some of the most vulnerable species to bycatch in fisheries (Brothers et al. 1999). These species are long-lived, have delayed sexual maturity, small clutches and long generation times, resulting in populations that are highly sensitive to changes in adult mortality. Twenty of the world's 21 albatross species are at least near threatened with extinction according to the International Union for Conservation of Nature (IUCN 2017), and incidental catch in fisheries, especially longline fisheries, is considered one of the principal threats to many of these species (Veran et al. 2007).

The Council and NMFS mitigate the potential for seabird interactions and seabird injury in longline fisheries permitted under the FEP through several measures as described in section 3.4.1. More information on current requirements can be found in the Hawaii Pelagic Regulation Summary (NMFS 2022a). The WCPFC agreed to similar mitigation measures for longline vessels greater than 24 meters in overall length north of 23° N, effective June 30, 2008 (WCPFC 2007) and for vessels shorter than 24 m in 2017 (WCPFC 2017). See section 3.4.1 for more details on seabird mitigation measures under regional fishery management organizations.

Table 11 contains the numbers of LAAL and BFAL that have interacted with the Hawaii DSLL fisheries from 2011 through 2021 based on observed interactions by the PIR Observer Program. On average, over 90% of the interactions are observed dead, which represent interactions that occur during the setting operations. In addition, from 2011 through 2021, the deep-set fishery has interacted with a small number of booby, shearwater, and gull species (WPRFMC 2022), but these interactions represented less than 2% of seabird interactions in the Hawaii deep-set fishery in 2020 (NMFS 2021). Alternatively, about 98% of seabird interactions in the fishery are albatross species, which this action is targeted to mitigate.

Table 11: Observed interactions, estimated total interactions, and percent of dead seabirds in observed interactions with Laysan and BFALs in the Hawaii DSLL fisheries, 2011-2021.

Year	LAAL				BFAL			
	Obs. total	Obs. dead	Est. Total	% dead	Obs. total	Obs. dead	Est. Total	% dead
2011	32	31	187	96.9%	13	12	73	92.3%
2012	30	25	136	83.3%	35	35	167	100.0%
2013	48	46	236	95.8%	50	47	257	94.0%
2014	13	10	77	76.9%	32	29	175	90.6%
2015	24	22	119	91.7%	107	92	541	86.0%
2016	34	32	166	94.1%	104	99	485	95.2%
2017	38	38	226	100.0%	97	85	475	87.6%
2018	33	29	157	87.9%	194	168	931	86.6%

2019	45	44	231	97.8%	146	139	767	95.2%
2020	59	55	387	93.2%	96	87	630	90.6%
2021	38	35	213	92.1%	87	80	488	92.0%
5 yr average	**42.6**	**40.2**	**242.8**	**94.2%**	**124**	**111.8**	**658.2**	**90.4%**

Source: WPRFMC (2022), McCracken and Cooper (2021)

A BFAL population model indicated that the recent increase in albatross interactions is unlikely to significantly affect population growth as long as the increase is limited to the Hawaii longline fishery or is episodic (Bakker and Finkelstein 2021). While reliable North Pacific-wide bycatch estimates are not available, available information on Alaska fisheries bycatch suggest that the 2015-2016 increase in BFAL interactions is unlikely to be basin-wide (Hyrenbach et al. 2021).

3.2.6 Sea Turtles

Table 10 lists ESA-listed sea turtle species that have been observed or may occur in the area where DSLL fishery operates. All sea turtles, being air-breathers, are typically found closer to the surface, i.e., in the upper 100 m of the ocean's surface. Some turtles, however, are also susceptible to hooking and entanglement by Hawaii DSLL gear because of deeper foraging behaviors.

In addition to the BiOps listed in the previous section, more detailed information, including the range, abundance, status, and threats of the listed sea turtles, can be found in the status reviews, 5-year reviews, and recovery plans for each species found on the NMFS species directory or clicking on the hyperlink for each species in Table 10.

The Council and NMFS manage the longline fisheries permitted under the FEP through several measures that mitigate the potential for turtle interactions and injury. These measures include training and handling requirements for reducing the severity of interactions, 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. A summary of current management requirements applicable to DSLL vessels can be found in the Hawaii Pelagic Regulation Summary (NMFS 2022a). As a non-regulatory measure, PIRO funds marine sea turtle management and recovery projects to contribute to recovery efforts for ESA-listed sea turtles.

After considering a range of potential effects to sea turtles, NMFS determined in the 2023 BiOp that the operation of the Hawaii DSLL fishery in accordance with the FEP and implementing regulations, is not likely to jeopardize the continued existence of any ESA listed sea turtles. NMFS anticipates the incidental take of 77 green sea turtles, 92 leatherback sea turtles, 43 loggerhead sea turtles, and 592 olive ridley sea turtles by the Hawaii DSLL fishery over the course of 5 years. Should the amount or extent of incidental take be exceeded, NMFS would be required to reinitiate consultation for the continued authorization of the Hawaii DSLL fishery.

Table 12 summarizes the fleet-wide sea turtle interaction estimates for the Hawaii DSLL fishery from 2010 through 2021 and Table 13 summarizes sea turtle interactions, mortalities, and population level impacts in the Hawaii DSLL fleet.

Table 12. Annual sea turtles interactions (takes) expanded from observed data to fleet-wide estimates for the Hawaii DSLL fishery, 2010-2020.

Year	Sea Turtle Species				
	Green	Leatherback	Loggerhead	Olive Ridley	Unidentified hardshell
2010	1	6	6	10	0
2011	5	14	0	36	0
2012	0	6	0	34	0
2013	5	15	11	42	0
2014	16	38	0	50	0
2015	4	18	9	69	0
2016	5	15	7	162	5
2017	18	0	12	119	0
2018	17	12	4	96	0
2019	12	14	0	138	0
2020	13	31	19	79	0
2021	17	8	5	46	0

Source: WPRFMC (2022).

Table 13. Sea turtle interactions, mortalities, and population level impacts in the Hawaii DSLL fleet.

DPS	Annual Interactions	Annual Mortalities	ANE	Nester abundance	Proportion of nesting population	Years to adult female mortality
Green	40	37				
East Pacific DPS	32	NA	0.4	20,112	0.00002	2.5
Central North Pacific DPS	18	NA	0.2	3,846	0.00005	5
East Indian-West Pacific DPS	12	NA	0.14	77,009	0.00001	7.14
Southwest Pacific DPS	10	NA	0.11	83,058	0.00001	9.09
Central West Pacific DPS	8	NA	0.09	6,518	0.00001	11.11
Central South Pacific DPS	10	NA	0.11	2,677	0.00004	9.09
Leatherback						
Western Pacific	41	17	3.04	2,750	0.00111	0.33
Eastern Pacific	3	1	0.22	1,000	NA	4.55
North Pacific Loggerhead DPS	28	18	1.77	8,632	0.00019	0.56
Olive Ridley						
Eastern Pacific DPS	132	124	35.7	1,000,000	0.00004	0.03
Western Pacific DPS	48	45	13.0	205,000	0.00006	0.08

Source: NMFS (2018a)

3.2.7 Marine Mammals

Table 10 lists ESA-listed marine mammal species that have been observed or may occur in the area where DSLL fishery operates. Marine mammals not listed under the ESA that may occur in the region and that may be affected by the fisheries managed under the FEP include the following species:

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

Detailed information on these species' geographic range, abundance, bycatch estimates, and status can be found in the most recent stock assessment reports (SARs). Additional, recent information on ESA listed species may be found on the NMFS species directory or by clicking on the hyperlink for each species in Table 10

Marine mammals are primarily vulnerable to Hawaii DSLL fishery through hooking and entanglement. Although blue whales, North Pacific right whales, and sei whales occur within the action area and could potentially interact with the FEP fisheries, fishermen and observers have not reported any incidental hooking or entanglements of these species in the Hawaii deep-set fishery. Other potential impacts to marine mammals from the operation of fisheries include collisions with vessels, exposure to waste and discharge, and disturbance from human activity and equipment.

The Council and NMFS manage the longline fisheries permitted under the FEP through several measures that mitigate the potential for marine mammal interactions and injury if interactions

occur. 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 on interaction mitigation techniques. Longline vessel owners and operators must post a NMFS-approved placard with marine mammal handling and/or release procedures in a conspicuous location on their vessels and crew must be supervised by the longline vessel operator during marine mammal handling and release procedures.

In the Hawaii DSLL fishery, circle hooks must have a wire diameter not exceeding 4.5 mm and leaders and branch lines must have a diameter of 2.0 mm or larger if made of monofilament nylon or, if another material, have a breaking strength of at least 400 lb. These Hawaii DSLL fishery gear requirements are meant to allow marine mammals to straighten the hook and release themselves if accidentally hooked. All incidental mortality and injury of marine mammals during commercial fishery operations must be reported within 48 hours after the end of a fishing trip where mortality or injury occurs. 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. A summary of current management requirements applicable to DSLL vessels can be found in the Hawaii Pelagic Longline Regulation Summary (NMFS 2022a).

NMFS determined in the 2023 BiOp that the operation of the Hawaii DSLL fishery in accordance with the FEP and implementing regulations, is not likely to jeopardize the continued existence of any listed marine mammals. NMFS anticipates the incidental take of 6 endangered sperm whales, and approximately 1 (0.427) endangered MHI IFKW by the DSLL fishery over the course of 5 years. Should the amount or extent of incidental take be exceeded, NMFS would be required to reinitiate consultation for the continued authorization of the Hawaii DSLL fishery. NMFS determined the DSLL fishery will have a negligible impact on ESA-listed marine mammal species for the purposes of issuing a permit under MMPA (Docket 2020-0096). Correspondingly, NMFS issued an MMPA permit covering the DSLL effective for a three-year period beginning May 6, 2021(86 FR 24384). Table 14 shows the fleet-wide marine mammal interaction estimates for the Hawaii DSLL fishery from 2011 through 2021.

Table 14. Estimated annual marine mammal interactions (including mortalities, and serious and non-serious injuries) with the Hawaii DSLL fishery from 20011-2021.

Species	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Risso's dolphin	0	0	0	0	10	0	5	0	7	16	0
Short-finned pilot whale	0	0	4	0	4	0	0	0	0	0	6
Blainville's beaked whale	0	0	0	0	0	0	0	0	0	0	0
False killer whale	10	15	22	55	21	39	45	49	75	22	84
Pantropical spotted dolphin	0	0	0	0	0	0	0	0	0	0	0
Striped dolphin	4	0	0	0	4[3]	0	0	0	0	0	0
Bottlenose dolphin	0	0	11	0	0	5	7	3	0	10	17
Pigmy killer whale	0	0	5	0	0	0	0	0	0	0	0
Kogia species	0	0	0	10	0	0	0	0	0	4	0

Species	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Humpback whale	0	0	0	5	0	0	0	0	0	0	0
Sperm whale	6	0	0	0	0	0	0	0	0	0	0
Rough-toothed dolphin	0	0	5	0	0	5	0	0	4	29	11
Unidentified cetacean[2]	10	10	10	10	5	10	20	20	15	26	22
Unidentified whale[2]	0	0	0	0	1[3]	0	0	0	0	0	0
Unidentified dolphin[2]	0	0	0	0	5	0	0	0	0	0	0
Unidentified beaked whale[2]	0	0	0	0	0	5	0	0	5	7	0

[1]2021 estimates expanded by multiplying observed interactions by expansion factor based on observer coverage in 2021. Fractional estimates are rounded up to nearest whole number. Because preliminary observed interactions are reported by date of trip arrival and observer coverage rates are reported by date of trip departure, interaction data may vary from other sources.
[2]Unidentified species identification based on PIR Observer Program classifications. Unidentified cetacean species refers to a marine mammal not including pinnipeds (seal or sea lion); unidentified whale refers to a large whale; and unidentified dolphin refers to a small cetacean with a visible beak. Further classifications based on observer description, sketches, photos and videos may be available from PIFSC.
[3]This dolphin was later identified as a striped dolphin but is listed as an unidentified dolphin in the 2015 Annual Observer Report.
Source: WPRFMC (2022)

NMFS monitors the effects of the fishery on non-ESA listed marine mammals through comparison of the average level of interactions which result in M&SI to a stock's potential biological removal (PBR). For most marine mammal stocks where the PBR is available, the number of observed takes of marine mammal species in the DSLL fishery inside the U.S. EEZ around Hawaii is well below the PBR in the time period covered by the most current stock assessment report (Table 15).

Table 15. Mean estimated annual M&SI and PBR by marine mammal stocks with observed interactions in the Hawaii DSLL fishery.

Stock	Years Included in Draft 2020 SAR and the Draft 2021 SAR	Outside EEZ[a]	Inside EEZ[b]	
		Mean Estimated Annual M&SI	Mean Estimated Annual M&SI	PBR (Inside EEZ only)
Bottlenose dolphin, HI Pelagic	2014-2018	3.0	0	undetermined
Pantropical spotted dolphin, HI Pelagic	2014-2018	0	0	265
Rough-toothed dolphin, HI	2014-2018	1.0	0	548
Risso's dolphin, HI	2014-2018	2.9	0	61
Striped dolphin, HI	2014-2018	0.4	0	291
Blainville's beaked whale, HI	2014-2018	0	0	5.6
False killer whale, MHI Insular	2014-2018	N/A	0.2	0.3
False killer whale, HI Pelagic	2014-2018	28.8	9.8	16
False killer whale, NWHI	2014-2018	N/A	0.01	1.4
False killer whale, Palmyra Atoll	2006-2010	N/A	0.3	6.4
Kogia spp. whale (Pygmy or dwarf sperm whale), HI	2014-2018	Pygmy = 0 Dwarf = 0	Pygmy = 0 Dwarf = 0	Pygmy = 257 Dwarf = undetermined
Pygmy killer whale, HI	2014-2018	0	1.1	56

Short-finned pilot whale, HI	2014-2018	1.4	0.9	87
Humpback whale, Central North Pacific	2014-2018[d]	0.9		83[c]
Sperm whale, HI	2014-2018	0	0	18

[a] PBR estimates are not available for portions of the stock outside of the U.S. EEZ around Hawaii, except for the Central North Pacific stock of humpback whales for which PBR applies to the entire stock.
[b] PBR estimates are only available for portions of the stock within the U.S. EEZ around Hawaii.
[c] PBR for the Central North Pacific stock for humpback whales apply to the entire stock.
[d] 2019 SAR.
Source: WPRFMC (2022)

False killer whales have interacted with DSLL gear more than other marine mammal species and NMFS has implemented changes to the operations of the fishery based on the recommendations of the False Killer Whale Take Reduction Team to reduce incidental interactions. The mitigation requirements include the gear specifications mentioned above, a permanently closed area around the MHI, and an EEZ interaction limit, which, when reached, triggers a southern longline fishing exclusion zone (see 50 CFR 229.37). Readers seeking more information may read the 2012 FKWTRP (77 FR 1260).

3.2.8 Sharks and Rays

Table 10 lists ESA-listed shark or ray (elasmobranch) species that have been observed or may occur in the area where DSLL fishery operates. Sharks and rays are vulnerable to longline fisheries through hooking and entanglement. Additional, recent information on ESA listed species may be found on the NMFS species directory or by clicking on the hyperlink for each species in Table 10. Table 16 shows the fleet-wide interaction estimates for the Hawaii DSLL fishery with ESA-listed sharks and rays from 2010-2021.

Table 16. Estimated total ESA-listed shark and ray interactions with the Hawaii DSLL fishery for 2010-2021.

Year	Scalloped Hammerhead	Oceanic Whitetip	Giant Manta Ray
2010	0	1,198	95
2011	0	1,176	5
2012	0	878	11
2013	0	973	5
2014	0	1,670	11
2015	0	2,654	10
2016	0	2,188	22
2017	0	1,257	0
2018	0	1,092	3
2019	0	2,125	0
2020	0	1,980	7
2021	0	TBA	0

Source: WPRFMC (2022)

NMFS determined in the 2023 BiOp that the operation of the Hawaii DSLL fishery in accordance with the FEP and implementing regulations, is not likely to jeopardize the continued

existence of the threatened giant manta ray, threatened Indo-West Pacific scalloped hammerhead, or threatened oceanic whitetip shark. NMFS anticipates the incidental take of 181 giant manta rays, and 14 Indo-West Pacific scalloped hammerhead sharks, and 10,589 oceanic whitetip sharks by the DSLL fishery over the course of 5 years. Should the amount or extent of incidental take be exceeded, NMFS would be required to reinitiate consultation for the continued authorization of the Hawaii DSLL fishery.

The terms and conditions of the 2023 BiOp require that NMFS SFD implement measures to minimize the amount of trailing gear left on ESA-listed species to the maximum extent practicable to reduce the amount of injury and harm, the likelihood of further gear entanglement or entrapment, and improve the post-release mortality of ESA-listed species. They also require that NMFS SFD shall require species handling training for crew members and at a minimum have one trained person on deck who directs and oversees activities of the vessel when retrieving fishing gear.

In an effort to improve post-hooking survival of oceanic whitetip sharks unintentionally caught in the FEP longline fisheries, NMFS published a final rule prohibiting the use of wire leaders, specifically steel wire line, within 1 meter of the hook, in the Hawaii DSLL fishery (87 FR 25153). This rule became effective on May 31, 2022, and is expected to reduced oceanic whitetip shark catch at retrieval by approximately 32% from bite-offs and mortality by approximately 30% from bite-offs and reduced post-release mortality (Bigelow and Carvalho 2021).

3.2.9 Chambered Nautilus

DSLL vessels avoid deploying gear in areas where chambered nautilus may occur; the animals live in close association with the substrate on coral reefs, fore reefs, and deep reef slopes, which fishermen avoid to reduce the potential for loss of gear. This minimizes the risk of hooking and entanglement. Vessel strikes from transiting are unlikely, as the longline fishery avoids shallow areas to protect the vessel's hull. Pelagic longline vessels do not anchor and therefore there are no impacts from anchoring or impacts to habitat from anchoring. Finally, discharge of pollutants from vessels will likely be infrequent, small, and quickly diluted or dispersed during transit and fishing operations. Due to the spatial separation between the fishery and the habitat of chambered nautilus and the reasons described above, NMFS expects that impacts to chambered nautilus from the operation of the fishery are extremely unlikely to occur (NMFS 2019).

3.2.10 Marine Habitat and Protected Areas

Under the baseline, FEP longline fisheries are not known to have adverse effects on marine habitats. Fishing does not occur in any area designated as critical habitat, besides MHI insular false killer whale (MHI IFKW) habitat (83 FR 35062, effective August 28, 2018). MHI IFKW critical habitat is defined as the specific areas within the action area that are occupied by MHI IFKW and their prey species and that contain physical or biological features essential to conservation of the species. Currently only 5.4% of the MHI IFKWs' range overlaps with active commercial longline fishing area. A recovery status review (NOAA Fisheries 2021) for the MHI IFKW was completed in August 2021 that updated the 2010 Status Review Report (Oleson et al. 2010) and provided detailed information on MHI IFKW biology, ecology, status and threats, and conservation efforts. In the 2021 review, the treatment of prey competition within the

commercial longline fisheries was listed in the categories of least relative concern and was downgraded to a low to moderate threat from a moderate threat in the 2010 report.

Longline fishing does not occur in marine protected areas (MPA), marine sanctuaries, or marine monuments so marine protected areas would not be affected. Longline fishing involves suspending baited hooks in the upper surface layers of the water column, which does not materially affect benthic marine habitat under typical operations. Derelict longline gear may impact marine benthic habitats, especially substrate such as corals if carried by currents to shallow depths. When fishing, all longline fishers occasionally lose hooks, mainline, floats, float lines, and branch lines, which include lead weights in the deep-set fishery.

3.2.11 Essential Fish Habitat

The Magnuson-Stevens Act defines essential fish habitat (EFH) as those waters and substrate necessary for federally managed species to spawn, breed, feed, and/or grow to maturity. Federal agencies whose action may adversely affect EFH must consult with NMFS in order to conserve and enhance federal fisheries habitat. Habitat areas of particular concern (HAPC) are subsets of EFH that merit special conservation attention because they meet at least one of the following four considerations:

1) provide important ecological function;
2) are sensitive to environmental degradation;
3) include a habitat type that is/will be stressed by development;
4) include a habitat type that is rare.

HAPC are afforded the same regulatory protection as EFH and do not exclude activities from occurring in the area, such as fishing, diving, swimming or surfing.

An “adverse effect” to EFH is anything that reduces the quantity and/or quality of EFH. It may include a wide variety of impacts such as:

1) direct impacts (e.g., contamination or physical disruption);
2) indirect impacts (e.g., loss of prey, reduction in species’ fecundity); or site-specific/habitat wide impacts, including individual, cumulative or synergistic consequences of actions.

NMFS considers all EFH in determining whether a proposed fishery management action may affect EFH. Under the baseline, FEP DSLL fisheries are known to interact only with the Pelagic EFH and HAPC for all pelagic tropical and temperate species. This EFP designation includes the water column down to a depth of 200 m (100 fm) from the shoreline to the outer limit of the EEZ for egg and larval stage pelagic species and the water column down to a depth of 1,000 m (500 fm) for juvenile and adult stage pelagic species. This HAPC designation includes the water column from the surface down to a depth of 1,000 m (500 fm) above all seamounts and banks with summits shallower that 2,000 m (1,000 fm) within the EEZ. The Hawaii DSLL fishery is not known to adversely affect EFH or HAPC.

3.3 Socioeconomic Setting

The socioeconomic setting for the Hawaii DSLL fishery is described below. A more detailed description of the fishery and the latest socio-economic statistics can be found in the FEP Annual SAFE Reports.

Longline is a type of fishing gear consisting of a mainline that exceeds 1 nm (6,076 ft) in length that is suspended horizontally in the water column, from which branch lines with hooks are attached. Longline deployment is referred to as "setting," and the gear, once deployed, is referred to as a "set." Sets are normally left drifting for several hours before they are retrieved, along with any catch. In DSLL fishing, the gear is configured so that hooks fall below 100 m to target deeper-dwelling tunas.

Domestic longline fishing around Hawaii consists of the SSLL sector and the DSLL sector, subject to separate mitigation measures based on the characteristics of the fishing activity. The DSLL fishery targets bigeye tuna in the EEZ around Hawaii and on the high seas at an average target depth of 167 m (WPRFMC 2009). The SSLL fishery targets swordfish to the north of the Hawaiian Islands. NMFS and the Council manage the fisheries under a single limited-access permit program. Some Hawaii-permitted vessels also hold American Samoa longline permits. There are currently (October 26, 2022) 20 dual-permitted vessels based on NOAA's Pacific Islands Permit Holders webpage. Dual-permitted vessels land their catch in Hawaii or American Samoa.

The DSLL fishery operates in the deep, pelagic waters around the Hawaiian archipelago and on the high seas throughout the year, mostly within 300-400 nm (556-741 km) of the MHI. However, federal regulations and other applicable laws prohibit longline fishing inside the 200 nm U.S. EEZ around the Northwestern Hawaiian Islands. Longline fishing within 50 to 75 nm from the shoreline in the MHI is prohibited to minimize the potential for gear conflicts with small boat fisheries and interactions with protected species.

Some limited longline fishing occurred in the U.S. EEZ around the PRIA of Kingman Reef and Palmyra Atoll (5° N) prior to 2016. Figure 7 shows the distribution of fishing effort by the Hawaii DSLL fleet as the annual average number of hooks set per 5 degree square in millions of hooks over 2021 as compared to 2011-2020. The distribution of fishing operations over the fishing grounds varies seasonally and from year-to-year.

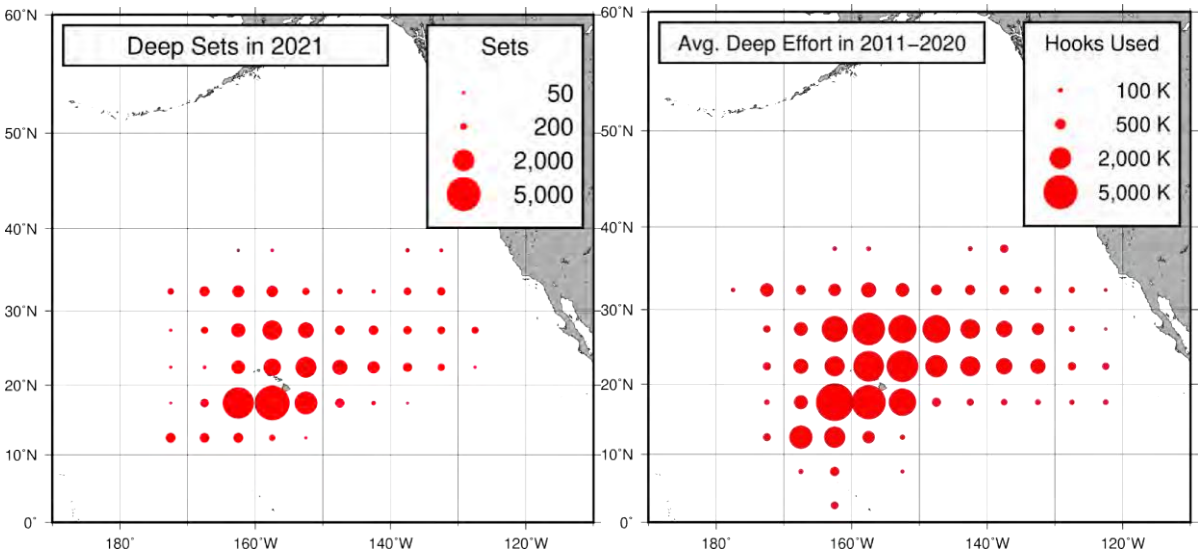

Figure 7. Distribution of deep-set fishing effort (hooks deployed) in 2021 (left panel) and for the 2011-2020 period (right panel). Source: NMFS 2022b

Fishing effort in the Hawaii DSLL fishery has increased over the years. From 2004-2012, the annual number of vessels that participated in the deep-set fishery remained relatively stable, ranging from 124 to 129. The number of active vessels has increased since 2012, with an average of 146 vessels operating over the last five years (2017-2021). In 2021, 146 DSLL vessels made 1,690 trips with 22,192 sets and deployed 65.4 million hooks (Table 17).

Table 17. Number of active longline vessels and fishing effort in the Hawaii deep-set fishery, 2010-2021.

Year	Vessels making deep-sets	Deep-set fishing effort (millions of hooks)	Deep-set fishing effort (trips)	Deep-set fishing effort (sets)
2010	122	37.2	1,206	16,075
2011	129	40.8	1,308	17,192
2012	128	44.1	1,361	18,115
2013	135	46.9	1,383	18,754
2014	139	45.6	1,350	17,777
2015	142	47.5	1,447	18,470
2016	142	51.1	1,480	19,391
2017	145	53.6	1,539	19,674
2018	143	58.6	1,643	21,012
2019	150	63.2	1,724	22,513
2020	146	59.7	1,644	20,785
2021	146	65.4	1,690	22,192

Source: WPRFMC (2022)

In 2021, Hawaii-based DSLL vessels landed approximately 26.8 million pounds of pelagic fish, with a record high ex-vessel revenue of $108.5 million, or an average of $743,000 per vessel. This was a decrease from the average landings of 28.5 million pounds over 2011-2020 valued at

$94.4 million in inflation-adjusted dollars (WPRFMC 2021). The increase in revenue in 2021 from $73.5 million in 2020 is partially attributed to a substantial decrease observed in 2020 associated to the COVID pandemic. Revenue declined in 2020 about 24% from $94.3 million in 2019. Average price per pound of pelagic species also increased by $0.90 from 2020 to 2021 while total pelagic fishery ex-vessel revenue increased from $83.4 million to $124.4 million. The average trip cost for a DSLL trip was $26,638 in 2021. Of this cost 49% represented fuel cost, 26% represented bait cost, and 10% ($2,664 per trip or $26,638 per year) represented gear cost (WPRFMC 2022).

3.4 Management Setting

The DSLL and SSLL fisheries are managed under as a single limited access fishery with a maximum of 164 vessel permits. The deep-set fishery is monitored at approximately 20% 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 (OLE) and U.S. Coast Guard enforce these regulations for all Hawaii permitted vessels. A summary of current management requirements applicable to DSLL vessels can be found in the Hawaii Pelagic Longline Regulation Summary (NMFS 2022a). For the complete official fishing regulations, refer to Title 50, Code of Federal Regulations (CFR), Parts 229, 300, 404, 600, and 665. A detailed description of the management setting for the deep-set fishery can also be found in the FEP (WPRFMC 2009). Current seabird mitigaion meausres applicable to the Hawaii DSLL fishery are described in section 1.5.

NMFS also conducts management activities relevant to managing the longline fisheries as a whole. These include the ESA listing process, the ESA consultation process, and conducting status reviews and recovery planning under the ESA. NMFS also manages the Hawaii longline fishery through a take reduction team to reduce interactions with false killer whales. These management processes would continue under the proposed action without change.

3.4.1 Seabird Mitigation Measures under Regional Fishery Management Organizations

The Inter-American Tropical Tuna Commission (IATTC) Area comprises the area of the Pacific Ocean bounded by the coastline of North, Central, and South America and by the 50°N parallel from the coast of North America to its intersection with the 150°W meridian, the 150°W meridian to its intersection with the 50°S parallel, and the 50°S parallel to its intersection with the coast of South America. The Western and Central Pacific Fisheries Commission (WCPFC) adjoins, or overlaps, the area of competence of the Inter-American Tropical Tuna Commission.

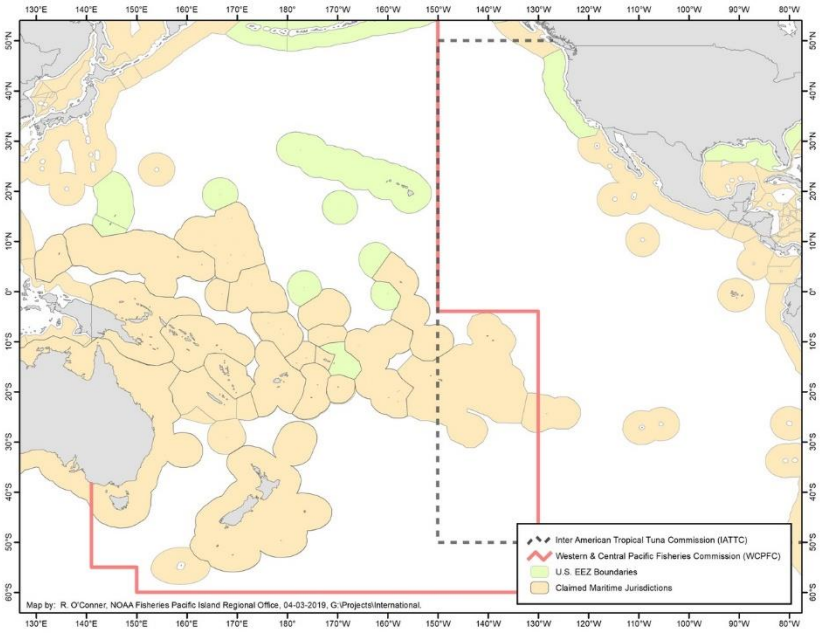

Figure 8: IATTC and WCPFC Convention Areas

The Western and Central Pacific Fisheries Commission (WCPFC) and the Inter-American Tropical Tuna Commission (IATTC) have adopted measures to mitigate seabird bycatch in longline fisheries. Both commissions have adopted a "menu approach" whereby vessels may choose measures from two columns, and both commissions require measures to be applied north of 23° N.

WCPFC's Conservation and Management Measure (CMM) 2018-03 have separate requirements depending on the overall length of vessels. Vessels equal to or greater than 24 meters are required to use at least two mitigation methods from Table 18, with at least one method from column A, and vessels that are less than 24 m in length are required to use at least one mitigation method from column A in Table 18. The IATTC's Resolution C-11-02 applies to longline vessels greater than 20 m in overall length. The resolution requires longline vessels to use at least two mitigation methods listed in Table 19, with at least one coming from column A, but not using the same measure from Column A and Column B.

Table 18. Seabird Mitigation Measure Table in WCPFC CMM 2018-03.

Column A	Column B
Side-setting with a bird curtain and weighted branch lines[1]	Tori line[2]
Night setting	Blue-dyed bait
Tori line	Deep setting line shooter
Weighted branch lines	Management of offal discharge
Hook-shielding devices[3]	

[1] If using side-setting with a bird curtain and weighted branch lines from Column A, this will be counted as two mitigation measures

[2] If a tori line is selected from both Column A and Column B, this equates to simultaneously using two (i.e. paired) tori lines.

[3] Hook-shielding devices can be used as a stand-alone measure.

Table 19. Seabird Mitigation Measure Table in IATTC Resolution C-11-02.

Column A	Column B
Side-setting with bird curtains and weighted branch lines[1]	Tori line[2]
Night setting with minimum deck lighting	Weighted branch lines
Tori line	Blue-dyed bait
Weighted branch lines	Deep-setting line shooter
	Underwater setting chute
	Management of offal discharge

[1] This measure can only be applied in the area north of 23° N until research establishes the utility of this measure in waters south of 30° S. If using side-setting with a bird curtain and weighted branch lines from Column A, this will be counted as two mitigation measures.
[2] If a tori line is selected from both Column A and Column B, this equates to simultaneously using two (i.e. paired) tori lines.

3.5 Resources Eliminated from Detailed Study

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 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 deep-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 deep-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 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. A summary of potential effects is presented in Table 22.

Table 20. Summary of Effects of the Alternatives

Resource	Alternative 1	Alternative 2	Alternative 3
Overview of Alternatives	Status quo with stern-setting vessels required to use blue-dyed, thawed bait, strategic offal discharge, weighted branch lines, and line shooter.	For stern-setting vessels, replace blue-dyed, thawed bait and strategic offal discharge requirements with a new tori line requirement, and modify strategic offal discharge requirement to non-regulatory offal management best practices taught at mandatory protected species workshops.	For stern-setting vessels, replace blue-dyed, thawed bait requirement with a new tori line requirement, and modify the strategic offal discharge requirement to an offal management requirement.
Physical resource: Water quality	Status quo	No change	No change
Biological Resource: Seabirds	Similar to baseline conditions described in section 3.	Albatross interactions expected to be reduced in the fishery as all stern-setting vessels convert from blue-dyed bait to tori lines. Removing strategic offal discharge requirement from regulations not expected to increase seabird interaction risk.	Albatross interactions expected to be reduced in the fishery as all stern-setting vessels convert from blue-dyed bait to tori lines. Modification of offal measure from strategic discharge to strategic offal management requirement may slightly decrease seabird interaction risk.
Biological Resource: Other protected species	Similar to baseline conditions described in section 3.	No change expected.	No change expected.
Biological resource: Target & Non-target stocks	Similar to baseline conditions described in section 3.	Removal of Blue Dye bait is not expected to change the catch rates of target and non-target species.	Removal of Blue Dye bait is not expected to change the catch rates of target and non-target species.

Resource	Alternative 1	Alternative 2	Alternative 3
		Tori line and offal discharge measures are not anticipated to have a significant effect the catch rates of target or non-target stocks but may result in minor increases in catch rates due to higher bait retention on the hook.	Tori line and offal discharge measures are not anticipated to have a significant effect the catch rates of target or non-target stocks but may result in minor increases in catch rates due to higher bait retention on the hook.
Socio-economic setting	Similar to baseline conditions described in section 3.	Initial cost per vessel to convert to tori lines expected to be approximately $1,075. Annual cost to vessels of $334 for blue-dyed bait will be removed. Remove fishery participants' burden of blue-dyed bait and strategic offal discharge measures.	Initial cost per vessel to convert to tori lines expected to be approximately $1,075. Annual cost to vessels of $334 for blue-dyed bait will be removed. Remove fishery participants' burden of blue-dyed bait and reduce burden of strategic offal discharge measures.
Management Setting	Similar to baseline conditions described in section 3.	Regulatory and related administrative burdens optimized with the replacement of blue-dyed bait and strategic offal discharge with tori line. Increased management flexibility, observer data collection and enforcement burdens would be optimized for offal management component.	Regulatory and related administrative burdens optimized with the replacement of blue-dyed bait with tori line. Observer data collection and enforcement burdens would be reduced with the modification of the offal management measure.

4.1 Potential Effects of Alternative 1: No Action (Status Quo)

Hawaii DSLL vessel owners and operators, when stern-setting, are required to use completely thawed bait that has been dyed blue to an intensity level specified by a color quality control card issued by NMFS and maintain a minimum of two cans (each sold as 0.45 kg or 1 lb size) containing blue dye on board the vessel. Vessel owners and operators are also required to discharge offal while setting or hauling longline gear, on the opposite side of the vessel from where the longline gear is being set or hauled, when seabirds are present. For the purpose of strategically discharging in accordance with this requirement, owners and operators are also required to 1) retain sufficient quantities of fish, fish parts, or spent bait between the setting of longline gear, 2) remove all hooks from fish, fish parts, or spent bait prior to discharge, and 3)

remove the bill and liver of any swordfish that is caught, sever its head from the trunk, cut it in half vertically and periodically discharge the butchered heads and livers.

Under Alternative 1, the No Action Alternative, no changes would be made to management measures intended to mitigate seabird interactions in the Hawaii DSLL fishery. All existing measures to mitigate interactions with seabirds would be maintained, including blue-dyed bait and strategic offal discharge, and no new measures would be required. Given the existing status quo trends, BFAL and LAAL albatross interactions would be expected to remain at the higher levels observed since 2015 as no changes would be made to improve the effectiveness of the required mitigation measures. Under Alternative 1, no improvement would be made to the industry's operational practicality or mitigation efficacy of these seabird measures for the Hawaii DSLL fishery. Additionally, NMFS would continue to experience the administrative burden and associated costs to monitor and enforce the blue-dye bait and strategic offal discharge measures, both of which require observer program staff resources to consistently review and provide information on potential violations to NOAA OLE. The Hawaii DSLL fishery's effort, target and non-target catch, and other protected species interactions would be expected to remain similar to the historical baseline under Alternative 1.

Therefore, this alternative does not fulfill our stated purpose. It does not minimize seabird bycatch mortality to the extent practicable consistent with National Standard 9, reflect the results of the recent cooperative research, or relieve cost and time burdens associated with less effective mitigation measures.

4.1.1 Effects on Physical Resources

There are no known significant impacts to air quality, noise, water quality, view planes or terrestrial resources from past or current seabird mitigation measures under the no action alternative. The current suite of measures in place was determined to not have significant impacts prior to their respective and collective regulatory adoption.

4.1.2 Effects on Biological Resources

As described in section 2.2.1, the requirements for owners and operators of Hawaii DSLL vessels to use seabird mitigation techniques will continue to apply when fishing north of 23° N. An analysis of observer data indicates that seabird interaction rates north of 23° N are an order of magnitude higher than to the south (Gilman et al. 2016) even with required seabird mitigation measures. No new information is available to suggest additional protections are warranted to the south. Additionally, owners and operators of all Hawaii longline vessels will continue to be required to follow existing seabird handling and release requirements (50 CFR 665.815(b)-(c)), regardless of where they fish, to maximize the post-release survival of any seabirds that are caught alive. They must also attend and be certified for completion of an annual protected species workshop conducted by NMFS (50 CFR 665.814).

This alternative would not implement changes to improve the mitigation efficacy of seabird measures for the Hawaii DSLL fishery. Stern-setting with blue-dyed bait is known to be less effective than the alternative side-setting measure (Gilman et al. 2016), yet 82.1% of observed deep-set vessels in 2019 used blue-dyed bait with stern-setting instead of side-setting (NMFS

2021). Additionally, offal discharge may be contributing to long-term increase in albatross interactions in the DSLL fishery by attracting more birds to attend the vessels (Abraham et al., 2009; Pierre et al., 2010, 2012).

Furthermore, the strategic offal discharge measure requirements were not tested for efficacy in the DSLL fishery, and therefore may not be as effective as when applied to the SSLL fishery which targets swordfish and hauls during the day. As described in section 1.5.4, the use of strategic discharge as currently required under 50 CFR 665.815 (a)(2) was a practice that was started by SSLL vessels which halved swordfish heads to attract seabirds away from fishing gear and bait. The swordfish heads provide a large attractant that stays afloat until seabirds are well astern of the vessel and less likely to resume pursuit of the baited hooks. However, swordfish heads are not readily available on the tuna-targeting DSLL vessels, and thus smaller pieces of offal or spent bait may be consumed more quickly by seabirds, allowing them to resume pursuit of the vessel (McNamara et al. 1999).

Blue-dyed, thawed bait and strategic offal discharge measures may not be consistently applied from vessel to. This may have the effect of making the measures even less effective at mitigating seabird interactions in the DSLL fishery than published results of controlled studies. For example, for ease of monitoring compliance, observers are instructed that any amount of discard when birds are present satisfies the strategic discharge requirement. After satisfying the requirement, the crew on one vessel may continue to watch seabird behavior and discharge strategically while another crew may not. Additionally, vessels are required to retain offal and spent bait during hauling operations so that discharge material is available during setting operations, as there is usually little to no offal or spent bait generated during the set. Therefore, offal may not be available for the first set of the trip and enough offal may not be saved for effective strategic discharge if more birds are present than expected. Discharged offal at the beginning of the set may have the effect of attracting more birds to the vessel which may then make attempts at baited hooks once the offal saved for strategic discard is gone. Blue-dyed bait color saturation may also be variable from vessel to vessel depending on the type of bait used, the amount of blue-dye used, the length of time it soaks, and how thawed it is while being dyed. A color quality control card is issued by NMFS for guidance, but matching the color may be subjective.

Under Alternative 1, BFAL and LAAL albatross interactions would be expected to remain at higher levels observed since 2015 as no changes would be made to improve the effectiveness of the required mitigation measures. Otherwise, the Hawaii DSLL fishery's effort, target and non-target catch, and other protected species interactions would be expected to remain similar to the historical baseline under Alternative 1.

Therefore, this alternative does not meet our stated purpose to minimize seabird bycatch mortality to the extent practicable consistent with National Standard 9 or reflect the results of the recent cooperative research.

4.1.3 Effects on Socioeconomic Setting

Under Alternative 1, there would be no operational change required in any of the longline vessels operating under the FEP, and the socioeconomic setting, including fishery costs and revenue, is

expected to remain at similar levels as the baseline described in section 3.3. As described in section 2.2.2, the no action alternative assumes that the Hawaii DSLL fishery would continue to be managed under the existing seabird mitigation measures in the FEP, and fishery participants would be required to use blue-dyed bait and strategic offal discharge when stern-setting north of 23° N.

In 2021 average annual estimated cost of dying bait blue was approximately $334 per stern-setting vessel, based on a cost of blue-dye at $4.87 per set, and average DSLL vessel annual effort of 68.6 sets north of 23° N (Table 21). However, this estimate does not include the cost of keeping a second can of dye, valued at $38.95 in 2021, on board for all trips and therefore likely underestimates the total annual costs of blue dye. There is minimal direct cost associated with the strategic offal discharge requirement; however, there are indirect costs associated with both blue-dyed, thawed bait and strategic offal discharge measures.

Table 21. Estimated annual cost of blue-dye per stern-setting vessel in the Hawaii DSLL fishery, based on price of blue dye in October 2021.

Item	Value	Data source
Price per 1lb box of blue dye	$38.95	*Personal communication*, Pacific Ocean Producers, October 13, 2021
Number sets dyed per 1lb box of blue dye	8 sets	*Personal communication*, Pacific Ocean Producers, October 26, 2021
Blue-dye cost per set	$4.87	
Average effort per vessel per year (2016-2020)	142 sets	2020 SAFE report (WPRFMC 2021)
Proportion of DSLL fleet effort north of 23° N (average of 2016-2020)	0.483	Unpublished observer data
Estimated annual per vessel effort north of 23° N	68.6 sets	
Cost of blue-dye per vessel per year[1]	**$334.08**	

[1] Calculated as a product of blue-dye cost per set and estimated annual per vessel effort north of 23° N.

As described in sections 1.5.3, 1.8 and 2.2.3, blue-dyed bait is not favored by fishermen because the dye is messy, thawing is impractical due to the amount of time required, and because it is thought to reduce bait retention on hooks (Gilman and Ishizaki 2018). Thawing enables blue dye saturation, however birds can more easily remove thawed bait from the hook as it is sinking during setting operations. While not statistically evaluated, thawing the bait and dying to the required saturation before a set may also delay optimal setting times and lost bait retention may lead to wasted effort and lower catches of targeted fish, both of which may lead to indirect revenue loss. Additionally, anecdotal information indicates that the Hawaii longline industry has recently experienced difficulty with sourcing blue-dye due to the consolidation of the food dye industry and the scarcity of blue-dye sold in container sizes which meet the regulatory requirements. Vessels are required to maintain a minimum of two cans (each sold as 0.45 kg or 1 lb size) containing blue dye on board the vessel. Difficulties in sourcing this required material could have the effect of delaying a fishing trip or causing a vessel to risk being in violation if the material cannot be sourced, both of which could result in lost revenue.

As described in section 2.1.2, effective use of strategic offal discharge would require a dedicated crew to observe seabirds and discharge offal accordingly, but most vessels do not have crew

available to be assigned to such a task. During hauling operations, time and effort are also spent by the crew performing duties including saving and discharging spent bait on the opposite side of the vessel, which may be unnecessary for satisfying the requirement when seabirds are present but not actively pursuing baited hooks. Additionally, offal from hauling operations must be saved for discharging during future sets. Sufficient offal for strategic discharge may take up deck space or freezer space which can be limited on fishing vessels.

This alternative would not implement any measures to improve the operational practicality and mitigation efficacy of these seabird measures for the Hawaii DSLL fishery.

4.1.4 Effects on Management Setting

None of the alternatives, including this no action Alternative, are anticipated to adversely impact the marine habitat, particularly critical habitat, essential fish habitat, habitat areas of particular concern, marine protected areas, marine sanctuaries, or marine monuments. The Hawaii DSLL 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 marine protected areas, marine sanctuaries or marine monuments.

The requirements for owners and operators of Hawaii DSLL vessels to use seabird mitigation techniques will continue to apply when fishing north of 23° N.

NMFS would continue to monitor the Hawaii DSLL fishery under statistically reliable observer coverage. The deep-set fishery has had consistent coverage of approximately 20% of all trips since 2001, with the exception of 2020 and 2021, when public health and travel restrictions resulted in a reduced annual coverage to approximately 15% and 18% respectively. NMFS collects data on seabird interactions (e.g., species, capture/release condition) as well as seabird mitigation measures used.

Under this alternative, NMFS would continue to experience administrative burdens associated with monitoring and enforcing the blue-dye bait and strategic offal discharge measures. Both of these measures require observer program staff resources and time to consistently review and provide information on potential violations to NOAA OLE. NOAA OLE in turn investigates possible violations and decides how to take action if needed, which also require staff resources and time. In particular, the existing regulatory language that requires offal to be strategically discharged “when seabirds are present” creates monitoring and compliance challenges. Seabirds present in the vicinity of the fishing vessel triggers the discharge requirement, but crew may not spot all seabirds present if they are focused on the fishing operation occurring on or immediately around the vessel. Observers, on the other hand, are required to perform a seabird scan as part of their sampling duties, and often sight seabirds that crew do not. This may lead to a mismatch in observer reports which note that seabirds are present but strategic offal discharge was not used as a mitigation measure.

The blue-dyed bait measure also has compliance and enforcement challenges. The regulations require that bait is completely thawed and dyed blue to an intensity level specified by a color

quality card issued by NMFS. However, resulting saturations are variable depending on the type of bait used, the amount of blue-dye used, the length of time it soaks, and how thawed it is while being dyed. Observers record whether the blue-dyed bait measure is used at the start of each set, but the determination of whether the color saturation meets the requirement may be subjective and may lead to a lack of consistency in reporting from observer to observer and in compliance. These instances are reported to PIR's Observer Program and OLE and staff time and resources must be used to investigate and determine whether the vessel was in compliance. Between 2009 and 2020, observers made 307 reports related to strategic offal discharge and blue-dyed bait requirements in the Hawaii longline fishery. Fifty-seven (19%) of those reports led to enforcement related actions, with 18 (6%) resulting penalties (Table 22). These administrative burdens and associated costs are expected to remain under the no action alternative.

Table 22. NOAA Office of Law Enforcement Offal and Blue Dye Enforcement Actions and Observer Reports, 2009-2020.

Type of Action	Cases
Monetary Penalties	18
Warnings	5
Compliance Assistance Provided	34
Lack of Evidence, Unfounded, Other	23
Observer Reports	307
Total Fines Assessed	$54,750

Therefore, this alternative does not meet our stated purpose, which includes consideration of the results from recent cooperative research and relieving cost and time burdens associated with any less effective mitigation measures.

4.2 Potential Effects of Alternative 2 and Alternative 3

The analysis in this subsection present the effects of both action alternatives. Given that both alternatives are identical with respect to replacing blue-dyed bait with tori lines, many of the subsections below present uniform effects. When different effects resulted during analysis, especially with respect to offal discharge, effects are documented separately.

Alternatives 2 and 3 consider replacing the blue-dyed, thawed bait requirement with a new tori line requirement for the Hawaii DSLL fishery, and would implement associated regulatory specifications for the tori line design. Alternatives 2 and 3 also consider the modification of the existing strategic offal discharge requirement through the adoption of revised best practices for the DSLL fishery as described in section 2.1.2. The difference between these two alternatives is whether the updated offal management best practices would be implemented as part of the annual protected species workshop already required for all Hawaii longline vessel owners and operators (Alternative 2) or a through a regulatory requirement (Alternative 3). Otherwise, all other elements between these action alternatives remain consistent. Neither alternative would modify the other existing seabird mitigation requirements for deep-set vessels that stern-set (i.e., weighted branch lines and line shooter).

As described in further detail below, both of the action alternatives meet the stated action purpose that includes minimizing seabird bycatch mortality to the extent practicable consistent with National Standard 9, reflecting the results of the recent cooperative research, and relieving cost and time burdens associated with less effective mitigation measures. Alternative 2, which would implement updated offal management best practices through the existing annual protected species workshop requirement, would optimize the related enforcement requirements analyzed in section 4.2.5 but may also decrease adherence to new best practices, although its effects on seabird interaction rates are likely to be marginal. Alternative 3 includes the monitoring and enforcement burdens associated with the implementation of offal management best practices regulations but would help to ensure new best practices are followed. The observer data collection and enforcement burdens associated with the updated offal management measure are either optimized, or remain burdensome depending on the associated implementation strategies of either alternative.

4.2.1 Effects on Physical Resources

With respect to the physical resources, the effects analysis for the proposed suite of measures is consistent for both alternatives. There are no known significant impacts to air quality, noise, water quality, view planes or terrestrial resources from both of these action alternatives. These measures would all occur at sea, disconnected from land and any public view planes and outside of the marine environment, thus no concerns nor impacts are anticipated to these physical environment features. Being that the blue-dye currently entering the marine environment is food-grade, removing this management measure is anticipated to have a null impact for the marine environment. Furthermore, these proposed measures were operationally tested during the Tori Line Cooperative Research Project detailed in section 1.8 of this document. No unanticipated effects on physical resources were observed during that effort.

4.2.2 Effects on Biological Resources: Seabirds

Replacement of blue-dyed thawed bait with tori lines

Under Alternatives 2 and 3, Hawaii DSLL fishery participants who stern-set would be required to use tori lines that meet regulatory specifications in lieu of the existing blue-dyed, thawed bait and strategic offal discharge requirements, when fishing north of 23° N. Fishery participants who currently use blue-dyed bait while stern-setting would be required to switch to using tori lines, or to side-set. This alternative is expected to improve the operational practicality and mitigation efficacy of seabird measures in the Hawaii DSLL fishery.

As described in sections 2.2.3 and 4.2.4, a majority of the DSLL participants are expected to use tori lines while stern-setting as the primary mitigation measure over side-setting under Alternatives 2 and 3. Data are not available to estimate exactly how effective stern-setting using tori lines is in mitigating seabird interactions compared to side-setting; however, analysis of observer data indicate that side-setting is up to 2-3 times less likely to catch seabirds than stern-setting with blue-dyed bait in the DSLL fishery (Gilman et al. 2016) and the Tori line Cooperative Research Project indicated that seabird captures were 14 times less likely when stern-setting using tori lines as compared to blue-dyed bait (Chaloupka et al. 2021).

Under Alternatives 2 and 3, albatross interactions are expected to be significantly reduced on stern-setting vessels that convert to tori lines from blue-dyed bait, compared to the no-action alternative. The Tori Line Cooperative Research Project detailed in section 1.8 indicated that tori lines are significantly more effective than the existing blue dye bait measure in mitigating seabird interactions on stern-setting vessels in the DSLL fishery. Specifically, the 2021 study showed that albatross contacts with bait when a tori line is used are four times less likely than when blue-dyed bait is used, and captures may be reduced as much as 14 times (Chaloupka et al. 2021). The reduction in capture was estimated based on a limited number of recorded captures during the study, with no seabirds captured on sets using tori lines. Thus the actual extent of reduction in albatross captures under Alternatives 2 and 3 may vary from the experimental results. However, the 2021 study provides a robust scientific basis indicating that replacing blue-dyed bait with tori lines in the Hawaii DSLL fishery would reduce albatross attempts and contacts on bait and associated captures.

The tori line regulatory specifications recommended by the Council at the 189th meeting are also expected to help ensure that tori lines used by fishermen will perform similar to the designs tested in the field trials. The proposed regulatory specifications include material specifications as described in section 2.1.1, which would require aerial and drag section materials and streamer configuration similar to those tested in the 2019-2021 field trials and would prohibit the use of monofilament nylon that does not produce a consistent aerial section and may affect the ability to deter seabird interactions. These specifications are expected to increase certainty that the tori line would perform similarly to the field trials conducted in 2019-2021. Providing additional non-regulatory guidance, coupled with a rollout strategy to provide tori lines and poles at no cost to vessels, would help the fleet transition successfully to a new seabird mitigation measure. HLA has secured a grant that would help equip vessels with a pole and one line. Additionally, funds secured by NMFS and the Council will provide additional support for additional lines to help the fleet meet the requirement to carry a second line.

The tori line regulatory specifications recommended by the Council include an exemption for the attachment point height to provide contingency for a potential tori pole breakage at sea. This exemption is not likely to affect the fleet-wide effectiveness of the modified seabird measures, because such breakages are likely to be rare and the exemption is only provided for the trip in which the breakage occurs. While higher attachment points generally increased the aerial extent, experiments conducted in New Zealand showed that attachment point heights between 3-5 meters produced overlapping aerial extents (Pierre et al. 2016). Based on data collected during the 2019-2021 DSLL cooperative research project, most vessels would be able to maintain a 3-4 meter attachment height without a pole (Gilman et al. 2021a). This suggests that temporarily attaching the tori line at the highest alternative point on the vessel that is below 5 meters height may not appreciably reduce the aerial extent and thus the effectiveness of the tori line in deterring seabird interactions. Additionally, as described in section 1.8, the 50 meter aerial extent that would be required under the regulatory specifications provides a buffer of approximately 10 meters beyond the minimum needed to cover the area with sinking baited hooks in the DSLL (approximately 40 m from vessel stern) (Gilman et al. 2021a).

The removal of blue-dyed bait from the DSLL seabird mitigation measures for stern-setting vessels may have some effect on seabird interaction rates during the haul under Alternatives 2 and 3, compared to the no-action alternative. McNamara and colleagues (1999) found that in the

SSLL fishery, blue-dyed bait reduced seabird attempts during the haul to about one third compared to when no other measure was used. A more recent analysis of the SSLL observer data suggested that blue-dyed bait did not have a significant effect in reducing seabird interactions during the haul after approximately 9 hours of gear soak (Gilman et al. 2014). Data are not available on the efficacy of blue-dyed bait on the haul in the DSLL. Nevertheless, any potential increase in interaction rates during the haul from the removal of blue-dyed bait is likely to have a small effect on the number of seabird interactions, given that hauling operations primarily occur at night when seabirds are not actively foraging.

Modification of the strategic offal discharge requirement

The difference between the two action alternatives is whether the updated offal management measure would be implemented through best practices training (Alternative 2) or a regulatory requirement (Alternative 3).

Under Alternative 2, the existing strategic offal discharge regulatory requirement would be replaced with best practice training on offal management as part of the required annual protected species workshop for vessel owners and operators. As described in sections 1.5.4, 2.1.2, and 4.1.2, there is inconclusive evidence that the existing strategic offal discharge requirement reduces seabird interaction risk as intended in either the setting or hauling operations in the DSLL fishery. In the absence of a strategic offal discharge requirement in this fishery, there would be limited overlap between daytime hours when seabirds are most actively foraging and when fish waste is being generated and discarded; thus, there is generally low overall risk that unregulated offal discharge in the DSLL fishery would exacerbate seabird catch risk. Specifically, little to no fish waste is generated during primarily daytime setting operations, and fishermen are not likely to retain offal and spent bait from the primarily nighttime hauling operation to discard during setting if there is no requirement to do so. The best practices training would focus on discouraging any offal discharge during setting operations, which represents a change compared to the status quo that requires strategic offal discharge when seabirds are present. Disseminating this information through the workshops would help update the fishermen's knowledge and practice of discharge practices, given the long-standing requirement that requires offal discharge during the set, when seabirds are present.

The best practice training under Alternative 2 would also clarify best practices for hauling operations. The majority of hauling operations and catch processing take place at night when seabirds are not actively foraging, and there is typically some break time between the end of the hauling operation (including catch processing) and the start of the next set (typically in the morning). Catch processing occurs as fish are retrieved during the haul, and fish parts are generated as the catch are gilled and gutted prior to being packed in ice in the fish hold. By operational preference, gilled and gutted material is typically discarded on the opposite side of the vessel from where gear is being hauled. Therefore, the main management concern with unregulated offal discharge would be discarding of spent bait during the minority of hauling operations that overlap with daylight hours when seabirds are more actively foraging. The best practices training would focus on situations when offal should be discharged from the opposite side from where the gear is being hauled to prevent seabirds from being further attracted to the hooks and exacerbating capture risk.

Under Alternative 3, the regulations would be revised to update the strategic offal discharge requirements for stern-setting DSLL vessels in accordance with the current best practices. For setting operations, the modified offal measure would prohibit fishermen from discharging offal to prevent seabirds from becoming more attracted to the vessel and exacerbating seabird capture risk. This prohibition would apply regardless of seabird presence. This would be a change from the status-quo measure, which requires that fishermen strategically discharge offal on the other side of the vessel from where gear is being deployed, when seabirds are present. If any fish waste is generated during the setting operations, fishermen would need to retain it until setting operations are completed prior to discharging it.

For hauling operations under Alternative 3, fishermen would be required to discharge offal and spent bait on the opposite side from where the gear is hauled, but the trigger for this requirement would be changed from the current "when seabirds are present" to be more specific to "when seabirds are actively pursuing baited hooks." This change is intended to clarify the existing language that has created monitoring and compliance burdens. Seabirds present in the vicinity of the fishing vessel do not immediately lead to interaction risk if seabirds are flying by and not actively foraging, and crew may not spot all seabirds present if they are focused on the hauling operation occurring on deck. The existing language is also problematic in the deep-set fishery because hauling operations take place primarily at night, and seabirds may not be seen flying in the vicinity. The modified language would therefore focus the requirement to manage offal discharge during the haul by requiring that offal be discharged on the opposite side of the vessel from where hauling operations take place when seabirds are actively pursuing baited hooks. Offal discharge on the side of the vessel where the gear is being hauled could exacerbate capture risk by attracting more seabirds into the area or causing seabirds to more aggressively pursue baited hooks as a result of increased food availability. Discharging offal on the opposite side of the vessel in these instances could distract birds away from the hooks and reduce capture risk.

Compared to the no-action alternative, the revised best practices for offal management under Alternatives 2 and 3 are expected to have limited effects on albatross interactions in the near-term based, or may have slight positive effects by reducing interaction risk over the long-term. This is based on inconclusive evidence that the existing strategic offal discharge measure to discharge offal away from hooks during hauling in the DSLL fishery reduces seabird interaction rates (Gilman et al. 2016), and that reducing offal discharge during setting operations may reduce attraction of seabirds to the vessels over the long-term (Abraham et al., 2009; McNamara et al. 1999; Pierre et al., 2010, 2012).

The difference between Alternatives 2 and 3 in terms of how the best practices would be implemented is not expected to substantially affect seabird capture risk. The recommended best practices for offal management would be consistent with how offal is typically generated and discharged in the DSLL fishery in the absence of the existing strategic offal discharge requirement. This is especially true during the setting operations when seabird capture risk is higher due to the temporal overlap with albatross foraging. Specifically, in the absence of a regulatory requirement to strategically discharge offal during setting operations under Alternative 2, fishery participants are not likely to retain offal and spent bait from hauling operations, and there would be no offal or spent bait available during setting operations to discharge. In rare cases when the vessel has a higher volume of catch than usual, a vessel may not finish processing fish before the start of a subsequent set and may continue generating fish

waste during the set. In this occurrence, under Alternative 3, the vessel would be required to retain all generated offal on the vessel or delay setting until all fish are processed. In this situation under Alternative 2, without the regulatory requirement, the vessel is more likely to discharge offal during the set, which could have the effect of attracting seabirds to the vessel and potentially increase seabird interactions. However, as this is an atypical occurrence, it is not expected to appreciably increase seabird interactions.

During the haul, Alternative 3 would likely provide greater compliance with proposed best practices than Alternative 2 because it would retain a regulatory requirement for offal discharge management and clarify the language on when this measure is required. However, improved compliance may only provide a marginal conservation benefit in reducing seabird interaction risk, considering that seabird interactions during hauling operations represent less than 10% of all DSLL seabird interactions, and available evidence on the effect of offal measures during hauling operations are inconclusive for the DSLL fishery, as described in sections 1.5.4, 2.1.2, and 4.1.2. Specifically, there is little empirical evidence that strategic offal discharge during DSLL hauling operations reduces seabird interaction risk, whereas retaining offal (i.e., no discharge) during hauling operations may increase seabird capture risk (McNamara et al. 1999).

4.2.3 Effects on Biological Resources: Other Protected Species, Target and Non-target Fish Species

Blue-dyed bait compared to untreated bait has been shown to have no significant effects on target and non-target fish and shark catch rates (Yokota et al. 2009). Additionally, bait color is not known to affect sea turtle capture rates (Swimmer et al. 2005; Yokota et al. 2009) or other protected species. Therefore, the removal of blue-dyed bait from the existing seabird mitigation measures for stern-setting DSLL vessels under Alternatives 2 and 3 is not expected to affect target and non-target fish and shark catch rates, or non-seabird protected species capture rates.

Tori lines that would be required for stern-setting DSLL vessels under Alternatives 2 and 3 are also not expected to affect target, non-target, and protected species catch rate (other than seabirds), as the tori line is used at the surface at the time of setting operations and do not affect the gear soak. There may be minor beneficial effects on catch rates of target and other retained catch if bait retention on hooks are improved with tori lines deterring seabird depredation of bait. However, bait retention is also affected by other factors, such as false killer whale depredation or quality of the bait, and therefore the tori lines are not likely to have a consequential effect on bait retention. Due to the lack of evidence that blue-dyed bait and tori lines affect target catch rates, this effect was not evaluated in the Tori Line Cooperative Research Project in the Hawaii DSLL fishery.

Changes to the offal management practice under Alternatives 2 and 3 are based on the revised best practices and are not expected to affect target and non-target fish and shark catch rates, or non-seabird protected species capture rates compared to the no-action alternative. Once deployed, longline gear actively fishes away from the vessel where any offal discharge may occur, and protected species interactions other than seabirds usually occur during the gear soak rather than near the vessel.

4.2.4 Effects on Socioeconomic Setting

With respect to the socio-economic setting, the effects analysis on direct costs for the proposed suite of measures is consistent for both alternatives.

Many DSLL fishery participants have expressed interest in using tori lines in lieu of blue-dyed bait, citing the operational burdens of using blue dye (Ayers and Leong 2020; Gilman and Ishizaki 2018). Therefore, the majority of the DSLL participants are expected to use tori lines as the primary mitigation measure over side-setting under Alternatives 2 and 3.

Based on the 2020-2021 Tori Line Cooperative Research Project, the cost of a tori line is approximately $350 (inclusive of materials and labor), and a tori pole constructed of marine-grade stainless steel is approximately $375 (inclusive of materials and labor). The tori line design used in the trials conducted in the DSLL fishery required minimal maintenance during the project period (trials conducted from February-July 2020 and February-June 2021), but it is expected that some maintenance would be required at least on an annual basis, and the line may need to be replaced once every few years.

The tori pole would be considered a fixed cost. While no tori poles required replacement during the 2019 to 2021 cooperative research project, there is not sufficient information to determine how long a tori pole meeting the specifications outlined in Alternatives 2 and 3 would last before requiring replacement. Tori lines meeting the design specifications considered under the Alternatives 2 and 3 are not currently sold commercially. However, the tori line design used in the project can be assembled by vessel operators and crew participants using materials available for purchase from retailers based in Honolulu or from online retailers. The tori line regulatory specifications recommended by the Council would require two tori lines to be present on board at the start of every trip, so the initial cost per vessel would be $1,075 (one tori pole and two tori lines), with a recurring cost of $375 to replace a tori line once every few years. These cost estimates are based on small scale tori line and tori pole production carried out for the field trials, and may be reduced if the lines and poles are produced at larger scale.

Implementing the replacement of the blue-dye bait measure with the tori line measure would introduce overall minimal setup and maintenance costs for the DSLL fishery operators in comparison to vessel revenue and the cost to implement existing measures. As described in section 3.3, the average revenue per DSLL vessel in 2020 was $490,000, and average annual gear cost was $27,248 per year per vessel. Therefore, the initial cost of outfitting a DSLL vessel with tori lines represents approximately 0.2% of the annual revenue, and approximately 4% of gear cost. Furthermore, because vessels would no longer be required to use blue-dyed bait, vessels would recoup an estimated $334 per year per vessel, based on costs estimated in section 4.1.3.

Both alternatives are expected to reduce seabird interactions as detailed in the Tori Line Cooperative Research Project results (section 1.8) which in turn is likely to increase bait retention and overall operational integrity. The recommended best practice to not discharge offal during setting under Alternatives 2 and 3 would also remove fishery participants' burden of retaining offal from the haul to discharge during the set and discharging offal and bait on the opposite side of the vessel during the haul when seabirds are present but not actively pursuing

the baited hooks. Under Alternative 3 vessels would be required to keep all offal on board during the set, which could lower operational efficiency if fish waste was still being generated in the rare case that fish were still being processed during the set. All offal would need to be stored until after setting operations were complete or setting would need to be delayed until all fish were finished being processed. Alternative 3 also carries the possible monetary penalty associated with enforcement action if the vessel is not in compliance with new offal management best practices.

4.2.5 Effects on Management Setting

Neither of these two alternatives is anticipated to adversely impact the marine habitat, particularly critical habitat, essential fish habitat, habitat areas of particular concern, marine protected areas, marine sanctuaries, or marine monuments. The Hawaii DSLL fishery is not known to have large adverse impacts to habitats, thus none of these 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 marine protected areas, marine sanctuaries or marine monuments.

The requirements for owners and operators of Hawaii DSLL vessels to use seabird mitigation techniques will continue to apply when fishing north of 23° N. NMFS would continue to monitor the Hawaii DSLL fishery under statistically reliable observer coverage. The deep-set fishery has had consistent coverage of approximately 20% of all trips since 2001, with the exception of 2020 and 2021, when public health and travel restrictions resulted in a reduced annual coverage to approximately 15% and 18%, respectively. NMFS collects data on seabird interactions (e.g., species, capture/release condition) as well as seabird mitigation measures used.

Alternative 2 would tailor the regulatory and related administrative burdens in an optimal way by implementing the offal management measures as a non-regulatory suite of measures. Guidance on best practices for offal management would be presented to vessel owners and operators during participation in an annual protected species workshop, which is an existing regulatory requirement. For offal, this approach would afford increased management flexibility and adaptability should these measures need retooling based on fleet observations and feedback. Alternative 2 would require updates to the protected species workshop content to reflect the best practices training on offal management as described in section 2.2.3.

Alternative 3 would modify the existing requirement for strategic offal discharge to an offal management requirement, maintaining some regulatory burdens for both enforcement and observer data collection. Compared to the No Action Alternative, Alternative 3 is expected to reduce the administrative burden on the observer program by clarifying the language on when offal and spent bait should be discharged on the opposite side of the vessel from where gear is being hauled. However, some administrative burden to monitor and enforce would remain in place as Alternative 3 would implement the modified offal management measure through regulations. This approach is less flexible and adaptable than Alternative 2 as the measures would be prescribed in regulation.

Aside from the offal measures, the regulatory changes under Alternatives 2 and 3 would not result in substantial changes to administrative burden, as the seabird mitigation measures could be monitored and enforced through the existing mechanisms (e.g., observer program, dockside inspections). Both alternatives would require updates to the protected species workshop content to reflect the offal measures. Alternative 2 would optimize the related enforcement requirements which are analyzed in section 4.1.4. The observer data collection and enforcement burdens associated with the updated offal discharge management measure would either be optimized, or be reduced, based on the two alternatives implementation strategies.

4.3 Other Effects

There are no other anticipated effects resulting from the implementation of any of the alternatives. The Tori Line Cooperative Research Project did not reveal any unanticipated effects, as detailed in section 1.8 of this document.

Under all alternatives, the Hawaii DSLL 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 fishery will be subject to terms and conditions described in the ITS for some listed species as defined in consultations under the ESA. With the exception of seabird species, NMFS anticipates no change in the number of interactions with protected species as a result of this action. The action alternatives are expected to have beneficial effects to seabird species. None of the proposed actions under the alternatives would change fishing intensity, locations, participation or seasonality. The action alternatives would change mitigation measures with expected nominal effects on target and non-target fish catch and no adverse effects on protected species.

4.4 Other Considerations

4.4.1 Public Health and Safety

Fishermen are potentially at risk from tori lines and tori poles causing injury by breaking under extreme pressure caused by the line becoming entangled with the gear. To address the potential increased injury risk associated with tori line entanglements that result in breaks, the Council recommended a requirement in the tori line specifications that a breakaway point must be included between the tori line and the attachment structure (tori pole or existing vessel structure). In the event the line becomes entangled it would breakaway in a controlled manner without breaking the tori line or the pole. The specification requirement that the aerial section and the drag line must be constructed with a material that floats should also reduce the occurrence of entanglements with the gear.

NMFS will also work with longline fishermen to ensure best safety practices are being utilized by providing guidance and training at required protected species workshops on the construction of tori lines to best reduce entanglements, the correct use of breakaway points, and safe tori line attachment points. The breakaway requirement and these safety training efforts are expected to minimize safety risks to fishermen of this action over the short-and long-term.

The longline fisheries operating under the FEP are not known to experience or cause other public health or safety-at-sea issues. The proposed rule would not change the operation of the fishery in

any manner affecting safety beyond entangled tori lines resulting in broken tori lines or poles described previously. Therefore, there is no potential for other significant adverse effects to public health or safety.

4.4.2 Sensitive Biological Resources, Biodiversity, and Ecosystem Function

There have been no identified impacts to sensitive biological resources, marine biodiversity, and/or ecosystem function from FEP longline fisheries. These fisheries operate away from coastlines and outside of marine sanctuaries or monuments and fishing gear does not contact the bottom or affect coral ecosystems. Because the proposed action would not substantially modify vessel operations or other aspects of these fisheries, NMFS does not anticipate the proposed action would result in changes in gear types beyond the use of tori lines, areas fished, or fishing methods, as compared to baseline conditions. As such, NMFS expects no significant impacts on biodiversity or ecosystem function relative to baseline from the proposed action.

4.4.3 Cultural Resources

Cultural or archeological resources or resources important to traditional cultural and religious practices are not known to exist within the action area. NMFS is not aware of any districts, sites, structures, or objects listed in or eligible for listing in the National Register of Historic Places within areas fished by FEP longline fisheries. Longline fisheries are not known to result in adverse impacts to scientific, historic, archeological, or cultural sites. The proposed action would not change the fishery in any manner that would result in effects to such sites; therefore, there is no potential for loss or destruction of significant scientific, cultural, or historical resources in the marine environment.

4.4.4 Invasive Species

This fishery is not known to be introducing or spreading non-indigenous species. Because the proposed action would not substantially modify vessel operations or other aspects of these fisheries, NMFS does not anticipate it would result in the introduction or spread of non-indigenous species as compared to baseline conditions.

4.4.5 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 the resources that are the focus of this analysis, including target stocks, non-target stocks, and protected species. However considerable uncertainty remains 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 the EA for the Bigeye Tuna Catch Allocation Limits for Pelagic Longline Fisheries in U.S. Pacific Island Territories (NMFS and WPRFMC 2019) and the 2019 Hawaii SSLL fishery BiOp (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 2023 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 population viability analyses for loggerhead and leatherback sea turtles, the environmental baseline, and the exposure, response, and risk analyses.

Most breeding populations of LAALs and BFALs are on low-lying atolls. Predicted sea-level rise associated with global climate change poses a considerable threat to the low-lying islands of the NWHI and the central Pacific (Arata et al. 2009). The breeding populations on these atolls are at risk from sea level rise and flooding as a result of the increases in the number and severity of storms which are considered a consequence of climate change. BFALs may be affected sooner than LAALs, because they nest on open, sandy beaches around the periphery of these islands, and strong storms and associated storm surges can cause significant nest loss (Arata et al. 2009). When sea levels rose in the past, it was assumed that species moved to higher islands as the low islands disappeared, but current human occupation and introduced predators on the MHI limit options for new, viable colony sites (Baker et. al, 2006). As sea levels rise over the next century, secure habitat on higher islands throughout the range will become increasingly important. It is difficult to predict the effects that large-scale changes in the marine ecosystem (for example, disruption of currents, acidification, changes to food webs and food distribution) will have on albatrosses. For example, recent research in the South Atlantic that suggests warming seas are increasing ‘divorce’ rates in breeding pairs of Black-browed Albatrosses (Ventura et al. 2021).

Scientists at the PIFSC modeled the effects of climate change on bigeye tuna and other PMUS targeted by the Hawaii DSLL fishery, whose action area overlaps that of the SSLL 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 that 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. 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. Significant changes in fishing behavior are not expected to occur under any of the Alternatives. Changes to fishing operations as a result of changes in seabird mitigation strategies are likely to be minor, and the overall effort level is not expected to be significantly affected because of the alternatives under consideration. Both Alternative 2 and Alternative 3 require the vessel to carry a backup tori line and contain a trip exemption for the attachment height as a contingency that would allow a vessel to continue fishing in the event a tori line is lost or a tori poll breaks. For these reasons, none of the alternatives are expected to result in a noteworthy change to greenhouse gas emissions.

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 interact 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 authorized pelagic longline fishing activities 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 or water quality, coral reefs, and benthic marine habitats. As such, these resources were not considered.

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;
- Establishing a framework for domestic catch limits and specifying a striped marlin limit; and
- Revising FEP management objectives and converting the FEPs to living documents.

In addition, effective May 31, 2022, NMFS prohibited the use of wire leaders in the Hawaii DSLL fishery and required the removal of fishing gear from any oceanic whitetip shark caught in the region's domestic longline fisheries. In general, the alternatives considered here would not have interactive effects with the proposed and upcoming actions. FEP revisions will result in negligible change to the fisheries, so there are no cumulative effects to consider from those actions. The expected changes would be a reduction in seabird interactions, increased operational efficiency, and decreased management burden.

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.

Potential Cumulative Effects on Target and Non-Target Species

None of the proposed actions under any of the three alternatives would change fishing intensity, locations, participation or seasonality. The measure would be a minor gear change with nominal effects on target and non-target fish catch and with no anticipated adverse effects on stock status of target and non-target stocks. Therefore, there are no anticipated cumulative effects on target or non-target stocks for any of the action alternatives.

4.5.2 Cumulative Effects Related to Effects on Protected Resources

Through data collected from observer programs and other sources, the Council and NMFS will continue to monitor interactions between managed fisheries and protected species as well as monitoring the status of those populations. Consultations under the ESA have amounts of exempted take defined in their respective ITSs and the fisheries have either not exceeded those amounts, or when it has occurred, or other triggers have been reached, consultation has been reinitiated (see Section 3.2). 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, reduce interactions, and improve handling and release techniques to mitigate protected species impacts.

Past, Present, and Reasonably Foreseeable Management Actions

NMFS and the Council are supporting several projects to address seabird interactions in the Hawaii longline fishery and to improve ecosystem-based fishery management. These include:

- Improving seabird handling and release guides, lesson plans, and associated outreach material for the annual protected species workshops, including production of video guides and translated materials for crew members;
- Ecosystem-based fisheries management (EBFM) project for protected species impacts assessment for the Hawaii and American Samoa longline fishery to evaluate ecosystem factors influencing bycatch in the longline fishery;
- Council recommended additional research and development of alternative mitigation measures for the Hawaii SSLL fishery;
- Development of a line cutter that would allow for quick and safe removal of trailing gear on oceanic whitetip sharks, leatherback turtles, and other large protected species that cannot be brought on board. These species when observed in the longline 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 the animals increase post-hooking mortality rates;
- 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 SSLL fishery, which are typically too large to board and do not allow for conventional methods of tagging.

The implementation of improved seabird handling and release guides, lesson plans and associated outreach material for the annual protected species workshop may be expected to indirectly effect the impacts of this action, by improving the deployment and use of tori lines and increasing the survivorship of released seabirds through improved handling. The net impacts would be beneficial to the mitigation of seabird interaction in the Hawaii DSLL fishery. The proposed action is not expected to interact with any other of these past, present or reasonably foreseeable management actions.

Potential Cumulative Effects on Protected Resources

Under all alternatives, Hawaii DSLL 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 fisheries will be subject to terms and conditions described in ITSs for some listed species as defined in consultations under the ESA. NMFS anticipates no change in the number of interactions with protected species other than seabirds as a result of this action. The alternatives considered are expected to reduce seabird interactions, which could have a positive cumulative impact on seabird populations in the Pacific Islands Region. None of the proposed actions under any of the three alternatives would change fishing intensity, locations, participation or seasonality. The measure would be a minor gear change with nominal effects on catch and with no adverse effects on other protected species. Therefore, there are no anticipated cumulative effects on non-seabird protected species for any of the action alternatives.

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.

4.5.3 Cumulative Effects Related to Fishery Participants and Communities

The potential cumulative effects of this action on the socio-economic setting are expected to be minimal. Major factors affecting fishery participants and the fishing community include current and future costs of fishing supplies, fuel, and vessel maintenance as well as access to fishing grounds and competition with imported seafood. Besides upfront costs associated with the initial tori line, none of these factors are expected to be influenced by any of the proposed alternatives. An analysis of costs under this action suggests that costs for Hawaii DSLL fishery participants will be relatively small and offset over time by relief of the blue dye requirement and possibly minor increases in the catch rates of target species. The proposed action requiring tori lines would require an estimated $1,075 initial cost per vessel for purchasing the tori line materials, and ongoing costs for repair or replacement of materials estimated to be approximately $375 every few years. When considered together, the initial and ongoing costs of both actions would potentially be offset by increases in target species catch. The anticipated costs will not disproportionally impact fishery participants. These measures would be relatively minor gear changes with nominal effects on catch and with no adverse effects on socio-economic setting. Therefore, there are no anticipated cumulative effects on socio-economics for any of the action alternatives.

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6 PROPOSED REGULATIONS

This section contains the draft proposed regulations necessary to implement the conservation and management measures described in the regulatory amendment, based on the preferred alternative selected by the Council at the 189th meeting in December 2021. Additions to the existing regulatory language are shown in underline, and deletions are shown in strikethroughs.

§ 665.802 Prohibitions.

* * * * *

(z) Fail to fish in accordance with the seabird take mitigation techniques set forth at §§ 665.815(a)~~(1) or 665.815(a)(2)~~ when operating a vessel registered for use under a Hawaii longline limited access permit.

* * * * *

(ll) Fail to use weighted branch lines or a bird curtain that meets the specifications of 50 CFR 665.815(a)(1)(i)-(vii) when operating a side-setting vessel that is registered for use under a Hawaii longline limited access permit, when making deep sets or shallow sets north of 23° N. lat., or shallow-sets south of 23° N. lat. in violation of § 665.815(a)(1).

(mm) Fail to use a line ~~setting machine or line~~ shooter with weighted branch lines~~,~~ to set the main longline, and fail to use a tori line system prior to the first hook being set that meets the

specifications of 50 CFR 665.815(a)(3)(i)(A)-(E) when operating a stern-setting vessel that is registered for use under a Hawaii longline limited access permit and equipped with monofilament main longline, when making deep sets north of 23° N. lat., in violation of § 665.815(a)(3)~~(1) or (a)(2)~~.

(nn) Fail to employ basket-style longline gear such that the mainline is deployed slack when operating a vessel registered for use under a Hawaii longline limited access permit north of 23° N. lat., in violation of § 665.815(a)~~(2)(v)~~(4).

(oo) Fail to maintain and use blue dye to prepare thawed bait when operating a stern-setting vessel registered for use under a Hawaii longline limited access permit when making shallow sets~~that is fishing north of 23° N. lat.~~, in violation of § 665.815(a)(2)(vi) through ~~(viii)~~(vii).

(pp) Fail to retain, handle, and discharge fish, fish parts, and spent bait, strategically when operating a stern-setting vessel registered for use under a Hawaii longline limited access permit when making shallow-sets ~~that is fishing north of 23° N. lat.~~, in violation of § 665.815(a)(2)(i) through (iv).

(qq) Fail to begin the deployment of longline gear at least 1 hour after local sunset or fail to complete the setting process before local sunrise from a stern-setting vessel registered for use under a Hawaii longline limited access permit while shallow-setting ~~north of 23° N. lat.~~, in violation of § 665.815(a)~~(4)~~(2)(v).

* * * * *

§ 665.815 Pelagic longline seabird mitigation measures.

(a) *Seabird mitigation techniques.* When deep-setting or shallow-setting north of 23° N. lat. or shallow-setting south of 23° N. lat., owners and operators of vessels registered for use under a Hawaii longline limited access permit, must either side-set according to paragraph (a)(1) of this section, or fish in accordance with paragraph (a)(2), (a)(3), and (a)(4) as applicable of this section.

* * * * *

(2) Alternative to side-setting when shallow-setting. Owners and operators of vessels engaged in shallow-setting that do not side-set must do the following:

* * * * *

(v)Begin the deployment of longline gear at least 1 hour after local sunset and complete the deployment no later than local sunrise, using only the minimum vessel lights to conform with navigation rules and best safety practices;

~~(v) When using basket-style longline gear north of 23° N. lat., ensure that the main longline is deployed slack to maximize its sink rate;~~

* * * * *

(viii) Follow the requirements in paragraph (a)(4) of this section, as applicable.

(3) Alternative to side-setting when deep-setting. Owners and operators of vessels engaged in deep-setting using a monofilament main longline north of 23° N. lat. that do not side-set must do the following: ~~Deep-setting requirements. The following additional requirements apply to vessels engaged in deep-setting using a monofilament main longline north of 23° N. lat. that do not side-set. Owners and operators of these vessels must do the following:~~

(i) Employ a tori line system, prior to the first hook being set, that meets the following specifications:

(A) Length and material. The tori line must have an aerial section with a minimum length of 50 m (164 ft) and be made of ultra-high molecular weight polyethylene, or other NMFS-approved material that is light-weight, water resistant, low stretch, and floats in water. The tori line must have a drag section made of a 6 millimeters or larger braided material that is water resistant and floats in water. Monofilament nylon is prohibited for use in the aerial or drag sections of the tori line. The tori line must have a minimum total length of 100 m (328 ft).

(B) Streamer configuration. The aerial section of the tori line must have light-weight material (hereafter referred to as (streamers) that are attached to the aerial section at intervals less than 1 m (3.3 ft) apart. Each streamer must have a length of at least 30 cm (11.8 in) from its attachment point to the tori line so that it hangs and moves freely/flutters in the wind. Where a single streamer is either threaded through or tied to the tori line, each length must measure at least 30 cm (11. in). Streamers are not required for the last 20 m (65.6 ft) of the aerial section to minimize entanglements with buoys and fishing gear.

(C) Two tori lines meeting the specifications in paragraphs (a)(3)(i)(A) and (a)(3)(i)(B) must be present on the vessel at the start of every trip.

(D) Attachment point and material. Attachment point and material. The aerial section of the tori line must be attached to the vessel or a fixed structure on the vessel made of rigid material. A weak link must be placed between the tori line and the point of attachment so that the tori line will break away from the point of attachment if gear entanglement creates tension on the tori line. The attachment point must have a minimum height of 5 m (16.4 ft) above the water when the attachment point is located within 2 m (6.6 ft) of the vessel stern. When the attachment point is more than 2 m (6.6 ft) from the stern, the attachment point height must be increased by 0.5 m (1.6 ft) for every 5 m (16.4 ft) distance from the stern.

(E) Attachment point height exemption. In the event that the structure used to attach the tori line breaks during a trip, the operator may use an alternative attachment point at the highest possible point on the vessel that is lower than the height specified in paragraph

(a)(3)(i)(D) to continue fishing north of 23° N lat. The exemption is only valid during the trip in which the structure broke.

(ii) ~~(i)~~ Employ a line shooter; and

(iii) ~~(ii)~~ Attach a weight of at least 45 g (1.6 oz) to each branch line within 1 m (3.3 ft) of the hook~~.~~;

(4) Basket-style longline gear requirement. When using basket-style longline gear north of 23° N. lat., owners and operators of vessels that do not side-set must ensure that the main longline is deployed slack to maximize its sink rate. ~~Shallow-setting requirement. In addition to the requirements set forth in paragraphs (a)(1) and (a)(2) of this section, owners and operators of vessels engaged in shallow-setting that do not side-set must begin the deployment of longline gear at least 1 hour after local sunset and complete the deployment no later than local sunrise, using only the minimum vessel lights to conform with navigation rules and best safety practices. 3~~

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APPENDIX A. REGULATORY IMPACT REVIEW

1. Introduction

This is a regulatory impact review (RIR) prepared under Executive Order (E.O.) 12866, "Regulatory Planning and Review." The regulatory philosophy of E.O.12866 stresses that, in deciding whether and how to regulate, agencies should assess all costs and benefits of all regulatory alternatives and choose those approaches that maximize the net benefits to the society. To comply with E.O. 12866, the National Marine Fisheries Service (NMFS) prepares an RIR for regulatory actions that are of public interest. The RIR provides an overview of the problems, policy objectives, and anticipated impacts of regulatory actions. The regulatory philosophy of E.O. 12866 is reflected in the following statement:

> *In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages, distributive impacts; and equity), unless a statute requires another regulatory approach.*

This RIR is for a proposed action which would modify seabird interaction mitigation measures through a regulatory amendment under the Fishery Ecosystem Plan for the Pelagic Fisheries of the Western Pacific Region (FEP).

2. Management Goals and Objectives

NMFS has monitored seabird interactions in the Hawaii longline fishery since 1994 and implemented seabird mitigation measures in 2001. Even with the seabird mitigation measures currently in place, black-footed albatross and Laysan albatross interactions in the Hawaii deep-set longline (DSLL) fishery have gradually increased, particularly since 2015.

The purpose of this action is to improve the overall operational practicality and mitigation efficacy of the required seabird mitigation measures for the Hawaii DSLL fishery.

The action is needed to address the increased albatross interactions observed in this fishery since 2015, and to minimize seabird bycatch and bycatch mortality to the extent practicable consistent with Magnuson-Stevens Fishery Conservation and Management Act National Standard 9 and other applicable laws. The action would relieve some of the time and cost burden associated with the less effective mitigation measures currently in use. Implementing this action would reflect the results of the recent cooperative research and the best available scientific information regarding mitigating albatross interactions.

3. Description of the Alternatives

This section describes the alternatives for modifying seabird interaction mitigation measures in the Hawaii DSLL fishery under the FEP; DSLL vessels operating under the FEP that land catch in Western Pacific ports outside of Hawaii, typically do not fish in areas where this action would apply (north of 23° N). These alternatives would only apply to stern-setting DSLL vessels, and not to those that side-set.

Alternative 1 is the No Action (status quo) alternative. Alternative 2 would replace blue-dyed thawed bait and strategic offal discharge measures required for stern-setting vessels with a tori line requirement combined with modified non-regulatory offal management measures, while Alternative 3 would replace blue-dyed thawed bait with a new tori line requirement, and modify the strategic offal discharge requirement to an offal management requirement. The difference between Alternatives 2 and 3 is whether the updated offal management measure would be implemented through non-regulatory best practices training (Alternative 2) or a regulatory requirement (Alternative 3). Both action alternatives call for replacing the blue-dyed thawed bait requirement with the tori line requirement.

Under all alternatives considered, seabird mitigation measures would apply to owners and operators of Hawaii DSLL vessels that stern-set (rather than side-set) north of 23° N. Additionally, owners and operators of all Hawaii longline vessels will continue to be required to follow existing seabird handling and release requirements regardless of where they fish to maximize the chances of post-release survival of any seabirds that are caught alive, as well as attend and be certified for completion of an annual protected species workshop conducted by NMFS. Other existing longline management measures would remain, including observer coverage and data collection on seabird interactions.

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

Under the No Action Alternative, no changes would be made to seabird mitigation management measures in the Hawaii DSLL fishery. All seabird interaction mitigation requirements would remain, including blue-dyed thawed bait and strategic offal discharge. Section 1.5 of the Environmental Assessment (EA) provides details on the current seabird mitigation measures in the Hawaii DSLL fishery.

3.2 Alternative 2: Replace blue-dyed thawed bait and offal discharge measures required for stern-setting vessels with a new tori line requirement (*Council Preferred Alternative*)

Under Alternative 2, new seabird mitigation measures would apply to the Hawaii DSLL fishermen who stern-set when fishing north of 23° N. The use of a tori line, meeting requirements specified in the EA, would replace the existing blue-dyed, thawed bait and strategic offal (fish, fish parts, or spent bait) discharge requirements when stern-setting. Non-regulatory measures that include best practices training on offal management would replace the strategic offal discharge requirement. The best practices training would be included in the annual protected species workshop already required for Hawaii longline vessel owners and operators (captains) and can be modified in the future without requiring regulatory changes, should new scientific information warrant updates. Current best practices would represent a change with

enhanced operational flexibility overall for fishermen compared to status quo and would ultimately reduce the chances of seabirds becoming hooked or entangled compared to status quo.

Alternative 2 would not modify the other existing seabird mitigation requirements for DSLL vessels that stern-set (i.e., weighted branch lines and line shooter). Section 2.2.3 of the EA provides more details on Alternative 2, while Sections 2.1.1 and 2.1.2 provide information regarding tori line specifications and current best practices for offal management respectively.

3.3 Alternative 3: Replace blue-dyed thawed bait with a new tori line requirement, and modify strategic offal discharge requirement to an offal management requirement

Under Alternative 3, new seabird mitigation measures would apply to the Hawaii DSLL fishermen who stern-set when fishing north of 23° N. The use of a tori line would replace the existing blue-dyed thawed bait requirement when stern-setting and the offal discharge requirements would be modified to reflect current best practices. All aspects of implementing the use of tori lines are the same as Alternative 2. The main difference between Alternatives 2 and 3 is whether the updated offal management measure would be implemented through a non-regulatory best practices training (Alternative 2) or a regulatory requirement based on current best practices (Alternative 3). Under Alternative 3, DSLL fishermen would be prohibited from discarding offal while stern-setting, regardless of seabird presence. DSLL would also be required to strategically discharge offal on the opposite side from where the gear is hauled, when seabirds are actively pursuing baited hooks.

Alternative 3 would not modify the other existing seabird mitigation requirements for DSLL vessels that stern-set (i.e., weighted branch lines and line shooter). Section 2.2.4 of the EA provides more details on Alternative 3, while Sections 2.1.1 and 2.1.2 provide information regarding tori line specifications and current best practices for offal management respectively.

4. Description of the Fishery and Socioeconomic Background

This section describes the socioeconomic setting for the Hawaii DSLL fishery. A more detailed history and description of the fishery as well as catch, revenue and cost information can be found in Section 3.3 of the EA as well as the FEP Annual SAFE Reports (http://www.wpcouncil.org/annual-reports).

The Hawaii longline fishery consists of a shallow-set sector which targets swordfish and deep-set sector which targets bigeye tuna, each subject to separate mitigation measures based on the characteristics of their fishing activities. NMFS and the Council manage the longline fishery under a single limited-access permit program, capped at 164 longline vessels. The Hawaii DSLL fishery operates around the main Hawaiian Islands and on the high seas primarily within 300-400 nm between the Equator and 35° N and is the largest of the pelagic fisheries in Hawaii. In general, DSLL vessels operate out of Hawaii ports, with the vast majority based in Honolulu and a few in Hilo. Some deep-set trips originate from other ports such as Long Beach or San Francisco, California, or Pago Pago, American Samoa and then fishermen land their catches in Hawaii. Some Hawaii-permitted longline vessels also possess American Samoa longline permits. These dual-permitted vessels land their catch in either Hawaii or American Samoa.

Fishing effort in the Hawaii DSLL fishery has increased over the years. From 2004-2012, the annual active vessels remained fairly stable, ranging from 124 to 129 a year. Since then, the average number of active vessels have increased with an average of 146 vessels operating over the 2017-2021 time frame. In 2021, 146 DSLL vessels made 1,679 trips with 22,074 sets and deployed 62.7 million hooks. The fishery landed 26.8 million pounds of pelagic fish valued at $108.5 million. In 2020, 146 vessels made 1,644 trips with 20,785 sets and deployed 59.7 million hooks. The fishery landed 27 million pounds of pelagic fish valued at $73.5 million. The trend in revenue peaked in 2018 and decreased in 2019 and again in 2020 with a 25% drop compared to 2019. Catch per unit effort for bigeye tuna was lower in 2021 compared to 2020 with a drop from 3.5 fish to 2.9 fish for every 1,000 hooks deployed, however, 2021 revenues climbed despite the lower catch, because of the increase in the price per lb sold. Figure 1 summarizes recent catch and revenue for the DSLL fishery.

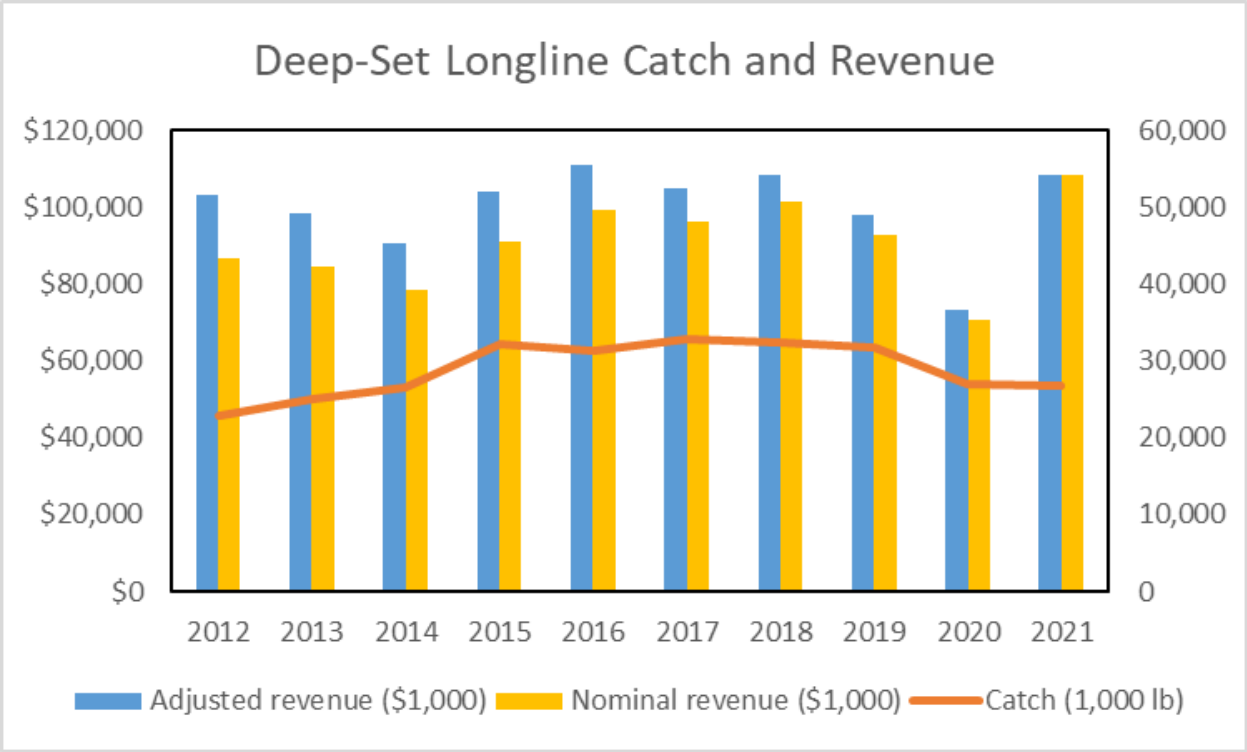

Figure 1. Hawaii Deep-set Longline fishery catch, nominal and adjusted revenue (2012-2021) 2021 SAFE Report (WPRFMC 2022)

With regard to DSLL expenditures, fuel accounts for the largest share of total (non-labor) fishing trip costs (see Figure 2 for trend in fuel and overall non-labor costs from 2012-2021 and Figure 3 for the cost structure of an average DSLL trip in 2021). In 2021, fuel cost accounted for the largest portion of DSLL (non-labor) trip costs at 49% of trip costs, while expenses associated with bait and gear comprised the second and third largest portions at 26% and 10% respectively (Figure 3).

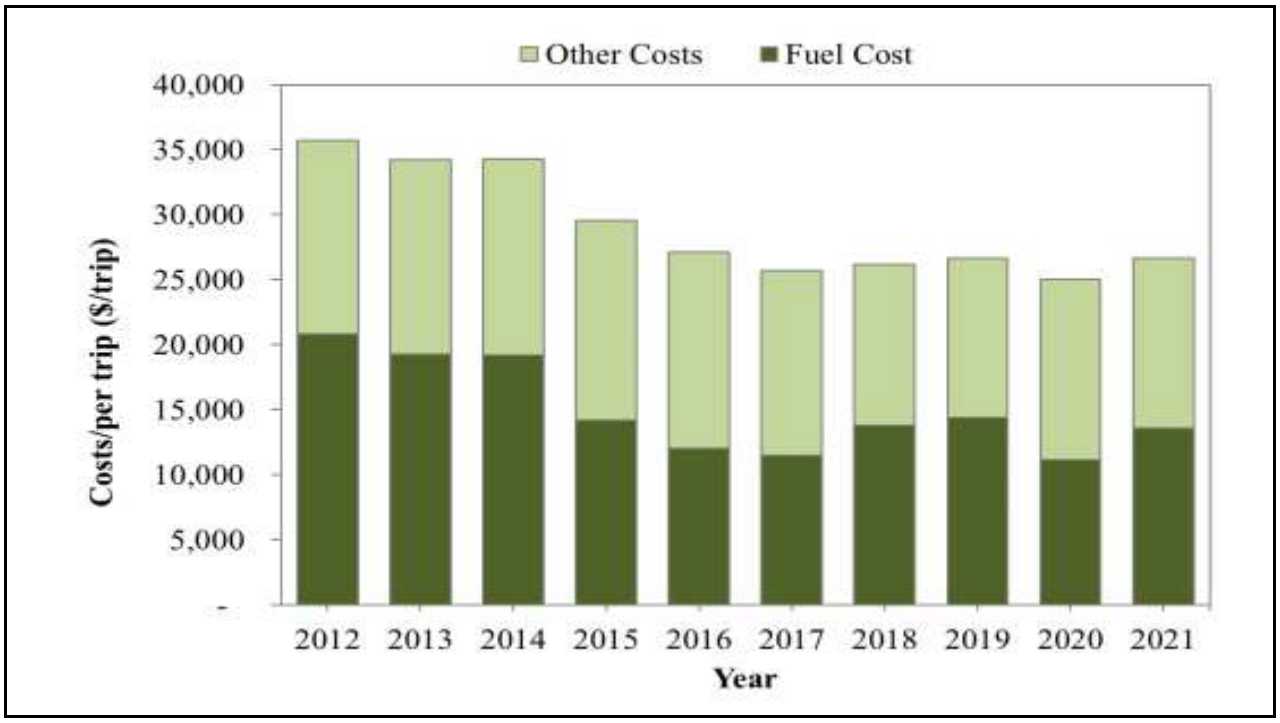

Figure 2. The trend of average trip costs for Hawaii longline deep-set fishing from 2011-2021 adjusted to 2021 dollars.

Source: 2021 SAFE Report (WPRFMC 2022)

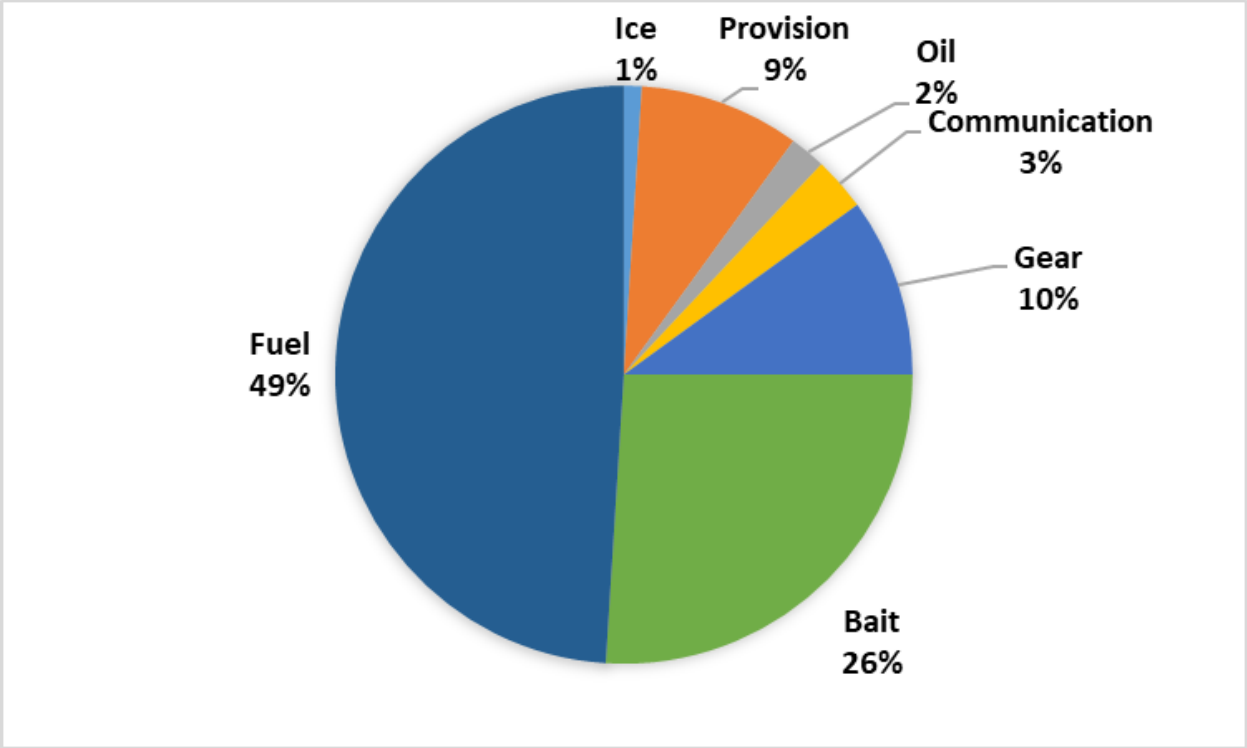

Figure 3. The non-labor cost structure of an average deep-set fishing trip in 2021.

Source: 2021 SAFE Report (WPRFMC 2022

Hawaii's Regional Economy

The tourism and defense industries dominate Hawaii's economy, with tourism, by far, the leading industry in terms of employment and expenditures. An estimated 10,386,673 visitors traveled to Hawaii by air or cruise ship in 2019, the last full year prior to the pandemic curtailing domestic and global travel, and their spending was estimated to be $17.8 billion (HTA 2020). Food and beverage represented the second largest spending category for visitors, after lodging. In 2020, travelers arriving into Hawaii and traveling among the islands were subject to travel restrictions and quarantine requirements starting in March because of the pandemic. Travel arrivals curtailed drastically with an estimated 2,678,073 visitors arriving in Hawaii that year. Travel restrictions and quarantine requirements began to ease in the middle of 2021 and were fully lifted at the end of March 2022 for domestic travelers. In 2021, there were 6,777,760 visitors, all arriving by air, as there were no cruise activities that year. Total visitor expenditures was an estimated $13.15 billion with food and beverage representing the second largest spending category at roughly 21 percent of visitor spending (HTA 2022). For the Federal Fiscal Year 2021 (October 1, 2020 through September 30, 2021), the Department of Defense reported spending $7.9 billion in Hawaii, which makes up over 8% of Hawaii's Gross Domestic Product (DOD 2021). Hawaii's Gross Domestic Products (GDP) for 2019, 2020, and 2021 were $91.8 billion, $82.9, and $90.1 billion, respectively (DBEDT 2022). As noted earlier, the DSLL landed pelagic fish with an estimated value of $108.5 million and $73.5 million in 2020 and 2021 respectively. Although small in terms of contribution to the Hawaii GDP, the seafood industry remains an

important component of local and tourist consumption, and recreational and subsistence fishing represent a substantial proportion of the local population.

5. Impacts Analysis of the Proposed Action

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

Under Alternative 1, the Hawaii DSLL fishery would continue to be managed under the existing seabird mitigation measures under the FEP, and fishery participants would be required to use blue-dyed bait and strategic offal discharge when stern-setting north of 23° N. Vessel owners and operators are required to use completely thawed bait dyed blue to an intensity level specified by a color quality control card issued by NMFS and maintain a minimum of two cans (each sold as 0.45 kg or 1 lb size) containing blue dye onboard the vessel. They are also required to discharge fish, fish parts (offal), or spent bait while setting or hauling longline gear, on the opposite side of the vessel from where the longline gear is being set or hauled, when seabirds are present. For purposes of strategically discharging in accordance with this requirement, owners and operators are also required to 1) retain sufficient quantities of fish, fish parts, or spent bait between the setting of longline gear, 2) remove all hooks from fish, fish parts, or spent bait prior to discharge, and 3) remove the bill and liver of any swordfish that is caught, sever its head from the trunk, cut it in half vertically and periodically discharge the butchered heads and livers.

This alternative would not implement any measures to improve the operational practicality and mitigation efficacy of seabird measures for the Hawaii DSLL fishery. The blue-dyed bait requirement is less effective at mitigating seabird interactions while more burdensome for fishermen than alternative mitigating measures. DSLL fishermen who voluntarily use alternative means for seabird mitigation would still need to use blue-dyed bait while stern-setting. In addition, the current offal discharge requirements appear to be a contributing factor in the long-term increase in albatross interactions in the Hawaii DSLL fishery by attracting more birds to the vessels.

The Hawaii DSLL fishery's effort, target, non-target catch, fishing costs and revenues would be expected to remain similar to the historical baseline. DSLL fishermen can expect revenues and costs to remain at levels similar to recent years, excluding the time frame spanning from March 2020 through the latter part of 2021. NMFS also expects markets and the fishing community to continue similar to the historical baseline.

The average annual material cost of meeting the blue-dyed bait requirement is an estimated $334 per stern-setting vessel. This estimate is based on a cost of using blue-dye at $4.87 per set, and the average DSLL vessel annual effort (68.6 sets) north of 23° N between 2016 and 2020. In addition to the cost associated with blue-dyed bait, fishermen are likely to view its use as messy and inconvenient. Thawing the fish bait enables greater saturation of the blue-dye, but increases the amount of time to prepare bait and reduces the retention of bait on hooks, potentially delaying optimal setting times and reducing targeted catch rates. Furthermore, it appears that fishermen have encountered difficulty in obtaining blue-dye, and that meeting the requirement of having a minimum of two cans onboard could either delay a fishing trip or cause a vessel to risk being in violation if the material cannot be sourced, either of which could result in lost revenue or increased costs to fishermen.

Strategic offal discharge also potentially adds inconvenience and diverts resources away from fishing activities. Effective use of strategic offal discharge would require a dedicated crew to observe seabirds and discharge offal accordingly as well as perform specific activities such as saving bait, discharging spent bait on the opposite side of haul operations, and cutting swordfish heads in half and removing livers for discharge. Sometimes these duties are performed unnecessarily when seabirds are present but not actively pursuing baited hooks in order to meet the current regulatory requirement. Furthermore, offal for discharge from a haul must be saved for future sets. This may take up deck or freezer space which can be limited on fishing vessels.

Under Alternative 1, albatross interactions would likely remain at the higher levels observed in recent years. In addition, NOAA would continue to experience administrative burdens associated with monitoring and enforcing the blue-dye bait and strategic offal discharge measures. Both of these measures require observer program staff resources and time to consistently review and provide information on potential violations to the NOAA Office of Law Enforcement (OLE). NOAA OLE in turn are required to investigate possible violations and decide whether and how to take action, which also requires staff resources and time. In particular, the current requirement that offal to be strategically discharged "when seabirds are present" creates monitoring and compliance challenges. Seabirds present in the vicinity of the fishing vessel trigger the discharge requirement, but crew may not spot all seabirds present if they are focused on fishing operations. Observers, on the other hand, are required to perform a seabird scan as part of their sampling duties, and often sight seabirds that crew do not. This may lead to a mismatch in observer reports which note that seabirds are present but strategic offal discharge was not used as a mitigation measure.

The blue-dyed, thawed bait measure also has its own compliance and enforcement challenges. Whether fishermen complied with the blue-dyed bait requirement, including whether the bait was dyed an appropriate intensity of blue, is open to interpretation by observers. This may lead to a lack of consistency in reporting potential violations and subsequent NOAA resources in investigating whether the vessel was in compliance. As described in Section 4.1.4 of the EA, observers filed 307 reports associated with the strategic offal discard and blue-dyed bait requirements in the Hawaii longline fishery over the 2009-2020 period, but only 57 led to enforcement related actions. These enforcement actions included monetary penalties (18), warnings (5), and compliance assistance (34) with assessed fines totaling $54,750.

Alternative 2: Replace blue-dyed thawed bait and offal discharge measures required for stern-setting vessels with a new tori line requirement (*Council preferred alternative*)

Alternative 2 would implement a new tori line requirement with associated tori line design specifications and remove the blue-dyed bait requirement for the Hawaii DSLL fishery. Alternatives 2 would also remove the existing strategic offal discharge requirement and implement through training, a suite of revised best practices for mitigating seabird interactions. This training would be included in the annual protected species workshop that is already required for longline vessel owners and operators.

Under Alternative 2, fishery participants who currently use blue-dyed bait while stern-setting when fishing north of 23° N, would be required to either use tori lines or switch to side-setting instead. Many DSLL fishermen stern-set and NMFS expects that of these, most will switch to

tori lines while stern-setting if they have not already done so, rather than choosing to side-set. Many DSLL fishery participants have already expressed interest in using tori lines in lieu of blue-dyed bait, citing the operational burdens of using blue dye (Ayers and Leong 2020; Gilman and Ishizaki 2018), although a small portion of participants may initially favor blue-dyed bait over tori lines due to its familiarity and perceived uncertainty associated with a new measure. Most fishery participants who currently side-set are expected to continue to do so.

Section 4.2.4 of the EA provides the basis for calculating the cost estimates of tori lines. These cost estimates are based on small scale tori line and tori pole production carried out for field trials, and costs might be lower if the lines and poles are produced at a larger scale. Each tori line is expected to cost roughly $350 (inclusive of materials and labor), and a tori pole constructed of marine-grade stainless steel is expected to cost approximately $375 (inclusive of materials and labor). Tori lines meeting the required design specifications are not currently sold commercially, but can be assembled by vessel operators and crew participants using materials available for purchase from local retailers or online.

The tori line design used in field trials required minimal maintenance during the project period, but some maintenance can be expected on an annual basis, while the line may need to be replaced once every few years. The tori pole would likely last multiple years, given its construction using marine grade stainless steel and the use of a break-away point for the tori line that should also protect the pole from breaking. While no tori poles needed to be replaced over the course of the 2019-2021 cooperative research project designed to test their effectiveness, there is not sufficient information to determine how long a tori pole which meets the regulatory specifications would last before requiring replacement.

DSLL vessels would be required to have two tori lines onboard at the start of every trip, so the initial cost per vessel would be $1,075 (one tori pole and two tori lines), with a recurring cost of $375 to replace a tori line once every few years. Using 2021 cost and revenue information, the initial cost of outfitting a DSLL vessel with tori lines represents approximately 0.1% of the annual revenue, and approximately 3.5% of gear cost. However, compliance costs associated with tori line requirements would be partially offset by the removal of the blue-dyed bait requirement at an estimated $334 per year per vessel.

Removing the offal discharge requirement would remove fishery participants' burden of retaining offal from the haul to discharge during the set. The recommended best practice of discharging offal from the opposite side of the vessel from where gear is being hauled while seabirds are actively pursuing the baited hooks, rather than when they are simply present, removes fishery participants' burden of strategically discarding at unnecessary times. These best practices are closely in line with current fishing operations, as well as how they would occur in the absence of the current discharge requirement. The overall removal of the regulatory requirement for strategic offal discharge would also eliminate associated administrative and enforcement burden. Without the incentive of enforcement however, the adoption of best practices in the fishery may occur more slowly than the adoption of best practices under Alternative 3, which would implement these best practices through regulation. However, seabird interaction rates are not expected to differ materially between Alternatives 2 and 3 and providing the offal management as a non-regulatory guidance allows for this information to be updated

based on best scientific information available without the administrative burden and process of a regulatory amendment.

Under Alternative 2, the Hawaii DSLL fishery's effort, target and non-target catch, revenue, markets, fishing community, and local economy would be expected to remain similar to that described under Alternative 1. The impacts to fishermen would largely be seen through changes in gear costs and fishing operations.

Seabird interactions are expected to be lower with Alternative 2's educational approach used in tandem with the tori line requirements, compared to Alternative 1. There would be unquantified benefits to the public associated with reducing serious injury and mortality of black-footed albatross and Laysan albatross. These benefits include passive use values such as those associated with bird viewing activities, and non-use values including knowing seabirds remain for future generations (bequest value) and values placed on knowing seabirds will continue to survive (existence value).

Alternative 3: Replace blue-dyed thawed bait with a new tori line requirement, and modify offal discharge requirement to an offal management requirement

Alternative 3 is similar to Alternative 2, except that Alternative 3 would implement current best practices for seabird mitigation under a regulatory approach. The impacts would be similar under both action alternatives, but with minor differences.

Both action alternatives are expected to reduce seabird interactions compared to Alternative 1. In terms of implementing the best practices as a regulatory measure, under Alternative 3, fishermen would be required to keep all offal on board while setting. This could lower operational efficiency if fish waste was still being generated in the rare case that fish were still being processed during the set. All offal would need to be stored until the completion of setting operations and new sets must wait until all fish processing is complete. Alternative 3 also carries the possible monetary penalty associated with enforcement action if the vessel is not in compliance with new offal management best practices. Alternatives 2 and 3 will not likely differ substantially regarding seabird capture risk, although Alternative 3 would likely provide greater compliance with proposed best practices which could result in a slightly lower risk of seabird capture. Compared to the No Action Alternative, Alternative 3 is expected to reduce administrative burden on the observer program by clarifying the language on when offal and spent bait should be discharged on the other side of the vessels from where gear is being hauled. However, some administrative burden associated with monitoring and enforcement would remain under Alternative 3 with the modified offal management measure applied through regulations, compared to Alternative 2.

6. Impacts of the Proposed Action on Net National Benefits

Overall the preferred action is anticipated to have positive net national benefits compared to the status quo, as it is designed to optimize domestic harvests of bigeye tuna and other catch by Hawaii-based longline vessels and improve operational efficiency, while reducing the risk of capture of black-footed albatross and Laysan albatross.

7. Distributional Changes in Net Benefits

NMFS expects the proposed action to have no distributional effects among different fisheries, as it is not likely that the bigeye tuna or other catch in domestic fisheries would be noticeably different.

8. Changes in Income and Employment

The proposed action could decrease average gear and operating costs as well as costs associated with penalties from enforcement action compared to status quo. However, the extent of these changes is not likely to lead to noticeable impacts in income and employment for those who work with DSLL fishermen, including businesses providing fuel, supplies, equipment and provisioning services as 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.

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

11. References

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