**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
501 West Ocean Boulevard, Suite 4200
LONG BEACH, CA 90802

January 31, 2024

Dear Recipient:

In accordance with provisions of the National Environmental Policy Act (NEPA), we announce that the *Draft Environmental Impact Statement (DEIS) for Consideration of Exempted Fishing Permits for Testing Fishing Practices to Target Swordfish and Other Marketable Highly Migratory Species in the United States West Coast Exclusive Economic Zone* is available for review.

The Proposed Action is to issue exempted fishing permits (EFPs) under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) to evaluate new fishing practices as exemptions from existing regulations prohibiting longline fishing within the United States West Coast Exclusive Economic Zone (EEZ). The purpose of the Proposed Action is to allow testing of "longline-type" fishing practices (i.e., hooks set along a horizontal mainline) to target swordfish (*Xiphias gladius*) and other marketable highly migratory species (HMS) under EFPs to provide more information to facilitate decision-making in support of statutory objectives of the MSA, including achieving optimum yield (i.e., MSA-National Standard 1), and minimizing bycatch (i.e., MSA-National Standard 9). Additionally, the Driftnet Modernization and Bycatch Reduction Act calls for adoption of alternative fishing practices (to drift gillnetting) that minimize incidental catch of living marine resources in the Proposed Action Area. The Proposed Action to test alternative fishing practices under EFPs is needed to permit fishing operations in Federal waters off the West Coast that are otherwise prohibited by existing regulations at 50 CFR 660 subpart K.

The DEIS is accessible electronically through the following website at:
https://www.fisheries.noaa.gov/west-coast/laws-policies/west-coast-region-national-environmental-policy-act-documents

During the public comment period, comments may be emailed to *wcr.hms@noaa.gov*. Include "DEIS EFPs" in the email subject line when submitting comments.

Written comments may also be submitted by mail to the below address:

WCR HMS EFP DEIS
National Marine Fisheries Service, West Coast Region
Sustainable Fisheries Division
501 West Ocean Boulevard, Suite 4200
Long Beach, CA 90802

Comments must be received no later than 60 days after the date on which EPA publishes the DEIS notice of availability in the Federal Register.

Thank you in advance for your input and assistance in finalizing the Environmental Impact Statement.

Sincerely,

Jennifer Quan
Regional Administrator

# Consideration of Exempted Fishing Permits for Testing Fishing Practices to Target Swordfish and Other Marketable Highly Migratory Species in the United States West Coast Exclusive Economic Zone

## Draft Environmental Impact Statement

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## Abstract:

The National Marine Fisheries Service (NMFS) is proposing to issue exempted fishing permits (EFPs) to allow the use of longline-type fishing practices (i.e., hooks set along a horizontal mainline) in a portion of the United States (U.S.) West Coast Exclusive Economic Zone (EEZ), to target swordfish (*Xiphias gladius*) and other marketable highly migratory species (HMS). With input from the Pacific Fishery Management Council (Council), NMFS reviews EFP applications for consistency with key standards under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and objectives of the *Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species* (HMS FMP). The HMS FMP was established in 2004 and allows comprehensive Federal management of HMS fisheries with decision-making supported by the Council process. In 2014, the Council solicited EFP applications to test modified drift gillnet or alternative fishing practices as exemptions from regulations implemented under the HMS FMP. A key purpose was to collect more information to facilitate Council decision-making in support of statutory objectives of the MSA, such as achieving optimum yield (i.e., MSA-National Standard 1) and minimizing bycatch (i.e., MSA-National Standard 9). The Council annually reviews and makes recommendations on EFP applications to NMFS. NMFS determines whether to issue EFPs pursuant to MSA-implementing regulations at 50 CFR 600.745(b). Proposed legislation to transition away from use of drift gillnet in the U.S. West Coast EEZ spurred interest among drift gillnet vessels in obtaining EFPs to test other fishing practices. In December of 2022, with the enactment of the Driftnet Modernization and Bycatch Reduction Act which amended the MSA, NMFS was directed (through the Secretary of Commerce) to establish a transition program to facilitate the phase-out of drift gillnet fishing gear and adoption of alternative fishing practices that minimize incidental catch of living marine resources. The purpose of the Proposed Action, here, is to allow exploratory HMS fishing operations to test alternative fishing practices, collect information useful for assessing the type and extent of interactions with protected species and non-target finfish, evaluate the economic viability of operations, and inform future management decisions for HMS fisheries in the U.S. EEZ. The Proposed Action is needed to authorize the use of otherwise prohibited fishing practices in Federal waters off the U.S. West Coast. The Proposed Action alternatives cover deep-setting and shallow-setting fishing

practices as well as a suite of mandatory terms and conditions and a menu of additional terms and conditions that could apply individual EFPs. The Proposed Action is expected to result in some bycatch of non-target finfish and interactions with protected species. These expectations are based on catch rates from proxy datasets from U.S. fisheries and EFP fishing trials.

## Executive Summary

This draft environmental impact statement (EIS), pursuant to the National Environmental Policy Act (NEPA), considers potential impacts of a Proposed Action to issue Exempted Fishing Permits (EFPs) to allow a vessel or vessels to fish with longline-type gear in the United States (U.S.) West Coast Economic Exclusive Zone (EEZ; defined in Section 8, Appendix 2—Glossary) to target swordfish (*Xiphias gladius*) and other marketable highly migratory species (HMS). This Proposed Action would allow for exploratory fishing in the U.S. West Coast EEZ, under EFPs, to gauge impacts, to determine whether longline-type of fishing is economically viable, and to assess the type and extent of interactions (defined in Section 8, Appendix 2—Glossary) with protected species and non-target finfish. The Proposed Action is needed because fishing with longline-type gear is currently prohibited in the EEZ under 50 Code of Federal Regulations (CFR) 660.712(a)(1). The Proposed Action must conform to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the principal statutory basis for fishery management within the EEZ, which extends from the outer boundary of state waters at 3 nautical miles (nm) to a distance of 200 nm from shore. According to MSA regulations, a National Marine Fisheries Service (NMFS) Regional Administrator may authorize "for limited testing, public display, data collection, exploratory, health and safety, environmental cleanup, and/or hazard removal purposes, the target or incidental harvest of species managed under an FMP [fishery management plan] or fishery regulations that would otherwise be prohibited" (50 CFR 600.745(b)). More specifically, Federal regulations implementing the *Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species* (HMS FMP; PFMC 2003) state that "in the interest of developing an efficient and productive fishery for HMS, the Regional Administrator may issue exempted fishing permits (EFP) for the harvest of HMS that otherwise would be prohibited" (50 CFR 660.718(a)). Therefore, issuance of EFPs provides such authorization.

Section 1 of this document provides an introduction to, and background information on, the Proposed Action, including discussion of how the Proposed Action relates to broader goals identified for the U.S. West Coast swordfish fishery, a description of the specific purpose and need for the Proposed Action, and identification of the Proposed Action Area. Section 1 also summarizes public comments received on the Notice of Intent (NOI) to prepare an EIS, which NMFS published on August 10, 2020 (85 FR 48205).

Section 2 summarizes the alternatives to be analyzed. These are grouped under two Components which correspond to shallow-setting and deep-setting fishing practices. Section 2 specifies five shallow-setting alternatives under Component 1 and four deep-setting alternatives under Component 2. The first alternative in each component (Alternative 1-1 and Alternative 2-1) is the no-action alternative. The action alternatives represent different levels of anticipated fishing effort by key functional aspects of longline-type gear (shallow-setting and deep-setting) and effort (number of hooks), and each are subject

to a set of mandatory terms and conditions. Section 2 also describes a list of additional mitigation measures that may be applied to the action alternatives to further minimize catch of non-target species. We call these "additional" mitigation measures because they are considerations beyond the mandatory terms and conditions identified for the action alternatives.

Section 3 describes the methodology used to evaluate the potential effects of the Proposed Action on the affected environment. Our method of analysis includes the use of proxy datasets, given data limitations, such as the lack of large fishery-dependent datasets to describe potential environmental impacts of the Proposed Action within the Proposed Action Area. The proxy datasets include observer data from the Hawaii shallow-set longline (SSLL) and deep-set longline (DSLL) fisheries east of 140˚ West (W) Longitude (Hawaii fisheries east of 140˚W; Appendix 3), the U.S. West Coast drift gillnet fishery (West Coast DGN; Appendix 4), the U.S. West Coast deep-set longline fishery operating outside the U.S. West Coast EEZ (West Coast DSLL; Appendix 5), the three-month 2019 SSLL and DSLL EFP trials in the U.S. West Coast EEZ (2019 Longline EFPs; Appendix 6) and the U.S. West Coast deep-set linked buoy gear (LBG) EFP trials (LBG EFPs; Appendix 7).

Section 4 describes the affected environment and analyzes the impacts of the alternatives on components of the affected environment that are likely to be affected, or may be affected, by the Proposed Action. Analysis of the Proposed Action relies on catch rates from proxy datasets as a predictive tool to project catch and interaction rates. These proxy datasets come from U.S. fisheries and EFP fishing trials that are regulated to mitigate interactions with non-target species in the Pacific Ocean. This section includes a biological impact analysis for species in which interactions were documented in the proxy datasets. More specifically, the analysis includes the environmental consequences for a list of species categorized as *commonly caught management unit species*, *other commonly caught species*, *prohibited species*, and *protected species*. Section 4 also includes a discussion and an evaluation of essential fish habitat and critical habitat, and domestic fisheries landing swordfish to the U.S. West Coast that may be affected by the Proposed Action as well as the no-action alternative. Lastly, Section 4 describes the expected impacts of additional measures that may be applied under the Proposed Action. These measures and expected impacts are discussed in a qualitative manner.

Section 5 describes the cumulative effects of other fisheries and other EFPs in or near the Proposed Action Area, the incidental catch of protected species in or near the U.S. West Coast EEZ, and the geographic and temporal boundaries of the Proposed Action. The Section also includes a summary of the past, present and reasonably foreseeable future actions within the Proposed Action Area, and discusses climate variability and climate change.

This document closes with a list of persons responsible for the preparation of the draft EIS (Section 6), and of references cited (Section 7), followed by an index of eleven appendices (Section 8).

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This EIS is being prepared using the 1978 Council on Environmental Quality (CEQ) NEPA Regulations. NEPA reviews initiated prior to the effective date of the 2020 CEQ regulations may be conducted using the 1978 version of the regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020. This review began on August 10, 2020, and the agency has decided to proceed under the 1978 regulations.

# 1 Introduction

## 1.1 NMFS Proposed Action

The Proposed Action is to allow a vessel or vessels to fish with longline-type gear in the United States (U.S.) West Coast EEZ via EFPs, awards of financial assistance programs, or both. Currently, fishing with longline-type gear is prohibited in this area. Longline or longline-type gear is an umbrella term for fishing practices that employ either a horizontal mainline or hooks set in a horizontal footprint that exceeds one nautical mile (nm) in length and is supported at regular intervals by vertical lines connected to surface floats. Descending from the mainline are branch lines with a baited hook or hooks. This general definition of longline-type gear can be applied to many types of gear configurations or fishing practices, which become distinct from one another by functional aspects of the gear (e.g., depth of set, hook type, hook size, bait type), and operational limitations (e.g., mainline length, maximum number of hooks per set, maximum soak times, etc.) or mitigation measures or both. While longline-type gear is generally a multi-species gear type, longline-type gear may be used to selectively target swordfish, tunas, or other marketable HMS or target these species as a complex. In many cases, NMFS applies mitigation measures as terms and conditions on proposed fishing practices undergoing EFP testing for the purpose of minimizing incidental catch of non-target finfish and interactions with protected species. However, the efficiency and effectiveness of any particular mitigation measure is likely to vary as combined with other measures or across fishing practices.

Longline-type vessel operators are typically opportunistic, making subtle changes to fishing operations to target the best available economic opportunity on each individual trip. Similarly, it is expected that EFPs to target HMS will be used to test a wide range of fishing styles and depths to provide more information for determining which aspects of the gear, operational strategies, or mitigation measures may work best in the Proposed Action Area to minimize bycatch and protected species interactions while balancing economic viability. Therefore, the Proposed Action focuses on hook depths as a key functional aspect of different fishing practices. That is, shallow-set gear is typically used to set hooks at a target depth less than 100 meters (m) or ~328 feet (ft), and deep-set gear is typically used to set hooks at a target depth between 300 to 400 m or ~984 to 1,312 ft. Furthermore, deep-set gear types must be deployed such that the deepest point of the main longline between any two floats, i.e., the deepest point in each sag of the mainline, is at a depth greater than 100 m (~328 ft) below the sea surface (50 CFR 660.712(a)(9). This approach correlates with proxy data we use to inform expectations about impacts of these proposed activities (more information on this provided in Section 3).

Typically, NMFS issues HMS EFPs for up to two years. After the initial period, the applicant, the Pacific Fishery Management Council (Council), and NMFS will evaluate whether to renew an EFP or EFPs. Per

the Council's Operating Procedure 20, HMS EFP applicants must present a preliminary report on the results of the EFP and the data collected (including catch data) to the Council's Highly Migratory Species Management Team (HMSMT) at the June Council meeting of the year following their EFP issuance (PFMC 2017). A final written report on the results of the EFP and the data collected must be presented to the HMSMT and the Council at the September Council meeting once the EFP is complete. This information can be used to evaluate impacts of fishing activities under EFPs to determine whether a continuation of the activities and additional data collection is likely to be useful for making future fishery management decisions. NMFS expects to follow the same process for longline-type EFPs, with an initial duration of 2 years with possible renewals.

### 1.2 Proposed Action Area

The Proposed Action Area is the Federal waters inside the U.S. West Coast EEZ (Figure 1-1); however, we consider several no-fishing zones (Section 2.4) which would limit activities under the Proposed Action to a portion of the EEZ (Figure 2-1). For example, the Council recommended a no-fishing zone for EFPs in Federal Waters off of Washington and another in Federal Waters off of Oregon during the first year of any EFP operations. Other no-fishing zones being considered are for nearshore waters and other area-based designations, such as National Marine Sanctuaries (NMS) and critical habitat defined under the Endangered Species Act (ESA).


**Figure 1–1.** Coast-wide view of the Proposed Action Area, which is the Federal waters inside the U.S. West Coast EEZ; however, several no-fishing zones are considered (Section 2) which would limit activities under the Proposed Action to a portion of the EEZ.

## 1.3 Background

There is both a domestic and international context contributing to the impetus for issuing EFPs under the Proposed Action. Domestic fisheries for HMS are subject to both national and international governance, and are in competition with foreign HMS fisheries in the global seafood market. Regulatory changes impact fishery competitiveness, which in turn can lead to shifts in fishing effort, sources of environmental impacts, and seafood availability to U.S. consumers. In this Section, we discuss: (1) domestic fishery management in the context of international seafood markets, (2) history of U.S. longline fishery management as it pertains to U.S.-caught swordfish and other HMS supply to the U.S. West Coast, and (3) recommendations of U.S. fishery managers relating to the Proposed Action.

Domestic HMS Fisheries in Context

Several laws, including the MSA, the Marine Mammal Protection Act (MMPA), and the ESA, guide fisheries management in the United States. Under MSA regulations, marine fisheries management in U.S. Federal waters must foster long-term biological and economic sustainability of marine fisheries and other living marine resources, as guided by 10 National Standards (50 CFR 600.355). Despite progress in ending overfishing in the United States through science-based management and collaboration and efforts to advance and export best practices internationally, more than 80 percent of swordfish consumed in the U.S. is imported, and without effective traceability and monitoring (Aquarium of the Pacific 2023). Therefore, illegally caught fish from around the world can enter the United States market (USCG 2020).

Under the MSA, fishery managers are charged with managing fisheries according to 10 National Standards. National Standard 1 calls on U.S. fishery managers to achieve optimum yield while preventing overfishing. In the U.S. West Coast swordfish fishery, optimum yield has been met only in part, as evidenced by a healthy stock and declining catch by the West Coast-based fishery in recent decades (Berube *et al.* 2015). The demand for swordfish in the U.S. has been consistent over the last few decades, while domestic supply has fallen. During the 1980s and into the mid-1990s, domestically caught swordfish generally supplied domestic demand. Since 1997, however, the proportion of imported swordfish increased, with an average of 75 percent of swordfish demand met by imports. In 2002 and 2004, the proportion of swordfish imports reached 81 percent, making the U.S. one of the largest markets for foreign-caught swordfish. A large share of these imports come from regions with fragile leatherback turtle populations (Southwest Fisheries Science Center (SWFSC) 2015), thus raising some concern over the transfer of fishing effort to fleets with higher interaction rates with protected species that regulations on U.S. fisheries were intended to safeguard against. Meanwhile, the biomass of swordfish stocks off the U.S. West Coast is estimated to be well above levels necessary to produce maximum sustainable yield on

a continuing basis (ISC 2018a).

Between 2015 and 2020, 84 percent of the total swordfish supply on the U.S. West Coast came from foreign imports, with 16 percent supplied from domestic sources (NMFS 2021a). This gap between domestic demand and domestic supply can be attributed to a number of factors. These include rising operational costs to comply with regulations for U.S. fleets using gear types capable of producing high volume catches, attrition in the domestic drift gillnet (DGN) fleet, and the lower price of imported swordfish compared to catches by other, lower-volume gear types used to fish off the U.S. West Coast (e.g., harpoon and deep-set buoy gear (DSBG; i.e., both "standard" and "linked")). In the absence of new domestic sources of swordfish supply, the gap will likely continue to widen due to the December 2022 enactment of the Driftnet Modernization and Bycatch Reduction Act (Driftnet Act). This Act sunsets the DGN fishery at the end of 2027, after which the use of large-mesh DGN gear will be prohibited in Federal waters (see details below in *Federal Bill for the West Coast DGN Fleet* in Section 5.1.1).

Past, Present, and Future of U.S. West Coast-based Vessels Targeting Swordfish and Other Marketable HMS

At present, three commercial gear types used for commercial harvest of swordfish in the U.S. West Coast EEZ are authorized under the HMS FMP: DGN, harpoon and DSBG. The DGN fleet historically produced the predominant share of swordfish landings to the West Coast; however, landings have decreased with attrition in this fleet and further decline in domestic landings is anticipated with the phase-out of the fishery under the Driftnet Act. Swordfish harvest by the harpoon fleet is small, accounting for less than 3 percent of the total U.S. West Coast swordfish catch from 2015 through 2020 (NMFS 2021a). While DSLL is authorized under the HMS FMP, DSLL fishing to target tuna must take place outside of the U.S. West Coast EEZ. Few vessels fish with deep-set longline gear under the HMS FMP permit as a result. In recent years, increased participation of U.S. fishermen in EFP trials with DSBG has led to an additional domestic source of swordfish supply. Between 2015 and 2020, DSBG fishing contributed 12 percent of total landings to the U.S. West Coast (NMFS 2021a). The Hawaii-based pelagic longline fisheries contributed the greatest share of domestic swordfish landings to the U.S. West Coast during this time. Notably, on June 7, 2023, DSBG (both standard and linked configurations) was added as an official gear type under the HMS FMP (88 FR 29545) and NMFS prepared an EIS to assess the potential impacts of authorizing this new gear type. This analysis included an evaluation of up to 300 limited entry permits being issued to fish DSBG in the Southern California Bight (SCB; defined in Section 8, Appendix 2—Glossary) as an additional gear type (i.e., the analysis did not consider DSBG as a substitute gear type for DGN; NMFS 2023). In 2023, 77 individuals qualified to receive a limited entry DSBG permit. Additional permits will become available on a first-come, first-served basis for the 2025 fishing season (88 FR

29545, May 8, 2023); however, issuance of additional limited entry permits is limited to 25 each year up to a maximum of 300 limited entry permits.

Longline and longline-type fishing is currently prohibited within the West Coast EEZ; however, this prohibition has not always been in place. Historically, vessels of the U.S. longline fleet moved back and forth between California and Hawaii in response to changing regulations and ocean conditions. A California-based SSLL fishery began in 1993 with the arrival of vessels from the Gulf of Mexico (PFMC 2015a). An active pelagic longline fishery based out of Hawaii already existed at that time. However, in 1991 the Western Pacific Fishery Management Council (WPFMC) implemented a moratorium on new entrants, followed by a limited entry program due to rapid expansion in the fishery. The WPFMC was concerned about the negative effects of gear and market competition. By 1994, 31 vessels composed the California-based fishery, fishing the grounds beyond the EEZ and landing swordfish and tuna in California ports. These vessels fished alongside Hawaiian vessels in the area around 135° W longitude (about halfway between the U.S. West Coast and Hawaii) from September through January. The California fishery declined from its peak in the mid-1990s as vessels either acquired the permits necessary to enter the Hawaii fishery or returned to the Gulf of Mexico.

Twenty Hawaiian longline fishing vessels relocated to southern California to join the fishing fleet when the Hawaii SSLL fishery closed in 2000 due to bycatch concerns, namely loggerhead sea turtles (Holts 2001; PFMC 2005). In 2001, NMFS developed an observer program to document incidental take (defined in Section 8, Appendix 2—Glossary) in this California-based fishery. That same year, the Council began developing the HMS FMP (Berube *et al.* 2015). Proposals for the FMP included a West Coast SSLL fishery among other fisheries targeting HMS. However, the final proposal did not include many of the modifications being developed and implemented in the Hawaii fishery, and NMFS ultimately only partially approved the Council's HMS FMP—disapproving authorization of the SSLL fishery.

The Hawaii SSLL swordfish fishery reopened in 2004 after implementing mitigation measures and modifying operations to reduce sea turtle bycatch and mortality. These measures included: (1) use of circle hooks to replace J-hooks, (2) use of fish as bait instead of squid, (3) sea turtle handling protocols, and (4) 100 percent observer coverage. When the Hawaii fishery reopened in 2004, there was a 90 percent decline in loggerhead sea turtle bycatch rates and an 82.8 percent decline in leatherback sea turtle bycatch rates (Gilman *et al.* 2007). There was also a significant reduction in the proportion of turtles that swallowed hooks, and a significant increase in the proportion of caught turtles that were released after removal of all terminal tackle, which likely increased the survival rates of those turtles.

When NMFS partially approved the HMS FMP for West Coast fisheries, it implemented regulations prohibiting fishing vessels to target swordfish with SSLL gear. These prohibitions were based on Federal review of the Council's proposal to allow the use of "outdated" SSLL gear fishing practices (i.e., J-hooks and squid bait) no longer used in the post-2000 Hawaii fishery as new regulations were put in place in the when the Hawaii fishery reopened in 2004. However, the HMS FMP states that longlining within the EEZ could take place under an EFP (Section 2.4 of the HMS FMP Amendment 2; PFMC 2011).

As a result of implementation of the HMS FMP in 2004, longline vessel operators could only obtain permits to use DSLL gear outside of the U.S. West Coast EEZ. Almost all vessels that had migrated to California returned to Hawaii (Ito and Childers 2014). The California-based longline fishery decreased to fewer than six vessels, with only a single West Coast-based vessel targeting tuna in the eastern Pacific outside of the EEZ with DSLL gear for many years. Vessels carrying Hawaii (or western Pacific) longline permits could access these same fishing grounds with both DSLL and SSLL in addition to fishing grounds in the western and central Pacific. If they also carry an open-access HMS FMP permit, they may unload their catch to U.S. West Coast ports, which they have been doing in increasing quantities (PFMC 2018).

In addition to federal regulations impeding the use of longline-type gears off the West Coast, state regulations have also played a role. In 1977, the State of California's Fish and Game Commission issued regulations requiring that swordfish be taken only with hand-held hook and line or harpoon within the California EEZ (14 California Code of Regulations § 107.12), which was later modified to allow the use of DGN. The California State Legislature prohibited fishing lines in the ocean that exceed 900 ft (~274 m). In 1991, the California State Legislature permitted targeting swordfish using longline gear outside of the EEZ off California (Holts 2001). However, swordfish and other marketable fish caught by longline gear outside the EEZ could be landed in California only if a declaration indicating such intent was filed with the California Department of Fish and Game (now California Department of Fish and Wildlife or CDFW) prior to departure. Additionally, landing of fish caught by lines exceeding 900 ft has been permitted by CDFW when fished under a Federal or state EFP (e.g., such as those issued for deep-set buoy gear). Washington and Oregon have never had longline prohibitions in place.

Council Recommendations

In 2014, the Council decided to solicit EFP proposals to test alternative gears, approaches, or methods to target swordfish and other marketable HMS following on a series of stakeholder workshops to address

concerns over declining catch and attrition in the U.S. West Coast swordfish fishery (PFMC 2014a). The EFPs are a means to promote innovation in the fishery and generate data on fishing operations in the U.S. West Coast EEZ such that fishery managers are equipped to determine which types of fishing practices and styles and areas of deployment are best suited for achieving goals for the U.S. West Coast swordfish fishery, and meeting National Standards under the MSA. The Council continues to review EFP applications from fishermen to test alternative fishing practices for targeting HMS in Federal waters off the U.S. West Coast.

The Council has reviewed several EFP applications to fish with longline-type gear. One of those applications proposes to fish with modified longline gear similar to that used in the Hawaii fishery and inclusive of additional measures specific to operations within the West Coast EEZ. The others propose to fish with truncated footprints, and reduced number of hooks relative to Hawaii longline operations; one such type is described as "midwater snap gear" and another is described as "deep-set extended linked buoy gear" (see 87 FR 1401, February 10, 2022 and 88 FR 69143, October 5, 2023, respectively). These applicants expressly stated their interest in innovating a fishing practice better suited to fishing offshore waters (including from drift gillnet vessels), in areas outside and north of the SCB, where other deep-set buoy gear has not proven easy to fish in the harsher prevailing weather and sea conditions or where drift gillnet has been prohibited from fishing due to existing regulations. NMFS publishes a notice of receipt of EFP applications and Council recommendations in the Federal Register and accepts public comment.

This draft EIS considers both longline-type EFP applications already reviewed by the Council and longline-type EFP applications received in the future, as well as associated funding or grants, to fish with longline-type gear as generically described in this document, and in accordance with the terms and conditions and menu of additional mitigation measures described in this document (see Sections 2). Any future effort by the Council to authorize ongoing permitting activities of otherwise unauthorized fishing practices (like those considered for EFPs) is outside of the scope of this draft EIS. That is, authorization of new legal gear types for targeting HMS in the Federal waters off the U.S. West Coast under the MSA and the HMS FMP is a matter for further engagement with the Council. Typically, the Council would make such a recommendation after a minimum of a three-meeting process, and public input on a draft amendment to the HMS FMP and implementing regulations. NMFS would engage the Council at that time in developing NEPA documentation for a Proposed Action to fully authorize a new gear type.

## 1.4 Purpose and Need

When soliciting requests for EFP proposals, the Council's objective was to test fishing practices or methods that could serve as an alternative to using DGN gear to catch swordfish and other marketable HMS in the U.S. West Coast EEZ, or to test different approaches to contemporary DGN fishery management practices (PFMC 2014a). Since 1985, swordfish catch by U.S. West Coast vessels has declined 96 percent, from 3,073 metric tons (mt) at a value of $11.9 million in 1985, to 320 mt at a value of $2.8 million in 2020 (NMFS 2021a). This is in large part due to attrition in the West Coast DGN fishery (NMFS 2014). When the Council began soliciting EFP applications, the annual attrition rate for the DGN fleet was 10 percent, and West Coast swordfish catch is likely to continue to decline (SWFSC 2010; NMFS 2014). Since then, in 2018, the State of California implemented a West Coast DGN Transition Program with the intent of further reducing and eliminating participation in this fleet. Then, in December 2022, with the enactment of the Driftnet Act, NMFS was directed to conduct a transition program to facilitate the phase-out of drift gillnet fishing and adoption of alternative fishing practices that minimize the incidental catch of living marine resources. The phase-out of the gear must be complete within five years of enactment of the Driftnet Act.

According to regulations, a NMFS Regional Administrator may authorize "for limited testing, public display, data collection, exploratory, health and safety, environmental cleanup, and/or hazard removal purposes, the target or incidental harvest of species managed under an FMP or fishery regulations that would otherwise be prohibited" (50 CFR 600.745(b)). Issuance of an EFP would provide such authorization. Specifically, the Proposed Action is needed to test longline-type gear within the West Coast EEZ, as well as to test the efficacy of additional mitigation measures in these waters. Other permits, licenses, or entitlements needed to pursue the Proposed Action are described in Section 1.6.

The purpose of EFPs is to allow fishing practices that are new to a fishery and not otherwise permitted under an FMP. The specific purpose of the Proposed Action is to allow exploratory longline-type fishing to gauge impacts, to determine whether these types of fishing gears are economically viable, and to assess the type and extent of interactions with protected species and non-target finfish. The Proposed Action is expected to have bycatch of non-target finfish and interactions with protected species. However, a key consideration is whether bycatch or interactions per unit effort or per catch is minimized and relative to the levels in foreign fisheries from which the U.S. West Coast otherwise imports. Data collection under the Proposed Action can also inform a comparison of bycatch to catch or effort from the proposed fishing activities to other U.S. fisheries for HMS, such as those used as proxy datasets for this analysis.

The Proposed Action is primarily needed because fishing with longline or longline-type gear is currently prohibited in the West Coast EEZ under 50 CFR 660.712(a)(1). As discussed above, this prohibition was

put in place in 2004, prior to gear modifications in U.S. longline fisheries that have proven to be effective strategies for reducing sea turtle interactions, injuries, and mortalities (Boggs and Swimmer 2007; Gilman *et al.* 2007). Additionally, other terms and conditions can be specified for EFPs such that fishing operations are based on the best scientific information available (further explained in Section 2). Moreover, EFPs can be used to test additional mitigation measures whether for minimizing bycatch or increasing operational flexibility beyond that provided in existing regulations.

In the future, the Proposed Action may help to identify new fishing practices as a potential component of a West Coast swordfish fishery targeting swordfish and other marketable HMS, such that the fishery is viable and better positioned to address the 10 National Standards (NS) for Conservation and Management included in MSA (50 CFR 600.355), in particular NS 1 (optimum yield; 50 CFR 600.310) and NS 9 (minimize bycatch; 50 CFR 600.350). The capacity to issue EFPs to fish longline-type gear subject to terms and conditions could elicit new and modified gear types that could help satisfy the need for commercially viable options to support sustained participation in the swordfish fishery. In doing so, the Proposed Action addresses NS 8 (consider the importance of fishery resources to fishing communities; 50 CFR 600.345). Additionally, to the extent that additional mitigation measures tested are effective at minimizing bycatch to levels comparable to or lower than in other fisheries from which the U.S. imports, testing under EFPs could lead to conservation gains if harvests from these domestic fishing activities offset U.S. consumption of foreign imports. Furthermore, if the United States can transport more conservative fishing gears or practices to foreign fisheries as a member of international Regional Fishery Management Organizations, the conservation gains could be Pacific-wide.

## 1.5 Public Involvement

Scoping: Notice of Intent

On August 10, 2020, NMFS published a NOI to prepare an EIS for this Proposed Action in the Federal Register (85 FR 48205). The NOI invited interested parties to submit comments on alternatives to be considered in an EIS, and to identify potential issues, concerns, and additional alternatives that might be considered. The public comment period closed on September 9, 2020.

*Public Comments*

NMFS received eight written comments on the NOI through September 9, 2020. One duplicate comment was received through the Pacific Fishery Management Council's September meeting. The list of commenters is below in Table 1-1 and their comments informed the development of this draft EIS.

**Table 1-1**. Comments received by commenter and date.

| | Commenter | Subject/Concern |
|---|---|---|
| 1 | California Department of Fish and Wildlife | In support of EFPs but:<br>• Include alternatives to reduce catch of non-target species<br>• Include species and numbers of animals potentially be captured |
| 2 | California Pelagic Fisheries Association | In support of the EFPs but:<br>• Asked for flexibility in testing depth range, to not close the Pacific Leatherback Conservation Area to SSLL fishing, to not close a portion of the SCB<br>• Clarify hook size, blue-dyed bait and setting times for SSLL<br>• Limits on leatherback and loggerhead sea turtles seem overly restrictive<br>• Need flexibility to strategize on optimizing outcomes and gear adjustments as to not deter innovation and learning<br>• Focus analysis on how EFPs can increase development of the swordfish fishery<br>• Agree on use of EcoCast |
| 3 | Center for Biological Diversity | Concerns with EFPs:<br>• Scoping of the EIS is premature without an application<br>• Bycatch of endangered or threatened species, and migratory birds<br>• Longline fishing in the West Coast EEZ would undermine efforts to recover depleted wildlife populations and to reduce risk of entanglements |
| 4 | Oceana & Earthjustice | Concerns with EFPs:<br>• Longlines are indiscriminate and have unacceptable high levels of bycatch<br>• Concerns that NMFS is not using best available science that shows DSBG is highly selective for swordfish and economically viable<br>• Lack of notice for public meeting on scoping |
| 5 | The Billfish Foundation | Concerns with EFPs:<br>• Add a term and condition for the economic impact to California's recreational fishery and to increase bycatch mortality of overfished species, including striped marlin<br>• Add a term and condition for length of longline; use of circle hooks; only dead bait; speed of deploying and retrieving lines to avoid seabirds and other species; limit soak time on sets |
| 6 | Turtle Island Restoration Network | Concerns with EFPs:<br>• Already have sufficient information regarding the extent and type of interactions of longlines with protected species and non-target finfish<br>• Consider that California listed Pacific leatherbacks as a "candidate species" under the California Endangered Species Act that may provide additional protections to leatherbacks in California waters |
| 7 | Wild Oceans *et al.*[1] | Concerns with EFPs:<br>• Urged NMFS to focus on authorizing DSBG before considering additional gear.<br>• Consider the impact of longlines on the open ocean system<br>• EFPs should be part of a research program that is scientifically rigorous and reproducible |
| 8 | Anonymous (via regulations.gov) | Concerns with EFPs:<br>• Recommend only subsistence fishing be permitted and commercial fishing banned |

[1] Wild Oceans, Game Fish Association, American Sportfishing Association, and Coastal Conservation Association of California.

NMFS also received public comments during a public hearing on August 27, 2020. Thirteen members of the public attended the public hearing. Public comments made during the hearing were similar in nature and scope to the above list of comments.

NMFS considered input into the NOI as well as input during Council discussions on EFPs per Council Operating Procedure 20 (PFMC 2017) during its decision-making process and incorporated the above comments into the analysis in the draft EIS to the extent practicable.

## 1.6 List of Permits, Approvals, and Consultations including any Possible Conflicts Between the Proposed Action and the Objectives of Federal, Regional, State, and Local Policies

National Marine Sanctuaries Act

The National Marine Sanctuaries Act (NMSA) provides the National Oceanic and Atmospheric Administration's (NOAA), Office of National Marine Sanctuaries (ONMS) with authority to comprehensively manage uses of the National Marine Sanctuary System, conduct consultation under section 304(d), and protect its resources through regulations, permitting, enforcement, research, monitoring, education and outreach. In 1992, Congress amended the NMSA to require interagency coordination pursuant to section 304(d). Section 304(d) requires Federal agencies to consult with the ONMS whenever their proposed actions are likely to destroy, cause the loss of, or injure a sanctuary resource. NMFS will work with ONMS staff to consider activities under this Proposed Action that may require NMSA consultation.

State Licenses and Permits

Representatives of the CDFW, the Oregon Department of Fish and Wildlife and the Washington Department of Fish and Wildlife participate in the Council's process to make recommendations on the issuance of Federal EFPs and to promote state-federal coordination in carrying out any Council-recommended Federal actions. If NMFS issues EFPs under the Proposed Action, the respective EFP holders will be required to possess all necessary state licenses, permits, and registrations to conduct fishing activities and land their harvests to ports along the U.S. West Coast.

Endangered Species Act Consultation and Accompanying Incidental Take Statement

The Endangered Species Act provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range and the conservation of the ecosystems on which they depend. A species is considered endangered if it is in danger of extinction throughout all or a significant

portion of its range. A species is considered threatened if it is likely to become an endangered species within the foreseeable future. Federal agencies are directed, under section 7(a)(1) of the ESA, to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Federal agencies must also consult with NMFS or U.S. Fish and Wildlife Service (USFWS), under section 7(a)(2) of the ESA, on activities that may affect a listed species. These interagency consultations, or section 7 consultations (defined in Section 8, Appendix 2—Glossary), are designed to assist Federal agencies in fulfilling their duty to ensure that Federal actions do not jeopardize the continued existence of a species, or destroy or adversely modify critical habitat. NMFS will conduct such an ESA section 7 consultation for the Proposed Action to assess potential impacts to protected species listed under the ESA.

# 2 Proposed Alternatives

## 2.1 Introduction (Alternatives Screening and NMFS Limitations)

The alternatives are presented by components 1 (shallow-setting) and 2 (deep-setting), and represent different levels of anticipated fishing effort by key functional aspects of gear set with horizontal mainlines (shallow-setting and deep-setting) and effort (number of hooks). There are five alternatives under Component 1 including a no-action alternative (Section 2.2) and four action alternatives to allow fishing with shallow-setting gear (Table 2-1). There are four alternatives under Component 2 including a no-action alternative (Section 2.2) and three action alternatives to allow fishing with deep-setting gear (Table 2-2). Each component is subject to a set of mandatory terms and conditions for all action alternatives under the respective component (Section 2.3). NMFS will select a preferred alternative under each component for the purpose of issuing EFPs, awards of financial assistance programs, or both issued under the Proposed Action. However, vessels may only deploy one of the authorized activities at a time (i.e., may either fish hooks shallow or deep for any given set).

The action alternatives include various levels of effort for testing alternative fishing practices that use horizontal mainlines. NMFS considered the annual average effort of individual vessels participating in the Hawaii shallow-set and deep-set longline fisheries (Appendix 8) when determining a set of alternatives under each component. Because EFP applicants propose different configurations, it is not known whether more or less effort will be necessary to make the proposed fishing configurations economically viable. However, if we assume average annual effort in the Hawaii fisheries to be a gauge for an economically viable operation for a single vessel, then alternatives 1-2 and 2-2 may permit enough effort for two vessels under each alternative, and alternatives 1-5 and 2-5 may each allow up to 10 vessels. We regard the Hawaii fisheries as a useful gauge for evaluating economically viable effort alternatives to foster a transitioning of the DGN fleet as HMS fishermen have repeatedly expressed concerns that DSBG is not an economically viable alternative (PFMC 2021a, PFMC 2022a, and PFMC 2022b).

**Table 2-1**. Component 1: Shallow-setting alternatives and effort levels in maximum annual total number of hooks permitted to be set for all EFP vessels in the Proposed Action Area.

| Alternative | Effort (maximum annual number of hooks set) |
|---|---|
| Alternative 1-1 | No action alternative. No EFPs would be granted to permit shallow-set fishing in the Proposed Action Area. |
| Alternative 1-2 | Up to a maximum annual of 122,000 shallow-set hooks |
| Alternative 1-3 | Up to a maximum annual of 244,000 shallow-set hooks |
| Alternative 1-4 | Up to a maximum annual of 366,000 shallow-set hooks |
| Alternative 1-5 | Up to a maximum annual of 610,000 shallow-set hooks |

**Table 2-2**. Component 2: Deep-setting alternatives and effort levels in maximum annual total number of hooks permitted to be set for all EFP vessels in the Proposed Action Area.

| Alternative | Effort (maximum annual number of hooks set) |
|---|---|
| Alternative 2-1 | No action alternative. No EFPs would be granted to permit deep-set fishing in the Proposed Action Area. |
| Alternative 2-2 | Up to a maximum annual of 662,400 deep-set hooks |
| Alternative 2-3 | Up to a maximum annual of 1,324,800 deep-set hooks |
| Alternative 2-4 | Up to a maximum annual of 3,312,000 deep-set hooks |

## 2.2 No Action Alternatives: Alternative 1-1 (Component 1) and Alternative 2-1 (Component 2)

Under each no-action alternative (Alternative 1-1 and Alternative 2-1), the EFP would not be granted and no longline-type fishing would occur within the U.S. West Coast EEZ for one or both components. All current regulations pertaining to longline-type fishing under the HMS FMP would continue to apply.

## 2.3 Action Alternatives Considered in Detail

The action alternatives considered below are analyzed by Component 1 (shallow-setting) and Component 2 (deep-setting), and by varying levels of annual effort (maximum number of hooks for all EFP vessels). There are four action alternatives under Component 1 for shallow-setting (Table 2-1) and three action alternatives under Component 2 for deep-setting (Table 2-2). Shallow-set longline-type gear (Component 1) is typically used to set hooks at a target depth less than ~328 ft or 100 m to target swordfish, and deep-set longline-type gear (Component 2) is typically used to set hooks at a target depth between ~984 to 1,312 ft or 300 to 400 m (Section 1.1). EFP fishing under each of the action alternatives would be exempt from certain regulations and would be subject to a required set of terms and conditions, as discussed below.

Regulations at 50 CFR part 660, subpart K are implemented under the MSA and apply to HMS fisheries off the U.S. West Coast, and Section 660.712 is specific to fishing with longline gear. The action alternatives would be exempted from 50 CFR 660.712 (a)(1), which prohibits the use of longline gear to fish for or target HMS within the West Coast EEZ, to allow for longline-type fishing in the West Coast EEZ under EFPs. Additionally, regulations at 50 CFR 660.712(a)(2)-(9) and (c)(1)(i) are inapplicable to HMS EFP fishing activities under the Proposed Action, as they apply to activities occurring outside of the Proposed Action Area. All other regulations at 50 CFR 660.712 are applicable to HMS EFP fishing activities under the Proposed Action and are discussed below.

Regulations at 50 CFR 660.712(d)(1)-(5) contain requirements related to vessel monitoring systems (VMS). Although VMS would be required when fishing under the Proposed Action, all action alternatives will nevertheless be exempt from these regulations (except vessels greater than or equal 24 m under IATTC regulations[1]) in favor of explicit terms and conditions for using VMS when fishing under the Proposed Action. These terms and conditions are described in further detail below as terms and conditions that will apply to all action alternatives under the Proposed Action. Vessels would not be exempt from regulations at 50 CFR 660.705(o) and (p), which contain prohibitions against engaging in certain activities without an operating VMS unit.

Regulations at 50 CFR 660.712(c)(1)-(7) describe mitigation measures for avoiding or reducing the likelihood of interactions with seabirds, but do not make distinctions between shallow- versus deep-setting or side- versus stern-setting activities. Therefore, the Proposed Action, including all action alternatives, will be exempt from these regulations in favor of terms and conditions specific to whether fishing under certain EFPs constitutes shallow- or deep-setting and whether the gear is being deployed from the side or stern of the vessel. These terms and conditions are described in further detail below as they would apply to all of the action alternatives under the Proposed Action.

All other regulations at 50 CFR 660.712 will apply to all action alternatives for fishing under the Proposed Action (i.e., vessels fishing under the Proposed Action will not be exempt from these regulations). Furthermore, vessels fishing under EFPs may be subject to additional terms and conditions described below in Subsection 2.4 as additional mitigation measures that could be required as well as the terms and conditions discussed in this Section.

Regulations at 50 CFR part 300, subpart C are implemented under the Tuna Conventions Act in accordance with resolutions of the Inter-American Tropical Tuna Commission (IATTC). As a member of the IATTC, the United States is obligated to implement decisions of the IATTC through domestic regulations. These regulations apply to U.S. fishing vessels targeting or pursuing tunas or tuna-like species within the IATTC Convention Area, which includes the EEZ off the U.S. West Coast. Therefore, these regulations will also apply to all action alternatives under the Proposed Action.

[1] The vessel owner or operator of any U.S. commercial fishing vessel that is 24 meters or more in overall length and engaging in fishing activities for tuna or tuna-like species in the IATTC Convention Area must obtain and have installed on the fishing vessel, in accordance with instructions provided by the AD and the VMS unit manufacturer, a VMS unit that is type-approved by NOAA for fisheries in the IATTC Convention Area (50 CFR 300.26).

Terms and Conditions for all Action Alternatives under Both Components:

1. **Require observer coverage.**

   EFP vessels operating under the Proposed Action are required to have observer coverage, either human observers[2] or, if deemed sufficient by NMFS for data collection, electronic monitoring. This is to allow for independent verification of target species catch as well as bycatch of non-target fishes and interactions with protected species and to allow for documentation of area fished. Observer coverage will be set at levels that provide sufficient confidence and verification in discerning impacts of EFP activities.

2. **Possess on board a valid Protected Resources Workshop certification.**

   EFP vessels captains operating under the Proposed Action must participate in an annual Protected Species Workshop and obtain a certification pursuant to 50 CFR 660.712(e). Certification of attendance in a protected species workshop ensures that fishing vessel owners and operators are well versed on the most up-to-date interaction mitigation, handling, and release techniques for sea turtles, seabirds, and other protected species.

3. **Possess on board a valid Pacific HMS permit.**

   EFP vessels operating under the Proposed Action must comply with current U.S. West Coast regulations under 50 CFR 660.770(a)-(e), including the possession of a valid Pacific HMS permit. A Pacific HMS permit is required for vessels that fish for HMS off or land HMS in the States of California, Oregon, and Washington.

4. **Require all vessels to have a vessel monitoring system installed and in use.**

   EFP vessels operating under the Proposed Action must have a vessel monitoring system (VMS) installed and in-use during all EFP fishing activities (50 CFR 660.705(o) and (p)). A VMS is defined as an automated, remote system and mobile transceiver unit that provides information about a vessel's identity, location, and activity for the purposes of routine monitoring, control,

[2] Observers are NMFS-trained fishery biologists (all are university graduates) responsible for collecting data on fishing gear, locations, weather conditions, and catch (including protected species). Observers collect data on the species composition of the catch including the target species, incidental catch, bycatch, and any sightings or incidental catch of protected species. Including tallying the catch, observers will also take various measurements of many species and various biological samples. Observers may be asked to conduct necropsies on marine mammals and collect whole, dead sea turtles. NMFS (and its contractors) provide enough observer coverage to assess and estimate both target species catch levels and also protected species impacts. This can range from a few percentage points to 100 percent coverage.

surveillance and enforcement of area and time restrictions and other fishery management measures. All costs and fees associated with VMS are expected to be the responsibility of the EFP vessel. *Subsection 2.4-additional mitigation measure number 25* below further specifies a range of potential ping rates that may be required for VMS units.

5. **Require carrying and use of specific equipment for handling and releasing of sea turtles, seabirds, and marine mammals.**

EFP vessels operating under the Proposed Action are required to carry and use specific equipment (handling and dehooking gear) for safe handling and release of sea turtles (50 CFR 660.712(b)), seabirds (50 CFR 660.712(c)(8)-(17)), and marine mammals.

6. **Prohibition on the sale of striped marlin.**

The sale of striped marlin is prohibited under the Billfish Conservation Act of 2012 and the HMS FMP and its implementing regulations (50 CFR 660.711(b)).

7. **Fishing under the Proposed Action is authorized only for Federal waters of the U.S. West Coast EEZ.**

EFP vessels operating under the Proposed Action must fish in Federal waters inside the U.S. West Coast EEZ (Figure 1-1) according to the specified terms and conditions for each EFP. Additional management zones or area closure within the Proposed Action Area may be implemented for EFP fishing as described in Subsection 2.4.

8. **Prohibit shark finning and landing of shark fins.**

As required by the Shark Conservation Act of 2010, EFP vessels operating under the Proposed Action are prohibited from finning and landing shark fins (see 50 CFR 600.1203(a); 81 FR 42285, June 29, 2016). EFP vessels may possess and land shark fins only if the fins are naturally attached to the corresponding shark carcass, meaning attached to the carcass through some portion of uncut skin. Vessels may transfer or receive fins between vessels at sea only if the fins are naturally attached to the corresponding carcass. While at sea, fishermen may not remove any fins from a retained shark, including the tail.

*Component 1 Shallow-setting Action Alternatives and Terms and Conditions*

Under Component 1, there are four action alternatives (i.e., 1-2 through 1-5) that would approve EFPs to allow a vessel or vessels to fish with shallow-setting longline-type gear in the West Coast EEZ under EFPs according to varied maximum annual effort levels in terms of number of hooks (Table 2-1). The

maximum annual number of hooks for each alternative is calculated using the average annual observed hooks per set and average annual sets per vessel, which we derived from the entire Hawaii longline fishery observer data for the years 2004 through 2019 (E. Forney, pers. comm., October 1, 2020) and logbook data for the years 2004 through 2019 (E. Forney, pers. comm., October 20, 2020)[3]. The maximum annual number of hooks for all EFP vessels for each alternative is:

- Alternative 1-2: 122,000 hooks,
- Alternative 1-3: 244,000 hooks,
- Alternative 1-4: 366,000 hooks, and
- Alternative 1-5: 610,000 hooks (Table 2-1).

For comparison, the average hooks set per year in the Hawaii SSLL fishery (using observer data from 2004 through 2019[4]) is 1,330,145 hooks (Appendix 8; E. Forney, pers. comm., October 1, 2020).

For all of the action alternatives under Component 1 (shallow-setting) a suite of terms and conditions are detailed below. These terms and conditions specify commonly accepted mitigation measures for deterring or managing interactions with sea turtles and seabirds in longline fisheries and are based on the best scientific information available. The terms and conditions specific to Component 1 will be required in addition to the eight terms and conditions for all action alternatives discussed above.

Sea Turtle Terms and Conditions:

1. **EFP fishing is restricted to use of large circle hooks and mackerel-type fish bait for shallow-setting EFP vessels.**

   Shallow-setting EFP vessels operating under the Proposed Action are required to use large circle hooks and mackerel-type fish bait only (e.g., sardines, sanma, or mackerel); squid may not be used as bait. Circle hook size can be no smaller than 18/0. These restrictions are intended to

[3] Note that we used the Hawaii SSLL fishery observer and logbook datasets, including fishing conducted west of 140° W, as a proxy for typical annual effort for a longline vessel in a United States longline fishery (Appendix 8). The observer dataset for the years 2004 through 2019 were used to calculate the average annual observed hooks per set except in years 2006, 2011, 2018 and 2019 when the SSLL fishery was closed (Appendix 8; E. Forney, pers. comm. October 1, 2020). The logbook reports for 2004 through 2019 were evaluated for use; however, the reports did not include the number of active vessels for SSLL until 2007 (Appendix 8). Furthermore, the logbook reports data were not used for SSLL in years 2006, 2011, 2018 and 2019 when the SSLL fishery was closed (Appendix 8).

[4] We did not use the entire Hawaii SSLL fishery observer dataset for the years 2004 through 2019 to calculate the average hooks set per year in the Hawaii SSLL fishery because the fishery sector was closed in years 2006, 2011, 2018 and 2019 (Appendix 8). Additionally, the year 2004 was not a full year of observer data as the Hawaii SSLL fishery did not reopen to fishing until late 2004; therefore, the data from 2004 was excluded when calculating the average hooks set per year (E. Forney, pers. comm., March 31, 2021).

reduce interactions with sea turtles during Proposed Action fishing activities, and to increase the survival of sea turtles that may be accidentally caught. This hook and bait type has been shown to reduce the likelihood and severity of sea turtle takes, because sea turtles are less likely to deeply ingest circle hooks versus J-hooks (Boggs and Swimmer 2007; Swimmer *et al.* 2017). The use of large circle hooks with mackerel type bait is required in the Hawaii–based shallow-set fishery, and has resulted in significant reductions in the number and severity of sea turtle interactions in the shallow-set fishery. Since 2004, the minimum hook size for the Hawaii SSLL fishery has been 18/0, with no more than a 10° hook point offset (50 CFR 665.813 (f) and (g)).

Seabird Terms and Conditions:

2. **Follow best practices for seabird avoidance and protection measures when side-setting shallow-set gear under the Proposed Action. These best practices include use of proper branch line weights, deployment of a bird curtain, setting the mainline as far forward as possible, setting of the gear so the hooks remain underwater, and if a line shooter is used, it must be placed properly.**

These measures are similar to requirements for the Hawaii SSLL fishery (50 CFR 665.815(a)(1)) and must be followed in a matter consistent with the criteria as detailed below:

- *Branch lines with minimum 45 gram ((g); 1.6 ounce (oz)) weight within 1 m (3 ft 3 in.) of each hook.*
- *Deploy bird curtain when setting gear and on the same side of the vessel and aft of the line shooter or where the mainline is being deployed:*
    - *Bird curtain pole must be at least 3 m long with three streamers*
    - *Streamers must have a diameter of 20 millimeters (mm), with an allowable terminal end of 10 mm.*
- *When seabirds are present, set gear so hooks remain underwater and do not rise to the surface.*
- *A line shooter is not required; however, if used, it needs to be mounted as far forward on the port or starboard side of the vessel, and at least 1 m (3 ft 3 in.) from stern.*

These terms and conditions are intended to reduce the likelihood of seabirds being accidentally hooked, entangled, and killed during fishing operations. Vessel owners and operators must comply with the full suite of measures described above for side-setting. Side-setting involves deploying the gear from the side of the vessel, where crewmen set baited hooks forward and close to the side of the vessel's hull, where seabirds are unable or unwilling to pursue the hooks (NMFS 2019b). Weighting the branch lines allows hooks to descend more quickly, thus decreasing the time of seabirds' access to baited hooks on the top of the water column. A bird curtain is used to

deter seabirds while gear setting by inhibiting them from landing on the water along the side of the vessel where baits are accessible. Although a line shooter is not required, a line shooter can create slack in the mainline while setting allowing hooks to sink; and thus, reducing the time baited hooks may be available to seabirds. If a line shooter is used, it must be mounted at least 1 m forward from stern corner. Vessel owners and operators must either side-set following these specifications or use the suite of alternative measures for stern-setting in seabird term and condition number 3, below.

3. **Follow best practices for seabird avoidance and protection measures when stern-setting shallow-set gear under the Proposed Action. These best practices include setting the gear at night, using a tori line and minimum vessel lights when setting, and ensuring the mainline is set slack.**

These measures are similar to those used in the Hawaii shallow-set longline fishery (50 CFR 665.815 (a)(2)(v) and 50 CFR 665.815 (a)(4)) and are based on current best scientific information available. The measures must be followed in a matter consistent with the criteria as detailed below:

- *Night set: Begin set at least one-hour after sunset and finish setting before sunrise.*
- *Use of at least one NMFS-approved tori line.*
- *Ensure the mainline is set slack, including when using basket-style gear.*
- *Use minimum vessel lights necessary for navigation and safety.*

EFP vessels operating under the Proposed Action that stern-set are required to set shallow-setting gear at night to reduce accidental hooking and entanglement of seabirds (as described at 50 CFR 665.815 (a)(4)). Seabirds are typically hooked when the line is being deployed off the back of the vessel, with baited hooks in the air or suspended in surface waters before the gear sinks. The birds dive for the bait, get hooked, and may be dragged underwater and drown. Based on the premise that seabirds cannot see baited hooks in the dark, the night setting requirement reduces the likelihood of these interactions occurring (NMFS 2021b). We define setting at "night" to mean that gear deployment must begin at least one hour after local sunset (unless employing additional measure number 12 in Section 2.4—use of a double tori line), using the minimum vessel lights necessary to conform to navigation rules and best safety practices. This definition is consistent with NMFS Pacific Islands Regional Office's seabird compliance guide for the Hawaii-based longline fishery (NMFS 2020a).

In lieu of requirements for shallow-setting vessels that stern-set to use blue-dyed bait and strategically discharge offal, vessels operating under the Proposed Action will be required to use a tori line. A tori line (also known as streamer line, bird scaring line, or bait saver line) is a line that extends from a high point on a vessel (a mast, pole, or rigging) near the stern of the vessel to a drogue (usually a buoy with a weight, such as a section of chain; NMFS 2019b). As the vessel moves forward, the drogue creates tension in the line producing a span of area from the stern where the tori line is aloft. Individual streamers extend to the water to prevent aggressive birds from interacting with hooks.

Use of a tori line is consistent with the best scientific information available on methods to reduce seabird interactions during fishing operations. Tori lines have proven effective at reducing seabird bycatch in longline operations at rates approaching 100 percent (USFWS 2017; ACAP 2015; PSMFC 2013). Recent studies in the Hawaii DSLL fishery have shown that tori lines are more effective at reducing seabird interactions with baited hooks than the use of blue-dyed bait and strategic offal discharge requirements (WPFMC 2021a). The results showed 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). Furthermore, the Scientific and Statistical Committee of the Western Pacific Regional Fishery Management Council supports the replacement of blue-dyed fish bait and strategic offal discard requirements in the Hawaii DSLL fishery with tori lines and best practice training on offal management for seabird bycatch mitigation (WPFMC 2021a). However, when the National Weather Service (NWS) declares a Small Craft Advisory, use of a tori line will not be required.

EFP fishermen fishing under the Proposed Action would need to use NMFS-approved tori lines. Appendix 11 gives examples of tori lines currently approved by NMFS; however, there may be other tori lines approved by NMFS in the future. NMFS will cover “approved” tori line options, specifications, and deployment in the annual Protected Species Workshops, which is a mandatory term and condition for fishermen permitted under the Proposed Action (see terms and conditions number 2 above under all action alternatives).

Additionally, shallow-setting EFP vessels that stern-set must use minimum vessel lighting and ensure the mainline is set slack when using basket-style gear consistent with regulations at 50 CFR 665.815(a)(2)(v). Minimal lighting is to reduce the attraction of seabirds to the vessel. The

reason for setting the mainline slack is to encourage baited hooks to sink faster.

*Component 2 Deep-setting Action Alternatives and Terms and Conditions*

Under Component 2, there are three action alternatives (i.e., 2-2 through 2-4) that would approve EFPs to allow a vessel or vessels to fish with deep-setting longline-type gear in the West Coast EEZ to target swordfish and other marketable HMS under the EFPs according to varied maximum annual effort levels in terms of number of hooks (Table 2-1). The maximum annual number of hooks for each alternative is calculated using the average annual observed hooks per set and average annual sets per vessel, which we derived from the entire Hawaii longline fishery observer data for the years 2004 through 2019 (E. Forney, pers. comm., October 1, 2020) and logbook data for the years 2004 through 2019 (E. Forney, pers. comm., October 20, 2020)[5]. The maximum annual number of hooks for all EFP vessels for each alternative is:

- Alternative 2-2: 662,400 hooks,
- Alternative 2-3: 1,324,800 hooks, and
- Alternative 2-4: 3,312,000 hooks (Table 2-2).

For comparison, the average hooks set per year in the Hawaii DSLL fishery (using observer data from 2004 through 2019)[6] is 44,538,364 hooks (Appendix 8).

For all of the action alternatives under Component 2 (deep-setting) a suite of terms and conditions are detailed below. These terms and conditions specify commonly accepted mitigation measures for deterring or managing interactions with sea turtles and seabirds in longline fisheries and are based on the best

[5] Note that we used the Hawaii DSLL fishery observer and logbook datasets, including fishing conducted west of 140° W, as a proxy for typical annual effort for a longline vessel in a United States longline fishery (Appendix 8). The observer dataset for the years 2004 through 2019 was used to calculate the average annual hooks per set (Appendix 8; E. Forney, pers. comm., October 1, 2020). The logbook reports for 2004 through 2019 were evaluated for use; however, the reports did not include the number of active vessels for DSLL until 2005 as vessels did not need to declare whether they were fishing deep-set or shallow-set until the Hawaii SSLL fishery reopened in late 2004 (Appendix 8; E. Forney, pers. comm., March 31, 2021).

[6] We evaluated the Hawaii DSLL fishery observer dataset for the years 2004 through 2019 for use to calculate the average hooks set per year in the Hawaii DSLL fishery (E. Forney, pers. comm., October 20, 2020); however, data from the year 2004 was not used as vessels did not need to declare whether they were fishing deep-set or shallow-set until the Hawaii SSLL fishery reopened in late 2004 (Appendix 8; E. Forney, pers. comm., March 31, 2021). Additionally, for the Hawaii DSLL fishery, the average observed number of hooks sets per year was multiplied by an expansion factor because the fishery is not observed at 100 percent (Appendix 8).

scientific information available. The terms and conditions specific to Component 2 will be required in addition to the eight terms and conditions for all action alternatives discussed earlier in this Section.

Gear Terms and Conditions:

1. **Deploy deep-set fishing gear such that the deepest point of the main longline between any two floats is set at a depth greater than 100 m (~328 ft) below the sea surface.**

   EFP vessels operating under the Proposed Action are required to deploy deep-set longline-type gear such that the deepest point of the horizontal line from which gangions and hooks are attached is at a depth greater than 100 m (~328 ft) below the sea surface (50 CFR 660.712(a)(9)).

Protected Species Terms and Conditions:

2. **Unless using a heavy weighting system, deploy deep-set fishing gear in a manner consistent with the specifications below.**

   Unless using a heavy weighting system (additional measure number 41 in Section 2.4), these gear specifications are mandatory and are similar to the definition of *"deep-set" or "deep-setting"* in regulations for the Hawaii fishery (50 CFR 665.800 Definitions):

   • *Each float line must be at least 20 m (65 ft 7 in.) long.*
   The definition "float line" means a line used to suspend the main longline beneath a float.

   • *Attach at least 15 branch lines between two consecutive floats (basket gear - at least 10 branch lines).*
   A branch line (or dropper line) means a line attached to the mainline with a hook at its terminal end. Basket-style longline gear means a type of longline gear that is divided into units called baskets" each consisting of a segment of mainline to which 10 or more branch lines with hooks are spliced.

   • *Light sticks are prohibited from use on deep sets.*
   A "light stick" means any type of light emitting device, including any fluorescent "glow bead," chemical, or electrically-powered light that is affixed underwater to the longline-type gear.

3. **Deep-setting vessels fishing under the Proposed Action must use large circle hooks.**

   Vessels engaged in deep-setting under the Proposed Action must use circle hooks that are no smaller than 15/0. Regulations in place for the Hawaii-based DSLL fishery require the use of

circle hooks with wire diameter not to exceed 4.5 mm and with an offset no more than 10 degrees (50 CFR 229.37(i)-(ii). These specifications equate to roughly a 15/0 hook size. They were implemented to reduce the likelihood and severity of interactions with false killer whales. The preamble of the final rule discusses trade-offs between intending for a "weak hook" that false killer whales could straighten and a larger circle hook size being of benefit in instances of sea turtle interactions (77 FR 71260, November 29, 2012). The use of circle hooks has also been shown to reduce interactions with sea turtles, and to increase the survival of any sea turtle that may be accidentally caught (IATTC 2021). See additional measure number 19 in Section 2.4 for further specifications on "large circle hooks" that may apply to EFP activities under the Proposed Action.

4. **Unless using a heavy weighting system, vessels operating under the Proposed Action that deploy deep-set longline-type gear by side-setting must follow practices defined below.**

These measures are similar to requirements for the Hawaii DSLL fishery (50 CFR 665.815(a)(1)) and must be followed in a matter consistent with the criteria as detailed below:

- *Branch lines with minimum 45 g (1.6 oz) weight within 1 m (3 ft 3 in.) of each hook.*
- *Deploy bird curtain when setting gear on the same side of the vessel and aft of the line shooter or where the mainline is being deployed:*
    - *Bird curtain pole must be at least 3 m long with three streamers.*
    - *Streamers must have a diameter of 20 mm, with an allowable terminal end of 10 mm.*
- *Mainline set from port or starboard side, as far forward as possible, at least 1 m (3 ft 3 in.) from stern.*
- *When seabirds are present, set gear so hooks remain underwater and do not rise to the surface.*
- *A line shooter is not required; however, if used, mounted as far forward on the port or starboard side of the vessel, and at least 1 m (3 ft 3 in.) from stern.*

These measures implement fishing gear and operational requirements to reduce the likelihood of birds being accidentally hooked, entangled, and killed during fishing operations, unless using a heavy weighting system (additional measure number 41 in Section 2.4). These measures are consistent with regulations at 50 CFR 665.815(a)(1) and (3) for DSLL vessels participating in the Hawaii fishery and the rationale for these measures is detailed above in the shallow-setting (Component 1) Seabird Terms and Conditions number 2. Vessel owners and operators must either

side-set following these specifications or, if not side-setting, use the suite of alternative measures for stern-setting in number 5 below.

5. **Unless using a heavy weighting system, deep-setting vessels that stern-set must follow best practices for seabird avoidance and protection, such as use of a tori line, utilization of a line shooter, use of proper branch line weights, and when using basket-style gear ensure the mainline is set slack.**

Unless using a heavy weighting system (additional measure number 41 in Section 2.4), vessels that stern-setting under the Proposed Action are required to deploy deep-set gear consistent with best practices described below:

- *Use of at least one NMFS-approved tori line.*
- *When using monofilament gear, use a line shooter to set the gear.*
- *Branch lines with minimum 45 g (1.6 oz) weight within 1 m (3 ft 3 in) of each hook.*
- *When using basket-style gear, ensure the mainline is set slack.*

These requirements are intended to reduce the likelihood of interactions between seabirds and fishing operations under the Proposed Action. In lieu of requirements for deep-setting vessels that stern-set to use blue-dyed bait and strategically discharge offal, vessels operating under the Proposed Action will be required to use a NMFS-approved tori line (see Appendix 11 for examples of tori lines that are currently NMFS-approved; however, there may be other tori lines approved by NMFS in the future). NMFS will cover "approved" tori line options, specifications, and deployment in the annual Protected Species Workshops (terms and conditions number 2 above under all action alternatives). However, when the NWS declares a Small Craft Advisory, use of a tori line will not be required. The rationale for use of a tori line is detailed above in the shallow-setting (Component 1) Seabird Terms and Conditions number 3. Use of a line shooter and specifics on branch line weights are consistent with regulations at 50 CFR 665.815(a)(3) for DSLL vessels participating in the Hawaii fishery that stern-set, and the rationale for these terms and conditions is detailed above in the shallow-set (Component 1) Seabird Terms and Conditions number 3. If using basket-style gear, fishermen must ensure the mainline is set slack to maximize sink rate of the mainline, which is consistent with regulations at 50 CFR 665.815(a)(2)(v).

## 2.4 Menu of Additional Measures for Terms and Conditions on EFPs issued under the Proposed Action

Below is a menu of additional measures that may be applied to the action alternatives detailed in Section 2.3 (Action Alternatives Considered in Detail). These measures are proposed as additional terms and

conditions that may be applied to individual EFPs along with those described in Section 2.3 as required for all EFPs under the Proposed Action. Some of these additional measures provide further detail about specifications on required terms and conditions in Section 2.3.

Most of these additional measures are expected to further reduce the potential for adverse environmental impacts of the Proposed Action beyond those projected based on the proxy data used in this analysis (see Section 3 and Section 4). This is because these measures are not existing requirements in the proxy fisheries used in this analysis, whereas the terms and conditions described in Section 2.3 are reflective of existing regulations and practices. In other instances, additional measures described below represent ways to bolster enforcement or safety at-sea. Finally, because measures intended to reduce adverse environmental impacts or increase monitoring and enforcement capabilities can increase operational costs or constrain economic viability or both, some additional measures described below are intended to provide EFP operators flexibility in managing such trade-offs. Because there is little, if any, data to evaluate the effectiveness of these measures in the Proposed Action Area, we qualitatively discuss their potential impacts in Section 4.8.

The measures discussed in this subsection are divided into four categories. The first two categories discussed – "bycatch monitoring and mitigation measures" and "safety at-sea and enforcement measures" – could be applicable to any EFP fishing operation under the Proposed Action. The second two categories discussed contain measures that would be applicable to specific EFP types – i.e., "large-scale fishing operations" or "small-scale fishing operations." The process by which NMFS would choose which measures to apply to individual EFPs from the menu would consider the number of hooks proposed to be fished during sets as a means to differentiate small- versus large-scale individual EFP operations. Measure 34, below, sets limits on the number of hooks per set that NMFS would consider a "small-scale" operation (i.e., up to 400 hooks per shallow-set and up to 800 hooks per deep-set). EFPs that propose to fish a configuration with a number of hooks in excess of those limits at any given time would be considered "large-scale" operations.

In the list of measures below, we denote which measures were recommended by the Council for EFPs that the Council has approved to-date. NMFS will endeavor to apply all or as many of the Council's recommended measures as terms and conditions as possible. However, some additional measures may be cost-prohibitive or infeasible for applicants, either alone or in combination with other additional measures. We discuss some of these potential tradeoffs with respect to each measure in Section 4. Lastly, because EFPs would be issued for the purpose of gear testing and data collection, there is an expectation

of learning on behalf of the EFP holder, NMFS, and the Council. As information to evaluate EFPs becomes available, relative to the transition under the Driftnet Act and expressed goals for the swordfish fishery, NMFS may reevaluate which of the optional measures below should be applied to individual EFPs following a "cease fishing" during an EFP renewal period.

Bycatch Monitoring and Mitigation Measures

1. **Require human observer coverage.**

   This additional mitigation measure would specifically require use of human observers for purposes of monitoring fishing activities and onboard data collection. Given limited testing of electronic monitoring in HMS fisheries operating in the EPO, NMFS anticipates a human observer coverage requirement for any new EFP activity. Coverage rates may vary over time and with gear configurations and fishing operations permitted under the Proposed Action. However, EFP applicants should anticipate a 100 percent human observer coverage requirement for any EFP operations for which data has not previously been collected or for which NMFS has not approved other monitoring tools.

2. **EFP fishing is prohibited in waters off the State of Washington (north of the Washington/Oregon border at 46° 15' N latitude).**

   The Council recommended a prohibition on EFP fishing for HMS in waters off the State of Washington (north of the Washington/Oregon border (Figure 2-1) during the March 2015 meeting (PFMC 2015b).

3. **EFP fishing is prohibited in waters off the State of Oregon (north of the Oregon/California border at 42° N latitude and south of the Washington/Oregon border at 46° 15' N latitude).**

   During its March 2015 meeting, the Council recommended that all EFPs issued for newly recommended gear types be prohibited from fishing in Federal waters off the State of Oregon (north of the Oregon/California border and south of the Washington/Oregon border (Figure 2-1)) for the first year of EFP operations but open to EFP fishing in the second year of any given EFP (PFMC 2015b).

4. **Include National Marine Sanctuaries areas (including the Davidson Seamount Management Zone) in the no-fishing zone.**

   Several U.S. West Coast National Marine Sanctuaries (NMS) exist within the EEZ off the U.S. West Coast that could be included in the no-fishing zone (Figure 2-1). The NMSs include the Olympic Coast NMS, the Cordell Bank NMS, the Greater Farallones NMS, the Monterey Bay NMS (including the Davidson Seamount (brown-hatched quadrilateral polygon in Figure 2-1)), the Channel Islands NMS, and any newly designated NMSs (e.g.,

the proposed Chumash Heritage Site (88 FR 58123, August 25, 2023)).

5. **Include the critical habitat for the leatherback sea turtle in the no-fishing zone.**
Critical habitat for the West Pacific distinct population segment (DPS) of leatherback sea turtle was designated on February 27, 2012 (77 FR 4170, January 26, 2012). Figure 2-1 identifies this critical habitat relative to the Proposed Action Area and other potential no-fishing zones being considered as potential terms and conditions of EFPs, if issued. The critical habitat for the West Pacific DPS of leatherback sea turtles is defined based on presence of prey availability.

6. **Include the critical habitat for the humpback whale in the no-fishing zone.**
Critical habitat for the Central America DPS and the Mexico DPS humpback whales was designated on April 21, 2021 (86 FR 21082; Figure 2-1). This critical habitat is defined based on presence of prey availability.

7. **Include the critical habitat for the Southern Resident killer whale DPS in the no-fishing zone.**
Critical habitat for the Southern Resident killer whale DPS was designated on September 1, 2021 (86 FR 41668, August 2, 2021). Figure 2-1 identifies this critical habitat relative to the Proposed Action Area and other potential no-fishing zones being considered as potential terms and conditions of EFPs, if issued. This critical habitat is defined based on presence of prey availability, passage conditions to allow migration and water quality.

8. **No fishing within the Pacific Leatherback Conservation Area during the closure period.**
The Pacific Leatherback Conservation Area (PLCA) refers to a time-area closure for drift gillnet fishing (Figure 2-1). While the PLCA has been attributed to a decline in participation in the West Coast DGN fishery, the results of a recent study showed that the PLCA is still the shortest (i.e., August 15 to November 15) and most effective closure to balance sea turtle interactions and DGN fishing (Eguchi *et al*. 2017). Applying this closure area to deep-set (Component 2) fishing activities could help reduce the likelihood of mortalities from those activities.

9. **Use of the Temperature Observations to Avoid Loggerheads (TOTAL) tool to inform closure of the Loggerhead Conservation Area.**
The Loggerhead Conservation Area (LCA; Figure 2-1) refers to a time-area closure for the West Coast DGN fishery in the SCB during summer months when sea surface temperatures are anomalously high (see 50 CFR 660.713(c)(2)). This additional measure could be used to

prohibit EFP fishing activities under the Proposed Action in the LCA based on use of the *Temperature Observations To Avoid Loggerheads* (TOTAL; Welch *et al.* 2019) tool. That is, when the TOTAL tool indicates that sea surface temperature conditions reach a threshold for concern of increased loggerhead presence off southern California; it could trigger EFP vessels to cease fishing in the LCA for a period of time.

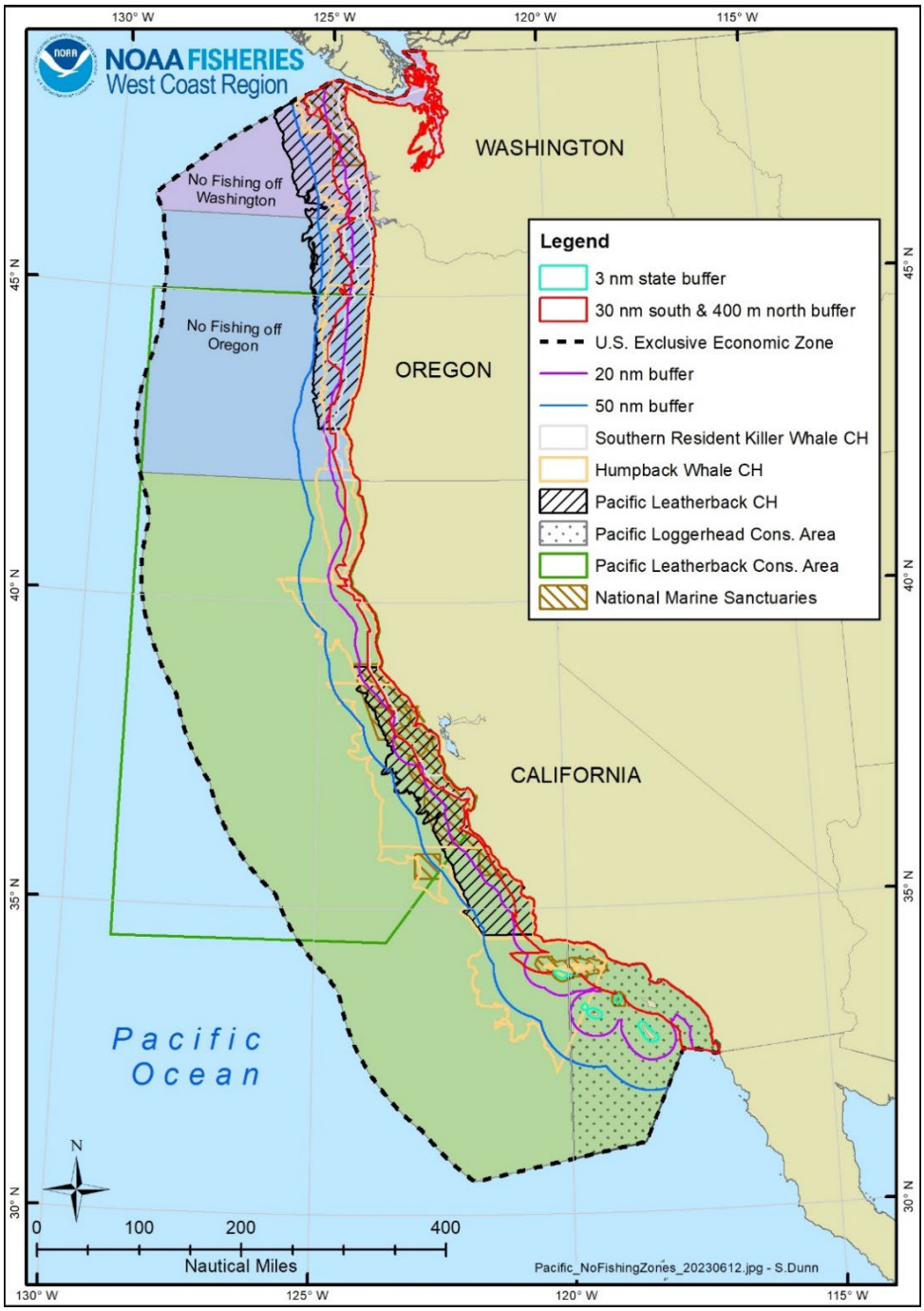


**Figure 2–1.** Coast-wide view of the U.S. West Coast EEZ along with potential no-fishing zone areas (defined in this Section) including areas off Washington and Oregon, the 50 nm line (which would apply to large-scale fishing operations only), the 30 nm line south of Pt. Conception (34.268981 North latitude) with the 400 m line north of Pt. Conception (which would apply to small-scale fishing operations only), the 20 nm line (which would apply to small-scale fishing operations only), critical habitat for the leatherback sea turtle, critical habitat for the humpback whale, critical habitat for the Southern Resident killer whale DPS, the Pacific Leatherback Conservation Area, the Loggerhead Conservation Area and the U.S. West Coast National Marine Sanctuaries (i.e., the Olympic Coast NMS, the Cordell Bank NMS, the Greater Farallones NMS, the Channel Islands NMS and the Monterey Bay NMS includes the Davidson Seamount (brown-hatched quadrilateral polygon)).

10. **A species limit placed on the number of hooked or entangled leatherback sea turtles[7] during the duration of EFP fishing.**

This limit would be up to the projected number of hooked or entangled animals, which is calculated by multiplying the leatherback sea turtle catch rate derived from proxy data (Section 3. Methodology, Table 3-4 and Table 3-6) by the maximum annual level of effort for shallow-setting and deep-setting components of EFP fishing under each action alternative (Table 2-1 for Component 1 alternatives and Table 2-2 for Component 2 alternatives), plus one animal. Because no hooking or entanglement of leatherback sea turtles is projected for deep-set activities, these limits are based on projections for shallow-set activities.

Because the projected number of hooked or entangled leatherback sea turtles (expressed as a rate per 1,000 hooks) in the proxy datasets is used to set limits, one animal may be added to the limit to account for potential variability in catch rates due to fishing in a different area or with different operational or gear specifications. This also accounts for variability in the probability of reaching these limits, given sea turtle interactions are considered rare events in the proxy fisheries. For example, projected catch of leatherback sea turtles in number of animals for Component 1-Alternative 3 is 1.9 (or 2; Table 2-3) animals which is based on the projected number of hooking or entanglements when setting 244,000 shallow-set hooks (Table 2-1, Alternative 1-3), plus one animal for a maximum limit of 3 leatherback sea turtles in any given year. EFP vessels must cease fishing if they exceed the limit.

[7] The annual hard cap for leatherback and loggerhead sea turtles in the Hawaii SSLL fishery was first implemented as a measure to control sea turtle interactions while NMFS gathered information on the effectiveness of using circle hooks and mackerel-type bait in reducing sea turtle interactions (69 FR 17329, April 2, 2004). At the time in 2004, the best scientific information available indicated that the North Pacific loggerhead turtle population was projected to decline (NMFS 2004). NMFS then revised the measures in 2020 (85 FR 57988, September 17, 2020). The best available scientific information available in 2020 indicated that the North Pacific loggerhead population is increasing at an average rate of 2.3 percent, and the total population estimated in the 2019 Biological Opinion (BiOp) is approximately 340,000 turtles (NMFS 2019a). The 2019 BiOp notes that nothing in the ESA requires fisheries hard caps be used as a management tool, and current information strongly suggests that other mitigation measures will be effective in reducing impacts to loggerheads, while allowing for year-round fishing opportunities.

In the absence of a hard cap for loggerhead turtles, EFPs would still be monitored and constrained by the projected number of loggerhead interactions predicted. Consistent with the requirements of the ESA, NMFS would reinitiate consultation pursuant to ESA Section 7 if the accompanying HMS EFPs' individual take statement (ITS) for loggerhead turtles was exceeded.

Unlike the loggerhead sea turtle, the current best scientific information available indicates that the western Pacific leatherback population is decreasing at an average rate of −6.1 percent, and the total population estimated in the 2019 loggerhead BiOp is approximately 175,000 turtles. Although NMFS has determined the operation of the SSLL Hawaii fishery is not likely to jeopardize the leatherback turtle, we will nevertheless take additional precautions with the West Coast longline-type EFPs and set leatherback sea turtle take limits.

**Table 2-3.** Annual projected catch in number of leatherback sea turtles for alternatives 1-2, 1-3, 1-4 and 1-5 for Component 1 (shallow-setting) and alternatives 2-2, 2-3 and 2-4* for Component 2 (deep-setting) followed by example limits.**

| | Alternative 2-Projected Catch in Number of Animals | Alternative 3-Projected Catch in Number of Animals | Alternative 4-Projected Catch in Number of Animals | Alternative 5-Projected Catch in Number of Animals* |
|---|---|---|---|---|
| Component 1-Shallow-setting | 0.9 | 1.9 | 2.8 | 4.7 |
| Component 2***-Deep-setting | 0 | 0 | 0 | - |
| Leatherback limits | 1 | 2 | 3 | 5 |

* Shallow-setting has 5 alternatives and deep-setting has 4 alternatives (see Tables 2-1 and 2-2).
** The number of animals is reported as a fraction (or decimal) of an animal (Table 4-46); however, for leatherback limits we round fractional amounts to whole animals under all alternatives by component.
*** There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no leatherback sea turtle interactions are projected for Component 2.

11. **A limit on the number of observed leatherback sea turtle mortalities.**

This additional measure would apply a limit on the number of observed leatherback sea turtle mortalities. In considering the leatherback sea turtle limits (above in Table 2-3), it is important to distinguish between an encounter (i.e., when the animal is released alive after contact with the fishing gear) and a direct mortality (i.e., where the animal is released dead). Post-release mortality rates for sea turtles can be significantly lower than 100 percent depending on the fishing gear component (e.g., deep-setting or shallow-setting), species, and type of encounter (e.g., lightly entangled versus a deeply ingested hook). A limit based on encounters with dead sea turtles is easier to monitor and enforce than a limit on projected post-release mortality. However, because one encounter may lead to a post-release mortality, NMFS may direct EFP vessels to cease fishing after an observed leatherback mortality as a result of an interaction if the estimated or observed mortality is more than expected over a given monitoring period.

12. **Allow vessels that stern-set shallow-set gear to begin setting earlier than local sunset, if using double tori lines for seabird avoidance.**

Under the Proposed Action, stern-setting shallow-set EFP vessels would be required to set shallow-setting gear at night – i.e., begin setting at least one hour after sunset and finish setting before sunrise (see term and condition number 3 for Component 1 in Section 2.3).

This additional mitigation measure would allow stern-setting shallow-set fishing gear deployments to begin setting earlier than local sunset with the required use of double tori lines for seabird avoidance under the Proposed Action. This would provide for greater flexibility and ease of setting the gear in daylight. EFP fishermen fishing under the Proposed Action would have the option to use either the West Coast groundfish fishery tori line (50 CFR 660.21(c)(i)-(v)) or the "light" tori line currently being tested in the Hawaii SSLL fishery (see Appendix 11 for examples of tori lines that are currently NMFS-approved, and note that NMFS may approve other tori lines in the future). This measure would not be applicable when the NWS declares a Small Craft (or higher) Advisory in the marine area being fished, which is likely to preempt the proper and safe use of tori lines. Therefore, in such instances, EFP vessels may not begin setting earlier than local sunset.

EFP studies are currently being conducted in the Hawaii SSLL fishery sector testing setting before sunset while using two tori lines (86 FR 71234, December 15, 2021).

13. **Prohibit use of wire leaders.**

This additional mitigation measure would prohibit the use of wire leaders, similar to the new regulations for the Hawaii DSLL fishery sector (50 CFR 665.802 (gg)). Additionally, in 2021, the Council recommended that no wire leaders be used when approving certain EFPs for NMFS to issue. Applying this measure could help reduce the likelihood of shark bycatch.

14. **Mako and blue shark post-release mortality research.**

This additional measure would require EFP fishing vessels, if requested by NMFS, to participate in a post-release survival study focusing on blue and shortfin mako sharks. This study would contribute to a broader study concerning shark interactions with longline gear throughout the Pacific, which currently lacks data for the West Coast EEZ, and is detailed in Appendix 10. Similar studies in Hawaii and American Samoa have used satellite tags to quantify post release survival rates and to identify best handling and discard practices to improve survival rates. This study would leverage the knowledge and capabilities of researchers that have been working with Hawaii-permitted longline vessels, including vessels based on the West Coast, as well as their experience working with the Hawaii observer program on cost-effective approaches to data collection and best practices in bycatch mitigation for longline fleets (including trade-offs across species, e.g., sea turtles, seabirds, and sharks).

15. **Use of EcoCast, a near real-time dynamic ocean management tool.**

Under this additional mitigation measure, EFP fishermen could be expected to use EcoCast,

which is a tool being developed to predict in near real-time the spatial distributions of protected species (e.g., sea turtles) as well as target stocks (swordfish and other marketable HMS) and may enhance bycatch avoidance. EcoCast is a tool that may help EFP fishermen make decisions about where to fish by offering predictions on concentrations of species (both target and non-target species of concern) based on ocean conditions. For example, if the tool indicates the expected presence of leatherbacks, EFP fishing vessels are strongly encouraged to assess the risks and consider not setting in the area. EFP holders and vessel operators will be provided guidance on the use of EcoCast and its requirements during the required Protected Resources Workshop (see Section 2.3 Term and Condition for all Action Alternatives under both Components—number 2).

16. **Prohibit the use of "lazy lines."**

This additional mitigation measure would prohibit the use of a "lazy line" during EFP fishing. A "lazy line" is a branch line that is unclipped from the mainline and clipped along the rail of a vessel when branch lines come to the surface faster than the fisherman can pull them on board. That is, during haul-back, a fisherman will either unclip (detach) the branch line from the mainline and coil the line on board the vessel immediately (tended line), or clip the branch line to the side or rear of the vessel to retrieve it later (untended line or "lazy line"). "Lazy lines" stack up at the end of the vessel, dragging the animals on the surface until the coilers can pull them aboard. Unintended interactions can occur, and species (e.g., seabirds and non-target fishes) may remain on the "lazy line" until the fishing crew can tend the line.

17. **Hook depth >30 m.**

At its September 2021 meeting, the Council recommended fishing hooks at depths greater than 30 m using weighted buoy line and gangions in combination for certain EFP applications. The intent is to reduce interactions with air-breathing protected species.

18. **Require the use of only mackerel-type bait when deep-setting.**

This additional mitigation measure would require vessels to use mackerel-type fish bait only (e.g., sardines, sanma, or mackerel) when deep-setting. Squid may not be used as bait. This measure is intended to reduce interactions between sea turtles during DSLL fishing activities under the Proposed Action. Mackerel-type bait is a required term and condition for vessels shallow-setting (Section 2.3, Sea Turtle Term and Condition number 1 for shallow-setting).

19. **Set limits on hook sizes for shallow-setting or deep-setting activities, or for both. Limit hook sizes between 16/0 to 18/0 hooks, and with hook offset by no more than 10˚.**

Under the Proposed Action, vessels fishing under EFPs would be required to use large circle hooks (see term and condition number 1 for Component 1 and term and condition number 3 for Component 2 in Section 2.3). This additional mitigation measure would require use of large circle hooks defined as a range between 16/0 to 18/0 size restrictions for the activities under the EFPs.

20. **Use of a hydraulic line shooter during all EFP operations.**

The use of a line shooter can create slack in the mainline while setting, allowing hooks to sink and reducing the time baited hooks may be available to seabirds.

21. **Require monofilament branch lines or leaders to have a diameter (thickness) of 2.0 mm or greater, and a minimum breaking strength of 181 kg (400 pounds) for any other material used in the construction of a leader or branch line.**

Each nylon monofilament branch line or leader must have a diameter or thickness of 2.0 mm or greater and a minimum breaking strength of 400 pounds for any other material. This measure is intended to further reduce impacts marine mammals, similar to the current Hawaii DSLL fishery sector regulations under the False Killer Whale Take Reduction Plan (50 CFR 229.37 (c)(2)). The intent of this measure is that the gear be assembled and maintained such that the hook is the weakest component of the terminal tackle. This requirement could further reduce impacts by reducing hooking or mortality when non-target or protected species depredate catch on hooks or baited hooks. Additionally, this measure will reduce the length of trailing gear remaining on released animals. However, the larger the diameter the more difficult it may be for a shark to bite through the monofilament, so there may be trade-offs in increasing the diameter of the branch lines.

22. **When deep-setting, require the use of circle hooks with a maximum wire diameter of 4.5 mm and must be offset by no more than 10˚.**

This additional mitigation measure would require circle hooks to have a maximum wire diameter of 4.5 mm (0.177 in.) containing round (non-flattened) wire that can be measured with a caliper or other appropriate gauge, and be offset by more than 10˚ when deep-setting under the Proposed Action; similar to the current Hawaii DSLL fishery sector regulations under the False Killer Whale Take Reduction Plan (50 CFR 229.37 (c)(1)). The regulations for the maximum 4.5 mm wire diameter are intended to create a “weak hook” to allow non-target or protected species, such as marine mammals, to escape by bending or straightening the hooks.

23. **Require gear and line marking to identify protected species entanglement.**

EFP vessels operating under this additional mitigation measure must ensure that every piece of longline-type gear, including monofilament line, can be attributed to the vessel from which it was deployed. Markings must be legible and permanent, and must be of a color that contrasts with the background material on every buoy and float, including each buoy and float that is attached to a radar reflector, radio antenna, or flag marker, whether attached to a deployed piece of gear or possessed on board the vessel. There has been a significant increase in the number of whale entanglements reported to NMFS-West Coast Region since 2014, especially ESA-listed humpback whales (D. Lawson, pers. comm., April 19, 2022). Only ~50 percent of these reports have been attributed to a known source. Most entanglement reports identified to an origin have been associated with commercial pot/trap fisheries (e.g., Dungeness crab), but there have been six confirmed entanglements since 2015 (five humpback whales and one sperm whale) that are known to involve monofilament line that is difficult to identify to a specific origin. The six confirmed entanglements included five humpback whales and one sperm whale, of which five were considered of unknown origin. This measure could help identify animals that may have escaped the gear used in EFP fishing yet remain hooked or entangled.

Safety At-sea and Enforcement Measures

24. **Use the Hawaii longline fishery "flyback prevention device" for fishermen safety while using monofilament leaders.**

NMFS recommends fishermen use a flyback prevention device in the absence of wire leaders (e.g., under additional measure number 12). Replacing wire leaders with monofilament line increases the risk of lead weights "flying back" at crew when cutting large sharks or other animals free. The NMFS-Pacific Islands Regional Office created a flyback prevention device (Figure 2-2) to increase safety of crew, and improve safe-handling and release capabilities.

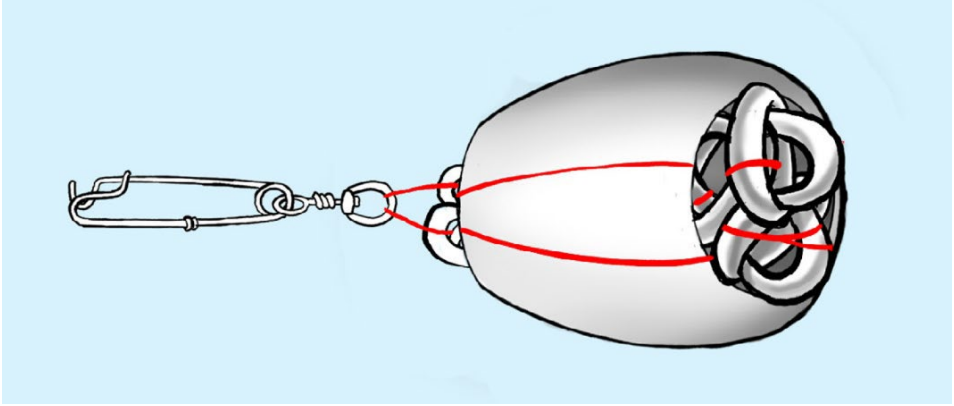

**Figure 2.2.** Flyback prevention device. (C. Brady, pers. comm., February 4, 2022).

25. **VMS ping rates at once per hour, or more frequent for specific EFPs.**
This measure would require the use of current VMS ping rates for existing HMS fisheries (once per hour), but may require additional pings per hour (e.g., every 15 minutes) if an increased rate is needed to adequately monitor the terms and conditions of EFPs.

26. **Require an automatic identification system (AIS) be installed and in use when fishing gear is deployed.**
As recommended by the Council at its September 2021 meeting, this measure would require EFP vessels to have an automatic identification system (AIS) installed and in use when fishing gear is deployed, to reduce the possibility of entanglements with other vessels carrying AIS. AIS must be installed on the vessel and cannot be placed on the fishing gear. Having an AIS allows other vessels with AIS to be visible via satellite or radar to one another, whereas VMS is visible only to fishery managers and enforcement agents. AIS is required by the U.S. Coast Guard for vessels 65 ft length overall or greater; however, this measure would extend this requirement to smaller vessels fishing under the Proposed Action. Each fishing vessel would be responsible for the purchase of their own AIS.

27. **Mainline must remain attached to the vessel.**
As recommended by the Council at its September 2021 meeting, this measure would require the mainline be attached to the EFP fishing vessel at all times. By attaching the mainline to the vessel, VMS positions could then be used as a proxy for gear tracking. It may also be the case that this practice contributes to the ability to actively tend the gear.

28. **Gear will be clearly marked and lit, and never set in shipping lanes, areas of high traffic, or areas where whale activity is observed.**
Under this additional mitigation measure, EFP vessels must ensure that the official number

of the vessel be affixed to every buoy and float, including each buoy and float that is attached to a radar reflector, radio antenna, or flag marker, whether attached to a deployed piece of gear or possessed on board the vessel. Markings must be legible and permanent, and must be of a color that contrasts with the background material. Furthermore, gear must be clearly lit and never be intentionally set in known shipping lanes, areas of high traffic, or areas where whale activity is observed. The Council recommended this measure in September 2021 when recommending that NMFS approve EFPs.

Measures Applicable to Large-scale Fishing Operations

29. **No fishing within 50 nm of the mainland shore and islands.**

During its March 2015 meeting, the Council recommended a prohibition on operating within 50 nm from the mainland shore and islands (Figure 2-1; PFMC 2015b). The 50 nm no-fishing zone is intended to reduce gear conflicts with other commercial and recreational fishing vessels.

30. **Annual limit on the incidental catch of striped marlin.**

Although the eastern North Pacific stock of striped marlin is not overfished or subject to overfishing (Subsection 4.4; Maunder and Hinton 2010), commercial landings of this species are prohibited under the Billfish Conservation Act of 2012, and under the HMS FMP and its implementing regulations (50 CFR 660.711(b); Section 2.3 Terms and Conditions for All Action Alternatives- number 6). Additionally, in 2015, the Council recommended an incidental catch limit for striped marlin in a longline EFP to discourage targeting and address concerns shared by the recreational fishing community about potential impacts of the Proposed Action.

The annual limit imposed by this measure would be equal to the projected striped marlin catch based on methods described in Section 3 and catch rates applied to effort by action alternative and component detailed in Section 4 below (Tables 4-34 and 4-35). If the limit is met, EFP fishing would cease immediately and EFP fishing would remain closed throughout the duration of the annual limit period. Table 2-4 and Table 2-5 show annual limits for striped marlin for each action alternative by component. Note that the derived projected catch, for most instances, is reported as a fraction (or decimal) of an animal; however, we round fractional amounts for shallow-setting and deep-setting components to whole animals under all alternatives for an overall species limit.

**Table 2-4.** Annual species limits on striped marlin for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Alternative 2-Annual Limit in Number of Animals[1] | Alternative 3-Annual Limit in Number of Animals[1] | Alternative 4-Annual Limit in Number of Animals[1] | Alternative 5-Annual Limit in Number of Animals[1] |
|---|---|---|---|---|
| Striped marlin limit | 6 | 12 | 18 | 29 |

[1] The number of animals is reported as a fraction (or decimal) of an animal (Table 4-34); however, for species limits we round fractional amounts to whole animals under all alternatives by component. Actual overall species annual limits would be additive for each component and depend on specific alternatives for striped marlin as catch is projected in both components.

**Table 2-5**. Annual species limits on striped marlin for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Alternative 2-Annual Limit in Number of Animals[1] | Alternative 3-Annual Limit in Number of Animals[1] | Alternative 4-Annual Limit in Number of Animals[1] |
|---|---|---|---|
| Striped marlin limit | 132 | 264 | 659 |

[1] The number of animals is reported as a fraction (or decimal) of an animal (Table 4-35); however, for species limits we round fractional amounts to whole animals under all alternatives by component. Actual overall species annual limits would be additive for each component and depend on specific alternatives for striped marlin as catch is projected in both components.

Measures Applicable to Small-scale Fishing Operations

31. **No fishing within 20 nm of the mainland shore and islands.**

The prohibition on operating within 20 nm from the mainland shore and islands is based on a recommendation from the Council during the September 2021 meeting (Figure 2-1; PFMC 2021b). The 20 nm no-fishing zone is intended to reduce gear conflicts with other commercial and recreational fishing vessels fishing close to shore.

32. **No fishing shore-side within 30 nm of the mainland shore when south of Point Conception[8] and no fishing shore-side of the generalized 400 m depth contour when north of Point Conception.**

The prohibition on operating within 30 nm from the mainland shore when south of Point Conception and shore-side of the generalized 400 nm depth contour when fishing north of Point Conception is based on a recommendation at the September 2022 Council meeting (Figure 2-1; PFMC 2021b). These no-fishing zones are intended to reduce gear conflicts with other commercial and recreational fishing vessels.

[8] Point Conception for this measure is specifically defined as the line drawn at 34.268981 North latitude.

33. **Annual limit of 10 striped marlin incidentally caught during EFP fishing.**

In 2021, the Council recommended an annual limit equal to 10 injured or killed striped marlin caught (PFMC 2021b). If the limit is met, EFP fishing would cease immediately and EFP fishing would remain closed throughout the remainder of a 12-month period.

34. **All non-marketable live sharks will be released alive, and all dead sharks must be retained unless prohibited from commercial take.**

As soon as possible after catching a shark that is alive, crew conducting EFP activities under the Proposed Action should take reasonable steps for releasing it carefully without compromising human safety. This includes following best practices for releasing sharks by leaving sharks in the water (not brought onboard to remove gear) and cutting away as much trailing gear as possible (ideally leaving less than 1 m). Dead sharks must be retained unless prohibited from commercial take (i.e., sharks prohibited under the HMS FMP in Table 4-33 in Section 4.4, as well as the oceanic whitetip shark protected under the ESA discussed in Section 4.5.3)). Furthermore, observers should attempt to collect additional data on the catch of sharks, such as condition at vessel and release, handling and release methods, trailing gear, hook location, length, sex, etc.

35. **Each buoy will have a plastic breakaway link connecting buoy and buoy line.**

As recommended by the Council at its September 2021 meeting, each buoy must have a plastic breakaway link connecting the buoy and buoy line.

36. **Limits on number of hooks on any shallow-set to 400 or fewer, and on any deep-set to 800 or fewer.**

A limit of 400 hooks per shallow-set is roughly 30 percent of the average hooks per set in the Hawaii SSLL fishery. A limit of 800 hooks per deep-set is roughly 30 percent of the average hooks per set in the Hawaii DSLL fishery. During its September 2021 meeting, the Council recommended a limit on the number of hooks per set when recommending approval of some EFP applications.

37. **Limit total mainline length to less than 5 nm.**

This requirement sets a limit on the length of fishing gear in the water for any given set. The Council, at its September 2021 meeting, recommended that mainline length not exceed 5 nm of mainline when setting a limit of 150 hooks. However, the limit on mainline length should correspond with hook limits (under measure 36).

38. **Limit total mainline length to less than 10 nm.**

This requirement sets a limit on the length of fishing gear in the water for any given set. The

Council, at its September 2021 meeting, recommended that mainline length not exceed 10 nm of mainline when setting a limit of 150 hooks. However, the limit on mainline length should correspond with hook limits (under measure 36).

39. **Limit soak time.**

The Council, at its September 2021 meeting, recommended limiting soak time to not exceed 4 hours for EFPs using 5 nm of mainline to facilitate active tending of the gear. However, soak time may need to increase with mainline length.

40. **Use of gear tending.**

This additional mitigation measure would limit the distance a vessel may be from its fishing gear. Gear tending can be enhanced if executed as a set of measures, e.g., including specifications on gear length, or soak time, or strike indicator buoys.

41. **Use of a heavy weighting system.**

This additional mitigation measure would require the use of a heavy weighting system defined as use of weights greater than 1.8 kg or 4 lbs. Use of a heavy weighting system provides rapid descent rates to avoid non-target species above the thermocline, maintains hooks at a constant depth, and maintains taut vertical lines to reduce probability of entanglement.

42. **Use of a strike indicator.**

This additional mitigation measure would require the use of a strike indicator during EFP fishing operations. A strike indicator is typically a float system designed to detect strikes by a change in surface buoy orientation and allows for service of gear when a hooked species is on the line. Strike indicators may reduce the amount of time non-target species are likely to be on the line with quick release from the hook which could potentially decrease post release mortality.

43. **Use of GPS trackers on fishing gear.**

This additional mitigation measure would require the use of GPS trackers on fishing gear allowing real-time monitoring of fishing gear during EFP fishing operations. GPS trackers will help prevent gear loss, facilitate daytime servicing of gear, and provide additional safeguards in the rare event of a marine mammal entanglement.

44. **Use of electronic monitoring for observing.**

This additional mitigation measure would allow for the use of electronic monitoring in place

of human observers. Use of electronic monitoring will only be permitted during day-time fishing operations to ensure their visibility on camera as well as potential interactions with non-target species.

# 3 Methodology

Because longline-type fishing is prohibited within the U.S. West Coast EEZ, there are no fishery-dependent records for describing impacts of longline-type fishing using gear similar to that used in the post-2004 Hawaii longline fishery within the Proposed Action Area (i.e., U.S. West Coast EEZ). Therefore, we use observer data from the Hawaii longline fisheries east of 140˚ W (Appendix 3), the DGN fishery (Appendix 4) and the West Coast DSLL fishery (Appendix 5) as proxies in quantitatively analyzing impacts of the Proposed Action. We also use datasets from the 2019 Longline EFP trials (Appendix 6) and the deep-set LBG EFP trails (Appendix 7) as proxies in qualitatively analyzing the impacts. While NMFS regards the Hawaii longline fisheries and DGN fishery data as the best scientific information available for the purposes of evaluating the effects of Proposed Action, we acknowledge that the use of proxy data carries an inherent uncertainty.

Numerous species caught in HMS fisheries are considered in detail in this document. We derived a species list using a hierarchy of data (see Methodology below). Species that are actively managed under the U.S. West Coast HMS FMP are termed Management Unit Species (MUS), and are listed in Table 3-1 (PFMC 2016a). Fisheries for these species may be managed through the Council process, and management measures and regulations may result (PFMC 2016a). Some of these MUSs would likely be the primary target species for the EFPs; except there will be no targeting or landing of striped marlin (see Section 2.3 Terms and Conditions for All Action Alternatives- number 6) because their landings are prohibited under the HMS FMP (general catch restrictions 50 CFR 660.711 (b)) and by the State of California (16 U.S. Code § 1827a - Prohibition on sale of billfish), and because other resource user groups have expressed concerns about the potential for interactions.

**Table 3–1**. HMS FMP Management Unit Species.

| Common Name | Scientific Name |
|---|---|
| Striped marlin | *Kajikia audax*[1] |
| Swordfish | *Xiphias gladius* |
| Common thresher shark | *Alopias vulpinus* |
| Shortfin mako shark | *Isurus oxyrinchus* |
| Blue shark | *Prionace glauca* |
| North Pacific albacore | *Thunnus alalunga* |
| Yellowfin tuna | *T. albacares* |
| Bigeye tuna | *T. obesus* |
| Skipjack tuna | *Katsuwonus pelamis* |
| Pacific bluefin tuna | *T. orientalis* |
| Mahi-mahi or Dolphinfish | *Coryphaena hippurus* |

[1] Previously, striped marlin were included in the genus *Tetrapturus* (Collette *et al.* 2006).

### 3.1 Methods of Analysis

Table 3-2 provides a summary assessment of the robustness of the fishery-dependent proxy and EFP fishing trial datasets, and describes their usage in the impact analysis. The table also highlights some key characteristics of the fishery-dependent datasets in relation to the activities of the Proposed Action. These datasets are also included in appendices (Appendices 3 through 8), and how they are used in the impact analyses is described in more detail below.

To determine potential impacts of the Proposed Action, we rely on observer data from other HMS fisheries as proxies. These include:

- The Hawaii SSLL and DSLL fisheries data east of 140˚ W (Appendix 3), which use similar gear to those proposed in the action alternatives, but operate outside of the Proposed Action Area.
- The West Coast DGN fishery (Appendix 4), which uses a different gear than those proposed in the action alternatives to target swordfish in the Proposed Action Area.
- The West Coast DSLL fishery (Appendix 5), which uses similar gear to that proposed in the action alternatives, but operates outside of the U.S. West Coast EEZ (and therefore outside the Proposed Action Area).

In addition to data from these fisheries, we use data collected during EFP fishing trials in the Proposed Action Area including the 2019 three-month longline EFP (2019 Longline EFP; Appendix 6) and the deep-set LBG EFPs (Appendix 7). While these fishing activities best represent those being proposed in the action alternatives, the data are limited. Relative to the other data sets used in this analysis, these datasets include fewer sets over a much shorter time. For example, the longline EFP data was from two vessels fishing for three months while the deep-set LBG EFP data was from up to six vessels fishing for three years in comparison to decades of fishing from an average of 20 vessels in the Hawaii SSLL fishery and an average of 130 vessels fishing in the Hawaii DSLL fishery. Furthermore, effort per set and catches shifted over the course of these limited trials. Additionally, terms and conditions under the Proposed Action may differ in comparison to those for the 2019 Longline EFP fishing trials.

While we include information from the entire Hawaii longline fisheries dataset in Appendix 8, we do not present the species catch composition for the entire Hawaii dataset as the fishing in the western central Pacific Ocean occurred in warmer waters with different species assemblages and catch frequencies than those in the U.S. West Coast EEZ, which is largely dominated by cooler waters due to upwelling within the California Current System that can act as a front or boundary marine life (Mauzole *et al*. 2020, and Field and Francis 2006). Rather, we stratify the Hawaii longline observer records to consider the species catch composition of sets made east of 140° W (Appendix 3), to reduce, to some degree, the otherwise

likely bias towards the suite of species and magnitude of interactions in waters in closer proximity to the Hawaiian Islands.

**Table 3-2.** Ranking of the robustness[9] of fishery-dependent data sets and summary of their use in the analysis of action alternatives.

| Proxy Date Sets | Rationale | Data Usage | | | |
|---|---|---|---|---|---|
| **In Order from Most Robust to Least Robust** | **Characteristics of Fishery-dependent Dataset** | **Inform Action Alternatives** | **Identify and Categorize Species Caught** | **Apply Catch Rates to Alternatives** | **Provide Insight on Potential Impacts** |
| Entire 2004-2019 Observer and Logbook Dataset for Hawaii DSLL and SSLL fisheries | Because DSLL and SSLL vessels move between the eastern and western Pacific Ocean, the entire dataset is necessary to estimate annual effort levels. | Determine average and range of annual hooks and hooks per set by gear type. | | | |
| 2004-2019 Observer Dataset for Hawaii DSLL and SSLL East of 140˚ West Longitude | This dataset is a 16-year time series of fishing activities conducted with gear possessing similar characteristics to that of the Proposed Action, and in an area of the Eastern Pacific that is in close proximity to the Proposed Action Area. | | Use catch data to categorize *commonly caught* versus *uncommonly caught species*, and protected species likely to be affected by the Proposed Action. | Calculate catch per unit effort rates to quantify potential impacts of the Proposed Action. | |
| 2001/2002-2019/2020 Observer Dataset for the U.S. West Coast Large-Mesh Drift Gillnet Fishery | This dataset includes nearly two decades of fishing activity in and/or in close proximity to the Proposed Action Area. However, the gear type differs from that of the Proposed Action. | | Use catch data to categorize species potentially affected by the Proposed Action. For example, some DGN-caught species were added as likely to be affected, even if there was no catch in the SSLL or DSLL longline datasets. | | |
| 2019 and 2020 Observer Data for West Coast DSLL Outside of the EEZ East of 140˚ West Longitude | This dataset includes few years of fishing activities with three or more vessels. The gear is similar to that of the Proposed Action, and in an area of close proximity to the Proposed Action Area. | | Use catch data to categorize affects to species by the Proposed Action. Some West Coast DSLL-caught species were added as likely to be affected, even if there were no catch in the Hawaii DSLL dataset or the DGN dataset. | For species for which catch rates could not be generated based on the Hawaii longline datasets, this dataset was used to do so. | |
| 2019 EFP Observer Dataset for SSLL and DSLL in the U.S. West Coast EEZ | This dataset covers fishing activities similar to the Proposed Action alternatives occurring in the Proposed Action Area. The sample size is small with fewer than three months of data from two vessels with varying fishing gear type. | | | For species for which catch rates could not be generated based on the Hawaii or West Coast longline datasets, this dataset was used to do so. | Qualitatively evaluate predictions based on Hawaii DSLL and SSLL, West Coast DSLL and DGN datasets. |
| 2018-2020 EFP Observer Dataset for Deep-set LBG in the U.S. West Coast EEZ | This dataset covers a three-year time series of EFP fishing activities conducted with deep-set LBG in and/or in close proximity to the Proposed Action Area. The sample size is small with data from six vessels. | | Use catch data to categorize species potentially affected by the Proposed Action. LBG data was evaluated; however, no new species or catch rates were added as likely to be affected. | | Qualitatively evaluate predictions based on Hawaii DSLL and SSLL, West Coast DSLL and DGN datasets. |

[9] We evaluated the robustness and usage of the various datasets in Table 3-2 based on the number of records, length of the time-series, proximity of the activities to the Proposed Action Area, and similarity to the gear type and management context to be considered for the Proposed Action.

Appendix 3 provides the catch by species composition as recorded by observers for the Hawaii DSLL and SSLL vessels fishing east of 140° W from 2004 through 2019. Observer coverage was 100 percent for the Hawaii SSLL fishery and around 20 percent for the DSLL fishery (Appendix 5). As described in Table 3-2, we used the entire Hawaii longline observer and logbook dataset from 2004 through 2019 (Appendix 8), including fishing conducted west of 140° W, to derive annual average level of effort for a typical Hawaii longline vessel to determine expected effort levels under the action alternatives. This is important because individual DSLL and SSLL vessels in the Hawaii longline fleet may fish in both the eastern and western Pacific Ocean (see Figure 3-1). Therefore, a spatially stratified look at effort data is not useful for determining the average level of effort for a typical vessel in terms of annual sets per vessel and hooks per set deployed.

Additionally, while the history of the Hawaii longline fishery extends further back in time, regulations put in place on April 2, 2004 (69 FR 17329) for the purpose of reducing bycatch and protected species interactions resulted in significant changes to the practices of the fleet and the catch per unit effort (CPUE) for many species affected by the fishery. The SSLL fishery now utilizes gear consisting of large 18/0 circle hooks and mackerel-type bait, among other components. Therefore, we use the Hawaii longline fisheries dataset from 2004 to 2019 because the fishing gear used during these years more closely represents that of the Proposed Action (i.e., large 18/0 circle hooks and solely mackerel-type bait as opposed to 9/0 J-hooks with a mixture of squid, mackerel, and other bait types used in the Hawaii longline fishery prior to 2004). Despite the fact that regulations for the Hawaii DSLL fishery did not change, the data for the DSLL fishery sector is also truncated to roughly the same time period, as Hawaii longline fishery trips did not declare whether they were fishing deep-set or shallow-set[10] until the SSLL fishery re-opened in 2004.

Appendix 4 provides the catch composition as recorded by observers for the West Coast DGN fishery from fishing seasons 2001/2002 through 2019/2020. Since 1990, NMFS has sought to attain 20 percent observer coverage each year for this fishery, per recommendations from the SWFSC (NMFS 1989). NMFS increased its target observer coverage rate to between 20 and 30 percent in 2013; however, between 2013 and 2019 actual observer coverage averaged about 23 percent (Suter *et al.* 2021). Because approximately 40 percent of the fleet was made up of unobservable vessels (six unobservable plus three

[10] When the Hawaii SSLL fishery sector re-opened in June of 2004, all trips that followed thereafter either had to be declared as SSLL or DSLL; therefore, data for the SSLL fishery sector started in late June 2004 and data for the DSLL fishery sector started in early July 2004 (E. Forney, pers. comm., March 31, 2021). However, there is no data for the DSLL fishery sector for 2004 because no fishing took place east of 140° W that year.

excluded—where "excluded" refers to the lack of data due to erratic VMS transmission rates or vessels that only participated in the fishery for the first year of the study timeframe), an estimated 47 percent of sets made by periodically observed portion of the fleet was necessary to achieve the goal of 20 to 30 percent observer coverage. This fishery primarily operates off the central and southern coast of California, in the southern reaches of the Proposed Action Area (Figure 3-1), and provides the closest approximation to the spatial and temporal scope of the Proposed Action Area. Observer records from the DGN fishery can help inform predictions about the potential suite of target, non-target, prohibited finfish, and other species likely to interact with fishing gear in the Proposed Action Area, despite differences in gear type and without using this dataset to project catch rates for the Proposed Action. While DGN fishery records date back to the 1970s, operational characteristics have changed considerably over time, to adapt to regulations intended to improve the fishery's performance with respect to environmental protection objectives of U.S. statutes, like the MMPA and ESA (Urbisci *et al.* 2017). Therefore, we truncate the time series to examine catches after the 2000/2001 fishing season. This period is more reflective of applicable management approaches and considerations for evaluating EFPs to target swordfish and other marketable HMS in response to the Council's 2014 solicitation for EFP proposals (PFMC 2014a).

Appendix 5 provides the species catch composition as recorded by observers for the West Coast DSLL fishery, which takes place outside of the Proposed Action Area. Due to limited participation in this fishery, we report catch composition for 2019 and 2020 only, when three or more vessels were engaged in fishing in order to protect MSA-confidential fisheries information. Regulations in place for this fishery are similar to that for the Hawaii DSLL fishery and their areas of operation overlap (Figure 3-1).

Appendix 6 provides catch composition as recorded by observers on vessels fishing with SSLL and DSLL gear in the Proposed Action Area during the 2019 Longline EFP fishing trials. Based on fishing trips made by two fishing vessels in a three-month span, this data is limited. However, the data is not confidential as it was collected under an EFP. Appendix 7 provides catch compositions as recorded by observers on vessels fishing deep-set LBG EFPs near the Proposed Action Area. Figure 3-2 shows the spatial extent for longline-type gear EFPs including effort during the 2019 Longline EFP and for deep-set LBG EFPs.

Note that from 2011 to 2013 there were also small-scale longline fishing research studies performed by the SWFSC with the goal of exploring gear alternatives for targeting swordfish off California (see Appendix 9; SWFSC 2014). Because this fishery-independent research fishing was different from activities under the Proposed Action, and fishing conditions during these trials were subject to anomalous oceanographic conditions, the SWFSC advised that the data from the trials should not be used to assess

commercial fishing techniques other than those employed during the study, and that more research is warranted on the subject (PFMC 2014a, PFMC 2014b and SWFSC 2014).

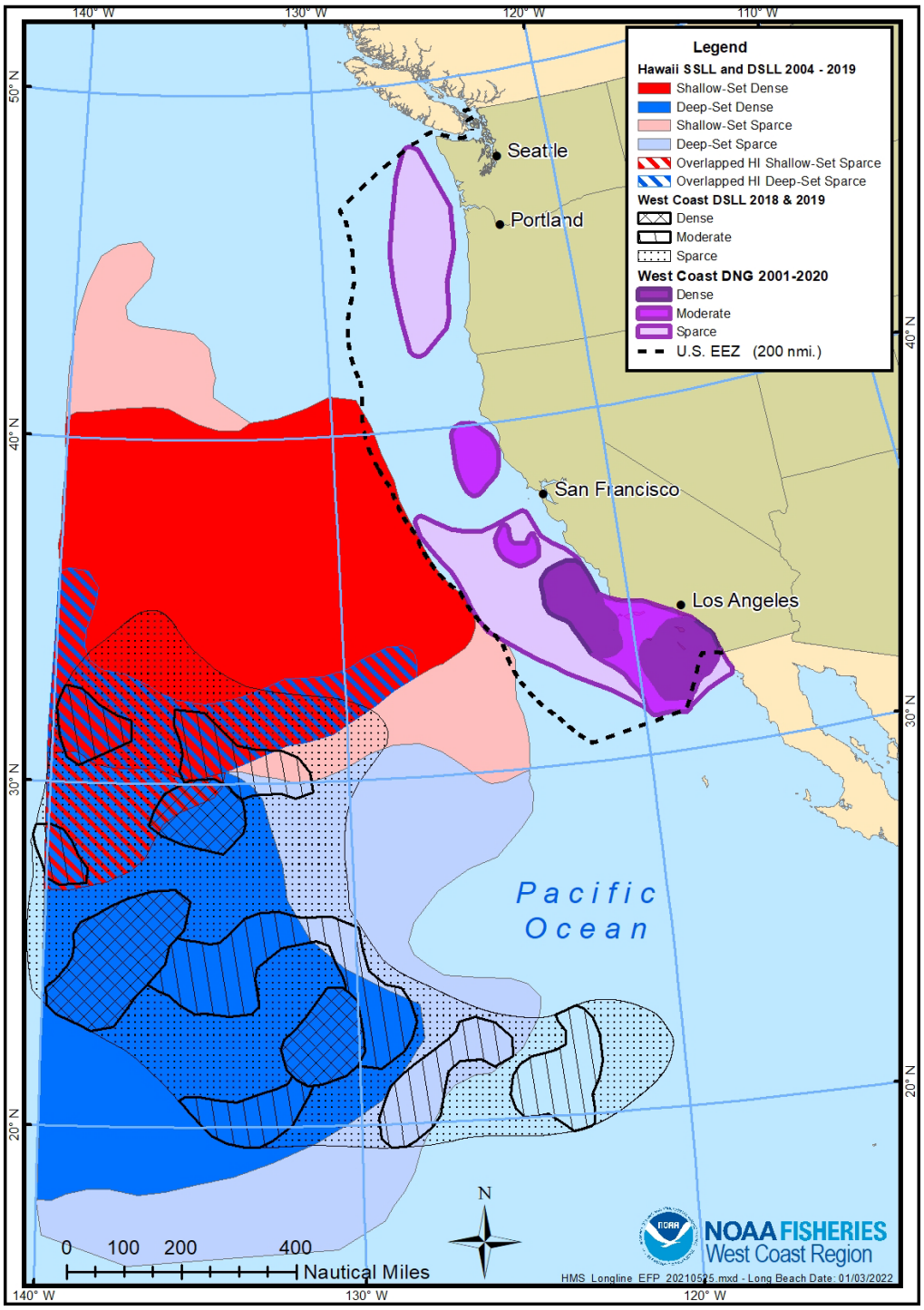


**Figure 3-1**. Spatial extent of fishing effort by density for fishery datasets used as proxies for the Proposed Action and the U.S. West Coast EEZ (i.e., the Proposed Action Area). Proxy datasets include: the 2004 through 2019 Hawaii longline fisheries dataset east of 140˚ W longitude, the 2001/2002 through 2019/2020 West Coast DGN observer dataset, and the 2018 and 2019 West Coast DSLL fishery dataset.

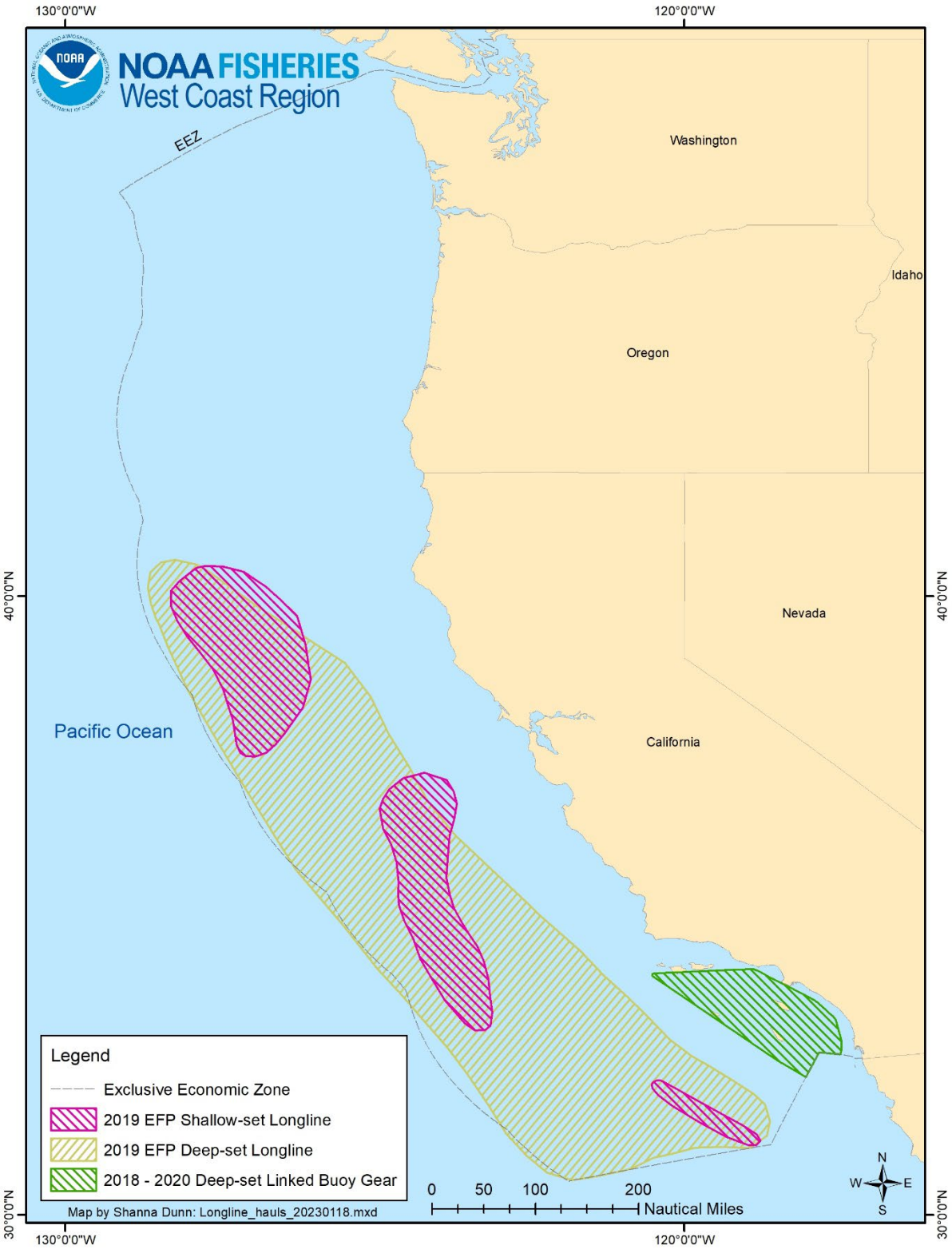


**Figure 3-2**. Spatial extent of fishing effort for the three-month shallow-set longline and deep-set longline sectors of the 2019 Longline EFP fishing trials (Appendix 6), the deep-set LBG EFP trails (Appendix 7). and the U.S. West Coast EEZ (i.e., the Proposed Action Area).

As described in Table 3-1, we evaluated the robustness and usage of the various datasets described above and in the referenced Appendices based on the number of records, length of the time-series, proximity of the activities to the Proposed Action Area, and similarity to the gear and management context to be considered for the Proposed Action. For analytical purposes, we primarily rely on observer data from Hawaii SSLL and DSLL vessels fishing east of 140° W in 2004 through 2019 to derive CPUE or interaction rates and categorize species as either a *commonly caught management unit species*, *other commonly caught species*, or an *uncommonly caught species*, or likely to be affected. Specifically, MUSs of the HMS FMP that have been captured at rates greater than 0.5 animals per 1,000 hooks are considered *commonly caught management unit species*, species other than MUSs that have been captured at rates greater than 0.5 animals per 1,000 hooks are considered *other commonly caught species*, and species that are captured at rates below 0.5 animals per 1,000 hooks are considered an *uncommonly caught species*. Any protected species in this dataset (Hawaii SSLL and DSLL fisheries data east of 140° W) is considered likely to be affected by the Proposed Action, and the corresponding interaction rates are used in the analysis.

Then, we examined the observer data for the West Coast DGN fishing seasons from 2001/2002 to 2019/2020. Any species in the *major species* category that was not present in the Hawaii SSLL or DSLL fisheries data east of 140˚W longitude was added to either the *commonly caught management unit species* or *other commonly caught species* categories for this analysis. However, we did not apply catch or interaction rates from the West Coast DGN dataset to the analysis of alternatives given differences in gear type (net versus hook-and-line), and therefore the basis for CPUE is catch per 100 sets for DGN versus catch per 1,000 hooks for longline.

Next, we reviewed the observer data for the West Coast DSLL fishery for years 2019 and 2020. For species where catch or interaction rates were not available based on observer data for Hawaii DSLL fisheries operating east of 140° W, we rely on the catch or interaction rates derived from this West Coast DSLL dataset.

After that, if no catch or interaction rate was available based on the observer data for Hawaii SSLL and DSLL fisheries operating east of 140° W longitude in 2004 through 2019 or for the West Coast DSLL fishery occurring in 2018 and 2019, we considered if a rate could be derived from the 2019 Longline EFP dataset. If so, we rely on that rate for the analysis of alternatives. We also note differences in catch or interaction rates from the 2019 Longline EFP data relative to the other larger, more robust datasets for the analysis. However, we do not use the limited 2019 Longline EFP dataset to categorize species.

Finally, we examined the observer and logbook data from the West Coast deep-set LBG EFPs from 2018

to 2020. Any species in the *major species* category that was not present in the Hawaii DSLL fishery data east of 140˚W longitude was added to either the *commonly caught management unit species* or *other commonly caught species* categories for this analysis. However, we did not apply catch or interaction rates from the deep-set LBG EFPs dataset to the analysis of alternatives given differences in gear configuration (fewer hooks and actively tended), and therefore the basis for CPUE is catch per total days fished for deep-set LBG versus catch per 1,000 hooks for longline.

Based on this approach (summarized in Table 3-2), we report *commonly caught management unit species* and *other commonly caught species* as well as protected species likely to be affected in a series of tables in this Section. However, given that we anticipate no impacts to *uncommonly caught species* (Appendix 3-Hawaii SSLL and DSLL fisheries data east of 140˚ W, Table A-3-2 and Table A-3-4) or *minor species* (Appendix4-West Coast DGN fishery data, Table A-4-1) resulting from any of the Proposed Action alternatives due to their infrequent capture in the proxy datasets, and given also that there are no pressing resource conservation concerns for these species, they are not discussed further. Therefore, specifically, we report species catch composition and catch rate (per 1,000 hooks) for use in assessing impacts of the Proposed Action Alternatives for *commonly caught management unit species* and *other commonly caught species* for both SSLL and DSLL effort in Tables 3-3 and 3-5, respectively, as well as species composition and interaction rates of protected species for both SSLL and DSLL effort in Tables 3-4 and 3-6, respectively. Table 3-7 includes a list of species categorized as either *other commonly caught species* or protected species likely to be present in the Proposed Action Area that were included in the West Coast DGN dataset (Appendix 4), but for which catch or interaction rates are not specified as these species were not present in the other SSLL or DSLL datasets considered in the impact analysis.

**Table 3-3.** Total observed catch (number of animals), proportion of number kept, proportion of number returned alive or dead, and catch-per-unit-effort (number of animals per 1,000 hooks) by species for the proxy datasets used in a hierarchy of robustness (Table 3-2) for shallow-setting catch rates (Appendix 3).

| Species | Total Caught | Proportion of Number Kept | Proportion of Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|
| | | | Alive | Dead | |
| ***Commonly Caught Management Unit Species*** | | | | | |
| Swordfish | 38,125 | 0.91 | 0.03 | 0.06 | 10.867 |
| Shark, Blue | 29,676 | | 0.85 | 0.15 | 8.459 |
| Shark, Shortfin Mako | 5,345 | 0.12 | 0.63 | 0.25 | 1.523 |
| Mahi-mahi or Dolphinfish | 3,914 | 0.82 | 0.16 | 0.02 | 1.116 |
| Tuna, Bigeye | 3,878 | 0.86 | 0.10 | 0.04 | 1.105 |
| Tuna, Albacore | 2,255 | 0.80 | 0.10 | 0.10 | 0.643 |
| Tuna, Skipjack[1] | 71 | 0.96 | 0.03 | 0.01 | 0.020 |
| Shark, Common Thresher[1] | 21 | 0.14 | 0.67 | 0.19 | 0.006 |
| Tuna, Bluefin[1] | 6 | 1.00 | | | 0.002 |
| ***Other Commonly Caught Species*** | | | | | |
| Lancetfish, Longnose | 6,425 | | 0.10 | 0.90 | 1.831 |
| Escolar | 2,920 | 0.66 | 0.21 | 0.13 | 0.832 |
| Opah | 2,879 | 0.76 | 0.17 | 0.07 | 0.821 |
| Stingray, Pelagic | 2,446 | 0.15 | 0.78 | 0.07 | 0.697 |
| Oilfish | 1,838 | 0.08 | 0.73 | 0.19 | 0.524 |
| Mola, Common[1] | 265 | 0.00[2] | 0.97 | 0.03 | 0.076 |

[1] Species shaded in light gray were categorized as an *uncommonly caught species* in the Hawaii SSLL fishery data east of 140˚ W (Appendix 3), but were caught in the West Coast DGN fishery as a major species (Appendix 4); therefore, they are moved into either the *commonly caught management unit species* category or the *other commonly caught species*, and then their associated *uncommonly caught species* catch rate is applied.

[2] Proportion of animals with "0.00" had animals in the category (Appendix 3) but the proportion rounded to zero.

**Table 3-4.** Total observed protected species catch (number of interactions), proportion of number kept, proportion of number returned alive, dead or injured, and catch-per-unit-effort (number of interactions per 1,000 hooks) by species for the proxy datasets used in a hierarchy of robustness (Table 3-2) for shallow-setting catch rates (Appendix 3 and Appendix 6[1]).

| Protected Species | Total Caught | Proportion of Number Kept | Proportion of Number Returned | | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|---|
| | | | Alive | Dead | Injured | |
| **Fish** | | | | | | |
| Shark, Oceanic Whitetip[2] | 4 | | 0.75 | 0.25 | | 0.001 |
| **Seabirds** | | | | | | |
| Albatross, Black-footed | 52 | | | 0.17 | 0.83 | 0.015 |
| Albatross, Laysan | 31 | | | 0.13 | 0.87 | 0.009 |
| **Marine Mammals** | | | | | | |
| Dolphin, Risso's | 15 | | | 0.33 | 0.67 | 0.004 |
| Dolphin, Striped | 3 | | | | 1.00 | 0.001 |
| Dolphin, Bottlenose | 2 | | | 0.50 | 0.50 | 0.001 |
| Dolphin, Short-beaked Common | 1 | | | | 1.00 | 0.000[3] |
| Beaked Whale, Mesoplodont | 2 | | | | 1.00 | 0.001 |
| Fur Seal, Guadalupe[2] | 8 | | | | 1.00 | 0.002 |
| Seal, Northern Elephant | 4 | | | | 1.00 | 0.001 |
| Seal, Unidentified[4] | 1 | | | | 1.00 | 0.000[3] |
| Sea Lion, California[1] | | | | | 1.00 | 0.040[1] |
| **Sea Turtles** | | | | | | |
| Turtle, Loggerhead[2,5] | 40 | | | 0.02 | 0.98 | 0.011 |
| Turtle, Leatherback[2,6] | 27 | | | | 1.00 | 0.008 |
| Turtle, Olive Ridley[2,6] | 1 | | | | 1.00 | 0.000[3] |

[1] This light gray shaded California Sea Lion category was not caught in the Hawaii SSLL fishery data east of 140˚ W (Appendix 3), but were caught in the DGN fishery (Appendix 4). This species has a SSLL rate associated with California Sea Lion from the 2019 Longline EFP (Appendix 6); therefore, they were moved into protected species "likely to be affected" category (Section 4) and the 2019 Longline EFP catch rate is applied.

[2] Listed as a threatened or endangered species and/or DPSs under the ESA.

[3] Catch per 1,000 hooks rounds to zero; however, one interaction calculates to a rate of 0.0002850 per 1,000 hooks (Appendix 3).

[4] One Unidentified Seal was recorded by the observer as lacking ear flaps and also noted as having other seal like characteristics; however, due to the lack of specific data, the unidentified seal was not apportioned to a species category and remains categorized as an "Unidentified Seal" (M. McCracken, pers. comm., August 6, 2020). Data on this observation is not species specific; therefore, it will not be considered further in this document.

[5] Of the 40 loggerhead sea turtles, 39 were released alive (but injured) and one was released dead (Appendix 3).

[6] All leatherback sea turtles and the olive ridley sea turtle were released alive but injured (Appendix 3).

**Table 3-5**. Total observed catch (number of animals), proportion of number kept, proportion of number returned alive or dead, and catch-per-unit-effort (number of animals per 1,000 hooks) by species for the proxy datasets used in a hierarchy of robustness (Table 3-2) for deep-setting catch rates (Appendix 3 and Appendix 6[1]).

| Species | Total Caught | Proportion of Number Kept | Proportion of Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|
| | | | Alive | Dead | |
| ***Commonly Caught Management Unit Species*** | | | | | |
| Tuna, Bigeye | 20,933 | 0.93 | 0.05 | 0.02 | 5.595 |
| Mahi-mahi or Dolphinfish | 5,390 | 0.87 | 0.04 | 0.09 | 1.441 |
| Shark, Blue | 4,180 | | 0.95 | 0.05 | 1.117 |
| Tuna, Yellowfin | 2,643 | 0.91 | 0.05 | 0.04 | 0.706 |
| Tuna, Skipjack[2] | 1,834 | 0.88 | 0.00[2] | 0.12 | 0.490 |
| Shark, Shortfin Mako[2] | 655 | 0.06 | 0.71 | 0.23 | 0.175 |
| Swordfish[2] | 526 | 0.61 | 0.13 | 0.26 | 0.141 |
| Tuna, Albacore[2] | 167 | 0.98 | 0.01 | 0.01 | 0.045 |
| ***Other Commonly Caught Species*** | | | | | |
| Lancetfish, Longnose | 18,817 | | 0.05 | 0.95 | 5.030 |
| Opah | 7,192 | 0.93 | 0.03 | 0.04 | 1.922 |
| Snake Mackerel | 6,910 | 0.05 | 0.52 | 0.43 | 1.847 |
| Pomfret, Sickle | 4,312 | 0.96 | 0.03 | 0.01 | 1.153 |
| Escolar | 4,164 | 0.42 | 0.46 | 0.12 | 1.113 |
| Mackerel, Bullet[1] | | | | | 0.027[1] |
| Mola, Common[2] | 6 | 0.00[3] | 1.00 | | 0.002 |

[1] Bullet mackerel (dark gray shaded species) was not caught in the Hawaii DSLL fishery east of 140˚ W (Appendix 3), but was caught and categorized as a *major species* in the West Coast DGN fishery dataset (Appendix 4) and has an associated DSLL catch rate from the 2019 Longline EFP dataset (Appendix 6); therefore, the bullet mackerel was moved into the *other commonly caught species* category and the 2019 deep-set Longline EFP catch rate is applied.

[2] These light gray shaded species were an *uncommonly caught species* in the Hawaii DSLL fishery dataset east of 140˚ W (Appendix 3), but were caught in the West Coast DGN fishery as *major species* (Appendix 4); therefore, they were moved into *commonly caught management unit species* or into *other commonly caught species*; then the *uncommonly caught species* catch rate is applied.

[3] Proportion of animals with "0.00" had animals in the category (Appendix 3) but the proportion rounded to zero.

**Table 3-6**. Total observed protected species catch (number of interactions), proportion of number kept, proportion of number returned alive, dead or injured, and catch-per-unit-effort (number of interactions per 1,000 hooks) by species for the proxy datasets used in a hierarchy of robustness (Table 3-2) for deep-setting catch rates (Appendix 3 and Appendix 5[1]).

| Protected Species | Total Caught | Proportion of Number Kept | Proportion of Number Returned | | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|---|
| | | | Alive | Dead | Injured | |
| **Seabirds** | | | | | | |
| Albatross, Black-footed | 9 | | | 1.00 | | 0.002 |
| Unidentified Shearwater Species[1] | 1 | | | 1.00 | | 0.001[1] |
| **Marine Mammals** | | | | | | |
| Whale, False Killer[3] | 2 | | | | 1.00 | 0.001 |
| **Sea Turtles** | | | | | | |
| Turtle, Olive Ridley[2,3] | 3 | | | 0.67 | 0.33 | 0.001 |
| Turtle, Loggerhead[2,3] | 1 | | | 1.00 | | 0.000[3] |
| Turtle, Green/Black[2,3] | 1 | | | 1.00 | | 0.000[3] |

[1] Unidentified Shearwater Species (light gray shaded species) were not caught in the Hawaii DSLL fishery east of 140˚ W (Appendix 3) but were caught in the West Coast DSLL fishery (Appendix 5); therefore, they were moved into the "likely to be affected" category and the catch rate from the West Coast DSLL fishery dataset is applied.

[2] Listed as a threatened or endangered species and/or DPSs under the ESA.

[3] The false killer whale category is the sum of one unidentified whale from 2016 plus one identified false killer whale from 2019 in the Hawaii DSLL fishery east of 140˚ W (Appendix 3). The 2016 "unidentified whale, dolphin or porpoise" encounter the observer collected a skin biopsy for deoxyribonucleic acid (or DNA) comparison. When the skin biopsy was analyzed in the lab the animal was identified as a false killer whale (S. J. Arceneaux, pers. comm., March 21, 2018). Given the 2016 encounter with the false killer whale occurred near 138° W longitude the animal was most likely an individual from the Eastern and Central North Pacific pelagic stock (pelagic stock), and not the Main Hawaiian Islands (MHI) stock whose range is restricted to movements and foraging in the waters surrounding the main Hawaiian Islands (Baird *et al.* 2012). Furthermore, the pelagic stock is not an ESA listed species whereas the MHI stock is listed as an endangered distinct population segment under the ESA. The false killer whale encountered in 2019 occurred near 136° W longitude; therefore, (similar to the animal encountered in 2016) the animal was most likely an individual from the Eastern and Central North Pacific pelagic stock (pelagic stock), and not the MHI stock.

[4] Catch per 1,000 hooks rounds to zero; however, one interaction calculates to a rate of 0.0002673 per 1,000 hooks.

**Table 3-7**. *Other commonly caught* and protected species caught by the West Coast drift gillnet fishery (Appendix 4) without an associated longline-type catch rate from the Hawaii longline fisheries, the West Coast DSLL or the 2019 Longline EFP.

| Species |
|---|
| ***Other Commonly Caught Species*** |
| Mackerel, Pacific |
| Bonito, Pacific |
| **Protected Species** |
| **Marine Mammals** |
| Dolphin, Northern Right Whale |
| Dolphin, Long-beaked Common |
| Dolphin, Pacific White-sided |
| Whale, Gray[1] |
| Whale, Short-finned Pilot |
| Whale, Sperm[1] |
| Dolphin, Unidentified |
| Porpoise, Dall's |
| Whale, Humpback[1] |
| Whale, Minke |
| Whale, unidentified |
| **Fish** |
| Ray, Giant Manta[1] |
| **Birds** |
| Northern Fulmar |
| Unidentified Auklet |
| Bird, unidentified |

[1] Listed as a threatened or endangered species and/or DPSs under the ESA.

## 3.2 Data Limitations, Incomplete or Unavailable Information

Given the disparate fishing areas between the Proposed Action and the entire Hawaii longline fleet, NMFS stratified the Hawaii observer records to compute CPUE rates from fishing that occurred in areas east of 140° W longitude where there is inherent uncertainty with regard to proxy datasets. While NMFS regards the Hawaii longline fishery and DGN fishery data as the best scientific information available for

the purposes of evaluating the effects of Proposed Action, we acknowledge that the use of proxy data carries an inherent uncertainty.

# 4 Affected Environment and Environmental Consequences

## 4.1 Introduction

This section describes the affected environment and then discusses the environmental consequences of the alternatives for both Component 1 (a no action alternative and four action alternatives for shallow-setting gear types, Table 4-1) and Component 2 (a no action alternative and three action alternatives for deep-setting gear types, Table 4-2). Specifically, this Section includes a brief description of stock status and a biological impact analysis for a list of species (Tables 3-3, Table 3-4, Table 3-5, Table 3-6 and Table 3-7) for which catch or interactions occurred in the Hawaii SSLL and DSLL fisheries east of 140˚ W longitude (Appendix 3), the West Coast DGN fishery (Appendix 4), the West Coast DSLL fishery (Appendix 5), the 2019 Longline EFP trials (Appendix 6) and the deep-set LBG EFP trails (Appendix 7). This section also identifies essential fish habitat, critical habitat, and domestic fisheries landing swordfish to the U.S. West Coast that may be affected by the Proposed Action and describes a menu of additional measures for terms and conditions that may be applied to EFPs issued under the Proposed Action.

The list of species likely to be affected by the Proposed Acton are presented as *commonly caught management unit species* and *other commonly caught species* (Table 3-3 and Table 3-5), prohibited species (Table 4-33) and protected species (Table 3-4, Table 3-6 and Table 3-7). In this Section, we describe the stock status of these species (i.e., Affected Environment) and project impacts (i.e., Environmental Consequences) of each alternative. The tables below in sections 4.2 through 4.5 display the projected catch of species likely to be affected by each alternative (e.g., Table 4-3 and Table 4-4), which are calculated by multiplying the respective species catch rates derived from proxy data (Table 3-3, Table 3-4, Table 3-5 and Table 3-6) by the maximum annual level of effort for shallow-setting (Table 4-1) and deep-setting (Table 4-2) components of EFP fishing under each alternative (Table 2-1 for Component 1 alternatives and Table 2-2 for Component 2 alternatives). Note that the derived projected catch, for most instances, is reported as a fraction (or decimal) of an animal.

**Table 4-1.** Maximum annual number of hooks set for each alternative under Component 1 for shallow-setting.

| Component 1 Alternatives | Maximum Annual Number of Hooks Set for SSLL |
|---|---|
| Alternative 1-1 | No Action or zero |
| Alternative 1-2 | 122,000 |
| Alternative 1-3 | 244,000 |
| Alternative 1-4 | 366,000 |
| Alternative 1-5 | 610,000 |

**Table 4-2.** Maximum annual number of hooks set for each alternative under Component 2 for deep-setting.

| Component 2 Alternatives | Maximum Annual Number of Hooks Set for DSLL |
|---|---|
| Alternative 2-1 | No Action or zero |
| Alternative 2-2 | 662,400 |
| Alternative 2-3 | 1,324,800 |
| Alternative 2-4 | 3,312,000 |

## 4.2 Commonly Caught Management Unit Species

Management unit species of the HMS FMP that have been captured at rates greater than 0.5 animals per 1,000 hooks in the Hawaii longline fisheries east of 140° W and the West Coast DSLL fishery, or at rates greater than 10 animals per 100 sets in the West Coast DGN fishery, are considered *commonly caught management unit species* (Section 3, Tables 3–3 and 3–5). These species are either susceptible to longline gear and/or occur in the Proposed Action Area, and therefore may be affected by the Proposed Action.

Note that some *commonly caught management unit species* may be target species under the Proposed Action; however, some of these species are incidental or unmarketable catch or both.

**Swordfish (*Xiphias gladius*)**

Swordfish-Affected Environment:

Stock assessments for swordfish in the North Pacific indicate two stocks in the Proposed Action Area and in the vicinity of the Proposed Action Area: a Western and Central North Pacific Ocean (WCNPO) stock and an Eastern Pacific Ocean (EPO) stock (ISC 2018a; ISC 2014). The WCNPO stock is not overfished or subject to overfishing (ISC 2018a), and has been in a healthy condition for over a decade (Sippel 2015). The WCNPO stock off the U.S. West Coast is an underutilized domestic resource (Berube *et al.* 2015). Based on the data through 2012, NMFS determined that the EPO stock is subject to overfishing, but not overfished (ISC 2014).

The Proposed Action falls within the WCNPO stock area. In 2016 (the terminal year of the WCNPO stock assessment), the relative spawning stock biomass ($SSB/SSB_{MSY}$; where SSB is the biomass, MSY is the maximum sustainable yield, and $SSB_{MSY}$ is the spawning stock biomass that would produce MSY) was estimated at 1.87. Additionally, spawning stock biomass was estimated to be greater than the minimum stock size threshold (MSST) specified in the HMS FMP by a factor of 2.4, and is therefore not overfished (i.e., below MSST, the stock would be considered overfished). The relative fishing mortality rate ($F_{2016}/F_{MSY}$, where $F_{2016}$ is the fishing mortality rate in 2016 and $F_{MSY}$ is the fishing mortality rate would achieve MSY) was 0.47. The maximum fishing mortality threshold (MFMT) in the HMS FMP is specified as equal to $F_{MSY}$; above this level the stock would be considered subject to overfishing (ISC 2018a). An updated assessment, which includes adjustments to swordfish stock boundaries and refers to the WCNPO stock as the North Pacific Ocean stock became available in 2023 (ISC 2023). A stock status determination relative to overfished and overfishing criteria of the HMS FMP is pending; however, no changes in status are expected based on the findings. The Proposed Action Area would fall within the boundaries of the North Pacific Ocean stock.

Data from the Hawaii longline fisheries east of 140˚ W indicate that swordfish have been caught at a rate of 10.867 fish per 1,000 hooks observed in the SSLL fishery and 0.141 fish per 1,000 hooks observed in the DSLL fishery (Table 3-3 and Table 3-5). Although swordfish are considered an *uncommonly caught species* in the Hawaii DSLL fishery east of 140˚ W, we included them in the *commonly caught*

*management unit species* category (see Section 3) because swordfish are an MUS and are a *major species* in the West Coast DGN fishery (Appendix 4, Table A-4-1).

Swordfish-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1) no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in swordfish and other marketable HMS landings to the U.S. West Coast by domestic fisheries are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act. It is not yet known whether the issuance of DSBG limited entry permits under the recent authorization of DSBG may offset a decrease in swordfish landings in the DGN fishery. However, preliminary data collected from the authorized fishery indicates fewer DSBG-caught swordfish landings than for EFPs. This may be attributable to reduced swordfish availability in the SCB or changes in the incentive to fish under an EFP or authorized permit, or other factors.

Action Alternatives:

Table 4-3 and Table 4-4 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-3.** Swordfish projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 10.867 | 1,325.7 | 2,651.5 | 3,977.2 | 6,628.7 |

**Table 4-4.** Swordfish projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3 and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.141 | 93.1 | 186.3 | 465.7 |

The proportion of swordfish kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2.

Because the biomass of the WCNPO stock is well above the MSY level and harvest of the stock is well below the MSY level, effects to the swordfish population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected catch = 6,628.7) + (Alternative 2-4 projected catch = 465.7) = 7,094.4) and the effects of this level of catch to the stock are likely to be minor.

**Blue Shark (*Prionace glauca*)**

Blue Shark-Affected Environment:

The most recent north Pacific blue shark stock assessment occurred in 2022 and included data through 2020 (ISC 2022a). The assessment results indicate that, relative to status determination criteria specified in the HMS FMP (i.e., MSST and MFMT), the north Pacific blue shark stock is not overfished nor is it subject to overfishing. In 2020, spawning biomass ($SSB_{2020}$ = 92,954) exceeded MSST by a factor of 1.3 to 1.46, and $F_{2017\text{-}2019}$ was estimated to be well below MFMT (ISC 2022a; PFMC 2022c).

Data from the Hawaii longline fisheries east of 140˚ W indicate that blue sharks have been caught at a rate of 8.459 fish per 1,000 hooks observed in the SSLL fishery and 1.117 fish per 1,000 hooks observed in the DSLL fishery (Table 3-3 and Table 3-5).

Blue Shark-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of blue shark by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-5 and Table 4-6 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-5**. Blue shark projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 8.459 | 1,031.9 | 2,063.9 | 3,095.8 | 5,159.7 |

**Table 4-6.** Blue shark projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3 and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 1.117 | 740.1 | 1,480.2 | 3,700.5 |

No blue sharks were kept in the Hawaii longline fisheries. The proportion of blue sharks returned alive or dead are calculated based on the use of proxy data and are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2. Blue sharks returned alive represented 85 percent of those caught with SSLL gear and 95 percent of those caught with DSLL gear, while those returned dead represented 15 percent for SSLL and 5 percent for the DSLL gear. The 2019 Longline EFP fishermen kept about 10 percent of the blue sharks caught with SSLL and DSLL gear. These fishermen reported to have found a market for blue shark (PFMC 2020). However, blue shark catches were many times greater than projected for both components of the 2019 Longline EFP (Appendix 6). A similar finding occurred when Kato (1969) performed 10 longline fishing test sets off Central Baja California and caught a large number of blue sharks. Given the learning occurring in the 2019 Longline EFP and the Kato (1969) study and the limited duration of these operations, these datasets should be viewed with caution relative to more robust datasets, like those from the Hawaii longline fisheries.

The estimated harvest of blue sharks under any of the action alternatives would represent a small incremental increase in overall fishing mortality and are unlikely to affect the sustainability of the stock under any of the action alternatives. Despite indication from the 2019 Longline EFP that blue shark CPUE may be higher in the Proposed Action Area, the impact would be minor given the overall blue shark population. Even under the highest level of effort for both components of the action alternatives, the

projected impacts (e.g., (Alternative 1-5 projected catch = 5,159.7) + (Alternative 2-4 projected catch = 3,700.5) = 8,860.2) and the effects of this level of catch to the stock are likely to be minor.

**Shortfin Mako Shark (*Isurus oxyrinchus*)**

Shortfin Mako Shark-Affected Environment:

Shortfin mako constitutes an important incidental catch to the DGN fishery, whose market quality and ex-vessel value are important components of the landed incidental catch (Cailliet and Bedford 1983; Holts *et al.* 1998). Shortfin mako is also caught in California's recreational fishery. A majority are caught by anglers fishing with rod-and-reel gear from private vessels in the SCB from June through October, peaking in August. During the early 1980s, they increased in prominence as a popular game fish, and annual catch estimates peaked in 1987 at 22,000 fish. Since 2001, annual catch estimates have ranged from 2,000 to 6,000 fish, with a percentage of sharks successfully released by southern California fishermen favoring catch-and-release versus harvest.

Based on the most recent stock assessment for shortfin mako in the North Pacific Ocean (ISC 2018b), which included data through 2016, NMFS determined that the stock is not overfished nor subject to overfishing. Spawning stock biomass in 2016 (86,200 female sharks) was greater than the MSST specified in the HMS FMP by a factor of 1.6. The relative fishing mortality rate in 2016 ($F_{2016}$/MFMT) was 0.47 (PFMC 2019a).

Data from the Hawaii longline fisheries east of 140˚ W indicate that shortfin mako sharks have been caught at a rate of 1.523 fish per 1,000 hooks observed in the SSLL fishery and 0.175 fish per 1,000 hooks observed in the DSLL fishery (Table 3-3 and Table 3-5). Although shortfin mako sharks caught in the Hawaii DSLL fishery east of 140˚ W are considered an *uncommonly caught species*, we added them to the *commonly caught management unit species* category (see Section 3) because shortfin mako sharks are an MUS in the HMS FMP and a *major species* in the West Coast DGN fishery (Appendix 4).

Shortfin Mako Shark-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of shortfin mako shark by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-7 and Table 4-8 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year for each action alternative under Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-7.** Shortfin mako shark projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 1.523 | 185.9 | 371.7 | 557.6 | 929.3 |

**Table 4-8**. Shortfin mako shark projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.175 | 116.0 | 231.9 | 579.9 |

The proportion of shortfin mako sharks kept or returned alive or dead are calculated based on the use of proxy data and reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2. Shortfin mako sharks kept represented 12 percent of those caught for SSLL, and 6 percent for DSLL. Shortfin mako sharks returned alive represented 63 percent of those caught with SSLL gear and 71 percent of those caught with DSLL gear, while those returned dead represented 25 percent for SSLL and 23 percent for the DSLL gear. Notably, mako shark catch per 1,000 hooks was higher during the 2019 Longline EFP (Appendix 6). Given the learning occurring in the 2019 Longline EFP and the Kato (1969) study and the limited duration of these operations, these datasets should be viewed with caution relative to more robust datasets.

The estimated harvest of mako sharks under any of the action alternatives would represent a small incremental increase in overall fishing mortality and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected catch = 929.3) + (Alternative 2-4 projected catch = 579.9) = 1,509.2) and the effects of this level of catch to the stock are likely to be minor. Taking into account that shortfin mako sharks were caught at higher rates during the 2019 Longline EFP, alternatives allowing more fishing effort in the Proposed Action Area may reflect a greater

increase in fishing mortality on this stock. However, given the results from the recent stock assessment in the North Pacific Ocean and the relatively small short-term level of catch to the stock, the effects of catch under any of the action alternatives to the stock are likely to continue to be minor.

**Mahi-mahi or Dolphinfish (*Coryphaena hippurus*)**

Mahi-mahi-Affected Environment:

United States West Coast fishermen access the northern range of mahi-mahi in the Pacific Ocean. Total U.S. West Coast commercial HMS landings in 2018 and 2019 were 12 mt and 21 mt, respectively (PFMC 2021c). There are no HMS FMP harvest guidelines recommended at this time (PFMC 2003). United States commercial fisheries in the western and central Pacific harvest the majority of mahi-mahi caught by United States vessels (WPFMC 2009). Although the population is not formally assessed, scientists assume mahi-mahi populations are stable because the species is highly productive and widely distributed throughout the tropical/subtropical Pacific (NOAA 2016).

Data from the Hawaii longline fisheries east of 140˚ W indicate that mahi-mahi have been caught at a rate of 1.116 fish per 1,000 hooks observed in the SSLL fishery and 1.441 fish per 1,000 hooks observed in the DSLL fishery (Table 3-3 and Table 3-5).

Mahi-mahi- Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Catch levels of mahi-mahi by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue at status quo levels.

Action Alternatives:

Table 4-9 and Table 4-10 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year for each action alternative under Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-9.** Mahi-mahi projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-set portion of EFP | 1.116 | 136.1 | 272.2 | 408.3 | 680.5 |

**Table 4-10**. Mahi-mahi projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 1.441 | 954.4 | 1,908.7 | 4,771.8 |

The proportion of mahi-mahi kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2.

Given the stock is assumed to be stable, and is highly productive and widely distributed throughout the tropical and subtropical Pacific Ocean, the effects of catch under any of the action alternatives to the stock are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected catch = 680.5) + (Alternative 2-4 projected catch = 4,771.8) =5,452.3) and the effects of this level of catch to the stock are likely to be minor.

**Bigeye Tuna (*Thunnus obesus*)**

Bigeye Tuna-Affected Environment:

Bigeye tuna in the Pacific Ocean are managed as two stocks: the WCPO stock and the EPO stock. The bigeye tuna stock in the Proposed Action Area is the EPO stock. The 2020 stock assessment completed by IATTC scientific staff using data through 2019 is the latest assessment determined to be the best scientific information available for purposes of determining stock status (Xu *et al.* 2020). The assessment results show that fishing effort has been below the level corresponding to MSY. Relative to the status determination criteria of the HMS FMP, the EPO stock is neither overfished (i.e., $B_{2019}$ was estimated to be 1.84 times MSST), nor subject to overfishing (i.e., $F_{2019}$ was estimated at the MFMT, but not above that; Xu *et al.* 2020). Based on resolutions adopted by the IATTC, NMFS implements management measures at 50 CFR part 300, subpart C for commercial fisheries that catch tropical tunas, including bigeye tuna in the eastern Pacific (e.g., 87 FR 40731, July 8, 2022). The EFP holders, if fishing from

vessels over 24 meters, would share in bigeye tuna harvest limits set for other fisheries; however, their share of the catch is not expected to create allocation issues. Further, the EFP catch would be monitored and subject to EPO catch limits for any HMS species.

Data from the Hawaii longline fisheries east of 140˚ W indicate that bigeye tuna have been caught at a rate of 5.595 fish per 1,000 hooks observed in the SSLL fishery and 1.105 fish per 1,000 hooks observed in the DSLL fishery (Table 3–3 and Table 3–5). Bigeye tuna are also a commonly caught species in the West Coast DSLL fishery (Appendix 5).

Bigeye Tuna-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Catch levels of bigeye tuna by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue at status quo levels

Action Alternatives:

Table 4-11 and Table 4-12 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year for each action alternative under Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-11.** Bigeye tuna projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 1.105 | 134.9 | 269.7 | 404.6 | 674.3 |

**Table 4-12.** Bigeye tuna projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 5.595 | 3,706.4 | 7,412.8 | 18,532.0 |

The proportion of bigeye tuna kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2.

Because the EPO stock is neither overfished nor experiencing overfishing, the effects to the bigeye tuna population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected catch = 674.3) + (Alternative 2-4 projected catch = 18,532.0) =19,206.3) and the effects of this level of catch to the stock are likely to be minor.

**Yellowfin Tuna (*Thunnus albacares*)**

Yellowfin Tuna-Affected Environment:

Yellowfin tuna in the Pacific Ocean are managed as two stocks: the WCNPO stock and the EPO stock. The yellowfin tuna stock in the Proposed Action Area is the EPO stock. The best scientific information available for the purposes of determining stock status includes a stock assessment, which incorporates data through 2019, and a risk analysis completed by the IATTC scientific staff (Minte-Vera *et al.* 2020). The assessment results show that relative to status determination criteria of the HMS FMP, the EPO stock is neither overfished (e.g., if the ratio of SSB to MSST is greater than 1, where $SSB_{2020}$/MSST proxy=3.16), nor subject to overfishing (e.g., if the probability of current F to $F_{MSY}$ is greater than 0.5, where probability $F_{2017\text{-}2019} > F_{MSY}$ is 0.09; Minte-Vera *et al.* 2020).

The United States' total contribution to EPO yellowfin tuna harvest is small, accounting for less than 3 percent of the total catch of the EPO yellowfin tuna stock. Based on resolutions adopted by the IATTC, NMFS implements management measures at 50 CFR part 300, subpart C for commercial fisheries that catch tropical tunas, including yellowfin tuna, in the eastern Pacific (e.g., 87 FR 40731, July 8, 2022).

Data from the Hawaii longline fisheries east of 140˚ W indicate that yellowfin tuna have been caught at a rate of 0.706 fish per 1,000 hooks observed in the DSLL fishery (Table 3–5). However, yellowfin tuna is considered an *uncommonly caught species* in the Hawaii SSLL fishery east of 140˚ W (Appendix 3, Table A-3-2), the West Coast DGN fishery (Appendix 4, Table A-4-1) and the 2019 Longline EFP (Appendix 6, Table A-6-2). As a result, they are not analyzed further in the SSLL portion of this document.

Yellowfin Tuna-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of yellowfin tuna by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-13 shows the estimated catch per 1,000 hooks set for DSLL and the projected catch in number of animals per year for each action alternative under Component 2 (deep-setting). There was no catch in our proxy datasets on which to base projections for Component 1 alternatives. As such, no yellowfin tuna catch is projected for Component 1.

**Table 4-13**. Yellowfin tuna projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.706 | 468.0 | 935.9 | 2,339.8 |

The proportion of yellowfin tuna kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-5 for alternatives under Component 2.

As stated above, there is no yellowfin tuna catch projected for Component 1; however, there is catch projected for Component 2. Because the EPO stock is neither overfished nor experiencing overfishing, the effects to the yellowfin tuna population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 2 action alternatives, the projected impacts (i.e., Alternative 2-4 projected catch = 2,339.8) and the effects of this level of catch to the stock are likely to be minor.

**North Pacific Albacore Tuna (*Thunnus alalunga*)**

North Pacific Albacore Tuna-Affected Environment:

North Pacific albacore tuna total stock biomass and female spawning stock biomass (SSB; where SSB is defined as total weight of fish in a stock that are old enough to reproduce) experienced a long-term decline until 2000, after which biomass becomes relatively stable (ISC 2020). The estimated female SSB has never fallen below the biomass-based limit reference point (LRP; adopted by the Albacore Working Group) since 1994, albeit with large uncertainty in the terminal year (2018) estimates. The point estimate

of female spawning stock biomass was estimated to be 58,858 tons and 2.30 times greater than the estimated LRP threshold of 25,573 tons. Current fishing intensity ($F_{2015\text{-}2017}$) was at or lower than all seven potential F-based reference points identified for the north Pacific albacore stock. Based on these reference points, the North Pacific albacore tuna stock is not experiencing overfishing and is most likely not in an overfished condition. Currently, there are no quotas or catch limits established for North Pacific albacore catch under the HMS FMP.

Data from the Hawaii longline fisheries east of 140˚ W indicate that albacore tuna have been caught at a rate of 0.643 fish per 1,000 hooks observed in the SSLL fishery and 0.045 fish per 1,000 hooks observed in the DSLL fishery (Table 3–3 and Table 3–5). Although albacore tuna caught in the Hawaii DSLL fishery east of 140˚ W are considered an *uncommonly caught species*, they are moved into the *commonly caught management unit species* category (see Section 3) because albacore tuna is considered a *major species* in the West Coast DGN fishery and they are an MUS (Appendix 4).

North Pacific Albacore Tuna-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of North Pacific albacore by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-14 and Table 4-15 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year for each action alternative under Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-14.** North Pacific Albacore tuna projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.643 | 78.4 | 156.8 | 235.2 | 392.1 |

**Table 4-15.** North Pacific Albacore tuna projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.045 | 29.6 | 59.1 | 147.8 |

The proportion of North Pacific albacore kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2.

Because the North Pacific albacore stock is neither overfished nor experiencing overfishing, the effects to the population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected catch = 392.1) + (Alternative 2-4 projected catch = 147.8) = 539.9) and the effects of this level of catch to the stock are likely to be minor.

**Skipjack Tuna (*Katsuwonus pelamis*)**

Skipjack Tuna-Affected Environment:

In 2022, IATTC Scientific Advisory Committee assessed the EPO stock of skipjack tuna (IATTC 2022a). The IATTC scientific staff use proxies for these MSY-based reference points (PFMC 2022d). The proxy for $B_{MSY}$ is $30\%SSB_0$ and the proxy for $F_{MSY}$ is the level of fishing mortality corresponding with the biomass target (i.e., $F_{Btarget}$ where $B_{target}$ is equal to $30\%SSB_0$). Applying these proxies to domestic status determination criteria results in an MFMT = $F_{Btarget}$ and MSST = 0.5 x $30\%SSB_0$. Because the assessment results indicate that $F_{current}/F_{Btarget} = 0.25$ (i.e., less than 1), current fishing mortality is lower than the MFMT. Additionally, because the assessment results indicate that current spawning biomass is above $B_{target}$, then it is also above the MSST for this stock. Therefore, the results indicate that the stock is not subject to overfishing nor overfished (PFMC 2022d).

Data from the Hawaii longline fisheries east of 140˚ W indicate that skipjack tuna have been caught at a rate of 0.020 fish per 1,000 hooks observed in the SSLL fishery and 0.490 fish per 1,000 hooks observed in the DSLL fishery (Table 3–3 and Table 3–5). Although skipjack tuna caught in the Hawaii longline fisheries east of 140˚ W are considered an *uncommonly caught species*, they are moved into the

*commonly caught management unit species* category (see Section 3) because skipjack tuna is considered a *major species* in the West Coast DGN fishery and they are an MUS (Appendix 4).

Skipjack Tuna- Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of skipjack tuna by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-16 and Table 4-17 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-16.** Skipjack tuna projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.020 | 2.5 | 4.9 | 7.4 | 12.3 |

**Table 4-17.** Skipjack tuna projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.490 | 324.7 | 649.5 | 1,623.6 |

The proportion of skipjack tuna kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2.

Because the stock is assumed to be neither overfished nor experiencing overfishing, the effects to the skipjack tuna population are likely to be minor and are unlikely to affect the sustainability of the stock

under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected catch = 12.3) + (Alternative 2-4 projected catch = 1,623.6) = 1,635.9) and the effects of this level of catch to the stock are likely to be minor.

**Common Thresher Shark (*Alopias vulpinus*)**

Common Thresher Shark-Affected Environment:

A stock assessment for common thresher shark off the west coast of North America was completed in 2016 using data through 2014, then peer reviewed in 2017 and revised in 2018. The assessment reported that the stock experienced a relatively large and quick decline in the 1970s and early 1980s but that the population appears to have stabilized after DGN regulations were imposed in 1990 (Teo *et. al* 2018). Over the past 15 years, the stock recovered quickly, and it is currently close to the unexploited level. Results of the assessment indicate the common thresher shark stock is not overfished ($SSB_{2014}$ exceeds MSST by a factor of 1.4) and is not subject to overfishing ($F_{2014}$ was estimated to be 0.21 of the MFMT) (PFMC 2019a).

In August 2014, animal advocacy organization, Friends of Animals, requested common thresher sharks be listed as endangered or threatened under the ESA, or, alternatively, delineated as six DPSs with each segment being listed as endangered or threatened. Friends of Animals cited fishing pressure, life history characteristics, and the lack of regulatory mechanisms to protect the sharks as the reasons for the listing. In 2016, NMFS published a comprehensive status review for common thresher sharks and found that the species was not in danger of extinction, nor was it likely to become so within the foreseeable future. Accordingly, the common thresher shark did not meet the definition of a threatened or endangered species, and thus, the common thresher shark did not warrant listing as threatened or endangered (81 FR 18979, April 1, 2016).

Common Thresher Shark-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of common thresher shark by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-18 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch in our proxy datasets on which to base projections for Component 2 alternatives. As such, no common thresher shark catch is projected for Component 2.

**Table 4-18.** Common thresher shark projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-set portion of EFP | 0.006 | 0.6 | 1.2 | 1.8 | 3.0 |

The proportion of common thresher shark kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1.

Minimal catch is projected for Component 1. For example, under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected catch = 3.0) and the effects of this level of catch to the stock are likely to be minor. It is possible that more common thresher sharks are caught than projected for the action alternatives based on proxy data, as the stock has recovered quickly and is close to unexploited levels. Catch of common thresher sharks under any of the action alternatives is expected to have a minor impact on the stock relative to the overall stock size.

**Pacific Bluefin Tuna (*Thunnus orientalis*)**

Pacific Bluefin Tuna-Affected Environment:

Pacific bluefin tuna is a single Pacific-wide stock with trans-Pacific migratory patterns. The majority of U.S. West Coast catch is caught opportunistically by commercial purse seiners and recreationally by commercial passenger fishing vessels. Using data through 2020, the Pacific bluefin tuna stock was last assessed in 2022 (ISC 2022b). The assessment results indicate that the stock is still overfished, but no longer subject to overfishing with respect to status determination criteria specified in the HMS FMP (i.e., $SSB_{2020}$ (65,464) was estimated to be lower than MSST (96,537) and $F_{2018\text{-}2020}$ (0.693) was estimated as lower than MFMT (0.8)). Projections of harvest scenarios performed in 2020 indicated that a continuation of current management measures under a low recruitment scenario would result in achieving the initial biomass rebuilding target by 2024 with 98 percent probability (ISC 2022b).

In the 2022 assessment, the Pacific Bluefin Tuna Working Group estimated a 30,000 mt increase from 2018 to 2020 according to the base-case model (ISC 2022b). This is in part due to the larger number of immature bluefin (0 to 2 years old) observed in 2016 to 2020, and is expected to accelerate the recovery of SSB in the future even further (ISC 2022b).

In accordance with IATTC Resolutions, and in an effort to rebuild the Pacific bluefin tuna stock, NMFS regularly implements commercial catch and trip limits for U.S. commercial catch of Pacific bluefin tuna in the EPO at 50 CFR part 300, subpart C (e.g., 87 FR 47939, August 5, 2022). Once these catch limits are reached, NMFS prohibits U.S. commercial vessels from targeting, retaining on-board, transshipping, or landing Pacific bluefin tuna through the remainder of the calendar year. The EFP holders would share in Pacific bluefin tuna harvest limits set by other fisheries; however, their share of the catch is not expected to create allocation issues. Further, the EFP catch would be monitored and subject to EPO catch limits for any HMS species.

Data from the Hawaii longline fisheries east of 140˚ W indicate that bluefin tuna have been caught at a rate of 0.002 fish per 1,000 hooks observed in the SSLL fishery (Table 3–3). However, bluefin tuna were only caught in the West Coast DGN fishery (Appendix 4), and were not caught in the Hawaii DSLL fishery east of 140˚ W (Appendix 3), or the West Coast DSLL fishery (Appendix 5), or the DSLL portion of the 2019 Longline EFP dataset (Appendix 6). Therefore, bluefin tuna do not have an associated DSLL rate and are not included in the DSLL dataset. Furthermore, even though bluefin tuna caught in the Hawaii SSLL fishery are considered an *uncommonly caught species*, they are moved into the *commonly caught management unit specie*s category because bluefin tuna are a *major species* in the DGN fishery (Appendix 4, Table 4-1) and they are an MUS (Section 3, Table 3-1).

Pacific Bluefin Tuna-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of Pacific bluefin tuna by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease relative to stock size due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act; however, landings could increase overall as a product of increasing stock size.

Action Alternatives:

Table 4-19 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch in our proxy datasets on which to base projections for Component 2 alternatives. As such, no bluefin tuna catch is projected for Component 2.

**Table 4-19.** Pacific bluefin tuna projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-set portion of EFP | 0.002 | 0.2 | 0.4 | 0.6 | 1.0 |

The proportion of Pacific bluefin tuna kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1.

Minimal catch is projected for Component 1. For example, under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected catch = 1.0) and the effects of this level of catch to the stock are likely to be minor. It is possible that more bluefin tuna are caught than projected for the action alternatives based on proxy data, as the stock has been significantly increasing in size (from highly depleted levels). Harvest of Pacific bluefin tuna under any of the action alternatives is expected to have a minor impact on the stock relative to the overall stock size.

## 4.3 Other Commonly Caught Species

Species that have been captured at rates greater than 0.5 animals per 1,000 hooks in the Hawaii longline fisheries east of 140° W longitude and the West Coast DSLL fishery, or at rates greater than 10 animals per 100 sets in the West Coast DGN fishery, are considered *other commonly caught species* (Section 3, Tables 3–3 and 3–5). These species are either susceptible to longline gear and/or occur in the Proposed Action Area, and therefore may be affected by the Proposed Action. None of these species are prohibited from retention, and, if marketable, are likely to be landed and sold.

### Longnose Lancetfish (*Alepisaurus ferox*)

Longnose Lancetfish-Affected Environment:

The longnose lancetfish is the most commonly caught non-target bony fish species observed in sets from 2004 to 2019 in the Hawaii longline fisheries east of 140˚W (Appendix 3). There is little information available on the population dynamics for this species, which prevents the use of conventional assessment

methods. However, Kindong *et al.* (2020a) applied a novel data-limited length-based Bayesian biomass estimator method to assess lancentfish in the Central Pacific Ocean. The researchers derived estimates of growth, length at first capture, and present relative biomass of these species were taken from length-frequency data collected from Chinese longline vessels fishing in the Central Pacific Ocean in 2015. Although the stock status of longnose lancetfish has never been assessed due to data limitations, the Kindong *et al.* (2020a) analysis suggests the population may be in decline or that fishing rates may be too high. However, the results of these this analysis must be viewed with caution as the data used in the analysis was limited, and there were outstanding questions regarding biases and uncertainties.

Data from the Hawaii longline fisheries indicate that longnose lancetfish have been caught at a rate of 1.831 fish per 1,000 hooks observed in the SSLL fishery and 5.030 fish per 1,000 hooks observed in the DSLL fishery (Table 3–3 and Table 3–5).

Longnose Lancetfish-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Current trends in catch of lancetfish by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-20 and Table 4-21 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-20.** Longnose lancetfish projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 1.831 | 223.4 | 446.8 | 670.3 | 1,117.1 |

**Table 4-21.** Longnose lancetfish projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 5.030 | 3,331.7 | 6,663.5 | 16,658.7 |

The proportion of longnose lancetfish kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2.

The effects to the longnose lancetfish population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected catch = 1,117.1) + (Alternative 2-4 projected catch = 16,658.7) = 17,775.8) and the effects of this level of catch to the stock are likely to be minor.

**Opah (*Lampris spp.*)**

Opah Environment:

Between 2014 and 2020, over 2,050 mt of opah were landed in California, with annual landings ranging from 138 mt to 402 mt. Opah are occasionally caught by HMS gear types such as DGN and longline. Sport fishermen targeting albacore from British Columbia to Baja, California occasionally catch opah. Within California, many sport-caught opah are taken from the northern Channel Islands to the Coronado Islands, just south of the U.S.-Mexico border. The stock status of opah has never been assessed, but there is no evidence that populations are in decline or that fishing rates are too high.

Data from the Hawaii longline fisheries indicate that opah have been caught at a rate of 0.821 fish per 1,000 hooks observed in the SSLL fishery and 1.922 fish per 1,000 hooks observed in the DSLL fishery (Table 3–3 and Table 3–5).

Opah-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of opah by domestic fisheries landing swordfish and other

marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-22 and Table 4-23 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-22.** Opah projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.821 | 100.1 | 200.2 | 300.3 | 500.6 |

**Table 4-23.** Opah projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 1.922 | 1,273.4 | 2,546.8 | 6,367.1 |

The proportion of opah kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2.

The estimated harvest of opah under any of the action alternatives would represent a small incremental increase in overall fishing mortality and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (i.e., (Alternative 1-5 projected catch =500.6) + (Alternative 2-4 projected catch = 6,367.1) = 6,867.7) and the effects of this level of catch to the stock are likely to be minor.

**Snake Mackerel (*Gempylus serpens*)**

Snake Mackerel-Affected Environment:

There is little information available on the population dynamics for this species. Snake mackerel are not a target species of any U.S. West Coast fishery. The stock status of snake mackerel has never been assessed, but there is no evidence that populations are in decline or that fishing rates are too high.

Data from the Hawaii longline fisheries indicate that snake mackerel have been caught at a rate of 1.847 fish per 1,000 hooks observed in the DSLL fishery (Table 3–5); however, they were an *uncommonly caught species* in the Hawaii SSLL fishery (Appendix 3).

Snake Mackerel-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Catch levels of snake mackerel by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue at status quo levels.

Action Alternatives:

Table 4-43 shows the estimated catch per 1,000 hooks set for DSLL and the projected catch in number of animals per year under each of the action alternatives in Component 2 (deep-setting). There was no catch in our proxy datasets on which to base projections for Component 1 alternatives. As such, no snake mackerel catch is projected for Component 1.

**Table 4-24.** Snake mackerel projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| DSLL portion of EFP | 1.847 | 1,223.5 | 2,447.0 | 6,117.4 |

The proportion of snake mackerel kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-5 for alternatives under Component 2.

As stated above, there is no snake mackerel catch projected for Component 1; however, there is catch projected for Component 2. The effects to the snake mackerel population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the

highest level of effort for Component 2 action alternatives, the projected impacts (i.e., Alternative 2-4 projected catch = 6,117.4) and the effects of this level of catch to the stock are likely to be minor.

**Sickle Pomfret (*Taractichthys steindachneri*)**

Sickle Pomfret-Affected Environment:

Monchong is a generic local name given to two deepwater pomfret species: the sickle pomfret, *Taractichthys steindachneri,* and the lustrous pomfret, *Eumegistis illustris* (WPFMC 2009). The sickle pomfret is commonly incidentally caught in pelagic longline fisheries throughout the North Pacific. Both monchong species are valued by Hawaii seafood wholesale and processing firms who have successfully promoted it in the fresh market and restaurant trade. Concerns over the sustainability of current pomfret removal rates with respect to recruitment prompted the WPFMC, in coordination with the Pacific Islands Fisheries Science Center, to launch an investigation into expanding knowledge of pomfret life history and ecology. There is little information available on the population dynamics for this species which prevents the use of conventional assessment methods. However, recently, Kindong *et al.* (2020a and 2020b) applied two different length models for data-limited fish stocks: a length-based Bayesian biomass estimator model (Kindong *et al.* 2020a) and length-frequency analysis model (Kindong *et al.* 2020b). The researchers derived estimates of growth, length at first capture, and present relative biomass of these species from data collected from Chinese longline vessels fishing in the Western Central and Eastern Pacific Ocean. Although the stock status cannot be fully analyzed due to data limitations, the analysis suggests the sickle pomfret population in the Pacific Ocean is healthy. However, the data used in the analysis was limited, and there were outstanding questions regarding biases and uncertainties.

Data from the Hawaii longline fisheries indicate that sickle pomfret have been caught at a rate of 1.153 fish per 1,000 hooks observed in the DSLL fishery (Table 3–5); however, they were an *uncommonly caught species* in the Hawaii SSLL fishery (Appendix 3).

Sickle Pomfret-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Catch levels of sickle pomfret by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue at status quo levels.

Action Alternatives:

Table 4-25 shows the estimated catch per 1,000 hooks set for DSLL and the projected catch in number of animals per year under each of the action alternatives in Component 2 (deep-setting). There was no catch

or recorded interactions in our proxy datasets on which to base projections for Component 1 alternatives. As such, no sickle pomfret catch is projected for Component 1.

**Table 4-25.** Sickle pomfret projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 1.153 | 763.5 | 1,527.0 | 3,817.4 |

The proportion of sickle pomfret kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-5 for alternatives under Component 2.

As stated above, there is no sickle pomfret catch projected for Component 1; however, there is catch projected for Component 2. The estimated harvest of sickle pomfret under any of the action alternatives would represent a small incremental increase in overall fishing mortality and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 2 action alternatives, the projected impacts (i.e., Alternative 2-4 projected catch = 3,817.4) and the effects of this level of catch to the stock are likely to be minor.

**Escolar (*Lepidocybium flavobrunneum*)**

Escolar-Affected Environment:

There is little information available on the population dynamics for this species. Escolar are not a target species of any U.S. West Coast fishery, though they are occasionally caught as bycatch in longline and DSBG fisheries. They are generally brought to market when they occur as bycatch. The stock status of escolar has never been assessed, but there is no evidence that populations are in decline or that fishing rates are too high.

Data from the Hawaii longline fisheries indicate that escolar have been caught at a rate of 0.832 fish per 1,000 hooks observed in the SSLL fishery and 1.113 fish per 1,000 hooks observed in the DSLL fishery (Table 3–3 and Table 3–5).

Escolar-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under

proposed terms and conditions. Trends in catch of escolar by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-26 and Table 4-27 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-26.** Escolar projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.832 | 101.5 | 203.1 | 304.6 | 507.7 |

**Table 4-27.** Escolar projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 1.113 | 737.3 | 1,474.6 | 3,686.4 |

The proportion of escolar kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2.

The effects to the escolar population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected catch = 507.7) + (Alternative 2-4 projected catch = 3,686.4) =4,194.1) and the effects of this level of catch to the stock are likely to be minor.

**Pelagic Stingray (*Pteroplatytrygon [Dasyatis] violacea)***

Pelagic Stingray-Affected Environment:

There is little information available on the population dynamics for the pelagic stingray. They are one of the most common ray species caught in longline fisheries (Williams 1997). The pelagic stingray is one of the most productive of the live-bearing elasmobranchs; its annual rate of increase of 31 percent is more

than triple that of some sharks and rays (Camhi *et al.* 2007). It therefore has a higher capacity to withstand fishing pressure (Dulvy *et al.* 2008). Pelagic stingrays are currently of little commercial value and are discarded in most areas. The stock status of pelagic stingray has never been assessed, but there is no evidence that populations are in decline or that fishing rates are too high.

Data from the Hawaii longline fisheries indicate that pelagic stingray have been caught at a rate of 0.697 fish per 1,000 hooks observed in the SSLL fishery (Table 3–5); however, they were an *uncommonly caught species* in the Hawaii DSLL fishery (Appendix 3).

Pelagic Stingray-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of pelagic stingray by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-28 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch in our proxy datasets on which to base projections for Component 2 alternatives. As such, no pelagic stingray catch is projected for Component 2.

**Table 4-28.** Pelagic stingray projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.697 | 85.1 | 170.1 | 255.2 | 425.3 |

The proportion of pelagic stingray kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1.

As stated above, there is no pelagic stingray catch projected for Component 2; however, there is catch projected for Component 1. The effects to the pelagic stingray population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the

highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected catch = 425.3) and the effects of this level of catch to the stock are likely to be minor.

**Oilfish (*Ruvettus pretiosus*)**

Oilfish-Affected Environment:

There is little information available on the population dynamics for this species. Oilfish are not a target species of any U.S. West Coast fishery. The stock status of oilfish has never been assessed, but there is no evidence that populations are in decline or that fishing rates are too high.

Data from the Hawaii longline indicate that oilfish have been caught at a rate of 0.524 fish per 1,000 hooks observed in the SSLL fishery; however, they were an *uncommonly caught species* in the Hawaii DSLL fishery (Appendix 3).

Oilfish-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of oilfish by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-29 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no

catch in our proxy datasets on which to base projections for Component 2 alternatives. As such, no oilfish catch is projected for Component 2.

**Table 4-29.** Oilfish projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.524 | 63.9 | 127.8 | 191.7 | 319.6 |

The proportion of oilfish kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1.

As stated above, there is no oilfish catch projected for Component 2; however, there is catch projected for Component 1. The effects to the oilfish population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected catch = 319.6) are likely to be minor.

**Common Mola (*Mola mola*)**

Common Mola-Affected Environment:

There is little information available on the population dynamics for this species. Common mola are not a target species of any U.S. West Coast fishery. They are frequently caught as bycatch in the West Coast DGN fishery, where a majority are released alive. The stock status of common mola has never been assessed, but there is no evidence that populations are in decline or that fishing rates are too high.

Data from the Hawaii longline indicate that common mola have been caught at a rate of 0.076 fish per 1,000 hooks observed in the SSLL fishery and 0.002 fish per 1,000 hooks observed in the DSLL fishery (Table 3–3 and Table 3-5). Although common mola caught in the Hawaii DSLL fishery east of 140˚ W are considered an *uncommonly caught species*, they are moved into the *other commonly caught species* category (see Section 3) because common mola are considered a *major species* in the West Coast DGN fishery.

Common Mola-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of common mola by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-30 and Table 4-31 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-30.** Common mola projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.076 | 9.2 | 18.4 | 27.6 | 46.1 |

**Table 4-31.** Common mola projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3 and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.002 | 1.1 | 2.1 | 5.3 |

The proportion of common mola kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2.

The effects to the common mola population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected catch = 46.1) + (Alternative 2-4 projected catch = 5.3) = 51.4) and the effects of this level of catch to the stock are likely to be minor.

**Bullet Mackerel (*Auxis rochei*)**

Bullet Mackerel-Affected Environment:

There is little information available on the population dynamics for this species. Bullet mackerel are not a target species of any U.S. West Coast fishery. The stock status of bullet mackerel has never been assessed, but there is no evidence that populations are in decline or that fishing rates are too high.

Data from the Hawaii longline fisheries indicate that bullet mackerel were neither caught in the SSLL nor the DSLL fishery (Appendix 3), nor the West Coast DSLL fishery; however, they are considered a *major species* in the West Coast DGN fishery (Appendix 4) and have been caught at a rate of 0.027 fish per 1,000 hooks observed from the DSLL sector of the 2019 Longline EFP (Appendix 6).

Bullet Mackerel-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Catch of bullet mackerel by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast is expected to decrease with continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-32 shows the estimated catch per 1,000 hooks set for DSLL and the projected catch in number of animals per year under each of the action alternatives in Component 2 (deep-setting). There was no catch in our proxy datasets on which to base projections for Component 1 alternatives. As such, no bullet mackerel catch is projected for Component 1.

**Table 4-32.** Bullet mackerel projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3 and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.027 | 17.8 | 35.7 | 89.1 |

The proportion of bullet mackerel kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-5 for alternatives under Component 2.

As stated above, there is no bullet mackerel catch projected for Component 1; however, there is catch projected for Component 2. The effects to the bullet mackerel population are likely to be minor and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 2 action alternatives, the projected impacts (i.e., Alternative 2-4 projected catch = 89.1) and the effects of this level of catch to the stock are likely to be minor.

**Pacific Mackerel *(Scomber japonicus*)**

Pacific Mackerel-Affected Environment:

The stock structure of Pacific mackerel off the coast of North America is generally defined as three spawning aggregations: one in the Gulf of California; one in the vicinity of Cabo San Lucas (Baja California, Mexico); and one along the Pacific coast north of Punta Abreojos (Baja California) that extends north to areas off southern California, and even further during favorable oceanographic periods to waters off the U.S. Pacific Northwest (Crone *et al.* 2019). The latter sub-stock is harvested by U.S. West Coast fishermen.

Estimates of Pacific mackerel stock biomass generally declined from 2008 to 2018, with the exception of 2012 that reflected abundance that included a large recruitment pulse estimated in 2011 (Crone *et al.* 2019). Similarly, high recruitment estimates in 2016 and 2018 translated to relatively higher estimated stock biomass in 2017 and into the forecast period (2019 through 2020), respectively. Given the forecasted stock biomass of age 1+ (for 2019/2020 is 71,099 mt and 2020/2021 is 56,058 mt) is above the lowest level of estimated biomass (18,200 mt) above which harvest is allowed and the overfishing limit has not been exceeded, Pacific mackerel are not overfished and are not subject to overfishing.

Pacific mackerel are considered a *major species* in the West Coast DGN fishery (Table 3-7 and Appendix 4); however, they were not caught in any of the longline fisheries proxy datasets and therefore have no associated longline catch rates.

Pacific Mackerel-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of Pacific mackerel by domestic fisheries landing

swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease with continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:
We make no quantitative projections for catch of these species based on proxy data. There is some potential for catch of Pacific mackerel under the Proposed Action; however, low levels, if any catch of Pacific Mackerel, are expected. Harvest under any of the action alternatives could represent a small incremental increase in fishing in the Proposed Action Area where Pacific mackerel occur.

**Pacific Bonito (*Sarda chiliensis*)**

Pacific Bonito-Affected Environment:

The stock status of Pacific bonito has never been assessed. Efforts have been made to obtain indicators of abundance for Pacific bonito; however, the estimates have not been reliable as both their abundance and spatial extent are highly variable from year to year (CDFW 2019). In 2019, the IATTC (Ortega-Garcia and Jakes-Cota 2019) performed an exploratory analysis of available data for Pacific bonito and future directions. The analysis concluded that the main focus for future analysis is to determine the main environmental factors that affect its abundance. Presently, there is no evidence that populations are in decline or that fishing rates are too high.

Pacific bonito are considered a *major species* in the West Coast DGN fishery (Table 3-7 and Appendix 4); however, they were not caught in any of the longline fisheries proxy datasets therefore have no associated longline catch rates.

Pacific Bonito-Environmental Consequences:

No Action Alternatives:
Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of Pacific bonito by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease with continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:
We make no quantitative projections for catch of these species based on proxy data. There is some potential for catch of Pacific bonito under the Proposed Action; however, we expect this will occur at low

levels, if at all. Harvest under any of the action alternatives could represent a small incremental increase in fishing in the Proposed Action Area where Pacific bonito occur.

## 4.4 Prohibited Species

Table 4–33 lists the prohibited non-HMS species designated under the HMS FMP. In general, prohibited species must be released immediately if caught, unless other provisions for their disposition are established, including for scientific study (80 FR 46519, Aug. 5, 2015).

**Table 4–33.** HMS FMP prohibited species.

| Common Name | Scientific Name |
|---|---|
| Great white shark | *Carcharodon carcharias* |
| Basking shark | *Cetorhinus maximus* |
| Megamouth shark | *Megachasma pelagio* |
| Pacific halibut | *Hippoglossus stenolepis* |
| Pink salmon | *Onchorhynchus gorbuscha* |
| Chinook salmon | *O. tshawytscha* |
| Chum salmon | *O. keta* |
| Sockeye salmon | *O. nerka* |
| Coho salmon | *O. kisutch* |

Data from the Hawaii longline fishery from 2004 through 2019 fishing seasons east of 140° W longitude indicate there were no recorded interactions with any HMS FMP prohibited species (Appendix 3). Observer data from the DGN fishery from 2001/2002 through 2019/2020 fishing seasons show two basking sharks (one released alive and one dead) and five megamouth sharks (all released alive) were observed caught using DGN gear within the Proposed Action Area (Appendix 4). However, we do not anticipate interactions with basking or megamouth sharks, as they are plankton eating shark species unlikely to interact with longline fishing gear. These species are not discussed further, as we anticipate no impacts resulting from any of the Proposed Action alternatives. As noted earlier, the sale of striped marlin is prohibited under the HMS FMP, so they are discussed in this Section.

### Striped Marlin (*Kajikia audax*)

Striped Marlin-Affected Environment:

Striped marlin is considered an *uncommonly caught species* in reference to the proxy fishery datasets (Appendix 3, Table A-3-2 and Table A-3-4); however, because resource user groups have expressed concerns about the potential for interactions with the proposed longline-type EFP activities and the need for a species-specific limit on striped marlin, striped marlin are discussed in this subsection in more detail. Data from the Hawaii longline fisheries indicate that striped marlin have been caught at a rate of 0.047 fish per 1,000 hooks observed in the SSLL fishery and 0.199 fish per 1,000 hooks observed in the DSLL

fishery (Appendix 3). Striped marlin were also observed caught as a *minor species* in the West Coast DGN proxy dataset (Appendix 4, Table A-4-1) and observed caught as an *uncommonly caught species* in the West Coast DSLL proxy dataset (Appendix 5, Table A-5-2); however, they were not caught during the 2019 Longline EFP activities (Appendix 6) or in deep-set LBG EFP trials (Appendix 7).

Genetic and tagging studies of striped marlin suggest four Pacific stocks of striped marlin: Southwest Pacific, Eastern Pacific, and two North Pacific stocks, including a Western and Central North Pacific (WCNP) stock generally located to the west of 140° W longitude and an eastern North Pacific stock generally located to the east of the 140° W (ISC 2015). West Coast commercial fisheries interact with the eastern North Pacific stock, which is not overfished or experiencing overfishing (Maunder and Hinton 2010). Prohibitions on the sale of striped marlin on the U.S. West Coast provide a strong disincentive for U.S. West Coast commercial fishermen to catch striped marlin in general. Additional measures imposing catch limits on striped marlin may also be applied as terms and conditions to action alternatives under the Proposed Action (Section 2.4, additional measure numbers 28 and 30).

The results of the most recent assessment for the striped marlin in the northeast Pacific Ocean indicate that the stock biomass increased from 5,100 mt in 2003 to 5,622 tons in 2009, and that SSB also increased. The ratio of $SSB/SSB_{MSY}$ was estimated to be 1.5. Fishing effort levels in 2007 to 2009 were estimated to be below those expected at MSY. Dead discards and catches were estimated to occur at a level 50 percent below MSY; therefore, the stock is expected to increase over the near term should this level of removals continue (Maunder and Hinton 2010).

Striped Marlin-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved under the Proposed Action, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Trends in catch of striped marlin by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease with continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-34 and Table 4-35 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the

projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-34.** Striped marlin projected catch for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Animals | Alternative 1-3 Projected Catch in Number of Animals | Alternative 1-4 Projected Catch in Number of Animals | Alternative 1-5 Projected Catch in Number of Animals |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.047[1] | 5.7 | 11.5 | 17.2 | 28.7 |

**Table 4-35.** Striped marlin projected catch for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.199[1] | 131.7 | 263.5 | 658.7 |

[1] Defined as a Management Unit Species under the HMS FMP (Table 3-1) but considered an *uncommonly caught species* as shown in Appendix 3, Table A-3-2 and Table A-3-4.

The proportion of striped marlin kept or returned alive or dead are calculated based on the use of proxy data and are reported in Table 3-3 for alternatives under Component 1 and Table 3-5 for alternatives under Component 2.

The estimated catch under any of the action alternatives would represent a small incremental increase in overall fishing mortality and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected catch = 28.7) + (Alternative 2-4 projected catch = 658.7) =687.4) and the effects of this level of catch to the stock are likely to be minor.

## 4.5 Protected Species

This section describes protected species that inhabit the environment within the Proposed Action Area (Table 4–36). The term "protected species" refers to organisms for which killing, capture, or harm is prohibited under several Federal laws, unless authorized. Incidental take of these species during fishing operations may be allowed under provisions of applicable laws. The laws are the ESA, the MMPA, the Migratory Bird Treaty Act (MBTA), and Executive Order (EO) 13186 (i.e., direct Federal Agencies to protect migratory birds by negotiating a memoranda of understanding with the USFWS). Many protected species occur in the Proposed Action Area (Table 4-36 and Table 4-54); however, only some of them may

be considered likely to be affected by the Proposed Action activities. Because longline-type fishing is not permitted within the U.S. West Coast EEZ, there are no fishery-dependent records for describing baseline conditions for longline-type fishing within the Proposed Action Area. Therefore, as described in Section 3, we use catch records from the Hawaii SSLL and DSLL fisheries data east of 140° W from 2004 through 2019 fishing seasons (Appendix 3), the West Coast DGN fishery from 2001/2002 through 2019/2020 fishing seasons (Appendix 4), the 2019 and 2020 West Coast DSLL fishery outside the U.S. West Coast EEZ (Appendix 5), the 2019 Longline EFP activities (Appendix 6) and the deep-set LBG EFP trials (Appendix 7) to determine species likely to be affected.

For the purposes of this draft EIS, the various protected species that may be affected by the Proposed Action have been grouped into four categories: marine mammals (Section 4.5.1), sea turtles (Section 4.5.2), protected marine and anadromous fishes and marine invertebrates (Section 4.5.3), and seabirds (Section 4.5.4). This section includes a species stock status (Affected Environment) and projected impacts (Environmental Consequences) for each species that has been identified as having the likelihood of being impacted. Impacts are described by component (i.e., shallow-setting or deep-setting; Section 2) for each alternative.

**Table 4–36.** Marine mammals, sea turtles, invertebrates and fish in the Proposed Action Area that are protected under the MMPA or ESA or both. ESU: evolutionarily significant unit; DPS: distinct population segment.

| Species/Stock | ESA Status (November 2021) |
|---|---|
| **Marine Mammals** | |
| Mesoplodon spp. | Not listed |
| Bottlenose dolphin<br>• California coastal stock<br>• California/Oregon/Washington stock | Not listed |
| Risso's dolphin | Not listed |
| Common dolphin<br>• Long-beaked spp.<br>• Short-beaked spp. | Not listed |
| Striped dolphin | Not listed |
| California sea lion | Not listed |
| Northern elephant seal | Not listed |
| Guadalupe fur seal | Threatened |
| False killer whale<br>• Unknown stock or population[1] | Not listed[2] |
| Humpback whale<br>• Mexico DPS<br>• Central America DPS<br>• Hawaii DPS[3] | Threatened<br>Endangered<br>Not listed |
| Gray whale<br>• Western North Pacific DPS<br>• Eastern Pacific stock | Endangered<br>Delisted[4] |
| Short-finned pilot whale, CA/OR/WA stock | Not listed |
| Minke whale | Not-listed |
| Sperm whale | Endangered |
| Northern right whale dolphin | Not listed |

[1]Until 2015, there were no documented sightings of false killer whales in the U.S. West Coast EEZ; however, in recent years they have made somewhat regular, yet brief, appearances in waters off southern California (K. Martien, pers. comm., April 13, 2021). Currently, there are no false killer whale stocks designated in the U.S. West Coast EEZ or eastern North Pacific.

[2]In 2015, NMFS scientists were able to collect biopsies from five animals sighted off La Jolla, California. (K. Martien, pers. comm., April 13, 2021). Laboratory analysis found these animals were not part of the MHI or Northwest Hawaiian Islands (NWHI) stocks, but were genetically similar to the offshore animals from the central and eastern North Pacific, including animals from the Hawaii Pelagic stock and the Eastern Tropical Pacific. Furthermore, based on north Pacific stock boundaries and genetic analyses performed on false killer whales off La Jolla, California, the animals sighted in the West Coast EEZ are not part of the endangered MHI or NWHI stocks. For details, see Section 4.5.1.

[3]The northern Washington and southern British Columbia humpback whale feeding group that primarily includes whales from the Mexico DPS also includes a small number of whales from the Hawaii DPS which is not listed under the ESA (Calambokidis *et al.* 2008; Barlow *et al.* 2011; Wade *et al.* 2016; Carretta *et al*. 2021).

[4] The Eastern Pacific gray whale stock was listed under the ESA in 1970 but then recovered and delisted in 1994.

**Table 4–36.** Continued. Marine mammals, sea turtles, invertebrates and fish in the Proposed Action Area that are protected under the MMPA or ESA or both.

| Species/Stock | ESA Status (November 2021) |
|---|---|
| **Marine Mammals** | |
| Pacific white-sided dolphin | Not listed |
| Dall's porpoise | Not listed |
| Dwarf sperm whale | Not listed |
| Pygmy sperm whale | Not listed |
| Blue whale | Endangered |
| Fin whale | Endangered |
| North Pacific right whale<br>• Eastern North Pacific stock | Endangered |
| Sei whale | Endangered |
| Killer whale<br>• Southern Resident DPS<br>• Eastern north Pacific offshore stock | Endangered<br>Not listed |
| Baird's beaked whale | Not listed |
| Cuvier's beaked whale | Not listed |
| Harbor porpoise | Not listed |
| Northern fur seal | Not listed |
| Harbor seal | Not listed |
| Steller sea lion, eastern DPS | Delisted[5] |
| **Sea Turtles** | |
| Leatherback turtle | Endangered |
| Loggerhead turtle<br>• North Pacific Ocean DPS | Endangered |
| Olive ridley turtle | Endangered/Threatened |
| Green turtle<br>• East Pacific Ocean DPS | Threatened |
| **Marine Invertebrates** | |
| White abalone | Endangered |
| Black abalone | Endangered |
| **Marine and Anadromous Fish** | |
| Giant manta ray | Threatened |
| Oceanic whitetip shark | Threatened |
| Green sturgeon<br>• Southern DPS | Threatened |
| Gulf Grouper | Endangered |
| Scalloped hammerhead shark<br>• eastern Pacific DPS | Endangered |
| Pacific eulachon<br>• southern DPS | Threatened |

[5] The Eastern DPS of Steller sea lion was listed under the ESA in 1990 but then recovered and delisted in 2013.

**Table 4–36.** Continued. Marine mammals, sea turtles, invertebrates and fish in the Proposed Action Area that are protected under the MMPA or ESA or both.

| Species/Stock | ESA Status (November 2021) |
|---|---|
| ***Chinook*** | |
| • Sacramento River winter, ESU | Endangered |
| • Central Valley Spring ESU | Threatened |
| • California Coastal ESU | Threatened |
| • Snake River fall ESU | Threatened |
| • Snake River spring/summer ESU | Threatened |
| • Lower Columbia River ESU | Threatened |
| • Upper Willamette River ESU | Threatened |
| • Upper Columbia River spring ESU | Endangered |
| • Puget Sound Chinook ESU | Threatened |
| ***Chum*** | |
| • Hood Canal summer run ESU | Threatened |
| • Columbia River ESU | Threatened |
| ***Coho*** | |
| • Central California Coastal ESU | Endangered |
| • S. Oregon/N. CA Coastal ESU | Threatened |
| • Oregon Coast ESU | Threatened |
| • Lower Columbia River ESU | Threatened |
| ***Sockeye*** | |
| • Snake River sockeye ESU | Endangered |
| • Lake Ozette sockeye ESU | Threatened |
| ***Steelhead*** | |
| • Southern California DPS | Endangered |
| • South-Central California DPS | Threatened |
| • Central California Coast DPS | Threatened |
| • California Central Valley DPS | Threatened |
| • Northern California DPS | Threatened |
| • Upper Columbia River DPS | Endangered |
| • Snake River Basin DPS | Threatened |
| • Lower Columbia River DPS | Threatened |
| • Upper Willamette River DPS | Threatened |
| • Middle Columbia River DPS | Threatened |
| • Puget Sound DPS | Threatened |

### 4.5.1 Marine Mammals

All marine mammals in the waters of the United States are protected under the MMPA. The MMPA and its implementing regulations set out requirements for monitoring marine mammal stocks and estimating human impacts on the stocks. Annually, NMFS is required to produce a Stock Assessment Report (SAR) that provides updated status and population estimates for each marine mammal stock in a region, based on

the most recent available information. In addition to estimating the stock's population, NMFS must identify sources of and calculate the maximum human-caused mortalities that can be sustained by the stock if the stock is to persist at its current population or increase. Under the MMPA, potential biological removal (PBR; defined in Section 8, Appendix 2—Glossary) is the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. (i.e., the number of animals that will result in the maximum productivity of the population or species). If the level of direct human-caused mortality exceeds a marine mammal stock's PBR level, that stock is considered a "strategic stock." A marine mammal stock is also considered a strategic stock if it is listed as an endangered or threatened species under the ESA or if it is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future. In this Section, marine mammals marked with an asterisk (*) represent strategic stocks. If a marine mammal stock is determined to be below its optimum sustainable population, it is considered a "depleted stock."

As previously described, there has not been longline or longline-type fishery targeting swordfish and other marketable HMS in the U.S. West Coast EEZ, so there are no fishery-dependent records to draw conclusions on which marine mammals may be affected by the Proposed Action. Therefore, observed catch records in proxy datasets (Section 3) are used to categorize marine mammals in the Proposed Action Area (Table 4-36) into three categories: species with interactions are considered "likely to be affected," species without interactions but that may be vulnerable are considered "may be affected," and species without interactions are considered "not likely to be affected." These categories are described below with the species stock status (i.e., Affected Environment) and the projected impacts (i.e., Environmental Consequences) for each affected species by fishing gear component (Component 1 is shallow-setting and Component 2 is deep-setting) and alternative.

Updated information for most of the marine mammals in the Proposed Action Area can be found in the most recent United States Pacific Marine Mammal SARs (Carretta *et al.* 2023). However, because not every species was updated or revised in that publication, the information for some species in the Proposed Action Area are cited using previous SARs, so that the most recent data for each species is presented.

Marine Mammals Considered Likely to be Affected by the Proposed Action

This subsection describes marine mammals considered likely to be affected by the Proposed Action based on interactions observed in the Hawaii SSLL and DSLL fisheries data east of 140˚ W, the West Coast DGN fishery from 2001/2002 through 2019/2020 fishing seasons, the West Coast DSLL fishery outside

the U.S. West Coast EEZ, and the 2019 Longline EFP activities (Table 3–4 and Table 3–6, and Table 3-7 in Section 3; and Appendix 6-Table A-6-3). However, while we considered the West Coast DSLL fishery dataset, there were no marine mammal interactions on which to base future projections under the Proposed Action. The discussion of each marine mammal considered likely to be affected includes the species stock status (i.e., Affected Environment) and the projected quantitative impacts (i.e., Environmental Consequences) by fishing gear component (Component 1 is shallow-setting and Component 2 is deep-setting) for each alternative. However, catch or interaction rates (i.e., rates in per 100 sets) from the West Coast DGN dataset were not applied to the analysis of alternatives given differences in catchability of drift gillnets, versus SSLL and DSLL (i.e., rates in per 1,000 hooks).

Eight species of marine mammals were caught in the SSLL fishery dataset with rates ranging from greater than 0.000[11] to 0.040 animals per 1,000 hooks (Table 3-4). These species include the Risso's dolphin, the striped dolphin, the bottlenose dolphin, the short-beaked common dolphin, the Mesoplodont beaked whale (including the ginkgo-toothed whale), the Guadalupe fur seal, the northern elephant seal, and the California sea lion; however, note that the California sea lion category was not caught in the Hawaii SSLL fishery dataset (Appendix 3) but was caught in the West Coast DGN fishery (Appendix 4) and 2019 Longline EFP fishing (Appendix 6), from which the interaction rate is applied below (Table 4-44). Two false killer whales were observed caught in the Hawaii DSLL fishery, with an interaction rate of 0.001 animals per 1,000 hooks (Table 3-6).

To evaluate potential impacts for each species, we apply the number of interactions per 1,000 hooks rate to the maximum effort for each action alternative by fishery component (i.e., shallow-setting or deep-setting; Section 2). Additionally, observed catch from the West Coast DGN fishery for the fishing seasons 2001/2002 to 2019/2020 include nine species of marine mammals and two unidentified marine mammals (unidentified dolphin and unidentified whale; see Table A-4-2 in Appendix 4). These marine mammal species include: the northern right whale dolphin, the long-beaked common dolphin, the Pacific white-sided dolphin, the gray whale, the short-finned pilot whale, the sperm whale, Dall's Porpoise, the humpback whale, and the minke whale (Table 3-7; Note that unidentified species are not included in stock status descriptions below). Note that any activities conducted under the Proposed Action will also be subject to an ESA section 7 consultation.

**Risso's Dolphin (*Grampus griseus*):**

[11] Catch per 1,000 hooks rounds to zero when rounded to the thousandths place.

Risso's Dolphin-Affected Environment:

Risso's dolphins in California/Oregon/Washington waters are considered one stock in the SARs (Carretta *et al.* 2017). The best estimate of population abundance for this stock is 6,336 animals (coefficient of variation (CV; defined in Appendix 2)=0.32), with a minimum population estimate of 4,817 animals. PBR for this stock is estimated to be 46 animals per year. The mean annual serious injury and mortality in commercial fisheries for this stock is estimated to be 1.3 animals (CV=0.93), based on data from 2010 through 2014. This stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2017).

Risso's Dolphin-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with Risso's dolphins by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-37 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no Risso's dolphin interactions are projected for Component 2.

**Table 4-37.** Risso's dolphin projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.004 | 0.5 | 1.0 | 1.6 | 2.6 |

The proportion of Risso's dolphins returned alive, dead, or injured are calculated based on the use of proxy data and reported in Table 3-4.

As state above, there are no Risso's dolphin interactions projected for Component 2; however, there are interactions projected for Component 1. The projected Risso's dolphin interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are

unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected interactions=2.6) and the effects of this level of interactions to the stock are likely to be minor because PBR for this stock is calculated to be 46 animals per year (Carretta *et al.* 2017).

**Striped Dolphin (*Stenella coeruleoalba*)—California/Oregon/Washington stock:**

Striped Dolphin-Affected Environment:

Striped dolphins in California/Oregon/Washington waters are considered one stock in the SARs (Carretta *et al.* 2022). The best estimate of abundance is generated from species distribution models using 1991 to 2018 line-transection survey data to estimate density and abundance of cetaceans in the California Current Ecosystem (Becker *et al.* 2020). The best estimate of population abundance for this stock is 29,988 animals (CV=0.299), with a minimum population estimate of 23,448 animals. PBR for this stock is estimated to be 225 animals per year. The mean annual serious injury and mortality in commercial fisheries for this stock is estimated to be 4 animals (CV=0.46), based on data from 2015 through 2019. This stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2022).

Striped Dolphin-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with striped dolphins by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-38 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no striped dolphin interactions are projected for Component 2.

**Table 4-38.** Striped dolphin projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.001 | 0.1 | 0.2 | 0.3 | 0.5 |

The proportion of striped dolphins returned alive, dead, or injured are calculated based on the use of proxy data and are reported in Table 3-4.

As stated above, there are no striped dolphin interactions projected for Component 2; however, there are interactions projected for Component 1. The projected striped dolphin interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected interactions =0.5) and the effects of this level of interactions to the stock are likely to be minor because PBR for this stock is calculated to be 225 animals per year (Carretta *et al.* 2022).

**Bottlenose Dolphin (*Tursiops truncatus truncatus*)—California/Oregon/Washington Offshore Stock:**

Bottlenose Dolphin-Affected Environment:

Bottlenose dolphins are distributed worldwide in tropical and warm-temperate waters (Carretta *et al.* 2022). In many regions, including California, separate coastal and offshore populations are known (Walker 1981, Ross and Cockcroft 1990, Van Waerebeek *et al.* 1990, Lowther 2006, Perrin *et al.* 2011). The SARs designate the offshore bottlenose dolphin found in the waters off California/Oregon/Washington as one stock (Carretta *et al*. 2022). The best estimate of abundance is generated from species distribution models using 1991 to 2018 line-transection survey data to estimate density and abundance of cetaceans in the California Current Ecosystem (CCE; Becker *et al.* 2020). The best estimate of population abundance for this stock is 3,477 animals (CV=0.696), with a minimum population estimate of 2,048 animals. PBR for this stock is estimated to be 19.7 animals per year. The mean annual serious injury and mortality in commercial fisheries for this stock is estimated to be 0.82 animals (CV=0.52), based on data from 2012 through 2019. This stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2022).

Bottlenose Dolphin-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with bottlenose dolphins by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-39 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no bottlenose dolphin interactions are projected for Component 2.

**Table 4-39.** Bottlenose dolphin projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.001 | 0.1 | 0.1 | 0.2 | 0.3 |

The proportion of bottlenose dolphins returned alive, dead, or injured are calculated based on the use of proxy data and are reported in Table 3-4.

As stated above, there are no bottlenose dolphin interactions projected for Component 2; however, there are interactions projected for Component 1. The projected bottlenose dolphin interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected interactions =0.3) and the effects of this level of interactions to the stock are likely to be minor because PBR for this stock is calculated to be 19.7 animals per year (Carretta *et al.* 2022).

**Short-beaked Common Dolphin (*Delphinus delphis*)—California/Oregon/Washington stock:**

Short-beaked Common Dolphin-Affected Environment:

The SARs designate the short-beaked common dolphin found within the U.S. EEZ of California, Oregon and Washington as a single management stock (Carretta *et al.* 2022). The best estimate of abundance is generated from species distribution models using 1991 to 2018 line-transection survey data to estimate

density and abundance of cetaceans in the CCE (Becker *et al.* 2020). The best estimate is 1,056,308 animals (CV=0.207), with a minimum population estimate of 888,971 animals (Carretta *et al.* 2022). The calculated PBR level for this stock is 8,889 short-beaked common dolphins per year. The mean annual serious injury and mortality in commercial fisheries for short-beaked common dolphins in U.S. commercial fisheries is 30.5 (CV=0.22) animals, based on information from 2015 to 2019. This stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2022).

Short-beaked Common Dolphin-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with short-beaked common dolphins by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-40 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no short-beaked common dolphin interactions are projected for Component 2.

**Table 4-40.** Short-beaked common dolphin projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.000[1] | 0.0 | 0.1 | 0.1 | 0.2 |

[1] Catch per 1,000 hooks rounds to zero; however, one interaction calculates to a rate of 0.0002850 per 1,000 hooks.

The proportion of short-beaked common dolphins returned alive, dead, or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1.

As stated above, there are no short-beaked common dolphin interactions projected for Component 2; however, there are interactions projected for Component 1. The projected short-beaked common dolphin interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the stock under any of the

action alternatives. Even under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected interactions =0.2) and the effects of this level of interactions to the stock are likely to be minor because PBR for this stock is calculated to be 8,889 animals per year (Carretta *et al.* 2022).

**Mesoplodont Beaked Whales (*Mesoplodon* spp.):**

Mesoplodont Beaked Whales-Affected Environment:

The genus *Mesoplodon* includes at least 14 species. Six species of Mesoplodont beaked whales are found in the Proposed Action Area, including Hubbs' (*M. carlhubbsi*), pygmy beaked whale or lesser beaked whale (*M. peruvianus*), gingko-toothed (*M. gingkodens*), Blainville's (*M. densirostris*), Perrin's (*M. perrini*), and Stejneger's (*M. stejnegeri*) beaked whales. However, because of both the difficult in identifying and the rarity of sightings of these six species, little species-specific information is currently available.

Based on a new trend-based analysis of line-transect data from surveys conducted between 1991 and 2014, the combined estimate of abundance for all species of Mesoplodont beaked whales in waters off of California, Oregon, and Washington is 3,044 (CV=0.54) animals (Moore and Barlow 2017). This estimate accounts for the proportion of unidentified beaked whale sightings likely to be Mesoplodon beaked whales and uses a correction factor for missed animals adjusted to account for the fact that the proportion of animals on the trackline missed by observers increases in rough seas. With a minimum population estimate of 1,967 animals, the estimated PBR for this group of species is 20 Mesoplodont beaked whales per year and the average serious injury and annual mortality of Mesoplodont beaked whales in U.S. commercial fisheries is estimated to be 0.1 animals, based on data from 2011 through 2015 (Carretta *et al.* 2017). This group of species is not classified as a strategic stock under the MMPA (Carretta *et al.* 2017).

Mesoplodont Beaked Whales -Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with Mesoplodont beaked whales by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-41 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no Mesoplodont beaked whale interactions are projected for Component 2.

**Table 4-41.** Mesoplodont beaked whales projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.001 | 0.1 | 0.1 | 0.2 | 0.3 |

The proportion of Mesoplodont beaked whales returned alive, dead or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1.

As stated above, there are no Mesoplodont beaked whale interactions projected for Component 2; however, there are interactions projected for Component 1. The projected Mesoplodont whale interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected interactions =0.3) and the effects of this level of interactions to the stock are likely to be minor because PBR for this stock is calculated to be 20 animals per year (Carretta *et al.* 2017).

***Guadalupe Fur Seal (*Arctocephalus townsendi*):**

Guadalupe Fur Seal-Affected Environment:

The most recent estimate of population size is based on pup count data collected in 2013 (García-Aguilar *et al.* 2018). García-Aguilar *et al.* (2018) estimated total population size by scaling up pup counts with resulting estimates of 34,187 individuals to 43,954 individuals. These estimates do not include animals at San Benito Island (Carretta *et al.* 2020). With a minimum population estimate of 31,019 animals, the estimated PBR Guadalupe fur seals is 1,062 animals per year, where the vast majority of the estimate would apply towards incidental mortality in Mexico as most of the population occurs outside of United States waters (Carretta *et al.* 2020).

The Guadalupe fur seal population was estimated to grow at 5.9 percent annually for the period 1984 to 2013 (García-Aguilar *et al.* 2018), and they have recently reappeared in their historic range along the U.S. West Coast (D'Agnese *et al.* 2020). Starting in 2005 through 2016, 169 Guadalupe fur seals stranded in Washington and Oregon, involving two designated unusual mortality events. This species is listed as a threatened species under the ESA (Table 4-36) and it is therefore considered strategic and depleted under the MMPA (Carretta *et al.* 2020).

Guadalupe Fur Seal-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with Guadalupe fur seals by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to remain at status quo levels; however, interactions may increase overall a product of increasing population size.

Action Alternatives:

Table 4-42 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no Guadalupe fur seal interactions are projected for Component 2.

**Table 4-42.** Guadalupe fur seal projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.002 | 0.3 | 0.6 | 0.8 | 1.4 |

The proportion of Guadalupe fur seals returned alive, dead, or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1.

As stated above, there are no Guadalupe fur seal interactions projected for Component 2; however, there are interactions projected for Component 1. The projected Guadalupe fur seal interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the population under any of the action alternatives. Even under

the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected interactions =1.4) and the effects of this level of interactions to the stock are likely to be minor because PBR for this stock is calculated to be 1,062 animals per year (Carretta *et al.* 2020).

**Northern Elephant Seal (*Mirounga angustirostris*):**

Northern Elephant Seal-Affected Environment:

Populations of northern elephant seals in the United States and Mexico have recovered after being hunted nearly to extinction (Stewart *et al.* 1994). The California breeding population is now demographically isolated from the Baja California population (Carretta *et al*. 2022). The SARs considers the California breeding population to be a separate stock. Elephant seal population size is estimated by counting the number of pups produced and multiplying by the inverse of the expected ratio of pups to total animals (McCann 1985). Based on counts of elephant seals at U.S. Channel Island rookeries off southern California (where 81.5 percent of the population resides (Lowry *et al.* 2014)) in 2013, a reported 34,788 pups were born (Lowry *et al.* 2020). The best estimate of population abundance for the California breeding stock is 187,386 from 2014 data (Lowry *et al.* 2020), with a minimum population estimate of 85,369 animals. PBR for this stock is calculated to be 5,122 animals per year (Carretta *et al.* 2022). The total estimated commercial fishery mortality is greater than 5.3 elephant seals annually. Takes have been documented in the West Coast DGN fishery, the California halibut and white seabass set gillnet fishery, the California halibut trawl fishery, the groundfish sablefish hook and line fishery, and the California/Oregon/Washington groundfish trawl fishery. Other threats include shooting, entanglement in marine debris, tar, boat collisions, harassment, and dog attacks. The stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2022).

Northern Elephant Seal-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with northern elephant seals by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-43 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no

catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no northern elephant seal interactions are projected for Component 2.

**Table 4-43.** Northern elephant seal projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.001 | 0.1 | 0.1 | 0.2 | 0.3 |

The proportion of northern elephant seals returned alive, dead or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1.

As stated above, there are no northern elephant seal interactions projected for Component 2; however, there are interactions projected for Component 1. The projected northern elephant seal interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected interactions =0.3) and the effects of this level of interactions to the stock are likely to be minor because PBR for this stock is calculated to be 5,122 animals per year (Carretta *et al.* 2022).

**California Sea Lion (*Zalophus californianus*):**

California Sea Lion-Affected Environment:

The population abundance estimate for this stock was based on 1975 through 2014 time series of pup counts (Lowry *et al.* 2017) combined with mark-recapture survival estimates (DeLong *et al.* 2017). Population size in 2015 was estimated to be around 257,606 animals, with a minimum population estimate of 233,515 animals. The PBR for this stock is calculated to be 14,011 animals per year. Estimated mean annual take in commercial fisheries is greater than 197 (CV=0.23) animals, based on data from 2010 to 2016; however, this is an underestimate based on stranding data (Carretta *et al.* 2019). Takes have been documented during those years in the DGN fishery, the California halibut and white seabass set gillnet fishery, the California small-mesh drift gillnet, the California purse-seine fishery, and the California/Oregon/Washington groundfish trawl fishery. Other threats to this stock include shooting,

power plant entrainment, marine debris, and boat collisions. The stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2019).

California Sea Lion-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with California sea lions by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-44 shows show the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no California sea lion interactions are projected for Component 2.

**Table 4-44.** California sea lion projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.040[1] | 4.9 | 9.7 | 14.6 | 24.3 |

[1] Note that California Sea Lion category was not caught in the Hawaii SSLL fishery data east of 140˚ W (Appendix 3) but was caught in the DGN fishery (Appendix 4) and has a SSLL rate associated with California Sea Lion from the 2019 Longline EFP (Appendix 6); therefore, they were moved into this protected species section (i.e., Section 4.5.1 Marine Mammals Considered Likely to be Affected) and the 2019 Longline EFP catch rate is applied.

The proportion of California sea lions returned alive, dead, or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1.

As stated above, there are no California sea lion interactions projected for Component 2; however, there are interactions projected for Component 1. The projected California sea lion interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5

projected interactions=24.3) and the effects of this level of interactions to the stock are likely to be minor because PBR for this stock is calculated to be 14,011 animals per year (Carretta *et al.* 2019).

**False Killer Whale (*Pseudorca crassidens*):**

False Killer Whale-Affected Environment:

Until 2015, there were no documented sightings of false killer whales in the U.S. West Coast EEZ; however, in recent years they have made somewhat regular, yet brief, appearances in southern California waters (K. Martien, pers. comm., April 13, 2021). Currently, there are no false killer whale stocks designated in the U.S. West Coast EEZ or eastern North Pacific. Therefore, there is no relevant data for false killer whales in the U.S. West Coast EEZ.

The only false killer whale stocks designated in the North Pacific Ocean (NPO) are three demographically independent Hawaiian Islands complex stocks which include the MHI Insular stock, Northwest Hawaiian Islands (NWHI) stock, and the offshore Hawaii pelagic stock in waters of the Eastern (ENP) and Central North Pacific (CNP; Chivers *et al.* 2010; Martien *et al.* 2014). The MHI Insular stock boundary is defined by a 72-km radius off the MHI and the NWHI stock boundary is defined by a 93-km radius around the NWHI (77 FR 70915, November 28, 2012). The offshore Hawaii pelagic stock has no inner or outer boundary within the U.S. EEZ around Hawaii; the extent of its range is unknown. The MHI stock is the only ESA-listed stock of false killer whales.

Martien *et al.* (2014) analyzed DNA from 206 individuals from the MHI stock, NWHI stock, and pelagic stock offshore waters of the CNP and ENP and showed highly significant differentiation between populations confirming limited gene flow between stocks in both sexes. They showed that the MHI and NWHI stocks could be genetically distinguished from pelagic stock using mitochondrial DNA sequences. Furthermore, in 2015, NMFS scientists were able to collect biopsies from five animals sighted off La Jolla, California (K. Martien, pers. comm., April 13, 2021). Laboratory analysis found these animals were not part of the MHI or NWHI stocks, but were genetically similar to the offshore animals from the Central and Eastern North Pacific, including animals from the Hawaii Pelagic stock and the Eastern Tropical Pacific. Therefore, based on north Pacific stock boundaries and genetic analyses performed on false killer whales off La Jolla, California, the animals sighted in the West Coast EEZ are not part of the endangered MHI stock. Additionally, because the false killer whales in the U.S. West Coast EEZ are of unknown origin, their stock status cannot be classified under the MMPA.

False Killer Whale - Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with false killer whales by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue at status quo levels; however, interactions may increase as a product of recent sighting of false killer whales in the West Coast EEZ.

Action Alternatives:

Table 4-45 shows the estimated catch per 1,000 hooks set for DSLL and the projected catch in number of animals per year under each of the action alternatives in Component 2 (deep-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 1 alternatives. As such, no false killer whale interactions are projected for Component 1.

**Table 4-45.** False killer whale projected total catch in number of interactions for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Interactions | Alternative 2-3 Projected Catch in Number of Interactions | Alternative 2-4 Projected Catch in Number of Interactions |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.001 | 0.4 | 0.7 | 1.8 |

The proportion of false killer whales returned alive, dead, or injured are calculated based on the use of proxy data and are reported in Table 3-6 for alternatives under Component 2.

As stated above, there are no false killer whale interactions projected for Component 1; however, there are interactions projected for Component 2. The projected false killer whale interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the stock under any of the action alternatives. Even under the highest level of effort for Component 2 action alternatives, the projected impacts (i.e., Alternative 2-4 projected interactions=1.8) and the effects of this level of interactions to the stock are likely to be minor. Because there is no relevant SAR for false killer whales in the U.S. West Coast EEZ, there is no documented PBR for this stock.

**Northern Right-whale Dolphin (*Lissodelphis borealis*):**

Northern Right-whale Dolphin-Affected Environment:

The SARs designate the northern right-whale dolphin found in the waters off California/Oregon/Washington a single management stock (Carretta *et al.* 2022). The best estimate of abundance is generated from species distribution models using 1991 to 2018 line-transection survey data to estimate density and abundance of cetaceans in the CCE (Becker *et al.* 2020). The best estimate is 29,285 animals (CV=0.717), with a minimum population estimate 17,024 animals (Carretta *et al.* 2022). The calculated PBR level for this stock is 163 animals per year. The mean annual serious injury and mortality in commercial fisheries for northern right-whale dolphins in U.S. commercial fisheries is 6.6 (CV=0.33) animals, based on information from 2012 to 2019. This stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2022).

Northern Right-whale Dolphin-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with right-whale dolphins by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data. As such, we anticipate interactions under the action alternatives are unlikely. However, interactions with this species were reported in the West Coast DGN fishery (see Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

**Long-beaked Common Dolphin (*Delphinus delphis bairdii*)—California stock:**

Long-beaked Common Dolphin-Affected Environment:

Long-beaked common dolphins were recognized as a distinct species in the 1990s (Heyning and Perrin 1994; Rosel *et al.* 1994); however, they are currently recognized as the subspecies *Delphinus delphis bairdii* (Carretta *et al.* 2022). The SARs designate the long-beaked common dolphin found within the U.S. West Coast EEZ as a single management stock. The best estimate of abundance is generated from species distribution models using 1991 to 2018 line-transection survey data to estimate density and abundance of cetaceans in the CCE (Becker *et al.* 2020). The best estimate is 83,379 animals (CV=0.216),

with a minimum population estimate of 69,636 animals (Carretta *et al.* 2022). The calculated PBR level for this stock is 668 long-beaked common dolphins per year. The mean annual serious injury and mortality in commercial fisheries for long-beaked common dolphins in U.S. commercial fisheries is 26.5 (CV=0.39) animals, based on information from 2015 to 2019. This stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2022).

Long-beaked Common Dolphin-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with long-beaked common dolphins by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data. As such, we anticipate interactions under the action alternatives are unlikely. However, interactions with this species were reported in the West Coast DGN fishery (see Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

**Pacific White-sided Dolphin (*Lagenorhyncus obliquidens*):**

Pacific White-sided Dolphin-Affected Environment:

The SARs designate the Pacific white-sided dolphin in the waters off California/Oregon/Washington as a single management stock (Carretta *et al.* 2022). The best estimate of abundance is generated from species distribution models using 1991 to 2018 line-transection survey data to estimate density and abundance of cetaceans in the CCE (Becker *et al.* 2020). The best estimate is 34,999 animals (CV=0.222), with a minimum population estimate of 29,090 animals (Carretta *et al.* 2022). The calculated PBR level for this stock is 279 Pacific white-sided dolphins per year. The mean annual serious injury and mortality in commercial fisheries for Pacific white-sided dolphins in U.S. commercial fisheries is 4.0 (CV=0.37) animals, based on information from 2015 to 2019. This stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2022).

Pacific White-sided Dolphin-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with Pacific white-sided dolphins by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue to decrease due to attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data. As such, we anticipate interactions under the action alternatives are unlikely. However, interactions with this species were reported in the West Coast DGN fishery (see Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

***Gray Whale (*Eschrichtius robustus*):**

Gray Whale-Affected Environment:

The Western North Pacific DPS of gray whales is listed as Endangered under the ESA, and is thought to include fewer than 300 individuals (Carretta *et al*. 2021). This DPS is primarily found along the coast of Eastern Asia, and there is no recovery plan currently in place for Western North Pacific gray whales. The Eastern North Pacific (ENP) gray whale stock, which is more likely to be present in the Proposed Action Area, is not ESA-listed and has increased over several decades, despite an unusual mortality event in 1999 and 2000, and has been relatively stable since the mid-1990s (Carretta *et al.* 2021). A recent 22 percent increase in ENP gray whale abundance over 2010/2011 levels is consistent with high observed and estimated calf production. In 2010, the International Whaling Commission Scientific Committee completed annual (2014 to 2018) range-wide workshops on the status of North Pacific gray whales with the primary objective to identify plausible stock structure hypotheses and create a foundation for developing range-wide conservation advice. In 2020, the Scientific Committee reported on the plausibility of various stock structure hypotheses that included up to three feeding groups or aggregations to gray whales feeding along the U.S. West Coast: the Pacific Coast Feeding Group (PCFG), the Western Feeding Group (WFG), and the North Feeding Group (NFG). The PCFG consists of animals that spend the summer and autumn feeding in coastal waters of the Pacific coast of North America from California to southeast Alaska. The WFG consists of whales that feed off Sakhalin Island as documented via photo-

ID. The NFG includes whales found feeding in the Bering and Chukchi Seas where photo-ID and genetic data are sparse. The feeding groups combined with the hypotheses of up to three extant breeding stocks (the Western Breeding Stock, the Eastern Breeding Stock and a third unnamed stock that includes WFG whales that interbreed largely with each other while migrating to the Mexico wintering grounds) adds to a still unresolved population structure at the feeding group level. At this time, given the lack of evidence to support separate stocks, the most recent estimate of abundance for the ENP whales based on a 2015/2016 southbound survey is estimated to be 26,960 (CV=0.05) animals, with a minimum population estimate of 25,849 animals. The PBR for this stock is 801 animals per year. The mean annual serious injury and mortality in known commercial U.S. fisheries is greater than 9.3 gray whales, based on data from 2014 through 2018 (Carretta *et al.* 2021). Furthermore, the ENP gray whales experienced an unusual mortality event (UME; defined in Section 8, Appendix 2—Glossary) beginning in 2019, when large numbers of whales stranded from Mexico to Alaska due to nutritional stress. An UME is defined under the MMPA as a stranding event that is unexpected, involves a significant die-off of any marine mammal population, and demands immediate response.

Additionally, NMFS has proposed to grant a waiver of the MMPA's moratorium on the take of marine mammals to allow the Makah Indian Tribe to take a limited number of ENP gray whales. On April 5, 2019, NMFS published a proposed rule (84 FR 13604) and regulations governing the hunting of ENP gray whales by the Makah Tribe for a 10-year period and a related notice of hearing before an administrative law judge to consider the waiver and proposed regulations. On September 23, 2021, the judge transmitted a recommended decision to the Assistant Administrator for NOAA Fisheries along with the hearing transcript and other required documentation in order for a final decision on the Makah Tribe's waiver request.

Gray Whale-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with gray whales by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data.

As such, we anticipate interactions under the action alternatives are unlikely. However, interactions with this species were reported in the West Coast DGN fishery (see Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

**Short-finned Pilot Whale (*Globicephala macrorhynchus*):**

Short-finned Pilot Whale-Affected Environment:

For the purposes of the SARs, short-finned pilot whales in the EEZ off California/Oregon/Washington are considered one stock. Short-finned pilot whales were once common off the coast of southern California. However, since a strong El Niño event in 1982 and 1983, few sightings were made between 1984 and 1992, despite increased survey efforts. Sightings still remain rare. The best estimated population abundance based on the geometric mean abundance estimate from the 2008 and 2014 ship-board surveys is 836 (CV=0.79) animals, with a minimum estimated population of 466 short-finned pilot whales. The PBR for this stock is 4.5 animals per year. The mean annual estimated serious injury and mortality of short-finned pilot whales in commercial fisheries is 1.2 animals, based on data from 2010 to 2014. The mean annual human-caused mortality is less than the PBR; therefore, this stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2017).

Short-finned Pilot Whale-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with short-finned pilot whales by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data. As such, we anticipate interactions under the action alternatives are unlikely. However, interactions with this species were reported in the West Coast DGN fishery (see Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

***Sperm Whale (*Physeter macrocephalus*):**

Sperm Whale-Affected Environment:

The SARs divide sperm whales into three discrete groups for management purposes, including waters off California/Oregon/Washington, Hawaii, and Alaska. Previous estimates of sperm whale abundance from 2005 (3,140, CV=0.40) (Forney 2007) and 2008 (300, CV=0.51) (Barlow 2010) show a ten-fold difference that cannot be attributed to human-caused or natural population declines and likely reflect inter-annual variability in movement of animals into and out of the study area. New estimates of sperm whale abundance in California, Oregon, and Washington waters out to 300 nm are available from a trend-model analysis of line-transect data collected from six surveys conducted from 1991 to 2014 (Moore and Barlow 2017). Abundance trend models incorporate information from the entire 1991 through 2008 time series to obtain each annual abundance estimate, yielding estimates with less inter-annual variability. The best estimate of sperm whale abundance in the California Current is the trend-based estimate from the 2014 survey of 1,997 animals (CV=0.57), which is corrected for diving animals not seen during surveys. The minimum population abundance estimate is 1,270 whales and the PBR for this stock is estimated to be 2.5 animals. The mean annual serious injury and mortality in commercial fisheries is less than 0.64 (CV=1.4) sperm whales, based on data collected from 2008 to 2017. Fisheries documented to have taken sperm whales include the West Coast DGN fishery (average 1.4 per year over 5 years, based on the observed serious injury of 2 sperm whales in 2010) and "illegal, unreported and unregulated" (IUU) fisheries, based on stranded whales. Sperm whales are formally listed as endangered under the ESA, and consequently the California to Washington stock is automatically classified as a depleted and strategic stock under the MMPA (Carretta *et al.* 2020).

Sperm Whale-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with sperm whales by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data. As such, we anticipate interactions under the action alternatives are unlikely. However, interactions with

this species were reported in the West Coast DGN fishery (see Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

**Dall's Porpoise (*Phocoenoides dalli*):**

Dall's Porpoise-Affected Environment:

The SARs designate Dall's porpoise in the waters off California/Oregon/Washington as a single management stock (Carretta *et al.* 2022). The best estimate of abundance is generated from species distribution models using 1991 to 2018 line-transection survey data to estimate density and abundance of cetaceans in the CCE (Becker *et al.* 2020). The best estimate is 16,498 animals (CV=0.608), with a minimum population estimate of 10,286 animals. The calculated PBR level for this stock is 99 Dall's porpoise per year. The mean annual serious injury and mortality in commercial fisheries Dall's porpoise in U.S. commercial fisheries is 0.66 (CV=0.4) animals, based on information from 2012 to 2019. This stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2022).

Dall's Porpoise-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with Dall's porpoise by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data. As such, we anticipate interactions under the action alternatives are unlikely. However, interactions with this species were reported in the West Coast DGN fishery (see Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

***Humpback Whale (*Megaptera novaeangliae kuzira*):**

Humpback Whale-Affected Environment:

Humpback whales occur worldwide but are recognized as three subspecies: North Pacific, Atlantic, and Southern Hemisphere (Jackson *et al.* 2014). The North Pacific subspecies population structure was characterized by Martien *et al.* (2020, 2023) as 'migratory whale herds' defined as groups of animals that share the same summering and wintering area, and are likely to be demographically independent due to their strong, maternally inherited fidelity to migratory destinations. Despite whales from multiple wintering areas sharing some summer feeding areas, Baker *et al.* (2013) reported significant genetic differences between North Pacific summering and wintering areas, driven by strong maternal site fidelity to feeding areas and return of animals to wintering areas to reproduce. This differentiation is supported by photo identification studies showing little interchange of whales between summering areas (Calambokidis *et al.* 2001).

NMFS completed a comprehensive status review of the humpback whale under the ESA, and on September 8, 2016, NMFS published a final rule to revise the listing status of the species and divide the globally listed endangered species into 14 DPSs, remove the species-level listing, and in its place listed four DPSs as endangered and one DPSs as threatened (81 FR 62259). Three DPSs (the Mexico DPS, the Central America DPS and the Hawaii DPS) occur off the U.S. West Coast, and may be present in or near the Proposed Action Area. The Mexico DPS is listed as threatened, the Central America DPS is listed as endangered and the Hawaii DPS is not listed under the ESA. However, when the DPSs were designated the stock assessments were not aligned with the identified ESA DPSs (i.e., some stocks were composed of whales from more than one DPS) which lead NMFS to reevaluate stock structure of under the MMPA.

The recent reevaluation of the North Pacific DPSs stock structure resulted in the delineation of demographically independent populations (DIP) as well as "units" that may contain one or more DIPs, where demographic independence is defined as "…the population dynamics of the affected group is more a consequence of births and deaths within the group (internal dynamics) rather than immigration or emigration (external dynamics)" (Carretta *et al.* 2023). From these DIPS and units, NMFS designated five new humpback whale stocks in the North Pacific, two of which are contained within the Pacific SARs and may be present in the Proposed Action Area: the "Central America/Southern Mexico-CA-OR-WA" stock (from the Central America DPS), and "Mainland Mexico/CA-OR-WA" stock (from the Mexico DPS) (Carretta *et al.* 2023). These two stocks summer off the U.S. West Coast but winter in Central America and Mexico waters, respectively.

Abundance estimates for the two stocks within the Proposed Action Area are derived from two separate SARs: one for the Central America/Southern Mexico-CA-OR-WA stock and another for the Mainland Mexico/CA-OR-WA stock (Carretta *et al.* 2023). Both stock abundance estimates were derived using mark-recapture methods based on data collected between 2019 and 2021 (Curtis *et al.* 2022). For the Central America/Southern Mexico-CA-OR-WA stock, the SARs showed an estimate of 1,496 humpback whales (CV=0.171) with a minimum population estimate of 1,284 whales. The calculated PBR level for the Central America/Southern Mexico-CA-OR-WA stock is 5.2 humpback whales per year; however, because this stock spends approximately one-third of its time outside United States waters, the PBR allocation for United States waters is 3.5 humpback whales per year (Carretta *et al.* 2023). For the Mainland Mexico/CA-OR-WA stock, the SARs showed an estimate of 3,477 humpback whales (CV=0.101) with a minimum population estimate of 3,185 whales. The calculated PBR level for the Mainland Mexico/CA-OR-WA stock is 65 humpback whales per year; however, because this stock spends approximately one-thirds of its time outside United States waters, the PBR allocation for United States waters is 43 humpback whales per year (Carretta *et al.* 2023).

The average minimum estimated annual mortality and serious injury attributed to U.S. commercial fisheries based on data from 2016 through 2020 for the humpback whale in CA-OR-WA summer feeding areas is 8.1 animals per year from the Central America/Southern Mexico–CA-OR-WA stock and 11.4 animals per year from the Mainland Mexico/CA-OR-WA stock. Data from the 2001/2002 through 2019/2020 West Coast DGN fishery proxy data show one interaction with a humpback whale in 2004. Additionally, there have been two more confirmed humpback whale interactions with the West Coast DGN fishery, one in the 2020/2021 fishing season (released alive with no gear attached) and one in the 2021/2022 fishing season (released alive with gear attached). These interactions are not included in the DGN data fishery data used in this analysis as we did not have access to the data for those fishing seasons at the time of preparing this draft EIS (C. Villafana pers. comm., West Coast Region Observer Program Manager, November 30, 2021 and December 12, 2021).

Additionally, in April 2021, NMFS published a final rule to designate critical habitat for the Central America, Mexico, and Western North Pacific DPSs of humpback whales (86 FR 21082, April 21, 2021). Because the Central America DPS is listed as endangered and the Mexico DPS is listed as threatened under the ESA, the California/Oregon/Washington stock is classified as strategic and depleted under the MMPA (Carretta *et al.* 2023).

Humpback Whale-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with humpback whales by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data. As such, we anticipate interactions under the action alternatives are unlikely. However, interactions with this species have occurred in the West Coast DGN fishery (see Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Of the humpback whale identified gear entanglements documented off the U.S West Coast from 1982 to 2017, seventy-three percent were from pot fisheries, two percent were from net fisheries, two percent were from salmon troll, and one percent were from weather buoy entanglement (Saez *et al.* 2021). On the U.S. East Coast where pelagic longline fishing occurs in the Atlantic Ocean, 89 percent of identified gear entanglements with humpback whales were attributed to pot and gillnet fisheries (Johnson *et al.* 2005). Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

**Minke Whale (*Balaenoptera acutorostrata*):**

Minke Whale-Affected Environment:

The SARs designate the minke whale off California/Oregon/Washington as one management stock. The best estimate of abundance is generated from species distribution models using 1991 to 2018 line-transection survey data to estimate density and abundance of cetaceans in the CCE (Becker *et al.* 2020). The best estimate is 915 animals (CV=0.792), with a minimum population estimate of 509 animals (Carretta *et al.* 2022). The calculated PBR level for this stock is 4.1 minke whales per year. The mean annual serious injury and mortality in commercial fisheries for minke whales in U.S. commercial fisheries is 0.59 (CV=0.99) animals, based on information from 2015 to 2019. This stock is not classified as a strategic stock under the MMPA (Carretta *et al.* 2022).

Minke Whale-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with minke whales by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:
No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data. As such, we anticipate interactions under the action alternatives are unlikely. However, interactions with this species were reported in the West Coast DGN fishery (see Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

Other Marine Mammals in the Proposed Action Area that May Be Affected by the Proposed Action
Although no interactions with blue and/or fin whales occurred in the proxy datasets (Section 3), they are present in the Proposed Action Area and are ESA-listed, and may be affected by the Proposed Action because of their vulnerability to entanglement in fishing gear.

***Blue Whale (*Balaenoptera musculus*):**

Blue Whale-Affected Environment:
The SARs recognize the eastern North Pacific stock of blue whales as one stock (Carretta *et al.* 2022). The U.S. West Coast is an important feeding area with nine important feeding areas identified off the California coast, including six areas in southern California and three in central California (Calambokidis *et al.* 2015). Abundance estimates for the eastern North pacific blue whale stock off the U.S. West Coast are based on data through 2018, using mark-recapture methods consistent with past estimates (Calambokidis and Barlow 2020). The best estimate of population abundance for this stock of blue whales is 1,898 (CV = 0.085) animals with a minimum population estimate of 1,767 animals based on the most recent 4 years (2015 to 2018) of capture-recapture data (Calambokidis and Barlow 2020; Carretta *et al.* 2022). The PBR for this stock is estimated at 7 animals per year; however, because this stock spends five months of their time outside of the U.S. West Coast EEZ, PBR is 4.1 blue whales annually. The total observed serious injury and mortality due to commercial fisheries from 2015 to 2019 is calculated to be 1.54 blue whales annually (Carretta *et al.* 2022).

Blue whales are also threatened by ship strikes. Ship strikes were implicated in the deaths of 4 blue whales and serious injury of a fifth whale from 2015 to 2019, resulting in an observed annual average of 0.8 ship strike deaths (Carretta *et al.* 2022). Ship strike mortality was estimated for blue whales in the U.S. West Coast EEZ (Rockwood *et al*. 2017), using an encounter theory model (Martin *et al.* 2016) that combined species distribution models of whale density (Becker *et al*. 2016), vessel traffic characteristics (size + speed + spatial use), along with whale movement patterns obtained from satellite-tagged whales in the region to estimate encounters (defined in Section 8, Appendix 2—Glossary) that would result in mortality. The estimated mortality of 18 blue whales annually due to ship strikes represents approximately 1 percent of the most recent estimated population size of the stock (18 deaths per 1,898 whales). The blue whale is listed as endangered under the ESA; therefore, this stock is classified as a depleted and strategic stock under the MMPA (Carretta *et al.* 2022).

Blue Whale-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with blue whales by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are not expected to occur.

Action Alternatives:

Although no interactions with blue whales occurred in the proxy datasets (Section 3), they are included here because of their ESA-listed status and their presence in the Proposed Action Area. However, given the lack of observed blue whale interactions in the proxy datasets, we anticipate no impacts resulting from any of the Proposed Action alternatives.

***Fin Whale (*Balaenoptera physalus velifera*):**

Fin Whale-Affected Environment:

North Pacific fin whales are recognized as a separate subspecies: *Balaenoptera physalus velifera* (Carretta *et al.* 2022). The SARs recognized three stocks of fin whales in the North Pacific: the California/Oregon/Washington stock, the Hawaii stock, and the Alaska stock. The best estimate of abundance for the California/Oregon/Washington stock is generated from species distribution models using 1991 to 2018 line-transection survey data to estimate density and abundance of cetaceans in the CCE (Becker *et al.* 2020). The best estimate is 11,065 animals (CV=0.405), with a minimum population

estimate of 7,970 animals (Carretta *et al.* 2022). The calculated PBR level for this stock is 80 fin whales per year. The mean annual serious injury and mortality in commercial fisheries for fin whales in U.S. commercial fisheries is 0.64 animals, based on information from 2015 to 2019.

Ship strikes were implicated in the deaths of 7 fin whales and the injury of another from 2015 to 2019. Ship strike mortality was estimated for fin whales in the U.S. West Coast EEZ (Rockwood *et al*. 2017), using an encounter theory model (Martin *et al.* 2016) that combined species distribution models of whale density (Becker *et al*. 2016), vessel traffic characteristics (e.g., size, speed, and spatial use), along with whale movement patterns obtained from satellite-tagged whales in the region to estimate encounters that would result in mortality. The estimated mortality of 43 fin whales annually due to ship strikes represents less than 0.4 percent of the most recent estimated population size of the stock (43 deaths per 11,065 whales; Carretta *et al.* 2022). Fin whales are listed as endangered under the ESA; therefore, this stock of fin whales is classified as depleted and strategic under the MMPA (Carretta *et al.* 2022).

Fin Whale-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with fin whales by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are not expected to occur.

Action Alternatives:

Although no interactions with fin whales occurred in the proxy datasets (Section 3), they are included here because of their ESA-listed status and their presence in the Proposed Action Area. However, given the lack of observed fin whale interactions in the proxy datasets, we anticipate no impacts resulting from any of the Proposed Action alternatives.

***North Pacific Right Whale (*Eubalaena japonica*):**

North Pacific Right Whale-Affected Environment:

The SARs recognize the Eastern North Pacific stock of right whales as one stock (Carretta *et al.* 2020). North Pacific right whales are today among the world's rarest marine mammals (Wade *et al.* 2011). The best estimate of abundance for the Eastern North Pacific stock is generated from mark-recapture analyses of photo-identification and genetic data through 2008 resulting between 28 and 31 individual whales, which also estimated that the population consisted of 8 females and 20 males. This estimate relates to a

subpopulation that uses the Bering Sea; there is no estimate for right whales in the Gulf of Alaska, and to date there have been no photo-identification matches between the two regions. Consequently, the total size of the Eastern North Pacific population may be somewhat higher; however, given the scarcity of recent sightings in the Gulf of Alaska, it seems unlikely that the overall abundance is significantly larger. The calculated PBR level for this stock is 0.05 whales per year. No human-caused mortality or serious injury of the Eastern North Pacific right whale stock was reported between 2014 and 2018; although, given the remote nature of the known and likely habitats of North Pacific right whales, it is very unlikely that any mortality or serious injury in this population would be observed.

Occasional sightings of right whales have been made off California including two recent records of single whales in California in 2017, off La Jolla and in the Channel Islands. Due to the rare occurrence and scattered distribution of the Eastern North Pacific right whale stock, it is impossible to assess the threat of ship strikes (Carretta *et al.* 2020). North Pacific right whales are listed as endangered under the ESA; therefore, this stock of right whales is classified as depleted and strategic under the MMPA (Carretta *et al.* 2020).

North Pacific Right Whale-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with North Pacific right whales by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are not expected to occur.

Action Alternatives:

Although no interactions with North Pacific right whales occurred in the proxy datasets (Section 3), they are included here because of their ESA-listed status and their presence in the Proposed Action Area. However, given the lack of observed North Pacific right whale interactions in the proxy datasets, we anticipate no impacts resulting from any of the Proposed Action alternatives.

Other Marine Mammals in the Proposed Action Area Not Likely to be Affected by the Proposed Action

A number of other marine mammal species either do not occur or may occur in the Proposed Action Area in rare instances. These species are listed in Table 4-46. There have been no observed interactions with these species to date with any of the proxy fisheries (the Hawaii SSLL and DSLL fisheries data east of

140˚ W, the West Coast DGN fishery data, the West Coast DSLL fishery data and the 2019 Longline EFP trials dataset ((Appendix 6); Table 3–4 and Table 3–6, and Table 3-7).

**Table 4-46.** Marine Mammals Considered Not Likely to be Affected by the Proposed Action

| **Species Common Name** | **Species Scientific Name** |
|---|---|
| Dwarf sperm whale | *Kogia sima* |
| Pygmy sperm whale | *Kogia breviceps* |
| Sei whale[1] | *Balaenoptera borealis* |
| Killer whale[1] | *Orcinus orca* |
| Baird's beaked whale | *Berardius bairdii* |
| Cuvier's beaked whale | *Ziphius cavirostris* |
| Harbor porpoise | *Phocoena phocoena* |
| Northern fur seal | *Callorhinus ursinus* |
| Harbor seal | *Phoca vitulina* |
| Steller sea lion | *Eumetopias jubatus* |

[1]Listed as endangered species and/or DPSs under the ESA.

These species are not discussed further, as we anticipate no impacts resulting from any of the Proposed Action alternatives.

### 4.5.2 Sea Turtles

Four species of sea turtles may be found in the area of the Proposed Action, and they are listed along with their ESA status in Table 4–36. As previously described, there has not been a longline or longline-type fishery targeting swordfish and other marketable HMS in the U.S. West Coast EEZ, which limits fishery-dependent records from which to draw conclusions about which sea turtles may be affected by the Proposed Action. Interactions with all four sea turtle species within the Proposed Action Area occur in the proxy fishery datasets (the Hawaii SSLL and DSLL fisheries data east of 140˚ W, the West Coast DGN fishery data, and the West Coast DSLL fishery data (Table 3–4 and Table 3–6) detailed in Section 3). Therefore, they are considered "likely to be affected" by the Proposed Action. The below section includes the species or DPS status (i.e., Affected Environment) and the projected impacts (i.e., Environmental Consequences) for each affected species by fishing gear component (Component 1 is shallow-setting and Component 2 is deep-setting) and the alternatives under each component.

Sea Turtles Considered Likely to be Affected by the Proposed Action

This subsection describes sea turtles considered likely to be affected by the Proposed Action based on interaction rates from proxy datasets (Section 3).

**Leatherback Sea Turtle (*Dermochelys coriacea*):**

Leatherback Sea Turtle-Affected Environment:

The leatherback sea turtle is listed as endangered under the ESA throughout its global range (Martin *et al.* 2020). While the western Pacific population is not currently recognized as a DPS, it is genetically and ecologically different from other populations and is treated like a DPS for management purposes (Martin *et al.* 2020). Western Pacific leatherback sea turtles can forage in the cold temperate regions of the oceans; however, nesting is confined to tropical and subtropical latitudes (Eckert *et al.*, 2012). Satellite tracking of post-nesting females and foraging males and females, as well as genetic analyses, indicate that the leatherbacks found foraging off the U.S. West Coast are from the western Pacific population. Western Pacific leatherback sea turtles spend between 45 to 78 percent of the year on the high seas, and migrate through the EEZs of at least 32 nations, including the U.S. EEZs of California and Hawaii (Harrison *et al.* 2018).

The estimate of total nesting female abundance for the western Pacific leatherback population is 790 females based on data from two index beaches in Indonesia (Jamursba-Medi and Wermon) from 2001 to 2017 (Martin *et al.* 2020). A Bayesian state-space model detailed in Martin *et al* (2020) suggests the leatherback population (based on annual nesters data collected from 2001 to 2017) is declining by 6.1 percent annually. As Jamursba-Medi and Wermon beaches likely represent approximately 75 percent of nesting for the western Pacific leatherback population, these declining trends are considered representative of the entire population; however, there may have been a slight increase in recent nesting activity (Tiwari *et al*. in prep in NMFS and USFWS 2020a).

The western Pacific leatherback population's decline is also evident in one of their foraging habitats off central California where a 28-year aerial survey study indicates a 5.6 percent decline in numbers of individuals foraging off California (Benson *et al.* 2020). Benson *et al*. (2020) provided an updated analysis showing an average estimate of 128 leatherbacks foraging off central California each year during the first half of their time series (1990 to 2003); however, during the second half of the time series (2004 to 2017) the estimate dropped to 55 leatherback sea turtles despite evidence that foraging conditions continued to be favorable.

Leatherback Sea Turtle-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with leatherback sea turtles by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue, and may decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-46 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no leatherback sea turtle interactions are projected for Component 2.

**Table 4-46.** Leatherback sea turtle projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.008 | 0.9 | 1.9 | 2.8 | 4.7 |

The proportion of leatherback sea turtles returned alive, dead, or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1. There were no leatherback sea turtle direct mortalities reported in the shallow-set longline fishery proxy dataset; therefore, we expect to observe zero direct mortalities of leatherback sea turtles under the Proposed Action.

As stated above, there are no leatherback sea turtle interactions projected for Component 2; however, there are interactions projected for Component 1. The projected leatherback sea turtle interactions under any of the action alternatives may represent a small incremental increase in the overall number of interactions and are unlikely to affect the sustainability of the population under any of the action alternatives. However, fishing effort under any of the action alternatives is anticipated from vessels that would otherwise fish in the West Coast DGN or Hawaii longline fisheries; therefore, the projected impacts are not expected to be in addition to impacts under status quo. Under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected interactions = 4.7) and the effects of this level of interactions to the population are likely to be minor. The terms and

conditions under the Proposed Action include measures shown to have significantly reduced leatherback sea turtle bycatch in U.S. longline fisheries (Swimmer *et al.* 2017). Mortality rates can be significantly lower than one hundred percent depending on the type of interaction (Serafy *et al.* 2012). Even under the lowest level of effort for Component 1 action alternatives, we estimate 0.9 interactions would occur and a mortality is unlikely based on estimated mortality rates. With vessels deciding to forgo fishing in authorized fisheries to fish under the Proposed Action, there is a reduced likelihood of those fisheries to reach authorized levels of take of leatherbacks.

Shallow-set fishing under the Proposed Action would require the use of large circle hooks and mackerel-type bait, and those measures are also being considered for deep-set fishing under the Proposed Action. For shallow-set fishing, these measures have been shown to reduce the likelihood of leatherback sea turtle interactions and increase the likelihood that hooking will be superficial, such as in the jaw or flipper, as opposed to deep ingestions that have been observed with J-hooks. Hence, when properly handled, a sea turtle with superficial hooking is believed to have higher probability of survival after being released than a deep-hooked animal.

**Loggerhead Sea Turtle—North Pacific Ocean DPS Loggerhead Turtles (*Caretta caretta*):**

Loggerhead Sea Turtle-Affected Environment:

On September 22, 2011, the USFWS and NMFS published a final rule listing nine DPSs of loggerhead sea turtles (76 FR 58868). Loggerhead sea turtles in the Proposed Action Area are considered part of the North Pacific Ocean DPS, which is listed as endangered. Martin *et al.* (2020) recently provided estimates for the North Pacific Ocean DPS based on nesting activity occurring outside the Proposed Action Area. The North Pacific loggerhead DPS nests primarily in Japan (Kamezaki *et al.* 2003), although low-level nesting may occur outside of Japan in areas surrounding the South China Sea (Chan *et al.* 2007; Conant *et al.* 2009). Recent nesting abundance and trends were evaluated using nest count data from three nesting beaches for which data were available (Inakahama, Maehama, and Yotsusehama on Yakushima) from 1985 to 2015 (Martin *et al.* 2020). Based on estimates derived from their trend analysis, they calculated an abundance "snapshot" of 4,541 nesting females (95 percent credible limit of 4,074 to 5,063) using those three beaches in 2015. Because these beaches comprise approximately 52 percent of the total nesting population, the extrapolated 2015 total nesting abundance for the entire DPS is approximately 8,733 nesting females (95 percent credible limit of 7,834 to 9,736 nesting females). The Bayesian state-space model indicates that the number of nesting females has increased an average of 2.3 percent annually (Martin *et al.* 2020). The most recent 3 years of data (2013, 2014, and 2015) demonstrate a short-term

decline, which may reflect natural variation. The conclusion was that North Pacific loggerhead nesting has increased between 1999 and 2012, at a minimum.

Loggerhead sea turtles that have been documented off the U.S. West Coast are primarily found south of Point Conception, California in the SCB. In Oregon and Washington, records have been kept since 1958, with 9 strandings recorded over approximately 54 years. This equates to less than one stranding every six years (NMFS Northwest Region stranding records database, 1958 to 2012, unpublished data).

A more recent analysis, including observer data through 2014, shows mitigation measures (e.g., circle hooks, mackerel-type bait, sea turtle handling procedures and 100 percent observer coverage) continue to be effective with reductions in loggerhead turtle interaction rates by 95 percent for the post-2004 regulation period (Swimmer *et al.* 2017). Between 2004 and 2019, there were 193 interactions with loggerhead sea turtles in the full expanse of the Hawaii longline fisheries, with only two resulting in at-vessel mortality (i.e., immediate death when boarded or brought next to the vessel during fishing operations; NMFS and USFWS 2020b). As a result, the 2019 Hawaii shallow-set longline biological opinion (BiOp; NMFS 2019a) indicates that hard caps no longer need to be used as a management tool, as current information strongly suggests that other mitigation measures will be effective in reducing impacts to loggerheads while allowing for year-round fishing opportunities.

Loggerhead Sea Turtle-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with loggerhead sea turtles by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue, and may decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-47 and Table 4-48 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-47.** Loggerhead sea turtle projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.011 | 1.4 | 2.8 | 4.2 | 7.0 |

**Table 4-48.** Loggerhead sea turtle projected total catch in number of interactions for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.000[1] | 0.2 | 0.4 | 0.9 |

[1]Catch per 1,000 hooks rounds to zero; however, one interaction calculates to a rate of 0.0002673 per 1,000 hooks.

The proportion of loggerhead sea turtles returned alive, dead or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1 and Table 3-6 for alternatives under Component 2.

The projected loggerhead sea turtle interactions under any of the action alternatives may represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the population under any of the action alternatives. However, fishing effort under any of the action alternatives is anticipated from vessels that would otherwise fish in the West Coast DGN or Hawaii longline fisheries; therefore, the projected impacts are not expected to be in addition to impacts under status quo. Under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected interactions = 7) + (Alternative 2-4 projected catch =0.9) = 7.9) and the effects of this level of interactions to the DPS are likely to be minor. The terms and conditions under the Proposed Action include measures shown to have significantly reduced loggerhead sea turtle bycatch in U.S. longline fisheries (Swimmer *et al.* 2017). Mortality rates can be significantly lower than 100 percent depending on the type of interaction (Serafy *et al.* 2012). Even under the lowest level of effort for both components of the action alternatives, we estimate 1.6 interactions would occur ((Alternative 1-2 projected interactions = 1.4) + (Alternative 2-2 projected catch =0.2) = 1.6)) and a mortality is unlikely based on estimated mortality rates. With vessels deciding to forgo fishing in authorized fisheries to fish under the Proposed Action, there is a reduced likelihood of those fisheries to reach authorized levels of take of loggerheads.

Shallow-set fishing under the Proposed Action would require the use of large circle hooks and mackerel-type bait, and those measures are also being considered for deep-set fishing under the Proposed Action. For shallow-set fishing, these measures have been shown to reduce the likelihood of loggerhead sea turtle interactions and increase the likelihood that hooking will be superficial, such as in the jaw or flipper, as opposed to deep ingestions that have been observed with J-hooks. Hence, when properly handled, a sea turtle with superficial hooking is believed to have higher probability of survival after being released than a deep-hooked animal.

**Olive Ridley Sea Turtle (*Lepidochelys olivacea*):**

Olive Ridley Sea Turtle-Affected Environment:

Although the olive ridley sea turtle is regarded as the most abundant sea turtle in the world, their nesting populations on the Pacific Coast of Mexico are listed as endangered under the ESA (NMFS and USFWS 2014). All other populations are listed as threatened. In the eastern Pacific, olive ridleys typically occur in tropical and subtropical waters from Southern California to Northern Chile (NOAA 2018a). The specific distribution of olive ridleys along the U.S. West Coast is unknown at this time but they do not nest in the United States. Olive ridley sea turtles are mainly a pelagic sea turtle but have been known to inhabit coastal areas including bays and estuaries. The post-reproductive migrations of olive ridleys in the eastern Pacific Ocean are unique and complex. Their migratory pathways vary annually, and they may swim hundreds to thousands of kilometers over vast oceanic areas (NMFS and USFWS 2014). Olive ridleys are believed to use warm water currents along the U.S. West Coast for foraging (NOAA 2018b).

Olive ridley sea turtles in the EPO nest primarily in large *arribadas* on the West Coasts of Mexico and Costa Rica. Since reduction or cessation of egg and turtle harvest in both countries in the early 1990s, annual nest totals have increased substantially (NMFS and USFWS 2014). At-sea estimates of density and abundance were determined from shipboard line-transect surveys conducted along the Mexico and Central American coasts during summer and autumn of 1992, 1998, 1999, 2000, 2003, and 2006 (Eguchi *et al*. 2007). A weighted average of the yearly estimates of olive ridley abundance was 1.39 million (Confidence Interval: 1.15 to 1.62 million). The eastern Pacific population is thought to be increasing, but there is inadequate information to suggest trends for other populations.

Olive Ridley Sea Turtle-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under

proposed terms and conditions. Interactions with olive ridley sea turtles by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-49 and Table 4-50 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-49.** Olive ridley sea turtle projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.000[1] | 0.0 | 0.1 | 0.1 | 0.2 |

[1] Catch per 1,000 hooks rounds to zero; however, one interaction calculates to a rate of 0.0002850 per 1,000 hooks.

**Table 4-50.** Olive ridley sea turtle projected total catch in number of interactions for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.001 | 0.5 | 1.1 | 2.7 |

The proportion of olive ridley sea turtles returned alive, dead, or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1 and Table 3-6 for alternatives under Component 2.

The projected olive ridley sea turtle interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the population under any of the action alternatives. Even under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected interactions = 0.2) + (Alternative 2-4 projected catch =2.7) = 2.9) and the effects of this level of catch to the population are likely to be minor because olive ridley sea turtles occur primarily in tropical and subtropical waters. Furthermore, mitigation measures put in place to protect sea turtles (i.e., use of circle

hooks, mackerel-type bait (for SSLL) and sea turtle handling protocols) are likely to increase the release of any sea olive ridley sea turtles alive and in good condition.

**Green Sea Turtles (*Chelonia mydas*):**

Green Sea Turtle-Affected Environment:

On April 6, 2016, the USFWS and NMFS published a final rule listing eleven DPSs of green sea turtles (81 FR 20057) that changed the listing status of some of the populations. The East Pacific Ocean DPS, which is listed as threatened, has a range that overlaps with the Proposed Action Area. The range of the East Pacific Ocean DPS extends from the California/Oregon border (42°N) southward along the Pacific coast of the Americas to central Chile (40°S; Seminoff *et al.* 2015). The northern and southern boundaries extend from the aforementioned locations in the United States and Chile to 143˚ W and 96˚ W, respectively. The offshore boundary of this DPS is a straight line between these two coordinates. The DPS includes an estimated total nester abundance of 20,062 females at 39 nesting sites in Mexico, Ecuador, Columbia, and Costa Rica. Green sea turtles do no not nest on the U.S. West Coast. The largest nesting aggregation (Colola, Michoacán, Mexico) hosts more than 11,588 females comprising nearly 58 percent of the total adult female population. Recent conservation efforts have led to increasing abundance at numerous nesting sites throughout the range of the East Pacific Ocean DPS. In addition to the increasing trends at Michoacán, Seminoff *et al.* (2015) found stable to slightly increasing nesting trends at Galápagos nesting beaches, which host the second largest nesting aggregation of the DPS. The observed increase may have resulted from nesting beach protection beginning in 1979—although it is not a clear cause, the consistency in timing is nonetheless compelling. Furthermore, a population viability analysis indicates the population will likely continue to increase (Seminoff *et al.* 2015).

Two populations of green sea turtles are found in two areas adjacent to the Proposed Action Area and may be affected by the Proposed Action. South San Diego Bay serves as important habitat for a resident population of up to about 60 juvenile and adult green sea turtles in this area (Eguchi *et al.* 2010). There is also an aggregation of green sea turtles that appear to be persistent where the San Gabriel River flows into the Pacific Ocean and surrounding coastal area in the vicinity of Long Beach (Lawson *et al.* 2011). This group of green sea turtles has only recently been identified and very little is known about their abundance, behavior patterns, or relationship with the population in San Diego Bay.

Green Sea Turtle-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under

proposed terms and conditions. Interactions with green sea turtles by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-51 shows the estimated catch per 1,000 hooks set for DSLL and the projected catch in number of animals per year under each of the action alternatives in Component 2 (deep-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 1 alternatives. As such, no green sea turtle interactions are projected for Component 1.

**Table 4-51.** Green sea turtle projected total catch in number of interactions for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.000[1] | 0.2 | 0.4 | 0.9 |

[1]Catch per 1,000 hooks rounds to zero; however, one interaction calculates to a rate of 0.0002673 per 1,000 hooks.

The proportion of green sea turtles returned alive, dead or injured are calculated based on the use of proxy data and are reported in Table 3-6 for alternatives under Component 2.

As stated above, there are no green sea turtle interactions projected for Component 1; however, there are interactions projected for Component 2. The projected green sea turtle interactions under any of the action alternatives would represent a small incremental increase in the overall number of interactions and are unlikely to affect the sustainability of the population under any of the action alternatives. Even under the highest level of effort for Component 2 action alternatives, the projected impacts (i.e., Alternative 2-4 projected interactions = 0.9) and the effects of this level of interactions to the DPS are likely to be minor as the projections for green sea turtle are based on a single interaction which occurred in 2018 in the DSLL fishery sector of the Hawaii longline proxy dataset.

### 4.5.3 Protected Marine and Anadromous Fishes, and Marine Invertebrates

As previously described, there has not been a longline or longline-type fishery targeting swordfish and other marketable HMS in the United States West Coast EEZ, so there are no fishery-dependent records to draw conclusions on which protected marine fishes may be affected by the Proposed Action. Therefore, observed catch records in proxy datasets (Section 3) are used to categorize protected marine fishes in the Proposed Action Area (Table 4-36) into two categories: species with interactions are considered "likely to be affected" and those species without interactions are considered "not likely to be affected." The below

subsections include the species or DPS status, and projected impacts for each affected species by component and alternative. The protected marine and anadromous fishes, and marine invertebrates not likely to be affected by the Proposed Action are listed in Table 4-53.

Protected Marine Fishes Considered Likely to be Affected by the Proposed Action

Of the protected marine fish species within the Proposed Action Area (Table 4-36), two species interactions are recorded in proxy datasets used for this analysis. These include interactions between the oceanic whitetip shark and the Hawaii SSLL fishery east of 140° W and the giant manta ray and the West Coast DGN fishery. Stock status descriptions for each of the protected marine fishes considered likely to be affected by the Proposed Action are detailed below.

**Oceanic Whitetip Shark (*Carcharhinus longimanus*):**

Oceanic Whitetip Shark-Affected Environment:

The oceanic whitetip shark is globally distributed and can be found in all ocean basins in epipelagic tropical and subtropical waters. Based on the best available data, the distribution of the species appears to be concentrated in areas farther south than the Proposed Action Area and in foreign waters or the high seas. Several archival satellite tagging studies from various regions of the species' range indicate that oceanic whitetip sharks spend most of their time at depths of less than 200 m (Musyl *et al.* 2011; Carlson and Gulak 2012; Howey-Jordan *et al.* 2013; Tolotti *et al.* 2017). Overall, oceanic whitetip sharks are highly mobile and can travel great distances in the open ocean (Filmalter *et al.* 2012), with excursion estimates of several thousand kilometers demonstrated in multiple studies. However, information on potential migratory corridors is lacking.

On January 30, 2018, NMFS published a final rule to list the oceanic whitetip shark as a threatened species under the ESA (83 FR 4153). Oceanic whitetip shark fins are also prevalent in the international fin trade, which has likely contributed to the significant declines of the species throughout its range. Given the relatively low reproductive output and overall productivity of the oceanic whitetip shark, it is inherently vulnerable to threats that would deplete its abundance. Therefore, while there is considerable uncertainty regarding the current abundance of oceanic whitetip sharks throughout its entire range, the best available information indicates that the species is likely to become an endangered species within the foreseeable future due to overutilization.

In the eastern Pacific, the oceanic whitetip shark reportedly occurs from southern California to Peru, including the Gulf of California and Clipperton Island (Compagno 1984). While its eastern Pacific range

reportedly extends as far north as southern California, this is likely due to warm water incursions that allow the species to venture into waters far beyond its normal range (Compagno 1984). Four oceanic whitetip sharks were observed caught in the Hawaii SSLL fishery operating east of 140° W longitude from 2004 through 2019. Three of the four the oceanic whitetip sharks were released alive and one was released dead. Ebert *et al.* (2017) notes that oceanic whitetip sharks are ‘‘rare’’ in southern California waters, usually observed around the Channel Islands during warm water years. Further confirming this finding, DGN fishery observers recorded zero oceanic whitetip sharks in 3,225 sets conducted from the 2001/2002 through 2019/2020 fishing seasons. There is no other information to suggest that oceanic whitetip sharks regularly occupy the waters of southern California or elsewhere along the U.S. West Coast (85 FR 12898, March 5, 2020).

Oceanic Whitetip Shark - Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with oceanic whitetip sharks by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

Table 4-52 shows the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no oceanic whitetip shark interactions are projected for Component 2.

**Table 4-52.** Oceanic whitetip shark projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.001 | 0.1 | 0.3 | 0.4 | 0.7 |

The proportion of oceanic whitetip sharks returned alive, dead or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1.

As stated above, there are no oceanic whitetip shark interactions projected for Component 2; however, there are interactions projected for Component 1. The projected oceanic whitetip shark interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the population under any of the action alternatives. Even under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected interactions = 0.7) and the effects of this level of interactions to the population are likely be minor.

**Giant Manta Ray (*Manta birostris*):**

Giant Manta Ray-Affected Environment:

Prior to 2009, the Manta genus was considered to be one species; however, Marshall *et al.* (2009) presented new data to support the splitting of the Manta genus into two species: giant manta ray (*M. birostris*) and reef manta ray (*M. alfredi*). Misidentifications are common both between *Manta* species (*i.e.,* between *M. alfredi* and *M. birostris*) as well as between *Manta* and *Mobula* rays. The giant manta ray, the largest living ray, is distributed circumglobally in tropical and warm temperate bodies of water from 36°S to 40°N (Mourier 2012), however within this expansive range, populations appear to be highly fragmented and sparsely distributed (Marshall *et al.* 2011). Giant manta rays inhabit tropical, subtropical, and temperate bodies of water and are commonly found offshore, in oceanic waters, and near productive coastlines (84 FR 66652, December 5, 2019).

There are no current or historical estimates of the global abundance of giant manta ray and due to their global nature, accurate population estimates will always be difficult to assess (Marshall *et al.* 2011). Most estimates of subpopulations are based on anecdotal diver or fisherman observations, which are subject to bias. These populations seem to potentially range from around 100-1,500 individuals. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 2013) reports that because 10 populations of giant manta ray have been actively studied, 25 other aggregations have been anecdotally identified, and all other sightings are rare, the total global population may be small.

The most significant threat to the giant manta ray is overutilization for commercial purposes. Very low population growth rates of manta rays, combined with the high value of their gill rakers and the international nature of trade, is highly likely to lead to rapid depletion and potential local extinction unless a rapid conservation management response occurs worldwide. Giant manta rays are both targeted and caught as bycatch in a number of fisheries throughout their range, and are most susceptible to industrial purse seine and artisanal gillnet fisheries. With the expansion of the international mobulid gill raker

market and increasing demand for manta ray products, estimated take of giant manta rays, particularly in many portions of the Indo-Pacific, frequently exceeds numbers of identified individuals in those areas.

In January 2018, NMFS listed giant manta ray as threatened under the ESA (83 FR 2916, January 22, 2018). Given the extremely low reproductive output and overall productivity of the giant manta ray, it is inherently vulnerable to threats that would deplete its abundance, with a low likelihood of recovery. So, while there is considerable uncertainty regarding the current abundance of the manta ray throughout its entire range, the best available information indicates that the species is likely to become an endangered species within the foreseeable future throughout a significant portion of its range (the Indo-Pacific and eastern Pacific portion) due to overutilization.

From 2001/2002 through the 2019/2020 fishing seasons, the DGN fishery had one interaction with a giant manta ray, which was released dead (J. Suter, pers. comm., April 29, 2020). The giant manta ray interaction was in 2005 near San Clemente Island in the SCB (C. Villafana, pers. comm. March 30, 2021). Further, documentation of a giant manta ray off the U.S. West Coast exists. There was a sighting of a single individual in 2014 (i.e., San Clemente Island, California; Warneke 2014); however, there have been no documented sightings since. Given the amount of fishing effort, as well as the human population density in these regions, it is highly unlikely that substantial concentrations of giant manta rays would have passed unnoticed. Therefore, we generally consider these individuals to be vagrant of the species (individuals that occur outside of the species' normal range). Data from the Hawaii longline fisheries from 2004 through 2019 indicate that giant manta rays have not been observed caught with either DSLL or SSLL fishing gear used east of 140° W longitude.

Because the occurrence of giant manta rays in waters off the U.S. West Coast is uncommon, we do not consider there to be much overlap between the Proposed Action Area and the species' geographical range. Further, there is no information to suggest the Proposed Action Area is essential to the conservation of the species (84 FR 66652, December 5, 2019).

Giant Manta Ray-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under the proposed terms and conditions. Interactions with giant manta rays by domestic fisheries landing

swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:
No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data. As such, we anticipate interactions under the action alternatives are unlikely. However, interactions with this species were reported in the West Coast DGN fishery (see Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

Other Protected Marine Fishes and Marine Invertebrates in the Proposed Action Area Not Likely to be Affected by the Proposed Action

A number of additional protected marine fishes and marine invertebrates are known to occur in the Proposed Action Area (Table 4-53), but with no record of interactions to date with any of the proxy datasets (the Hawaii SSLL and DSLL fisheries data east of 140˚ W, the West Coast DGN fishery data, the West Coast DSLL fishery data, the 2019 Longline EFP trials dataset and the deep-set LBG trials dataset; Table 3–4 and Table 3–6, and Table 3-7). Because we anticipate no impacts to these species resulting from any of the Proposed Action alternatives, these species are not discussed further in this EIS.

**Table 4-53.** Protected Marine Fishes and Marine Invertebrates Considered Not Likely to be Affected by the Proposed Action. ESU: evolutionarily significant unit; DPS: distinct population segment.

| Species Common Name | Species Scientific Name |
|---|---|
| Green sturgeon<br>• Southern DPS[1] | *Acipenser medirostris* |
| Gulf grouper[1] | *Mycteroperca jordani* |
| Scalloped hammerhead shark<br>• Eastern Pacific DPS[1] | *Sphyrna lewini* |
| Pacific eulachon<br>• Southern DPS[1] | *Thaleichthys pacificus* |
| Chinook<br>• Sacramento River Winter ESU[1]<br>• Central Valley Spring ESU[1]<br>• California Coastal ESU[1]<br>• Snake River Fall ESU[1]<br>• Snake River Spring/Summer ESU[1]<br>• Lower Columbia River ESU[1]<br>• Upper Willamette River ESU[1]<br>• Upper Columbia River Spring ESU[1]<br>• Puget Sound ESU[1] | *Oncorhynchus tshawytscha* |
| Chum<br>• Hood Canal Summer run ESU[1]<br>• Columbia River ESU[1] | *Oncorhynchus keta* |
| Coho<br>• Central California Coastal ESU[1]<br>• S. Oregon/N. CA Coastal ESU[1]<br>• Oregon Coast ESU[1]<br>• Lower Columbia River ESU[1] | *Oncorhynchus kisutch* |
| Steelhead<br>• Southern California DPS[1]<br>• South-Central California DPS[1]<br>• Central California Coast DPS[1]<br>• California Central Valley DPS[1]<br>• Northern California DPS[1]<br>• Upper Columbia River DPS[1]<br>• Snake River Basin DPS[1]<br>• Lower Columbia River DPS[1]<br>• Upper Willamette River DPS[1]<br>• Middle Columbia River DPS[1]<br>• Puget Sound DPS[1] | *Oncorhynchus mykiss* |
| White abalone[1] | *Haliotis sorenseni* |
| Black abalone[1] | *Haliotis cracherodii* |

[1] Listed as a threatened or endangered species or ESU or DPSs under the ESA (Table 4-36).

### 4.5.4 Seabirds

All seabirds in the waters of the United States are protected under the MBTA. The MBTA implements treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Seabirds are also protected under EO 13186—Responsibilities of Federal Agencies to Protect Migratory Birds, which directs Federal agencies to negotiate a Memorandum of Understanding with the USFWS that would obligate agencies to evaluate the impact on migratory birds as part of any NEPA process. Seabird species may also be listed as an endangered or threatened species under the ESA.

Seabird species found off the U.S. West Coast include resident and transitory species (migrating or foraging). This section describes those seabirds that inhabit the environment within the Proposed Action Area (Table 4–54). This list was derived from use of proxy datasets; however, only some of the seabird species on the list may be likely to be affected by the Proposed Action activities. Additionally, the species listed below in Table 4-54 were identified by the USFWS as potentially being attracted to fishing boats or to lights used in nighttime fishing operations.

As previously described, there has not been a longline or longline-type fishery targeting swordfish and other marketable HMS in the West Coast EEZ, so we used proxy datasets to draw conclusions on which seabirds may be affected by the Proposed Action, and the level of impacts. Observed catch records in proxy datasets are used to categorize seabird species into three categories: “seabirds considered likely to be affected by the Proposed Action,” “other seabirds in the Proposed Action Area that may be affected by the Proposed Action,” and “other seabirds in the Proposed Action Area not likely to be affected by the Proposed Action.” These species are listed below in Table 4-54. These categories are described below by subsection, and include the species status (i.e., Affected Environment) and the projected impacts (i.e., Environmental Consequences) for each affected species by component (Component 1 is shallow-setting and Component 2 is deep-setting) and action alternative.

**Table 4-54.** Seabirds in the Proposed Action Area protected under the MBTA, EO 13186, or both.

| Species | ESA Status (November 2021) |
|---|---|
| Black-footed albatross | Not listed |
| Laysan albatross | Not listed |
| Short-tailed albatross | Endangered |
| Northern fulmar | Not listed |
| Pink-footed shearwater | Not listed |
| Sooty shearwater | Not listed |
| Flesh-footed shearwater | Not listed |
| Fork-tailed storm petrel | Not listed |
| Leach's storm petrel | Not listed |

Seabirds Considered Likely to be Affected by the Proposed Action

Species of seabirds caught in the proxy datasets (Section 3) are considered likely to be affected by the Proposed Action. Over the 19-year span of data collection in the Hawaii longline fisheries operating east of 140˚W, 83 individual seabirds were observed caught in the SSLL fishery sector, with catch rates ranging from 0.009 to 0.015 observed caught per 1,000 hooks (Table 3–4) and 9 seabirds were observed caught in the DSLL fishery sector, with a catch rate of 0.002 caught per 1,000 hooks (Table 3–6). In the SSLL fishery data, these species include the black-footed albatross and the Laysan albatross; and in the DSLL fishery data, only black-footed albatross was caught. Additionally, one seabird (an unidentified shearwater species) was caught in the West Coast DSLL fishery dataset with a catch rate of 0.001 interactions per 1,000 hooks set; however, shearwater species are not included in the stock status below because the interaction was not identified at the species level (Appendix 5, Table A-5-3).

The seabirds observed caught and the number of animals per 100 observed sets (CPUE) in the West Coast DGN fishery for the fishing seasons 2001/2002 to 2019/2020 are shown in Table 3–7. Over the 19-year span of data collection, one species of seabird and two unidentified seabirds (unidentified Auklet and unidentified bird; see Table A-4-2 in Appendix 4) were observed caught in the West Coast DGN fishery. However, these species did not occur in our longline proxy dataset, so potential catch rates under the Proposed Action are not reported for these species. Although no interactions with short-tailed albatross occurred in the proxy datasets, they are included here because of their ESA-listed status and their presence in the Proposed Action Area.

**Black-footed Albatross *(Phoebastria nigripes)*:**

Black-footed Albatross-Affected Environment:

The black-footed albatross breeding distribution is almost entirely restricted to the Hawaiian Islands, with the exception of small colonies off Japan (USFWS 2005). In Hawaii, colonies occur in the northwestern

Hawaiian Islands and Kaula and Lehua in the main Hawaiian Islands. They have also recently recolonized Wake. During the breeding season, adults range mostly to the north and east of the Hawaii colonies. Adults that are brooding chicks forage closer to the colonies. After brooding, birds transit to continental shelf areas of North America while feeding chicks. Nonbreeding individuals are distributed throughout the North Pacific between 20° and 58° N (USFWS 2005).

Direct population estimates are unavailable because not all birds (e.g., juveniles and some adults) return to the breeding colonies every year. Instead, the numbers of breeding pairs, or numbers of active nests, are used to assess the health of albatross populations. The current black-footed albatross worldwide population estimate, with most counts from the 2010 nesting season, is approximately 67,215 breeding pairs. Based on one model, 67,215 breeding pairs would represent over 300,000 black-footed albatross (76 FR 62504, October 7, 2011).

On October 7, 2011, in response to a petition to list the black-footed albatross under the ESA, the USFWS found that the Hawaiian Islands breeding population and the Japanese Islands breeding population of the black-footed albatross are separate DPSs (76 FR 62504). However, the USFWS also found that neither DPS of the black-footed albatross warranted listing under the ESA. The USFWS observed that Hawaii-based longline fisheries should continue to minimize black-footed albatross bycatch through implementing effective bycatch minimization measures, and concluded that Hawaii-based longline fishing is not a significant threat to the black-footed albatross (NMFS 2020b).

Black-footed Albatross- Environmental Consequences:

No Action Alternatives:
Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with the black-footed albatross by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue at status quo levels.

Action Alternatives:
Table 4-55 and Table 4-56 show the estimated catch per 1,000 hooks set for SSLL and DSLL, and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting) and Component 2 (deep-setting).

**Table 4-55.** Black-footed albatross projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative1- 3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.015 | 1.8 | 3.6 | 5.4 | 9.0 |

**Table 4-56.** Black-footed albatross projected total catch in number of interactions for Component 2 (deep-setting) by alternatives 2-2, 2-3, and 2-4.

| Component 2 | Catch per 1,000 hooks set | Alternative 2-2 Projected Catch in Number of Animals | Alternative 2-3 Projected Catch in Number of Animals | Alternative 2-4 Projected Catch in Number of Animals |
|---|---|---|---|---|
| Deep-setting portion of EFP | 0.002 | 1.6 | 3.2 | 8.0 |

The proportion of black-footed albatross returned alive, dead, or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1 and Table 3-6 for alternatives under Component 2.

The projected black-footed albatross interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the population under any of the action alternatives. Under the highest level of effort for both components of the action alternatives, the projected impacts (e.g., (Alternative 1-5 projected interactions = 9) + (Alternative 2-4 projected catch = 8) = 17) and the effects of this level of catch to the population are likely be minor.

**Laysan Albatross (*P. immutabilis*):**

Laysan Albatross-Affected Environment:

The Laysan albatross breeding range is centered in the Hawaiian Islands, with smaller colonies on the Bonin Islands of Japan and islands off western Mexico. They have recolonized Wake and Johnston, and one pair successfully bred on Wake in 2001. Over 99 percent of the world's Laysan albatrosses breed in the northwestern Hawaiian Islands. Matrix modeling results indicate that the Laysan albatross population, summed across all three colonies (Midway Atoll, Laysan Island, and French Frigate Shoals), increased 6.7 percent per year from 1992 to 2005, and the estimated bycatch of 2,500 birds per year is less than the estimated PBR (Arata *et al.* 2009).

Breeding adults forage primarily to the north and northwest of Hawaii to the Gulf of Alaska and Aleutian Islands. During nonbreeding periods, adults disperse widely throughout the North Pacific. Because

variables such as population structure, mortality, and individual breeding frequency are not fully understood, a total world population estimate cannot be determined for this species. Instead, an estimate of total numbers of nesting pairs has been used to monitor Laysan albatross populations. The worldwide breeding population was estimated at 590,000 pairs in 2005 (NMFS 2010).

Laysan Albatross- Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with the Laysan albatross by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue at status quo levels.

Action Alternatives:

Table 4-57 shows show the estimated catch per 1,000 hooks set for SSLL and the projected catch in number of animals per year under each of the action alternatives in Component 1 (shallow-setting). There was no catch or recorded interactions in our proxy datasets on which to base projections for Component 2 alternatives. As such, no Laysan albatross interactions are projected for Component 2.

**Table 4-57.** Laysan albatross projected total catch in number of interactions for Component 1 (shallow-setting) by alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Catch per 1,000 hooks set | Alternative 1-2 Projected Catch in Number of Interactions | Alternative 1-3 Projected Catch in Number of Interactions | Alternative 1-4 Projected Catch in Number of Interactions | Alternative 1-5 Projected Catch in Number of Interactions |
|---|---|---|---|---|---|
| Shallow-setting portion of EFP | 0.009 | 1.1 | 2.2 | 3.2 | 5.4 |

The proportion of Laysan albatross returned alive, dead, or injured are calculated based on the use of proxy data and are reported in Table 3-4 for alternatives under Component 1.

As stated above, there are no Laysan albatross interactions projected for Component 2; however, there are interactions projected for Component 1. The projected Laysan albatross interactions under any of the action alternatives would represent a small incremental increase in the overall number interactions and are unlikely to affect the sustainability of the population under any of the action alternatives. Under the highest level of effort for Component 1 action alternatives, the projected impacts (i.e., Alternative 1-5 projected interactions = 5.4) and the effects of this level of interactions to the population are likely to be minor.

**Northern Fulmar (*Fulmarus glacialis*):**

Northern Fulmar-Affected Environment:

The northern fulmar occurs globally (Phillips *et al.* 1999) from the Aleutians and the coasts of Alaska and Canadian Arctic to southern California, and in the north Atlantic south to North Carolina, as well as northern Eurasia (Denlinger 2006). Fulmars are a pelagic species, coming to shore only to breed. The age at first breeding is between 8 and 10 years (Mallory *et al.* 2020), and individuals can live to 43 years (European longevity record; Fransson *et al.*, 2017). Fulmars are an abundant seabird, with a world population estimated at 15 to 20 million breeding pairs (Phillips *et al.* 1999), of which an estimated 1.4 million breeding individuals occur in the North Pacific (Nevins and Harvey 2003).

The fulmar can be seen feeding at the surface diving for its prey, or commonly behind fishing vessels foraging on fish waste thrown overboard (Phillips *et al.* 1999). Prey consists of crustaceans, fish, small squid, and jellyfish. Studies have suggested that commercial fishing may have contributed to the expansion in breeding numbers and range of the northern fulmar over the last two centuries (Phillips *et al.* 1999). The Northern fulmar is not listed as endangered or threatened.

Northern Fulmar- Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with northern fulmars by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to decrease due to continued attrition in the DGN fleet and the phase-out of the fishery under the Driftnet Act.

Action Alternatives:

No interactions occurred with this species in the Hawaii SSLL and DSLL fisheries operating east of 140˚ W; therefore, we make no quantitative projections for interactions of these species based on proxy data. As such, we anticipate interactions under the action alternatives are unlikely. However, 20 interactions with norther fulmars were reported in the West Coast DGN fishery (Appendix 4, Table A-4-2), suggesting that interactions under the Proposed Action alternatives may occur. Nineteen of the twenty seabirds were released alive. Given the relatively low interaction rate in the DGN fishery and the use of net gear, the level of impacts, if any, to the stock resulting from the use of hook-and-line type gear under any of the Proposed Action alternatives are expected to be minor.

Other Seabirds in the Proposed Action Area that May Be Affected by the Proposed Action

Although no interactions with short-tailed albatross occurred in the proxy datasets (Section 3), they are present in the Proposed Action Area and are ESA-listed. Additionally, seabird advocacy groups have expressed concerns about the potential for short-tailed albatross interactions with longline and longline-type gears.

**Short-tailed Albatross (*Phoebastria albatrus*):**

Short-tailed Albatross-Affected Environment:

Short-tailed albatrosses forage widely across the temperate and subarctic North Pacific, although the highest concentrations of short-tailed albatross are found in the Aleutian Islands and Bering Sea (primarily outer shelf) regions of Alaska. Subadults appear to be distributed along the West Coast of the United States more than has been reported in previous surveys (Guy *et al.* 2013). Historically, millions of short-tailed albatrosses bred in the western North Pacific on several islands south of the main islands of Japan (USFWS 2011). Known breeding colonies currently exist on Torishima Island, the Senkaku Islands, and Ogasawara Islands. Torishima Island contains a majority of the breeding population with around 84 percent of breeding adults (USFWS 2020) In the northwestern Hawaiian Islands, a pair of short-tailed albatrosses have nested and successfully fledged chicks on Eastern Island at Midway Atoll in 2011, 2012 and 2014 (USFWS 2020). The short-tailed albatross is listed as endangered under the ESA. The current worldwide population of short-tailed albatross is currently estimated at 7,365 individuals, and the 3-year running average population growth rate is estimated to be 8.9 percent (USFWS 2020).

Short-tailed Albatross- Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Interactions with the short-tailed albatross by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are not expected to occur.

Action Alternatives:

Although no interactions with short-tailed albatross occurred in the proxy datasets (Section 3), they are included here because of their ESA-listed status and their presence in the Proposed Action Area. However, short-tailed albatrosses are expected to be rare in the vicinity of the Proposed Action Area (USFWS 2017). Given the seabird deterrents included in the action alternatives (Section 2) and the lack of observed short-tailed albatross interactions in the proxy datasets, we anticipate no impacts resulting from any of the Proposed Action alternatives.

Other Seabirds in the Proposed Action Area Not Likely to be Affected by the Proposed Action

A number of other seabird species are known to occur in the Proposed Action Area. There are no interactions recorded in the proxy datasets used in this analysis. Table 4-58 lists these species.

**Table 4-58.** Seabirds Considered Not Likely to be Affected by the Proposed Action.

| **Species Common Name** | **Species Scientific Name** |
|---|---|
| Pink-footed shearwater | *Puffinus creatopus* |
| Sooty shearwater | *Puffinus griseus* |
| Flesh-footed shearwater | *Puffinus carneipes* |
| Fork-tailed storm petrel | *Oceanodroma furcata* |
| Leach's storm petrel | *Oceanodroma leucorhoa* |

These seabird species are not discussed further, as we anticipate no impacts resulting from any of the Proposed Action alternatives. NMFS may further assess potential impacts to these seabird species with the USFWS pursuant to the MBTA or EO 13186, or both.

## 4.6 Essential Fish Habitat and Critical Habitat

Affected Environment:

Under the MSA, essential fish habitat (EFH) for federally managed fish species is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH for HMS species is described in Appendix F of the HMS FMP. EFH consists of the epipelagic and mesopelagic zones of neritic and oceanic waters (PFMC 2003).

Critical habitat refers to specific areas which contain physical or biological features essential to conservation of an ESA-listed species, and that may require special management considerations or protection. Critical habitat has been designated for four species in or near the Proposed Action Area: the humpback whale, the Southern Resident killer whale DPS, the leatherback sea turtle and the Steller sea lion. Additionally, on July 17, 2023, a proposed rule was published to list critical habitat for six DPSs of the green sea turtle (88 FR 46572).

Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under

proposed terms and conditions. Current trends in fishing by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue in or near essential fish habitat and critical habitat areas.

Action Alternatives:
Longline-type fishing gear is pelagic fishing gear deployed in open water from the surface to 400 m depth and is not designed to contact the ocean bottom. Given the biophysical characteristics of the water column and the components of the fishing gear (i.e., lines, hooks, weights, floats, etc.), the gear does not affect biophysical habitat or availability of prey species. For this reason, it is unlikely that the action alternatives would impact EFH. For the Central America DPS and the Mexico DPS of the humpback whale (86 FR 21082, April 21, 2021), the Southern Resident killer whale DPS (86 FR 41668, August 2, 2021) and the leatherback sea turtle (77 FR 4170, January 26, 2012), longline or longline-type fishing practices are not likely to destroy or adversely modify their critical habitat or essential fishing habitat. The eastern DPS Steller sea lion has designated critical habitat, but the species has since been delisted (78 FR 66140, November 4, 2013). The Proposed Action alternatives are not likely to affect any EFH or critical habitat; therefore, potential affects will not be considered further in this document.

## 4.7 Domestic Fisheries Landing Swordfish and Other Marketable HMS to the U.S. West Coast

The socioeconomic environment affected by the Proposed Action includes the producers and consumers of swordfish and other marketable HMS species that are caught and landed by fisheries targeting swordfish, as well as processors and other providers of supporting services to the industry and fishing communities that benefit from direct and indirect revenue and employment impacts. This subsection includes an evaluation and discussion of U.S. West Coast HMS fisheries and provides a brief summary of impacts (Environmental Consequences) for each action alternative by component (shallow-setting or deep-setting). While Section 1 provides background on the domestic fisheries targeting and supplying swordfish and other marketable HMS to the U.S. West Coast, in this Section we provide an overview of recent participation and revenues as well as a characterization of catch and interactions in domestic fisheries landing swordfish to the West Coast.

Domestic Fisheries Landing Swordfish and Other Marketable HMS to the U.S. West Coast-Affected Environment:

Domestic fisheries supplying swordfish and other marketable HMS to the U.S. West Coast include DGN, West Coast and Hawaii-based longline vessels, harpoon, and DSBG. The majority of West Coast swordfish supply consists of imports caught by foreign fishing fleets. When imports are readily available,

domestic fisheries can have difficulty competing in the marketplace. The average price per pound (rounded weight) for swordfish imported to the West Coast was $3.30 in 2019 (Table 4-59; PFMC 2019b). The ability to offer a specialty product enables the harpoon and DSBG sectors to garner higher prices. The average price per pound in 2019 for these fisheries was $5.37 and $3.87, respectively. Higher prices are necessary for these fisheries to be viable, since they selectively target swordfish and produce lower-volume catches. For example, swordfish represented over 90 percent of their catch in recent years (Table 4-60; PFMC 2019b). The other domestic fisheries are multispecies fisheries. The DGN fishery is generally able to supply a local swordfish product at a price that is competitive with imports, e.g., the price per pound was $2.48 in 2019 (Table 4-59). Despite no longline vessels fishing in the West Coast EEZ, these fisheries are also able to supply swordfish at a price that is competitive with imported swordfish. For example, in 2019, the average price per pound for longline-caught swordfish from West Coast-permitted longline vessels was $1.99 and was $2.24 from Hawaii-permitted longline vessels.

Of the domestically caught swordfish supply landed to U.S. West Coast ports, the majority comes from Hawaii longline vessels that fish on the high seas (Figure 4-1; PacFIN 2022). West Coast vessels fishing with DGN, DSLL, harpoon, and DSBG make up the remaining proportion. These domestic fisheries targeting and supplying swordfish and other HMS to the U.S. West Coast may be affected by the Proposed Action in that vessels that participate in those fisheries are most likely to fish under the Proposed Action. In doing so, those vessels would forgo effort in those respective fisheries to trial gear under the Proposed Action.

The West Coast DGN fleet is a multi-species fishery that targets swordfish, common thresher shark and other marketable species. Approximately 44 percent of the total finfish caught in this fishery are common molas, 94 percent of which are released alive (Le Fol 2016). *Major species* caught in the West Coast DGN include shortfin mako shark, blue shark, albacore, skipjack tuna, opah, Pacific mackerel, Pacific bluefin tuna, Pacific bonito, and bullet mackerel (Appendix 4). Declining effort and effective fishery regulations have reduced interaction rates with marine mammals and sea turtles in this fleet; however, interaction events with these protected species do occur occasionally, accounting for about 1 percent of total catch and interaction events from 2000 through 2017 (NMFS 2021a). The fishery is listed as a Category II fishery under the MMPA, which is defined as having “occasional” incidental mortality or serious injury (defined in Section 8, Appendix 2—Glossary) of a marine mammal (i.e., annual mortality and serious injury of a stock in a given fishery is between 1 and 50 percent of the PBR level; 86 FR 3028, January 14, 2021). However, under the Driftnet Act, NMFS must conduct a transition program to facilitate the phase-out of drift gillnet fishing and adoption of alternative fishing practices that minimize

incidental take. The phase-out of the gear must be complete within five years of enactment of the Driftnet Act.

The U.S. West Coast harpoon fishery in the U.S. EEZ employs selective and low-impact fishing methods targeting swordfish when they bask in surface waters. The harpoon fishery is listed as a Category III fishery under the MMPA, which is defined as having a "remote likelihood" of incidental mortality or serious injury of a marine mammal (i.e., annual mortality and serious injury of a stock in a given fishery is 1 percent or less of the PBR level; 86 FR 3028, January 14, 2021). Records indicate no incidences of interaction with species listed as threatened or endangered under the ESA.

DSBG fishing trials have been ongoing under EFPs since 2015. DSBG employs a hook-and-buoy system to catch target species during the daytime in deep water, while they are feeding, with hooks commonly set at depths below 250 m. Standard DSBG configurations consist of strike indicator buoys deployed at the surface, a vertical mainline, baited circle hooks at depth, and a weighted sinker to ensure that hooks reach depth rapidly. Deep-set LBG employs sub-surface branch lines connecting the various strike indicator buoys (used for active tending), and more hooks at depth (Appendix 7). DSBG is highly selective for swordfish, typically fished close to shore, and involves few hooks per set (e.g., 8 to 30 hooks in a set). Fishing under EFPs is generally regarded a Category II fishery under the MMPA, given some uncertainty about the level of serious injury or mortality in the fishery and whether the fishery is likely to become authorized. Numerous drift gillnet fishermen have trialed DSBG under EFPs. In 2023, DSBG was authorized as a legal gear type under the HMS FMP (NMFS 2023). As stated in Section 2.1, NMFS prepared an EIS to assess the potential impacts of authorizing this new gear type and the analysis included an evaluation of up to 300 limited entry permits being issued to fish DSBG in the SCB as an additional gear type. In 2023, 77 individuals qualified to receive a limited entry DSBG permit. These permits will become available on a first-come, first-served basis for the 2025 fishing season (88 FR 29545, May 8, 2023).

The U.S. West Coast DSLL fishery consists of a small number of vessels which target tuna but incidentally catch swordfish and other marketable HMS (Appendix 5). This fishery is listed as a Category III fishery under the MMPA, and records indicate few incidences of interaction with species listed as threatened or endangered under the ESA (86 FR 3028, January 14, 2021). The fishery has landed HMS to U.S. West Coast ports since 2005; however, three or more vessels participated in the fishery for only a few seasons, so the West Coast DSLL fishery data was only used for 2019 and 2020. This is due to data confidentiality when fewer than three vessels participate in a fishery.

The Hawaii longline fisheries have landed the majority of domestic swordfish supply to the U.S. West Coast in recent years (Figure 4-1; NMFS 2021a). The Hawaii DSLL fishery is listed as a Category III fishery under the MMPA, while the Hawaii SSLL fishery is listed as a Category II fishery (86 FR 3028, January 14, 2021). Gear and operational modifications such as the adoption of circle hooks, whole finfish bait, and seabird avoidance measures have reduced rates of sea turtle and seabird interactions in these fisheries substantially. The Hawaii SSLL fishery sector operates under limits for leatherback sea turtles, such that the fishery closes for the remainder of the season if observed interactions with leatherback sea turtles exceed the limit for the fishing season (50 CFR 665.813 (b)).

Overall, fishing effort and landings by West Coast vessels have significantly declined over the last two decades (see Figure 4-1; PacFIN 2022). In 2013, 73 DGN permits were issued by the CDFW, but fewer than one third of the permittees were active in the fishery (CDFW 2014). In 2019, 15 DGN vessels made landings with a total revenue of $392,473 (Table 4-59). Swordfish represented roughly 73 percent of that revenue. In 2019, 13 vessels were active in the harpoon fishery with a revenue of $139,655 and swordfish represented nearly 95 percent of that revenue. In 2019, 32 DSBG EFP vessels were active and revenue was roughly $937,471 with swordfish representing in excess of 90 percent of this revenue. Participation in the West Coast DSLL fishery has been low for over two decades, with fewer than three vessels fishing in most years. However, four vessels made landings in 2019 worth $1,579,072 in revenue. Swordfish represented less than two percent of this revenue. The decline in fishing effort and landings is only expected to increase due to the phase-out of gillnet fishing by the end of 2027 under the Driftnet Act.

In recent years, Hawaii longline vessels have landed more swordfish to California than the West Coast fleets combined, despite an uptick in DSBG fishing effort by West Coast-based vessels under EFPs (Figure 4–2). In 2019, 17 Hawaii longline vessels landed catch to U.S. West Coast ports (Table 4-59). Some vessels fishing under Hawaii longline permits have home ports in Hawaii and some vessels have home ports along the U.S. West Coast. West Coast landings by Hawaii longline vessels amounted to $5,636, 088 in revenue, of which swordfish represented approximately 15 percent.

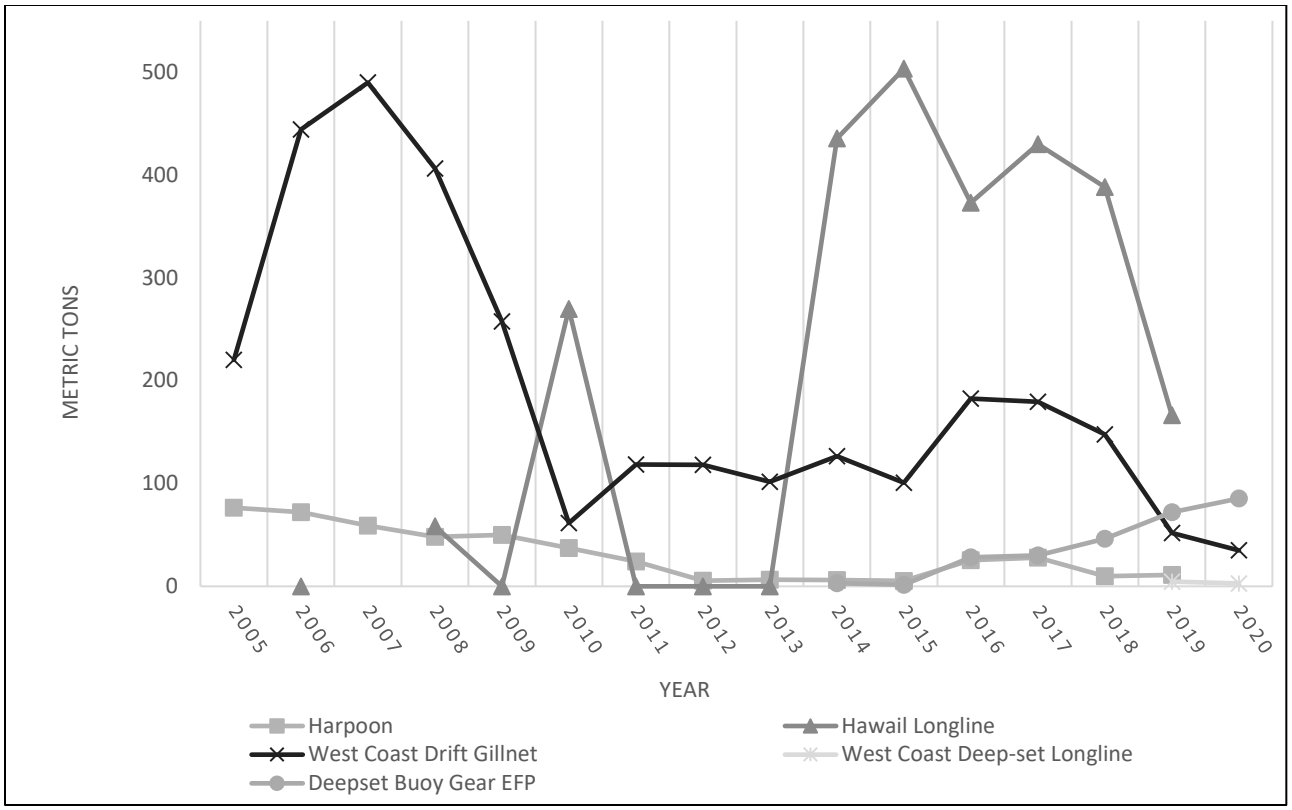


**Figure 4-1.** California swordfish landings by gear type 2004 to 2020.

**Table 4-59**. Participation and Revenue of Domestic Fleets Landing Swordfish to U.S. West Coast in 2019

| Fleet or Fishery | Vessels landing to the West Coast | Fleet Revenue | Revenue From Swordfish |
|---|---|---|---|
| Drift Gillnet | 15 | $392,473 | 72.1% |
| Harpoon | 13 | $139,655 | 94.9% |
| Deep-set Buoy Gear EFP | 32 | $937,471 | >90% |
| West Coast Longline | 4 | $1,579,072 | 1.3% |
| Hawaii Longline | 17 | $5,636,088 | 14.6% |

**Table 4-60**. Price per pound of swordfish landed by domestic fleets landing to the U.S. West Coast in 2019.

| Fleet or Fishery | Price Per Pound of Swordfish |
|---|---|
| West Coast Harpoon | $5.37 |
| Standard Deep-set Buoy Gear EFP | $3.87 |
| Linked Deep-set Buoy Gear EFP | $3.87 |
| West Coast Drift Gillnet | $2.48 |
| Hawaii permitted vessels | $2.24 |
| West Coast Longline | $1.99 |
| Average for all West Coast Landings | $3.30 |

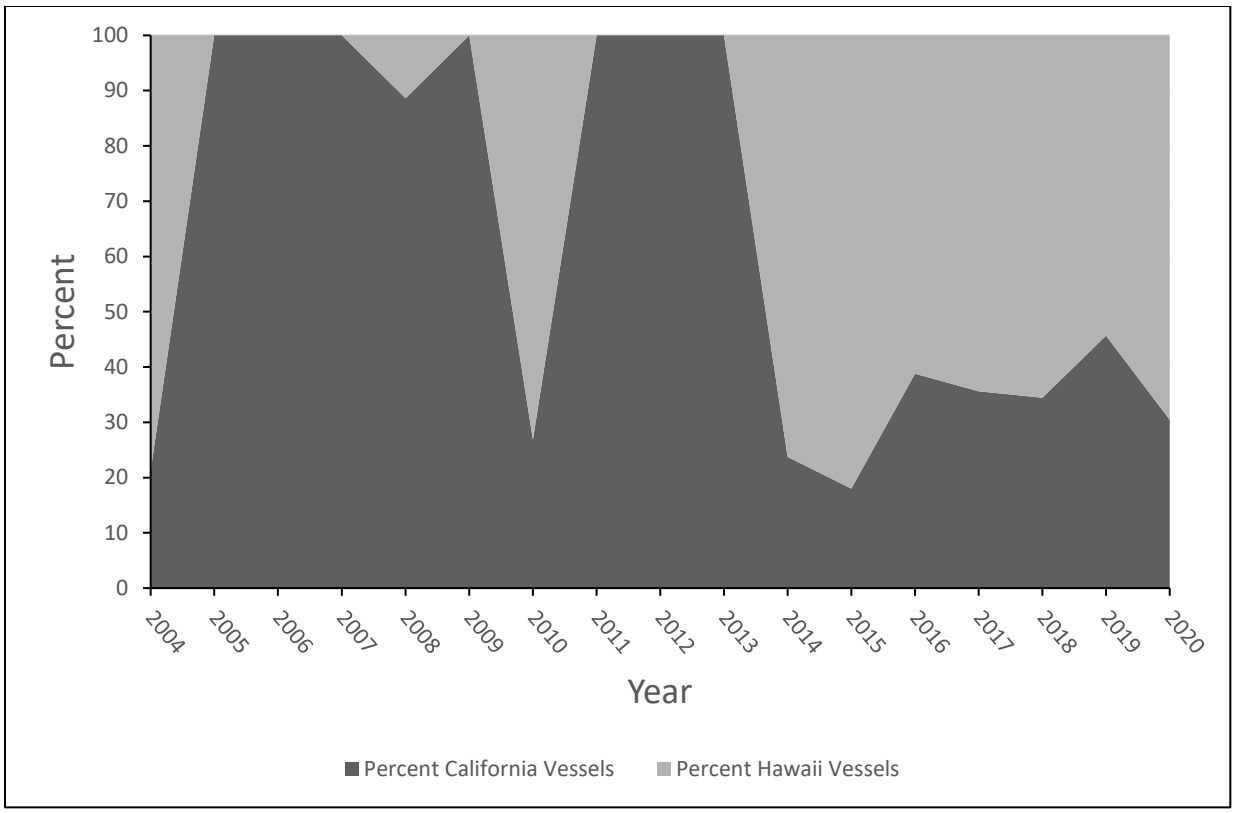


**Figure 4-2.** California swordfish landings by vessel origin 2004 to 2020.

Domestic Fisheries Landing Swordfish and Other Marketable HMS to the U.S. West Coast-Environmental Consequences:

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved, and NMFS and the Council would not obtain data to assess the efficacy of alternative fishing practices under proposed terms and conditions. Current trends in fishing by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue.

Under the No Action Alternative, a heavy reliance on imported swordfish is expected into the foreseeable future. Domestic fisheries landing swordfish to the U.S. West Coast generally would continue to operate under status quo conditions, with a possible increase or decrease in DSBG-caught swordfish depending on the economic viability of the gear as the new authorized fishery progresses. The landings of the Hawaii longline fisheries to the U.S. West Coast, and the impacts associated with these activities, would continue and likely increase as has been the trend for more than a decade. Foreign fisheries would continue to supply the majority of swordfish to the U.S. West Coast under the no action alternative.

Under the No Action Alternative, HMS fishermen would continue to be constrained by existing regulations and limited in their capacity to test the viability of alternative gear types for harvesting HMS from the U.S. West Coast EEZ and to compete in an import-dominated market. Given the transboundary nature of many protected species, continued reliance on imports may indirectly and negatively impact species which U.S. fishery regulations are designed to protect. For example, when bycatch rates in foreign fisheries importing swordfish to the U.S. are higher than those of domestic fisheries, a reliance on foreign fisheries for imported products may lead to more overall impacts to bycatch species throughout their range, which in turn, may require further constraints on domestic fisheries in effort to recover these species as directed by Federal mandates. Further, when costs for domestic fisheries to comply with U.S. protected species regulations constrains competitive pricing of domestic products in comparison to imported ones, profitability of U.S. fishing operations indirectly suffers.

Action Alternatives:

Based on projected landings, all action alternatives are expected to have an economic benefit for applicants that receive EFPs under the Proposed Action. The issuance of EFPs under the Proposed Action is unlikely to impact other fisheries operating within the Proposed Action Area. Any vessels electing to fish under EFPs as opposed to in authorized fisheries would do so voluntarily. The EFP holders would share in harvest limits set for species targeted by other fisheries; however, their share of the catch is not

expected to create allocation issues. Further, the EFP catch would be monitored and subject to catch limits for any HMS species.

Table 4-61 and Table 4-62 show the annual projected catch in number of swordfish and annual expected revenue for action alternatives by Component 1 (shallow-setting) and Component 2 (deep-setting). EFP fishing is expected to catch between 1,326 to 6,629 swordfish for the SSLL alternatives and 94 to 466 swordfish for the DSLL alternatives (PacFIN 2022). Multiplying the number of swordfish projected to be caught for each action alternative by the 2021 average weight of a swordfish caught in the Hawaii longline fishery (148 pounds or 68 kg; WPFMC 2021b) and the 2021 average price per pound of $4.85 (Table 4-61; PacFIN 2022), we project an estimated revenue of between $951,803 to $4,758,206 for the action alternatives under Component 1 and between $67,473 to $344,495 for action alternatives under Component 2. The average price per pound for longline caught swordfish landed on the West Coast was $4.85 in 2021 (PacFIN 2022). The projected swordfish catch and revenue for each action alternative is identified in Table 4-61 and 4-62.

**Table 4-61.** Projected annual revenue from swordfish catch for Component 1 (shallow-setting) for alternatives 1-2, 1-3, 1-4 and 1-5.

| Component 1 | Projected Catch in Number of Swordfish | 2021 Average Price per Pound of Swordfish (U.S. Dollars) | Average Weight of a Swordfish in a Longline Fishery (Pounds) | Estimated Revenue Generated by Swordfish Catch (U.S. Dollars) |
|---|---|---|---|---|
| Alternative 1-2 | 1,326 | $4.85 | 148 | $951,803 |
| Alternative 1-3 | 2,652 | $4.85 | 148 | $1,903,606 |
| Alternative 1-4 | 3,978 | $4.85 | 148 | $2,855,408 |
| Alternative 1-5 | 6,629 | $4.85 | 148 | $4,758,296 |

**Table 4-62.** Projected annual revenue from swordfish catch for Component 2 (deep-setting) for alternatives 2-2, 2-3 and 2-4.

| Component 2 | Projected Catch in Number of Swordfish | 2021 Average Price per Pound of Swordfish (U.S. Dollars) | Average Weight of a Swordfish in a Longline Fishery (Pounds) | Estimated Revenue Generated by Swordfish Catch (U.S. Dollars) |
|---|---|---|---|---|
| Alternative 2-2 | 94 | $4.85 | 148 | $67,473 |
| Alternative 2-3 | 187 | $4.85 | 148 | $134,229 |
| Alternative 2-4 | 466 | $4.85 | 148 | $334,495 |

While swordfish are the target species, EFP fishing effort under any of the action alternatives is likely to also result in catch and revenue from other marketable HMS species. These additional sources of revenue may bolster the viability of gear in trial. Furthermore, any EFPs issued under the action alternatives could inform future decisions about the performance of alternative fishing practices or mitigation measures for targeting swordfish or other marketable HMS when fishing in Federal waters off the U.S. West Coast. It is possible this information is useful for generating additional value, if operational efficiencies are maximized while protected species interactions are minimized.

Owners and operators of longline vessels and transitioning DGN vessels are likely to apply for EFPs to gain access to fishing grounds within Federal waters off the U.S. West Coast. That is, vessels fishing under EFPs under the Proposed Action are likely to be the same vessels that may otherwise fish with longline gear under a Hawaii permit or DGN fishermen fishing under a Federal DGN permit, and land their fish in California. Therefore, the fishing effort under the Proposed Action is more likely to be a shift in fishing effort in the Pacific Ocean rather than the addition of new fishing effort, and the biological and economic impacts of the Hawaii longline fisheries may decrease with a shift in effort under the action alternatives, i.e., away from distant waters towards Federal waters off the U.S. West Coast. Similarly, owners and operators of DGN vessels who are concerned about a continuation of the DGN fishery and who are interested in increasing fishing productivity per set relative to their DSBG EFPs may also be likely to apply for EFPs under the Proposed Action. In such instances, fishing effort by these vessels under any of the action alternatives would constitute a shift in effort away from DGN.

## 4.8 Menu of Additional Measures for Terms and Conditions on EFPs issued under the Proposed Action

Section 2.4 detailed a list of additional measures that may be applied to the action alternatives to further mitigate the potential for negative impacts of the Proposed Action. In general, most of these additional measures are expected to further reduce the potential for negative impacts of the Proposed Action beyond what is described in the Terms and Conditions in Section 2.3. That is, our analysis of impacts is primarily premised on proxy data from the Hawaii longline fisheries (Section 3), in which these additional measures were not required; therefore, these additional measures are additive to regulations for the Hawaii longline fisheries that are discussed as required terms and conditions for the action alternatives. Below we describe the potential impacts of additional measures which are categorized by "bycatch monitoring and mitigation" and "safety at-sea and enforcement," which could apply to any individual EFP operation, and as measures for "large-scale fishing operations," and "small-scale fishing operations," which would apply to either large- or small-scale EFPs, respectively (see Section 2.4 for a description of these additional

measures). Because there is a lack of data on the effectiveness of these measures, we discuss their potential impacts in a qualitative manner.

Bycatch Monitoring and Mitigation Measures

1. **Require human observer coverage.**

   This measure would require use of human observers to monitor fishing activities and provide onboard data collection. The greater the coverage rate, the greater the confidence level that data collected represents catch, bycatch, and protected species interactions of fishing activities as well as areas fished. In theory, there may be an "observer bias," such that fishermen have more incentive to fish conservatively when carrying an observer. However, when examining a variety of datasets in effort to determine whether an "observer bias" existed within the drift gillnet fishery, no evidence was found to suggest the presence of one (Suter *et al.* 2021).

2. **EFP fishing is prohibited in waters off the State of Washington (north of the Washington/Oregon border at 46° 15' N latitude).**

   As a limit on fishable area, this measure could increase impacts to target and non-target species that live outside of this area, and potentially reduce gear conflicts that might otherwise occur with other fishing vessels in the waters off the State of Washington. Other potential area closures addressed in this Section (e.g., nearshore zones, sanctuaries, and critical habitat) overlap with Federal waters off the State of Washington.

3. **EFP fishing is prohibited in waters off the State of Oregon (north of the Oregon/California border at 42° N latitude and south of the Washington/Oregon border at 46° 15' N latitude).**

   As a limit on fishable area, this measure could increase impacts to target and non-target species that live outside of this area, and reduce gear conflicts that might otherwise occur with other fishing vessels in the waters off the State of Oregon for the first year of EFP operations. Other potential area closures addressed in this Section (e.g., nearshore zones, critical habitat, and the PLCA) overlap with Federal waters off the State of Oregon.

4. **Include National Marine Sanctuaries areas (including the Davidson Seamount Management Zone) in the no-fishing zone.**

   This additional mitigation measure may further reduce the potential for impacts to non-target and protected species in comparison to expected impacts presented in Section 4, since there would be no likelihood of interactions if and when these species are within the NMSs. A proportion of the NMSs overlap with other closure areas identified in other measures in this menu. For example, 73 percent of NMSs would be included in the 20 nm no-fishing zone

(additional measure number 31), 57 percent would be included in the 30 nm and 400 m no-fishing zone (additional measure number 32), and 92 percent would be included in the 50 nm no-fishing zone (additional measure number 29).

5. **Include the critical habitat for the leatherback sea turtle in the no-fishing zone.**
The Proposed Action is not expected to affect the availability of leatherback prey species, which is the basis for the critical habitat for the West Pacific DPS leatherback sea turtle (NMFS and USFWS 2020a). This additional mitigation measure could further reduce the potential for impacts to non-target and protected species in comparison to expected impacts to this species as presented earlier in this Section. This is because there would be no likelihood of interactions if and when these species are in this critical habitat area. Without this measure, 45 percent of the leatherback critical habitat may otherwise be included in a 20 nm no-fishing zone (additional measure number 31), 43 percent may otherwise be included in the 30 nm and 400 m no-fishing zone (additional measure number 32) and 91 percent may otherwise be included a 50 nm no-fishing zone (additional measure number 29).

6. **Include the critical habitat for the humpback whale in the no-fishing zone.**
The Proposed Action is not expected to affect the availability of prey species, the presence of which is the basis for the critical habitat within the U.S. West Coast EEZ for humpback whales. The addition of this measure may further reduce the potential for impacts to non-target and protected species in comparison to expected impacts to humpbacks as described earlier in this Section. This is because there would be no likelihood of interactions if and when these species are in this critical habitat area. Without this measure, 42 percent of the humpback whale critical habitat may otherwise be included in the 20 nm no-fishing zone (additional measure number 31), 32 percent of their critical habitat may otherwise be included in the 30 nm and 400 m no-fishing zone (additional measure number 32), and 87 percent of their critical habitat may otherwise be included in the 50 nm no-fishing zone (additional measure number 29).

7. **Include the critical habitat for the Southern Resident killer whale DPS in the no-fishing zone.**
The Proposed Action is not expected to affect the availability of prey species, passage conditions or water quality, which are the basis for the critical habitat within the U.S. West Coast EEZ for Southern Resident killer whale DPS. The addition of this measure may further reduce the potential for impacts to non-target and protected species in comparison to expected impacts to killer whales which are no likely to be affected by the Proposed Action

(see Section 4.5.1 under Other Marine Mammals in the Proposed Action Area Not Likely to be Affected by the Proposed Action). This is because there would be no likelihood of interactions if and when these species are in this critical habitat area. Without this measure, 91 percent of the Southern Resident killer whale DPS critical habitat may otherwise be included in the 20 nm no-fishing zone (additional measure number 31), 100 percent of their critical habitat may otherwise be included in the 30 nm and 400 m no-fishing zone (additional measure number 32), and 100 percent of their critical habitat may otherwise be included in the 50 nm no-fishing zone (additional measure number 29; S. Dunn, pers. comm., November 8, 2022).

8. **No fishing within the Pacific Leatherback Conservation Area during the closure period.**

The addition of this closure of the PLCA to DSLL fishing would close 82 percent of the U.S. West Coast EEZ. However, 8 percent of the PLCA may otherwise be included in the 20 nm no-fishing zone (additional measure number 31), 6 percent of the PCLA may otherwise be included in the 30 nm and 400 m no-fishing zone (additional measure number 32) and 19 percent of the PLCA may otherwise be included in the 50 nm no-fishing zone (additional measure number 29).

An interaction among a leatherback and fishing gear at greater depths is more likely to result in a mortality due to the increased likelihood that a sea turtle cannot make it to the surface for air. While we do not expect interactions between leatherbacks and deep-set activities based on the proxy data used in this analysis, it is possible one could occur. Therefore, applying this time-area closure to deep-set longline-type gear configurations (i.e., Component 2 alternatives) under the Proposed Action may reduce the potential for a mortality event, if an interaction were to occur.

Closing the PLCA to EFP operations would likely have the effect of constraining these activities to Federal waters within the SCB and could result in increased conflicts or perceived conflicts with other user groups. That is, it may be less likely that EFP activities would take place off Oregon, even if permitted in later years (under additional measure number 3), since the PLCA extends from waters off central California to northern Oregon. Vessels may be unlikely to transit the considerable distance north to trial new fishing grounds.

Constraining fishing to areas outside of the PLCA may impact swordfish CPUE. The PLCA is recognized as productive fishing grounds for swordfish. Notably, swordfish CPUE

increased 5 to 7 fold in 2019 when fishing occurred inside the PLCA under the 2019 Longline EFP (Appendix 6). The swordfish CPUE for deep-setting activities under this EFP was 4.180 fish per 1,000 hooks for sets made inside, versus 0.773 fish per 1,000 hooks for sets made outside of the PLCA (Appendix 6, Table A-6-6). The swordfish CPUE during shallow-set activities under this EFP was 14.383 fish per 1,000 hooks for sets made inside versus 1.879 fish per 1,000 hooks for sets made outside of the PLCA (Appendix 6, Table A-6-5). Therefore, closing this area is likely to limit swordfish CPUE, which may have the effect of limiting data gathering as well as the profitability of EFP activities.

9. **Use of the Temperature Observations to Avoid Loggerheads (TOTAL) tool to inform closure of the Loggerhead Conservation Area.**

The addition of this measure may further reduce impacts to loggerhead sea turtles than the levels anticipated earlier in Section 4. Without this term and condition, 47 percent of the LCA would be included in the 20 nm no-fishing zone (additional measure number 31), 30 percent of the LCA would be included in the 30 nm and 400 m no-fishing zone (additional measure number 32), and 69 percent of the LCA would be included in the 50 nm no-fishing zone (additional measure number 29). A closure of the LCA and the PLCA would leave little area within the Proposed Action area open to fishing with deep-set gear.

10. **A species limit placed on the number of hooked or entangled leatherback sea turtles during the duration of EFP fishing.**

The addition of this measure may further reduce impacts to leatherback sea turtles during EFP fishing in comparison to projected impacts reported for this species earlier in this Section, as actions taken to constrain fishing upon a limit being reached could increase incentives to avoid a species. This assumes that information on how to avoid these species is available. The limits could also constrain fishing opportunities if information is lacking on how to prevent any such interactions.

11. **A limit on the number of observed leatherback sea turtle mortalities.**

The addition of this measure may further reduce impacts to leatherback during EFP fishing as actions taken to constrain fishing upon a limit being reached can increase incentives to avoid these species. This assumes that information on how to avoid these species is available. However, it could also constrain fishing opportunities, if limits on the mortality of these species require vessels to cease EFP fishing and if information is lacking on how to prevent any such interactions.

12. **Allow vessels that stern-set shallow-set gear to begin setting earlier than local sunset, if using double tori lines for seabird avoidance.**

The use of a double tori line may further reduce the likelihood of adverse impacts to seabirds. The proxy data used to project seabird interactions under the Proposed Action (see Section 4.5.4) came from fisheries that did not require the use of tori lines. As discussed in Section 2, recent studies indicate that the use of tori lines are more effective than the use of blue-dyed bait or strategic offal discharge requirements employed in the Hawaii longline fisheries. Additional studies are underway to explore the use of double tori lines with early set times in the Hawaii SSLL fishery (86 FR 71234, December 17, 2021). Based on currently available information, we expect seabird interactions under the Proposed Action to be lower than those projected in Section 4 with the use of a double tori line, despite the added flexibility to set earlier. That is, tori lines are expected to more than offset the potential negative impact to seabirds of beginning to set gear before sunset. Nonetheless, NMFS will consider the results of any studies that suggest otherwise when determining whether and when to apply this measure to EFPs.

Allowing vessels to set before sunset gives crew the operational flexibility to set gear more efficiently with the advantage of some daylight especially in shallow-setting EFPs that want to actively tend gear. Tori lines may cost upwards of $200 per unit (C. Brady, pers. comm., November 4, 2020) and require some investment of time to deploy according to specifications (Appendix 11).

13. **Prohibit use of wire leaders.**

This measure may further reduce impacts to sharks than those projected in Sections 4.2 through 4.5. That is, the proxy data used for our quantitative analysis of the impacts of the action alternatives comes from fishing activities for which the use of wire leaders was not prohibited. The best scientific information available suggests that a gear conversion from wire leaders to monofilament leaders is likely to reduce the impact to oceanic whitetip and other shark species (87 FR 25153, April 28, 2022). This is due, in part, to the fact that sharks can more easily bite through monofilament line, resulting in early release. Further, fishermen can efficiently release sharks that are brought to the vessel with less trailing gear attached to the animal. Hutchinson and Bigelow (2019) found that the condition at release (good versus injured) and the amount trailing gear left on the shark were the two factors that had the largest effect on post release fate. Animals released in good condition without trailing gear had the highest rates of survival. The cost of replacing wire with monofilament nylon leaders is $173 to $489 per vessel depending on whether fishing with SSLL or DSLL; this cost is expected to be reduced for small-scale fishing operations.

Swimmer *et al.* (2020) noted that the use of monofilament instead of wire leaders is known to be effective at reducing shark bycatch in longline fisheries. Additionally, in 2017, the International Commission for the Conservation of Atlantic Tuna's Standing Committee on Research and Statistics indicated that shark catch rates on longline gear, including shortfin mako shark catch rates, are lower on monofilament leaders compared to wire leaders (ICCAT 2020). These researchers further concluded that the use of monofilament leaders is an effective method for reducing shark bycatch in longline fisheries.

Replacing wire leaders with monofilament line increases the risk of lead weights "flying back" at crew when cutting large sharks or other animals free. We do not expect "flyback" issues to be as much of a concern for deep-set versus shallow-set activities because DSLL is hauled back at slower speeds. Therefore, the projected catch rate for sharks is expected to be lower for the deep-setting component of EFP fishing than that indicated in Sections 4.2 through 4.5. However, it is questionable whether potential safety-at-sea (National Standard 10, 50 CFR 600.355) concerns can be effectively mitigated for the fishing SSLL gear with monofilament, as opposed to wire leaders. This is because the risk of crew injuries due to "flyback" of the monofilament leader and weight increases with haul back speed, such that there may be insufficient time to use the flyback prevention device (additional measure number 24 and Figure 2-2). Additionally, measures intended to facilitate gear tending (additional measure number 40), like limits on soak times (additional measure number 39) may further exacerbate safety-at-sea issues that may arise if this measure is imposed.

14. **Mako and blue shark post-release mortality research.**

The addition of this measure would require the participation of EFP fishing vessels in a post-release survival study focusing on blue and shortfin mako sharks captured during EFP fishing (Appendix 10). The data collected could provide useful insights for mitigating shark interactions with fishing gear in the West Coast EEZ and expand existing datasets concerning shark interactions with longline and longline-type gears throughout the Pacific. Therefore, the addition of this measure will help further research on best practices to reduce impacts to sharks from fishing operations in the eastern Pacific, and better enable adaptive management of EFP activities.

15. **Use of EcoCast, a near real-time dynamic ocean management tool.**

The addition of this measure may help fishermen make decisions about where to fish to reduce the likelihood of interactions with non-target species which in turn may further reduce impacts to those species relative to the projected impacts of the Proposed Action

alternatives described in Sections 4.2 through 4.5. Use of EcoCast by EFP fishermen can also help validate or improve model predictions or both.

16. **Prohibit the use of "lazy lines."**

Prohibiting the use of lazy lines may further reduce impacts to non-target species, especially seabirds, (e.g., seabirds that would otherwise be diving down as well as non-target fishes dragging behind the vessel as described in Section 2) than those projected in Section 4.2 through 4.5, but it may slow down the haul-back of fishing gear.

17. **Hook depth >30 m.**

This additional mitigation measure may further reduce impacts to non-target species whose habitat includes the upper water column, particularly air breathing species like marine mammals or sea turtles.

18. **Require the use of only mackerel-type bait when deep-setting.**

We expect that this measure could further reduce impacts to sea turtles from those projected earlier in this Section. That is because the use of mackerel-type bait is not required in the Hawaii DSLL fishery. However, the use of mackerel-type bait (vs. squid) was found to significantly reduce the capture probability of loggerhead sea turtles in the Pacific Ocean; in addition, capture probabilities are lowest when using a combination of circle hook and mackerel-type bait (Swimmer *et al*. 2017).

Nonetheless, the intent to reduce sea turtle bycatch must be balanced against impacts to potential target species catch. Bait choice can potentially increase bycatch of certain sharks or other vulnerable species. Additionally, sea turtle interaction rates in the DSLL fishery are significantly lower than in the SSLL fishery as evidenced in Table 3-4 (SSLL interaction rates) and Table 3-6 (DSLL interaction rates). For example, in 2011, the rate was 0.001 turtle per 1,000 hooks in the deep-set fishery compared to 0.022 turtle per 1,000 hooks in the SSLL fishery (77 FR 34331, June 11, 2012).

19. **Set limits on hook sizes for shallow-setting or deep-setting activities, or for both. Limit hook sizes between 16/0 to 18/0 hooks, and with hook offset by no more than 10˚.**

Limitations on the size of circle hooks is consistent with the best scientific information available, which underpins regulations establishing a minimum hook size restriction for U.S. vessels fishing SSLL gear under Hawaii permits (50 CFR 665.813 (f) and (g)). In 2019, the IATTC adopted a revision to the IATTC sea turtle Resolution C-19-04 to include additional mitigation measures including large circle hooks for shallow-set longline fishing in the IATTC Convention Area. Because "large circle hook" was not defined, the Resolution

tasked the Bycatch Working Group to "…analyze scientific information regarding different circle hooks sizes and their effectiveness at mitigating sea turtle bycatch (decreasing catch and increasing post-release survival) and provide a recommendation to the Commission for a minimum hook size as well as a schedule for implementing this recommended minimum hook size through a revision to this resolution." In 2021, the IATTC hosted a circle hook workshop and presentations were provided on circle hook sizes including the effectiveness of 18/0 for sea turtle bycatch reduction in shallow-set longline fishing (IATTC 2022b). No agreement on a recommendation could be reached on a definition for large circle hook size at the workshop or at subsequent Bycatch Working Group meetings in 2021 through 2023. Because we used data from the Hawaii SSLL fishery to project impacts of the Proposed Action, we conclude that setting a smaller minimum hook size than 18/0 is likely to increase bycatch of sea turtles relative to levels projected for shallow-set activities earlier in Section 4. However, the 18/0 hook size is not required in the Hawaii DSLL fishery.

Since 2012, regulations for the Hawaii DSLL fleet have specified circle hooks with a maximum wire diameter of 4.5 mm (and 10˚ offset or less). The purpose of these regulations was to reduce bycatch of ESA-listed populations of false killer whales, which are not present in the Proposed Action Area (see Section 4.5.1 Marine Mammals). The maximum hook size restrictions intend for the use of a "weak" hook that is more easily straightened to release the animal (77 FR 71260, November 29, 2012). ESA-listed false killer whales, however, are not present in the Proposed Action Area. Yet, the intended conservation impact may be applicable to other species in the Proposed Action Area. As evidenced in Table 3-4 (SSLL interaction rates) and Table 3-6 (DSLL interaction rates), sea turtle interaction rates in the DSLL fishery are significantly lower than in the SSLL fishery. For example, in 2011, the rate was 0.001 turtle per 1,000 hooks in the deep-set fishery compared to 0.022 turtle per 1,000 hooks in the shallow-set fishery (77 FR 34331, June 11, 2012). Therefore, while we expect that requiring an 18/0 hook size for all activities under EFPs would further reduce impacts to sea turtles from those projected for deep-setting activities earlier in this Section, it is important to consider the potential for adverse impacts to other species from increasing the strength of the hook.

Overall, the addition of a large circle hook size limit is expected to reduce impacts to protected species overall, though it may negatively impact catchability of some target species. A circle hook and bait study conducted in 2002 and 2003 in the Western North Atlantic Ocean on longline vessels indicated that the combination of 18/0 circle hooks with

mackerel bait was even more effective than circle hooks alone are reducing bycatch of loggerhead sea turtles, and had a significant increase in swordfish catch by weight (Foster *et al.* 2012). Furthermore, with all hook types, mackerel bait resulted in a significant decrease in blue shark.

20. **Use of a hydraulic line shooter during all EFP operations.**

The addition of this measure may further reduce impacts to seabirds as a line shooter can create slack in the mainline while setting, which allows hooks to sink faster; and thus, reduces the time baited hooks may be available to seabirds.

21. **Require monofilament branch lines or leaders to have a diameter (thickness) of 2.0 mm or greater, and a minimum breaking strength of 181 kg (400 pounds) for any other material used in the construction of a leader or branch line.**

The Council recommended requiring that leaders be at least 2.0 mm in diameter. This measure is likely to further reduce impacts to sharks and marine mammals. Specifications on the diameter of leader lines seek for gear to be assembled and maintained such that the hook is the weakest component of the terminal tackle. However, there could be a trade-off to the benefits of requiring branch line or leader size greater than 2.0 mm. The larger the monofilament diameter, the increased likelihood the weak hooks (intended for the benefit of marine mammals) will bend or straighten before the monofilament breaks. Conversely, it could decrease the ability for sharks to bite through the monofilament. The Council's recommendation was intended to strike a balance between the two benefits. Depending on the interactions with sharks versus marine mammals, NMFS may adjust the monofilament diameter accordingly. Additionally, this measure may initially increase costs for new monofilament under the Proposed Action; however, vessels that fish in the Hawaii DSLL fishery are already required to fish with monofilament with 2.0 mm or greater diameter.

22. **When deep-setting, require the use of circle hooks with a maximum wire diameter of 4.5 mm and must be offset by more than 10˚.**

The addition of this measure would require circle hooks to have a maximum wire diameter of 4.5 mm (0.177 in.) containing round (non-flattened) wire that can be measured with a caliper or other appropriate gauge, and be offset by more than 10˚ when deep-setting under the Proposed Action, similar to the current Hawaii DSLL fishery sector regulations under the False Killer Whale Take Reduction Plan (50 CFR 229.37 (c)(1)). The wire diameter regulations for the Hawaii DSLL fishery are intended to create a "weak hook" to allow large marine mammals to bend or straighten the hook to escape. Weak hooks exploit the size and weight disparity between the fishery's target species and other species, and promote the

release of larger, non-target or bycatch species (Bigelow *et al.* 2011). To be effective, the hooks should be strong enough to retain target catch (which is tuna in the Hawaii DSLL fishery) and should bend and straighten under the strain of a marine mammal, allowing the animal to release itself and thereby reduce the likelihood and severity of injury. If fishing operations are small-scale then the probability of an interaction is less than in large-scale fishing operations where there are more hooks in the water during a given set. This measure may initially increase costs for new hooks under the Proposed Action; however, vessels that fish in the Hawaii DSLL fishery have likely already purchased "weak hooks" as they are required in that fishery.

23. **Require gear and line marking to identify protected species entanglement.**

This measure could help discern the source of impacts of animals found or reported as entangled in fishing gear. In instances where monitoring coverage of EFP activities approaches 100 percent, it is expected that entanglements in the fishing gear would be documented; therefore, this additional measure may not yield additional information. However, there could be some potential for an animal to escape an interaction unseen and with the fishing gear attached. It may be labor intensive for EFP vessel owners or crew to ensure that distinct line markings attributed to the vessel is affixed to every piece of longline-type gear, unless gear could be manufactured in this manner. This measure is likely to impose additional costs to fishermen interested in fishing under the Proposed Action as line-marking has not been a common practice in U.S. fisheries and would require either new gear purchases or modifications to existing fishing gear. These costs may vary depending on the amount of gear to be deployed during fishing operations and the length of line between markings. In cases of entanglements reported to NOAA Fisheries outside of fisheries monitoring programs, only 33 percent included six to 20 ft of line, whereas in 50 percent of cases fewer than 5 ft of line was available to identify the origin of entanglement (D. Lawson, pers. comm., April 19, 2022). Line marking could help identify the source of entanglements even if small amounts of line are left on the animal.

<u>Safety At-sea and Enforcement Measures</u>

24. **Use the Hawaii longline fishery "flyback prevention device" (Figure 2-2) for fishermen safety while using monofilament leaders.**

The addition of this measure is intended to mitigate safety at-sea issues arising from a requirement to replace wire leaders with monofilament line (additional measure number 13). This measure may increase safety of crew, and improve safe-handling and release capabilities in keeping with the MSA's National Standard 10, safety of life at sea (50 CFR

600.355).

25. **VMS ping rates at once per hour, or more frequent for specific EFPs.**

Higher ping rates may provide greater precision when determining a vessel's position at a specific point in time. This measure would require 1-hour ping rates, as required for other HMS fisheries, unless a higher rate is needed to adequately monitor EFP activities and enforce terms and conditions. At a once per hour ping rate, the costs to EFP vessel owners that are already required to use VMS in HMS fisheries, such as drift gillnet or longline, should remain relatively constant. However, if it is determined that higher ping rates are needed to effectively monitor terms and conditions of EFPs, then the cost of complying with this measure could double or triple. That is due to the communication costs for continued operation of a VMS unit; as the ping rate increases so do the communication costs.

26. **Require an automatic identification system (AIS) be installed and in use when fishing gear is deployed.**

The addition of this Council-recommended measure to require EFP vessels to have AIS installed and in use when fishing gear would bolster safety at-sea for vessels fishing in crowded areas and in or near shipping lanes. However, vessels fishing under the Proposed Action may be subject to no-fishing zone in areas shore-side of 50 nm (additional measure number 29) or 20 nm (additional measure number 31) or 30nm and 400 m depth contour (additional measure number 32). These measures would force fishing under the Proposed Action out of areas with heavier vessel traffic. Furthermore, AIS systems are designed for ship to ship interaction through VHF and other vessels are only clearly visible on radar with other vessels that carry AIS.

If applied as a term and condition of EFPs, each fishing vessel would be responsible for the purchase of their own AIS (costs range from $500 to $1,000; G. Busch, pers. comm., May 13, 2022). This would increase operating costs under Proposed Action relative to participation in other HMS fisheries, as AIS systems currently are not required for vessels under 65 ft. Costs are variable in that it typically costs more for vessels to integrate AIS with their VHF, but unlike with VMS, there are no continuing communication service fees. AIS is primarily a collision avoidance system while VMS is more effective for tracking fishing vessel movement and effort.

27. **Mainline must remain attached to the vessel.**

This Council-recommended measure was intended to strengthen gear tracking for enforcement purposes. That is, if the mainline is attached to the vessel, enforcement agents

can use the position of the vessel transmitted via VMS as a proxy for the position of the gear.

Attaching the mainline to the vessel may adversely affect fishermen's ability to effectively fish the gear (i.e., reach or maintain hooks at target depths). Such an affect may lead to increased adverse impacts relative to the projections reported earlier in Section 4. This is especially likely if hooks are fished in shallower depths than otherwise anticipated, and where the likelihood of interactions with air-breathing species increases. Fishing in rough seas and wind are more likely to reduce the capacity to fishing at target depths as the mainline may be pulled more erratically in response to the conditions.

Additionally, attaching the mainline to the vessel when fishing could present safety concerns in hazardous weather conditions. That is, the vessel may become limited in its capacity to safely respond to high wind and sea conditions if it is attached to the fishing gear. While offering an exemption from the requirement when the NWS declares a Small Craft Advisory could alleviate safety-at-sea concerns for fishing the gear in the SCB, the winds and seas are notoriously more intense in Federal waters north of Point Conception and inside the PLCA. Therefore, this measure may serve as a deterrent for EFP vessels to trial the use of alternative gear under the Proposed Action in areas outside of the SCB.

28. **Gear will be clearly marked and lit, and never set in shipping lanes, areas of high traffic, or areas where whale activity is observed.**

The addition of this measure may further reduce impacts to safety at-sea for vessels fishing in crowded areas and in or near shipping lanes, and help identify gear when protected species may become entangled. However, this measure would initially increase costs for gear marking compliance under the Proposed Action relative to requirements for other HMS fisheries. Marking gear can typically be achieved using permanent marker or paint to clearly apply vessel information to buoys or flags. The cost for a buoy with a radar reflector or strobe light varies, but is approximated at $500.

<u>Measures Applicable to Large-scale Fishing Operations</u>

29. **No fishing within 50 nm of the mainland shore and islands.**

The addition of this measure may further reduce the potential for impacts to sea turtles and protected species that frequent nearshore habitats within 50 nm from shore in comparison to expected impacts presented earlier in this Section, since there would be no likelihood of interactions if and when these species are in within 50 nm from shore with this no-fishing zone. The 50 nm no-fishing zone includes 91 percent of the leatherback critical habitat, 100 percent of the Southern Resident killer whale DPS critical habitat and 87 percent of the

humpback whale critical habitat. The 50 nm no-fishing zone also has overlap with 19 percent of the PLCA (50 CFR 660.713(c)(1))), 69 percent of the LCA (50 CFR 660.713(c)(2)) and 96 percent of the NMSs (Figure 2-1; R. Morse, pers. comm., January 6, 2022). This measure could also reduce the potential for gear conflicts in nearshore waters where there are elevated numbers of recreational and commercial fishing vessels.

30. **Annual limit on the incidental catch of striped marlin.**

This measure to limit the catch of striped marlin may further reduce the catch of striped marlin. It could also reduce impacts to non-target and protected species under all action alternatives if fishing must cease due to levels of marlin catch reaching the set limit. EFP fishing would remain closed throughout the duration of the annual limit period if a limit were reached.

Measures Applicable to Small-scale Fishing Operations

31. **No fishing within 20 nm of the mainland shore and islands.**

The addition of this measure may further reduce the potential for impacts to non-target and protected species that frequent nearshore habitats within 20 nm from shore in comparison to expected impacts presented earlier in this Section, since there would be no likelihood of interactions if and when these species are in within 20 nm from shore with this no-fishing zone. The 20 nm no-fishing zone includes 45 percent of the leatherback critical habitat, 100 percent of the Southern Resident killer whale DPS critical habitat and 42 percent of the humpback whale critical habitat. The 20 nm no-fishing zone also has overlap with 8 percent of the PLCA, 47 percent of the LCA and 72 percent of the NMSs (Figure 2-1). This measure could also reduce the potential for gear conflicts in nearshore waters where there are elevated numbers of recreational and commercial fishing vessels.

32. **No fishing shore-side within 30 nm of the mainland shore when south of Point Conception and no fishing shore-side of the generalized 400 m depth contour when north of Point Conception.**

The addition of this measure may further reduce the potential for impacts to non-target and protected species that frequent nearshore habitats within 30 nm from shore in comparison to expected impacts presented earlier in this Section, since there would be no likelihood of interactions if and when these species are in within 30 nm from shore with this no-fishing zone. The 30 nm and 400 m depth contour no-fishing zone includes 43 percent of the leatherback critical habitat, 100 percent of the Southern Resident killer whale DPS critical habitat and 32 percent of the humpback whale critical habitat. This no-fishing zone also has

overlap with 6 percent of the PLCA, 30 percent of the LCA and 57 percent of NMSs (Figure 2-1). This measure could also reduce the potential for gear conflicts in nearshore waters where there are elevated numbers of recreational and commercial fishing vessels.

33. **Annual limit of 10 striped marlin incidentally caught during EFP fishing.**

The addition of this Council-recommended measure to limit injuries or mortalities of striped marlin caught during EFP activities could incentivize avoidance of striped marlin. Additionally, the measure could reduce other impacts to non-target and protected species for all action alternatives should fishing cease and remain closed throughout the remainder of the 12-month period if a limit were reached.

34. **All non-marketable live sharks will be released alive, and all dead sharks must be retained unless prohibited from commercial take.**

The addition of these measures may further reduce impacts to sharks relative to those projected in Sections 4.2 through 4.5. Taking reasonable steps for releasing live sharks and following best practices for releasing sharks by leaving sharks in the water (not brought onboard to remove gear) and cutting away as much trailing gear as possible (ideally leaving less than 1 m) will allow for a potential decrease in mortality of sharks. Additionally, a requirement to retain dead sharks, unless otherwise prohibited, could reduce fishing time if hold capacity becomes full. This requirement could constrain a fishing vessels' hold capacity for other more marketable catch, and thus result in shorter fishing trips than may have otherwise been executed. For these same reasons, profitability of fishing trips could also be constrained, especially if retained sharks are either unmarketable species or valued lower than other marketable catch.

35. **Each buoy will have a plastic breakaway link connecting buoy and buoy line.**

The addition of this Council-recommended measures may further reduce potential negative impacts on protected species such as a whale if one were to interact with the gear. However, this practice would likely increase operational costs.

36. **Limits on number of hooks on any shallow-set to 400 or fewer, and on any deep-set to 800 or fewer.**

Because fewer hooks would be deployed during any given set, and less gear would be needed to deploy fewer hooks, the likelihood of entanglement may be reduced. As stated earlier, 400 shallow-set hooks or less per set represents 30 percent or less than the average number of hooks deployed per set in the Hawaii SSLL fishery, and limiting deep-set longline hooks to 800 or less hooks per set represents 30 percent or less than the average number of

hooks deployed per set in the Hawaii DSLL fishery. This measure may further reduce potential impacts to non-target species beyond the projections made earlier in this Section.

37. **Limit total mainline length to less than 5 nm.**

The addition of this Council-recommended measure may further reduce impacts to target and non-target species relative to those projected earlier in this Section. Some longlines can be up to 40 to 60 nm, so limiting mainline length to less than 5 nm greatly reduces the amount of gear being deployed from a vessel and soaked in the water during a set. Because of this, the likelihood of animal entanglement may be reduced.

38. **Limit total mainline length to less than 10 nm.**

The addition of this Council-recommended measure may further reduce impacts to target and non-target species relative to those projected earlier in this Section. Some longlines can be up to 40 to 60 nm, so limiting mainline length to less than 10 nm greatly reduces the amount of gear being deployed from a vessel and soaked in the water during a set. Because of this, the likelihood of animal entanglement may be reduced.

39. **Limit soak time.**

The addition of this Council-recommended measure is likely to further reduce impacts to target and non-target species relative to those projected earlier in Section 4. By reducing the amount of time the gear is soaked, fishermen must spend more time deploying and retrieving as opposed to fishing the gear. This practice would likely increase operational costs, but could reduce the amount of time any non-target species may remain hooked or entangled by the gear.

40. **Use of gear tending.**

The addition of this measure may further reduce impacts relative to those projected earlier in this Section. While data from DSBG fishing has shown that actively tending gear may allow strikes to be attended to more quickly, and thus, increase the likelihood that an animal is able to be released from the gear alive (NMFS 2021a), this dataset (see Section 3.1 and Appendix 7 for deep-set LBG EFP observer dataset) was only a small proportion of the proxy data used in this analysis. Actively tending the gear may increase the operational costs of fishing the gear, instead of soak time being used to attend to other tasks on the vessel. In addition to this measure, the Council also recommended other measures intended to facilitate active tending of the gear when fished. Examples include allowing some daytime shallow-setting (additional measure number 12), limits on the span of gear (additional measure numbers 37 and 38), limits on soak time (additional measure number 39), and/or break-away link

requirements (additional measure number 35).

41. **Use of a heavy weighting system.**

The addition of this measure may further reduce impacts to seabirds as a heavy weighting system (greater than or equal to 4 lbs) provides rapid decent rates to avoid non-target species above the thermocline, maintains hooks at a constant depth throughout deployments, and maintains vertical lines taut to reduce probability of entangling or hooking seabirds.

42. **Use of a strike indicator.**

This additional mitigation measure may further reduce impacts to non-target species as a strike indicator allows for service of gear when a hooked species is on the line. Strike indicators may reduce the amount of time non-target species are likely to be on the line with quick release from the hook which could potentially decrease post release mortality.

43. **Use of GPS trackers on fishing gear.**

This additional mitigation measure may further reduce impacts by preventing gear loss, facilitating daytime servicing of gear, and providing additional safeguards in the rare event of a marine mammal entanglement.

44. **Use of electronic monitoring for observing.**

This additional mitigation measure may further reduce impacts to non-target species as the use of electronic monitoring to monitor fishing activities would increase the coverage rate, and increase the confidence level that data collected represents catch, bycatch, and protected species interactions of fishing activities as well as areas fished, especially when electronic monitoring is used in tandem with a human observer.

# 5 Cumulative Effects

This section addresses the significance of expected cumulative impacts on the affected environment. Cumulative impacts result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7).

## 5.1 Past, Present, and Reasonably Foreseeable Future Actions Other than the Proposed Action

The scope of past and present actions for the affected resources includes actions that occurred after implementation of the HMS FMP in 2004 (PFMC 2003). Implementation of the HMS FMP and associated regulations represents a milestone in establishing the management framework for U.S. West Coast HMS fisheries and rules for their operations. For endangered species and other protected resources, the scope of past and present actions is determined by analysis pursuant to the ESA and MMPA, including BiOps (defined in Section 8, Appendix 2—Glossary) for the HMS fishery and marine mammal SARs. The temporal scope for future actions includes the data collection period for alternative fishing practices under EFPs, inclusive of adjustments in terms and conditions as learning takes place. The temporal scope is no shorter than the time necessary to transition the DGN fishery to alternative fishing practices as described in the Driftnet Act. In this Section, we consider cumulative impacts that might occur for different levels of anticipated fishing effort by Component 1 (shallow-setting) and Component 2 (deep-setting) alternatives.

### 5.1.1 Fishing-related Actions

Past, present, and reasonably foreseeable future state and Federal fishery management actions both authorize fisheries and control catch, bycatch, and interactions with protected species. These actions contribute to the current and future effects on managed stocks, protected resources, fishing opportunity, harvester costs and net revenue, and employment in fishing communities. Past, ongoing, and reasonably foreseeable actions with potentially detectable effects are summarized below.

Regularly Scheduled Management Activities for HMS Fisheries in the EPO

To guide domestic management activities for HMS fisheries occurring in the U.S. West Coast EEZ, the Council developed the HMS FMP to coordinate state, Federal, and international management recommendations. NMFS, on behalf of the United States Secretary of Commerce, partially approved the HMS FMP on February 4, 2004. The majority of the implementing regulations became effective on April 7, 2004. The reporting and record keeping provisions became effective February 10, 2005. The Council and NMFS regularly consider modifications, changes, or updates to management measures prescribed in

the HMS FMP, which are codified in the corresponding regulations. NMFS implements these decisions under the MSA. For example, the Council's biennial management process includes consideration of updates or changes to measures in the HMS FMP for determining the status of stocks and/or adjusting various catch limits or harvest guidelines for MUS. NMFS then works on implementing any such recommendations resulting from that process. A primary goal of the biennial management process is to ensure compliance with National Standard 1 by adopting conservation and management measures that prevent overfishing while achieving optimum yield on an ongoing basis.

In addition to domestic fishery management processes, the United States (along with many other fishing nations) participates in international organizations (e.g., regional fisheries management organizations (RFMOs)) to support the conservation and management of HMS on larger geographic scales. RFMOs adopt living marine resource conservation and management measures for oceanic regions (including multiple national jurisdictions and the high seas) through consensus on resolutions. The measures in these resolutions are binding for members. The United States is a member of the IATTC, which is the RFMO responsible for the conservation and management of fisheries for tunas and tuna-like species in the EPO (generally east of 150° W longitude). The United States is also a member of the Western and Central Pacific Fisheries Commission (WCPFC), which plays a parallel role in the western and central Pacific Ocean (generally west of 150° W longitude). The United States' obligations under the IATTC and WCPFC are pertinent with regard to cumulative effects on fisheries and resources in the Proposed Action Area, as well as fisheries in the vicinity of the Proposed Action Area that interface with resources in the Action Area. The IATTC and WCPFC have adopted resolutions to control catch of HMS that are also management unit species in the HMS FMP. Similar to the domestic management process, the RFMOs renegotiate catch controls on an ongoing basis. NMFS implements these resolutions under the Tuna Conventions Act (16 U.S.C. 951 *et seq.*). Catch limits for U.S. vessels that fish for bigeye and bluefin tuna in the EPO are especially relevant.

- ***Bigeye:*** NMFS has implemented IATTC Resolutions limiting the annual commercial catch of bigeye tuna in the EPO by longline vessels greater than 78.74 ft (24 m) in overall length. Once the limit is reached, NMFS closes commercial fishing for bigeye tuna to these vessels through the remainder of the calendar year (50 CFR 300.25(a)(2)). As described in Subsection 4.2 (Commonly Caught Management Unit Species), the latest assessment results show that fishing effort has been below the level corresponding to MSY, and that the stock is neither overfished nor subject to overfishing.

- ***Bluefin:*** Based on IATTC Resolutions and in accordance with advice from the Council, NMFS implemented catch and trip limits that apply to United States commercial vessels that fish for Pacific bluefin tuna in the EPO (50 CFR 300.25(g)(2) and (3)). Recent IATTC Resolutions are intended to aid in the rebuilding of the stock, and include reduced limits on bluefin tuna catches in the EPO. Preliminary results from a 2022 stock assessment indicate that the Pacific bluefin tuna stock reached the first rebuilding target, and the second rebuilding target is expected to be reached by the next stock assessment, which is sooner than anticipated (IATTC 2022c).

Fisheries Operating within or in the Vicinity of the Proposed Action Area

Because of the transboundary nature of HMS stocks and fisheries, management decisions have effects in the U.S. EEZ and international waters. State management entities may also influence fisheries operations. Given the anticipated target species and location of the Proposed Action, the most probable cumulative effects will be associated with the federal HMS fleets (the West Coast DGN fleet, the West Coast DSLL fleet and the DSBG fleet, as well as the Hawaii DSLL and SSLL fleets), the demersal longline sablefish fishery, and the Dungeness crab fishery managed by the states of California, Oregon, and Washington. Regulations pertaining to federal fisheries that target HMS in the EPO are codified in regulations located at 50 CFR part 660 subpart K, and 50 CFR part 300 subparts C and O. Past and present management actions for longline and longline-type fisheries that occur in the vicinity of the Proposed Action Area are also described in more detail in Subsection 1.3, Background.

These fisheries and fleets that operate in the vicinity of the Proposed Action may incidentally catch the same target and non-target species as those projected to be caught under the Proposed Action. The West Coast DGN fishery and the DSBG fleet target the same HMS species within the Proposed Action Area. The sablefish fishery targets non-HMS species within the Proposed Action Area. The Dungeness crab fishery targets non-HMS species in nearshore state waters. However, both fisheries have had interactions with protected species, which the Proposed Action may also affect.

DSBG Authorization and Other Active or Pending EFPs

In addition to the fisheries in or near the Proposed Action Area described in Section 3, final regulations authorizing DSBG under the HMS FMP became effective on June 7, 2023 (88 FR 29545) after an eight year period of DSBG fishing under EFPs. Most of the DSBG fishing activity (99 percent) has occurred in the SCB. In recent years, approximately 30 vessels or less have fished during DSBG seasons. Fifty limited entry DSBG permits were issued in 2023 to allow for fishing in the SCB, and another 27 are

expected to be issued in calendar year 2024. Following that, these permits will be available on a first-come, first served basis up to a maximum of 300 federal limited entry DSBG permits.

The Council and NMFS continue to review and consider other EFPs to target HMS, for example with modified deep-set buoy gear and night-set deep-set buoy gear. These EFPs would enable vessels to test fishing with more pieces of gear or different operational protocols (e.g., fishing at night instead of day) within the U.S. West Coast EEZ. For any EFPs issued, the authorization period and number of participants are limited to minimize risk of unintended or unforeseen consequences. Fishing under such EFPs may result in catching some of the same species as the Proposed Action; however, these cumulative impacts are not expected to negatively impact population sizes of these species, and would be subject to any catch limits in regulations for U.S. vessels (e.g., commercial catch limits for Pacific bluefin tuna).

Changes to the West Coast DGN Fleet

Several actions have resulted in changes to the West Coast DGN fleet with more changes anticipated in future years. These actions have cumulative effects with the Proposed Action by affecting effort and catch by the West Coast DGN fleet and incentivizing fishermen to switch from West Coast DGN fishing to other fishing gears.

- *California State Law for the West Coast DGN Fleet*

In 2018, Senate Bill (SB) 1017 became law in the State of California. Regulations to implement the legislation establish a transition program for the West Coast DGN fishery by providing funding to reimburse fishermen who surrender their Federal DGN permits and DGN gear. Under this program, California set aside public money for the program and sought additional funds from other sources. Any Federal DGN limited entry permit holder that does not participate will have their State of California limited entry DGN permit revoked in 2024, but would not be prevented from renewing their Federal DGN limited entry permit until that gear is phased-out at the end of 2027 pursuant to the Driftnet Act.

- *Revisions to the Driftnet Act to phase-out the West Coast DGN Fleet*

In 2019, during the 116th Congress, S.906 was introduced to revise the Driftnet Act to phase-out DGN within a five-year period. Similar to the state transition program outlined in California SB 1017, S.906 proposed to prohibit large-scale driftnets nationwide and implement a Federal program to fund transition of West Coast DGN fishermen to alternative fishing practices. This bill passed the Senate and the House of Representatives (HR) of the 116th Congress in 2020. While S.906 was vetoed by the President who asserted that the proposed legislation "[would] not achieve its purported conservation

benefits" and that "alternative gear… has not proven to be an economically viable substitute for gillnets," while citing concerns for circumventing consultation with the Council to terminate a fishery and increasing reliance on imported seafood, the circumstances promoted participation in the state of California's DGN buyback program. Ultimately, the Act was reintroduced in the House of Representatives (HR 404) and Senate (SB 273) during 117th Congress, passed the Senate and the House by September that year, and was signed into law on December 29, 2022, as part of the 2023 omnibus federal spending package.

The Driftnet Modernization and Bycatch Reduction Act (or Driftnet Act) amends the MSA to include large mesh drift gillnet in the definition of large-scale driftnet fishing (by adding mesh size of 14 inches or greater to the definition at §3(25)),[12] which is prohibited (§307(1)(M)), but includes an exception from the prohibition applicable to use of DGN gear within five years of enactment. The Act also directs NOAA Fisheries under the Secretary of the Department of Commerce to conduct a five-year transition program to facilitate the phase-out of large-scale driftnet fishing and to adopt alternative fishing practices that minimize incidental catch of living marine resources.

Illegal, Unreported and Unregulated (IUU) Fishing

One in five fish caught around the world is thought to have originated from IUU fishing (NOAA Fisheries 2020). Some IUU fishing may occur in the vicinity of the Proposed Action Area, with some effects to MUS of the HMS FMP and potentially protected species. Information on catch, effort, and protected species interactions for IUU activities is sparse and difficult to obtain. Nonetheless, it is expected that these activities likely contribute some unknown negative impacts on management unit species of the HMS FMP and protected species.

Protected Species: Fishery-related Actions and Fishing Avoidance Tools

Other Federal fisheries target HMS within the West Coast EEZ and may interact with ESA-listed sea turtles and other ESA-listed species. These fisheries were considered in the 2004 Biological Opinion on the HMS FMP (PFMC 2003). Additionally, NMFS Protected Resources Division has and may issue Biological Opinions for other U.S. West Coast fisheries including ITS (defined in Section 8, Appendix 2—Glossary) episodically. Biological opinions provide terms and conditions intended to ensure

[12] The term "large-scale driftnet fishing" means a method of fishing in which a gillnet composed of a panel or panels of webbing, or a series of such gillnets, with a total length of two and one-half kilometers or more, or with a mesh size of 14 inches or greater, is placed in the water and allowed to drift with the currents and winds for the purpose of entangling fish in the webbing.

monitoring and minimization of interactions with protected species. Many of these terms and conditions have been implemented as regulations for U.S. HMS fisheries operating inside the U.S. West Coast EEZ (at 50 CFR part 660 subpart K). NMFS will conduct an ESA section 7 consultation for the Proposed Action. Other protected species avoidance measures for fisheries that occur in the vicinity of the Proposed Action Area and that target HMS have been implemented as regulations (at 50 CFR 300 subparts B, C, and O) and included as a set of mandatory terms and conditions for the Proposed Action (Section 2.3).

New dynamic ocean modeling (DOM) tools are becoming available to fishermen to assist in protected species avoidance. Two tools available for use along the U.S. West Coast are TOTAL (detailed in Section 2.4 additional measure number 9; Welch *et al*. 2019) and EcoCast (detailed in Section 2.4 additional measure number 13; PFMC 2016b). TOTAL uses sea surface temperatures to identify when there is likely to be increased loggerhead presence off southern California, and EcoCast makes predictions of the spatial distributions of protected species (as well as target species) based on ocean conditions. The use of these DOM tools may be applied to EFP activities under the action alternatives detailed in Section 2.4 as additional measures to reduce the potential for adverse environmental impacts. Use of these tools by EFP participants and/or by other fishermen participating in fisheries that target HMS within and in the vicinity of the U.S. West Coast EEZ may incrementally and cumulatively reduce the potential for interactions with protected species.

Ecosystems

The Council developed measures to protect unfished and unmanaged forage fish species, pursuant to an initiative identified in the Pacific Coast Fishery Ecosystem Plan for the United States Portion of the California Current Large Marine Ecosystem. This action involved prohibiting directed harvest of shared ecosystem system component species for all fishery management plans for which the Pacific Council makes recommendations to NMFS to amend. These protections became effective in 2017 (see 50 CFR 660.6(b)) and benefit both currently unmanaged fish stocks and managed stocks that depend on forage fish. Current ecosystem status reports are available that gather information about an ecosystem to evaluate how that system is connected and changing (Morrison *et al.* 2022).

### 5.1.2 Non-fishing-related Actions, Including Climate Change

In addition to fishery management actions, other past, present, and reasonably foreseeable future non-fishery-related actions are considered.

Climate Variability and Climate Change

Two mesoscale climate phenomena likely affect the distribution of finfish and protected species found in the action area. The first is the El Niño-Southern Oscillation (El Niño), which is characterized by a relaxation of the Indonesian Low and subsequent weakening or reversal of westerly trade winds that cause warm surface waters in the western Pacific to shift eastward. An El Niño event brings warm waters and a weakening of coastal upwelling off the West Coast. Tunas and billfish are found farther north during El Niño years (Field and Ralston 2005). La Niña, a related condition, results in inverse conditions, including cooler water in the eastern tropical Pacific and CCE.

The second mesoscale climate phenomenon likely to affect the distribution of species in the action area is the Pacific Decadal Oscillation (PDO), which has important ecological effects in the CCE. Regime shifts indicated by the PDO have a periodicity operating at both 15- to 25-year and 50- to 70-year intervals (Schwing 2005). The PDO indicates shifts between warm and cool phases. The warm phase is characterized by warmer temperatures in the northeast Pacific (including the West Coast), as well as cooler-than-average sea surface temperatures and lower-than-average sea level air pressure in the central north Pacific; opposite conditions prevail during cool phases.

The CCE has large natural variability in its oceanography and coastal pelagic species abundance, which may directly impact the abundance and location of Pacific bluefin tuna in the EPO. Baumgartner *et al.* (1992) and Field *et al.* (2009) looked at deposits of coastal pelagic fish scales and were able to identify historic periods or regimes of anchovy and sardine abundance that they suggest are linked to large-scale climate phenomena. For example, during the 1930s through the 1950s when the California Current was undergoing a warm period as reflected in the PDO (Mantua *et al.* 1997), sardines were highly abundant; however, these populations experienced steep declines as the California Current and the North Pacific entered a cool period.

Recent reports by the Intergovernmental Panel on Climate Change have made it clear that the Earth's climate is changing, and with it, the environmental conditions in the ocean are also changing (Bindoff 2019). Since 2005, oceans have warmed and show continued warming trends affecting marine organisms at multiple trophic levels, impacting fisheries with implications for food production and human communities. Warming-induced changes in spatial distribution and abundance of fish stocks have already challenged the management of some important fisheries and their economic benefits. Fish stock range shifts under ocean warming will alter the distribution of fish stocks across political boundaries, thus demand for transboundary fisheries management will increase. Changes in distribution of transboundary

fish stocks could lead countries to renegotiate measures such as catch limits (Ho *et al.* 2016; Gourlie 2017; Asch *et al.* 2018).

Studies conducted by Perry *et al.* (2005) indicate that climate change is affecting marine fish distributions in ways that impact fish as well as commercial fisheries. Impacts to commercial fisheries include: (1) increases in ocean stratification leading to less primary production, which leads to less overall energy for fish production; (2) shifts in mixing areas of water zones leading to decreases in spawning habitat and decreased stock sizes; and (3) changes in currents that may lead to changes in larval dispersals and retention among certain habitats, which could lead to decreases in stock sizes and availability of resources to certain fisheries (Roessig *et al.* 2004).

Other climate change impacts to the marine environment include changes in ice cover, salinity, oxygen levels, and circulation (IPCC 2014). These effects are leading to shifts in the range of species; changes in algal, plankton, and fish abundance (IPCC 2014); and damage to coral reefs (Scavia *et al.* 2002). Ocean warming has contributed to observed changes in biogeography of organisms ranging from phytoplankton to marine mammals, consequently changing community composition. As organisms have evolved adaptations to natural variations in the environmental conditions of their habitats, changes to their habitat conditions larger than that typically experienced, or specific biological thresholds such as temperature or oxygen tolerance, may become hazardous (Mora *et al.* 2013). Plankton studies demonstrate that climate change is affecting phytoplankton, copepod herbivores, and zooplankton carnivores, which affect ecosystem services (e.g., oxygen production, carbon sequestration, and biogeochemical cycling). Fish, seabirds, and marine mammals will need to adapt to changing spatial distributions of primary and secondary production within pelagic marine ecosystems (Richardson *et al.* 2004).

Water Pollution

A variety of activities introduce chemical pollutants and sewage into the marine environment and cause changes in water temperature, salinity, dissolved oxygen, and suspended sediment. Although these activities tend to affect nearshore waters, they adversely impact marine fishery resources if a substantial part of these resources' life cycles occur in these waters. Examples of these activities include, but are not limited to, agriculture, port maintenance, coastal development, marine transportation, marine mining, dredging, the disposal of dredged material, and natural and human-induced disasters in the coastal zone. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality, and they may, indirectly, constrain the sustainability of fishery resources, non-target or prey species, and protected resources.

Other Authorities for Conserving Marine Resources

The MSA (Sec. 305(b)(2)) imposes an obligation on other Federal agencies to consult with the Secretary of Commerce on actions that may adversely affect EFH. NMFS also reviews certain activities that are regulated by Federal, state, and local authorities and that cause adverse effects on the marine environment through processes required by Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The jurisdiction of these activities is in "waters of the U.S." and includes both riverine and marine habitats. Under the Fish and Wildlife Coordination Act (Section 662), agencies must consult with USFWS over certain activities affecting freshwater habitats and seabirds. There is also opportunity for Federal and state coordination and decision-making through regional Council processes under the MSA. These statutes provide avenues for review of actions by other Federal and state agencies that may impact resources that NMFS manages. NMFS and USFWS share responsibility for implementing the ESA. Federal agencies are required to ensure that their activities do not jeopardize the continued existence of species listed under the ESA, or result in the destruction or adverse modification of designated critical habitat for those species. This provides a way for NMFS to review actions by other entities that may impact endangered and protected resources whose management units are under NMFS' jurisdiction, such as the federal demersal longline fishery for sablefish. Aside from involvement in the Council process, NMFS also coordinates with states regarding the impacts on protected species, such as the Dungeness crab fishery and other fisheries, and takes those impacts into account when consulting on Federal actions under section 7 of the ESA. Additionally, there are several U.S. West Coast NMSs within the EEZ off the U.S. West Coast with authority to comprehensively manage uses of the National Marine Sanctuary System through regulations, permitting, enforcement, research, monitoring, education, and outreach.

## 5.2 Effects of Past, Present, and Reasonably Foreseeable Future Actions

No Action Alternatives:

Under the No Action alternatives (Alternative 1-1 and Alternative 2-1), no EFPs would be approved under the Proposed Action. Alternatives 1-2 and 2-1 would not introduce any additional impacts to the human environment than what may be expected based on past, present, and reasonably foreseeable future actions other than the Proposed Action. These expectations are described below.

Current trends in fishing by domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast are expected to continue, including U.S. reliance on imported swordfish, into the foreseeable future. Domestic fisheries landing swordfish and other marketable HMS to the U.S. West Coast generally

would continue to operate under status quo conditions, with a possible increase in DSBG-caught swordfish as fishermen learn to be successful with the newly authorized gear and as NMFS limited entry "phases-in" additional limited entry DSBG permits over time (i.e., the "phased-in" limited entry program includes a 12-year timeline for reaching a maximum of 300 limited entry permits). It is also possible that there is a decrease in DSBG-caught swordfish as a result of availability within the SCB or reduced incentive to fish the authorized permit in comparison to fishing the EFP, which was necessary for the initial qualification period for a limited entry DSBG permit. The landings of the Hawaii longline fisheries to the U.S. West Coast, and the impacts associated with these activities, would continue and may increase as has been the trend for more than a decade (Section 4.7; see Figure 4-2). Foreign fisheries will continue to supply the majority of swordfish to the U.S. West Coast under the no action alternative. Active and pending EFPs listed above operate in the Proposed Action Area and may incidentally catch some of the same species.

Changes to regulations on West Coast DGN gear (i.e., the Driftnet Act) may have positive impacts on the biological resources (described in Section 4) through reductions in DGN effort and catch of target and non-target species. These same reductions may have negative economic impacts on U.S. fishermen and fishing communities by eliminating the opportunity to fish DGN gear under the Driftnet Act. The State of California's regulations implementing a transition program for DGN gear included a sunset date of January 31 of the fourth year following notice to the state Legislature of receipt of funding from nonstate sources; the fourth year is 2024. However, following litigation, the State of California clarified that DGN fishermen could continue to fish and land fish under a Federal DGN permit, even after the State of California's permits are sunsetted. Nonetheless, without a transition facilitated by the permitting of alternative fishing practices to "phase-out" the use of large-mesh DGN gear as called for under the Driftnet Act, the Act will prohibit use of the gear in Federal waters in 2027 thereby forcing DGN fishermen wishing to continue to target swordfish in the Proposed Action Area to fish with Federally authorized gear such as harpoon or DSBG. Because the currently authorized gear types selectively target swordfish and are, so far, low-volume fishing practices in comparison to DGN gear, we expect that swordfish landings and HMS fishery revenue by U.S. West Coast vessels would continue to decline, with importation of swordfish products likely increasing as a result.

Future regulatory adjustments to catch limits or harvest guidelines for *commonly caught management unit species* may cause changes to effort levels in other fisheries. Should additional effort occur as a result of increases in catch limits or harvest guidelines, it is unlikely to have negative effects on commonly caught *management unit species* because the new harvest specifications, whether derived from domestic, state, or international management processes, would be based on changes in the status of these fish stocks or

populations. There could be some minor negative effects to *other commonly caught species* or *uncommonly caught species* of fish and marine mammals, sea turtles, and seabirds, as additional effort in other fisheries may result in more incidental catch of these species. However, any such negative effects, if anticipated from operation of U.S. fisheries, are unlikely to occur without completing consultations or other procedures to determine whether additional protected species avoidance measures are needed.

Additional effort due to regulatory adjustments could result in minor or major beneficial impacts to affected fisheries and fishing communities, depending on the magnitude of increased allowable catch and whether additional catch results in additional revenue. Conversely, future regulatory adjustments to decrease catch limits or harvest guidelines for *commonly caught management unit species* would likely yield negative impacts for affected resources and fishing communities, while impacts to *commonly caught management unit species* would likely be lower. NMFS will further assess potential impacts to protected species of regulatory adjustments pursuant to an ESA section 7.

As other types of EFPs may be considered and administered for fishing activities that target swordfish and other marketable HMS off the West Coast, any negative effects of those EFPs would also be subject to NEPA, and/or consultations under the ESA and other applicable laws. With regard to fish stocks, it is expected that catch limits and harvest guidelines would continue to apply. However, there could be some additional competition among resource users either for access to fishing grounds or to secure a portion of the allowable catch. Nonetheless, a process is in place by which EFPs are considered that would likely uncover any expectations for negative impacts and result in additional mitigation measures to ensure that a derby fishery and/or other public safety concerns do not arise from such conflicts.

In an effort to ensure protections for sea turtle populations listed under the ESA, constraints are often placed on U.S. fishery operations as other threats to these populations that exist beyond U.S. jurisdiction are more challenging to regulate. The status of ESA-listed sea turtles is reported in Section 4 4.5.2, including the West Pacific DPS of leatherback sea turtles, which has been particularly constraining for U.S. pelagic fisheries. Below we describe threats to the West Pacific DPS of leatherback sea turtles including those in distant waters, and anticipated incidental takes and documented interactions within U.S. waters.

The primary threat to the West Pacific DPS of leatherback sea turtles is the legal and illegal harvest of leatherback turtles and their eggs (NMFS and USFWS 2020a). Over the past three decades, sporadic monitoring efforts resulted in estimates of up to 100 individuals harvested annually from Indonesian

nesting beaches, with an assumption that harvest pressure had declined and was no longer an issue (WWF 2018). However, recent enumerator surveys indicated that harvest continues with conservative estimates of 431 leatherback sea turtles killed over an 8-year period (an average of 53.9 turtles annually with at least 103 leatherbacks harvested in 2017). The taking of nesting females reduces both abundance and productivity. Such impacts are high because they directly remove the most productive individuals from the DPS, reducing current and/or future reproductive potential.

Although leatherback sea turtles are protected by regulatory mechanisms in all four nations (Indonesia, Papua New Guinea, Solomon Islands and Vanuatu) where the West Pacific DPS nests, the laws are largely ignored and not enforced (NMFS and USFWS 2020a). Given the declining nesting trends and current index of nesting female abundance of this DPS, the continued and unregulated poaching or harvest of leatherback sea turtles and eggs is the primary threat to the West Pacific DPS, accelerating its risk of extinction (NMFS and USFWS 2020a).

Another major threat to the West Pacific DPS is fisheries bycatch in coastal and pelagic fisheries. At-sea bycatch of leatherback sea turtles has been documented in a variety of gillnet and longline-type fisheries in the Pacific Ocean, but little is known about its total magnitude or full geographic extent (NMFS and USFWS 2020a). International longline fisheries are characterized by inconsistent reporting and traditional gear configurations (including J-style hooks with squid bait) resulting in high interaction and mortality rates (Swimmer *et al.* 2017). In fact, the Hawaii and foreign longline fisheries have different sea turtle bycatch rates with the turtle bycatch rate in Hawaii swordfish fishery being one of the lowest in the world (Bartram *et al.* 2010; Chan and Pam 2016). The relatively lower bycatch rates in Hawaii fisheries are due to incorporating measures such as circle hooks, mackerel-type bait, sea turtle handling procedures, 100 percent observer coverage, etc., that have shown an 84 percent reduction in leatherback sea turtle interactions in contrast to traditional gear configurations (Swimmer *et al.* 2017; USFWS and NMFS 2020). While interactions in U.S. managed fisheries cannot be discounted, it appears that international fisheries bycatch is a major threat to the West Pacific DPS. Ultimately, unilateral action by the United States to reduce leatherback sea turtle interactions will likely fail to reverse leatherback sea turtle population declines, since the animals that forage in waters in the U.S. West Coast EEZ represent a small portion of the whole population (Curtis *et al.* 2015 and Seminoff *et al.* 2012), and significant threats remain at the nesting sites and adjacent waters in the western Pacific and South China Sea (NMFS and USFWS 2020a; PFMC 2009).

Table 5-1 reports anticipated incidental takes of sea turtles by species for Federal fishery-related actions within or near the Proposed Action Area (according to ITSs in relevant published Biological Opinions). Note that that incidental take numbers do not represent actual observed, reported, or estimated take (e.g., a leatherback sea turtle take or interaction has not been observed in the U.S. West Coast DGN fishery since 2012; Carretta 2020). Furthermore, Table 5-1 shows the actual sea turtle ITS number over the authorization period for specific Biological Opinions (e.g., 4 alive leatherback sea turtles over 10 years for the 2016 HMS FMP West Coast DSLL fishery Biological Opinion). [13]

**Table 5-1.** Anticipated incidental takes (ITSs from relevant published Biological Opinions) of sea turtles by species and animal's condition for Federal fishery-related actions within or near the Proposed Action Area.

| Fishery | ITS Authorization Period and Year Published | Leatherback | | Loggerhead | | Olive Ridley | | Green | |
|---|---|---|---|---|---|---|---|---|---|
| **U.S. West Coast Fisheries Inside the U.S. West Coast EEZ** | | | | | | | | | |
| | | Alive | Dead | Alive | Dead | Alive | Dead | Alive | Dead |
| HMS FMP-West Coast DSLL | 10 years (2016) | 4 | 2 | 1 | 1 | 6 | 6 | 1 | 1 |
| U.S. West Coast Drift Gillnet | 1 year (2013) | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 |
| | 5 years (2013) | 10 | 7 | 7 | 4 | 2 | 1 | 1 | 1 |
| Pacific Coast Groundfish Fishery (sablefish trap) | 1year (2012) [1] | NA | 1 | NA | NA | NA | NA | NA | NA |
| | 5 years (2012) [1] | NA | 0.38 | NA | NA | NA | NA | NA | NA |
| **HMS and Other Fisheries Outside but near the U.S. West Coast EEZ** | | | | | | | | | |
| Eastern Tropical Pacific Purse Seine Fishery | 10 years (2004) | 20 | 1 | 30 | 1 (every 7 years) | 1,330 | 70 | 350 | 20 |
| Hawaii SSLL | 1 year (2019) | 21 | 3 | 36 | 6 | 5 | 1 | 5 | 1 |
| Hawaii DSLL | 5 years (2023) [1] | 92 | NA | 43 | NA | 592 | NA | 77 | NA |

[1]NA is where numbers are not specifically reported in individual ITSs.

[13] Note, NMFS has determined that annualized takes are an appropriate means of reporting estimated takes of leatherback sea turtles, but also that other methods of reporting leatherback takes may be appropriate, as well. In this case, we have reported documented takes.

Sea turtle interactions occur in fisheries in the U.S. West Coast EEZ (Table 5-1). These fisheries include the West Coast DGN fishery, the sablefish trap gear fishery, an unidentified crab pot fishery (NMFS 2018), and DSBG EFP fishing (NMFS 2021a); however, sea turtle interactions are considered rare events in these fisheries. Since the PLCA was implemented in 2001 and the LCA time/area closures were implemented in 2003 for the DGN fishery, two loggerhead sea turtles were observed taken and released alive (one in 2001 and one in 2006), and two leatherback sea turtles were observed taken and released alive (one in 2009 and one in 2012; Carretta 2020; NMFS 2018; see Appendix 4). In the sablefish trap gear fishery, one leatherback sea turtle was found entangled (dead) offshore California in 2008, and another leatherback sea turtle was found entangled and released alive in unidentified crab pot gear off central California in 2016 (NMFS 2018). In 2018, during DSBG EFP fishing, one loggerhead sea turtle was observed entangled in surface lines, and was disentangled and released alive (NMFS 2021). Following this event, NMFS amended the terms and conditions of DSBG EFPs in an effort to eliminate sea turtle interactions of this nature. In addition to these documented interactions with sea turtles, two state gillnet fisheries in California may interact with sea turtles: the set gillnet fishery and small mesh drift gillnet fishery.

In the West Coast DSLL fishery operating just outside the U.S. West Coast EEZ, there was one olive ridley sea turtle interaction (dead) in 2006; however, the incidental take of the olive ridley occurred in an area not typically fished by the DSLL fishing gear (NMFS 2016 and Appendix 5). The fisherman stated that it was an exploratory fishing trip south of traditional fishing grounds for the fishery and that he would no longer fish in that area. Note that data from this fishery during this time period was not used in the methods of analysis in this draft EIS because of data confidentiality issues arising when fewer than three vessels participate in a fishery. Then in 2019, one loggerhead sea turtle was released alive but injured in the West Coast DSLL fishery (Appendix 5). The ITS covering this fishery estimates up to one loggerhead, four leatherbacks, six olive ridley and one green sea turtle taken over a ten-year period beginning in 2016 (NMFS 2016).

In addition to issuing Biological Opinions for fishery-related actions, NMFS Protected Resources Division (PRD) also issues Biological Opinions for non-fishery-related actions within or near the Proposed Action Area. Table 5-2 reports anticipated incidental takes of sea turtles by species for non-fishery-related actions within or near the Proposed Action Area (according to ITSs in relevant published Biological Opinions). Furthermore, Table 5-2 shows the actual sea turtle ITS number over the authorization period for specific Biological Opinions (e.g., 5.5 years for the 2019 Seal Beach Naval Weapons Pier Construction Biological Opinion in Table 5-2 below) which is an alternative presentation to

current guidance from NMFS-PRD where anticipated incidental takes of sea turtles are expressed as annualized average incidental take numbers for fisheries where Biological Opinions report time period is longer than one year. That is, the annualized incidental take numbers in the guidance may not represent actual ITS numbers over the authorization time period as they were annualized.

**Table 5-2.** Anticipated incidental takes (ITSs from relevant published Biological Opinions) of sea turtles by species and animal's condition for non-fishing related actions within or near the Proposed Action Area.

| **Fishery** | **ITS Authorization Period and Year Published** | **Leatherback** | | **Loggerhead** | | **Olive Ridley** | | **Green** | |
|---|---|---|---|---|---|---|---|---|---|
| **Non-Fishery Actions/Consultations Inside the U.S. West Coast EEZ** | | | | | | | | | |
| | | Alive | Dead | Alive | Dead | Alive | Dead | Alive | Dead |
| Diablo Canyon-Power Plant | 1 year (2006) | 3* (*1 SI) | 1 | 3* (*1 SI) | 1 | 3* (*1 SI) | 1 | 15* (*1 SI) | 3 |
| San Onofre-Power Plant | 1 year (2006) | 3* (*1 SI) | 1 | 3* (*1 SI) | 1 | 3* (*1 SI) | 1 | 34* (*2 SI) | 3 |
| SWFSC Fisheries Research | 1 year (2015) | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 |
| NWFSC Fisheries Research | 1 year (2016) | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| City of Los Angeles wastewater discharge | 5 years (2018) | All sea turtles in Santa Monica Bay, California, are subjected to increased body burdens of contaminants and are at risk of incurring adverse effects to their growth, reproduction, and overall health and survival over a shorter period of time than would otherwise occur absent the action. | | | | | | | |
| Seal Beach Naval Weapons Pier Construction | 5.5 years (2019) | NA | NA | NA | NA | NA | NA | ~100 | 0 |

*SI refers to "seriously injured"

Other potential sources of sea turtle mortality in the past have been power plant entrapment, scientific research, and vessel collisions. In the past, two federally regulated nuclear power plants located in California have observed entrainment of loggerhead, leatherback and olive ridley sea turtles in very low numbers. Since 2006, the Diablo Canyon Power Plant Nuclear Generating Station has reported six entrainments of green sea turtles all released alive (one each year in 2007, 2009, 2010, 2012, 2014 and 2019); and the San Onofre Nuclear Generating Station has reported one olive ridley (alive) in 2009 and one loggerhead (alive) in 2010 (C. Fahy, pers. Comm., November 4, 2021). The ITS covering both power plants estimates up to six loggerheads taken and six leatherbacks taken (with two serious injuries and two mortalities for both species; Table 5-2; NMFS 2018). However, the San Onofre plant was closed in 2013

due to failure in the steam generators and is currently being decommissioned so the Biological Opinion and ITS coverage is no longer necessary. The SWFSC also completed a section 7 ESA programmatic consultation in 2015 for non-injurious research activities with an associated ITS covering an estimated two loggerhead, two leatherback sea turtles, two olive ridley sea turtles and two green sea turtles to be taken over a one-year period with no mortalities (Table 5-2). However, prior to completing a section 7 ESA consultation, one leatherback was observed in a research trawl net survey in 2011[14] and was released alive (NMFS 2018). Then in 2016, the SWFSC observed one green sea turtle taken during a longline survey which was released alive with minor hooking injury to flipper. There were no other takes reported through 2019 (C. Fahy, pers. Comm., November 4, 2021). The Northwest Fisheries Science Center completed a section 7 ESA programmatic consultation in 2016 and estimated one loggerhead sea turtle, one leatherback sea turtle, one olive ridley sea turtle, and one green sea turtle to be taken annually with no mortalities (Table 5-2).

Historically, vessel collisions have also occasionally been a source of injury and mortality to sea turtles along the U.S. West Coast, with specific reports of leatherback sea turtles being struck off central California; however, the U.S. Coast Guard, being responsible for safe waterways and establishing shipping lanes, completed a section 7 consultation on ship lane changes in 2017, and concluded that the action would result in no takes of leatherbacks and that it was not likely to adversely affect hard-shelled sea turtles, including the North Pacific loggerhead DPS and olive ridley sea turtles.

Climate change and water pollution would likely have negative effects on the affected resources and fisheries described in Section 3, over the long term, whereas actions taken to protect resiliency of the Pacific Coast would likely have minor positive and incremental effects, which could become major over the long term. The magnitude of these effects would depend on the ability of these resources and fisheries to adapt to such changes. It is unlikely that water pollution would have major effects because of the highly migratory nature of the fish, protected species, and seabirds in the affected environment. Fisheries that target HMS tend to occur further offshore, whereas water pollution concerns tend to be concentrated in nearshore environments. Climate change may require fisheries to invest additional search time and/or develop the ability to shift fishing and processing effort with changes in the distribution of customary target species. It is expected that species will move northward, where weather and sea conditions could be

[14] Note, this leatherback sea turtle interaction with the SWFSC trawl net survey in 2011 may not be represented in other NMFS leatherback effects analyses. That is because NMFS considers research on leatherback sea turtles as an overall benefit to the species and because the dataset used for the SWFSC Programmatic Research and MMPA Authorization Biological Opinion only included data from 2016 to 2021 (i.e., a time period that did not include the 2011 leatherback sea turtle interaction).

more challenging to fishing with certain gear types, like harpoon and DSBG. However, climate change may also cause warmer-water HMS and other species to inhabit customary fishing grounds (like the SCB) in higher abundances. Therefore, effects to fisheries and fishing communities may depend on the degree to which fisheries and fishing communities are able to offset potential losses in catches of more temperate-water species with gains in catches of warmer-water species.

Other than preventing some short-term economic gains that might be realized by the EFP applicants under the action alternatives, the no action alternatives would not yield additional impacts on the human environment. However, the perceived loss of opportunity to test new gear types may deter or delay U.S. fishermen's interest in continuing to pursue approval for such activities, which over the long-term could negatively impact innovation in the HMS fisheries to address resource issues in the Pacific. Such a scenario would reduce the likelihood of successful implementation of a transition program as called for in the Driftnet Act.

Action Alternatives:

Under the action alternatives, EFPs would be authorized in the U.S. West Coast EEZ with the terms and conditions specified in Section 2.3 of this document. Section 2.3 describes two components (i.e., shallow-setting and deep-setting) with various alternatives under each. Projected impacts are reported for each alternative under each component. It may be the case that an action alternative is adopted under one component and not the other or under both components. Additionally, Section 2.4 describes additional measures that may be applied and qualitatively reports how these measures are likely to influence projected quantitative estimates (which are based on the proxy data used in this analysis).

Volatility in future West Coast DGN fishing opportunity and the potential for fishery closures resulting from current and pending action affecting the DGN fishery (e.g., DGN transition program, the Driftnet Act, etc.) may have cumulative impacts with the Proposed Action. These actions may encourage HMS fishermen to transition from DGN to other gear types. The total estimated harvest of all the *commonly caught species management unit species, other commonly caught species* and *uncommonly caught species* under any combination of the action alternatives would represent a small incremental increase in overall fishing mortality and are unlikely to affect the sustainability of any of the fish stocks, non-ESA listed marine mammal stocks or DPSs affected under any of the action alternatives. We expect fishing mortality to increase under action alternatives allowing more fishing effort for both components (as shown in Section 4); however, the projected impacts do not account for any reductions in fishing effort in other

fisheries (like the West Coast DGN) from which fishermen may forgo participation in order to test gear under the Proposed Action. Additionally, increasing local swordfish and other HMS production can help bridge the gap between demand and domestic supply, potentially lessening the environmental impact of U.S seafood consumption associated with importing seafood into West Coast ports (e.g., impacts associated with long-distance transportation and transfer effects (Buchspies *et al.* 2011; Chan and Pam 2016)).

Furthermore, any projected catch of non-target species could be further mitigated by use of additional measures (e.g., species limits on leatherback sea turtles, see Section 2.4) that may be applied to the action alternatives detailed in Section 2.3. Most of these additional measures are expected to further reduce the potential for adverse environmental impacts of the Proposed Action beyond those projected based on the proxy data (Section 3) used in this analysis.

Authorizing EFPs under the Proposed Action may have cumulative impacts with climate change. It is possible that climate change causes species range shifts and changes in spawning stock biomass; however, the specific impacts of climate change to swordfish and non-target species populations in the Proposed Action Area are unclear at this time. Cumulative impacts may be positive in terms of benefits to swordfish and HMS fishermen that may otherwise lose access to fishing grounds if swordfish distributions shift northward and away from the SCB where use of harpoon and DSBG are limited by the prevailing weather and sea conditions. However, waters off of the central coast of California are known to be foraging grounds for leatherback sea turtles. Shifting fishing north of the SCB and into this area could increase the risk of interactions with leatherback sea turtles if the availability of their prey species does not change. Fishing under the Proposed Action would be authorized for relatively short durations and monitored and assessed before authorization is renewed or extended.

Based on projected landings, all action alternatives are expected to have an economic benefit for applicants who receive EFPs under the Proposed Action. EFP fishing is expected to catch between 1,326 to 6,629 swordfish for the SSLL alternatives (Component 1) and 94 to 466 swordfish for the DSLL alternatives (Component 2) (PacFIN 2022) with a projected estimated revenue of between $951,803 to $4,758,206 for the action alternatives under Component 1 and between $67,473 to $344,495 for action alternatives under Component 2 (Section 4.7). While swordfish are the target species, EFP fishing effort under the action alternatives is likely to also result in catch and revenue from other marketable HMS species. These additional sources of revenue may bolster the viability of gear in trial. Furthermore, any EFPs issued under the action alternatives could inform future decisions about renewal of EFPs and/or the

performance of alternative gear types or mitigation measures for targeting swordfish or other marketable HMS when fishing in Federal waters off the U.S. West Coast. It is possible this information is useful for generating additional incremental value in HMS fisheries, if operational efficiencies are maximized while protected species interactions are minimized.

The issuance of EFPs under the Proposed Action is unlikely to negatively impact other fisheries operating within the Proposed Action Area. Proposed terms and conditions seek to reduce the potential for gear conflicts with existing fisheries through area and operational restrictions. All EFP applications submitted to-date have been submitted by captains participating in other HMS fisheries, and include vessels that participate in other HMS fisheries. Any vessels electing to fish under EFPs as opposed to in authorized fisheries would do so voluntarily. Additionally, fishing under an EFP is a privilege that can be revoked. The EFP holders would share in harvest limits set for species targeted by other fisheries; however, their share of the catch is not expected to create allocation issues. Further, the EFP catch would be monitored and subject to EPO catch limits for any HMS species.

Owners and operators of longline and DGN vessels are likely to apply for EFPs to gain access to fishing grounds within Federal waters off the U.S. West Coast. That is, vessels fishing under EFPs under the Proposed Action are most likely to be the same vessels that would otherwise fish with longline gear under a Hawaii permit, or fish in the transitioning drift gillnet fishery within the West Coast EEZ, and land their fish in California. Therefore, the fishing effort under the Proposed Action would likely constitute a shift in U.S. fishing effort in the Pacific Ocean rather than the addition of new fishing effort. Therefore, biological and economic impacts of the Hawaii longline fisheries and U.S. West Coast DSLL fishery may decrease with a shift in effort under the action alternatives, i.e., away from distant waters towards Federal waters off the U.S. West Coast. Similarly, owners and operators of DGN vessels subject to a phase-out of the fishery under the Driftnet Act, and who are interested in a higher-volume gear type than DSBG, are also likely to apply for EFPs under the Proposed Action. In such instances, fishing effort by these vessels under any of the action alternatives would constitute a shift in effort away from the sunsetting West Coast DGN fishery or the DSBG fishery, or both.

# 6 Lists

## 6.1 List of Preparers

| Preparer Name and Affiliation | Responsibility |
|---|---|
| Tonya Wick, Fishery Biologist,<br>NOAA Fisheries Office of Sustainable Fisheries,<br>West Coast Region, HMS Branch | Primary author, data acquisition and analysis, biological analysis, socioeconomic analysis, technical and content edits, and revisions |
| Amber Rhodes, Fishery Policy Analyst,<br>NOAA Fisheries Office of Sustainable Fisheries,<br>West Coast Region, HMS Branch | Co-author, project management and coordination, document structure, technical and content edits, and revisions |
| Lyle Enriquez, Permits and Monitoring Branch Chief,<br>NOAA Fisheries Office of Sustainable Fisheries,<br>West Coast Region, HMS Branch | Document structure, technical and content edits, and revisions |
| Rachael Wadsworth, HMS Branch Chief,<br>NOAA Fisheries Office of Sustainable Fisheries,<br>West Coast Region, HMS Branch | Technical and content edits, and reviewer |
| Chris Fanning, Fishery Biologist,<br>NOAA Fisheries, Office of Sustainable Fisheries,<br>West Coast Region, HMS Branch | Biological analysis, and technical and content edits |
| Shanna Dunn, Geographic Information Systems Analyst, NOAA Fisheries Office of Protected Resources Division, West Coast Region | Geographic information systems assistance |
| Shelby Mendez, NEPA Coordinator,<br>NOAA Fisheries, West Coast Region | Scoping, document structure, document review, edits, and revisions |

## 6.2 List of Agencies, Organizations, and Persons Contacted

| Person or Organization Contacted | Responsibility |
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| Colby Brady, Fisheries Management Specialist, NOAA Fisheries Office of Sustainable Fisheries, Pacific Islands Regional Office | Biological and technical analysis |
| Eric Forney, Fisheries Information Specialist, NOAA Fisheries Office of Sustainable Fisheries, Pacific Islands Regional Office | Provision and review of observer and logbook data |
| Jenny Suter, Statistician, Fisheries Monitoring Program, Pacific Islands Fisheries Science Center | Provision and review of observer data |
| Christina Fahy, Fisheries Biologist, NOAA Fisheries Office of Protected Species, West Coast Region | Biological analysis |
| Dan Lawson, Fisheries Biologist, NOAA Fisheries Office of Protected Species, West Coast Region | Biological analysis |
| Heidi Dewar, (retired) Marine Mammal and Turtle Division, NMFS SWFSC | Biological analysis |
| Melanie Hutchinson, Senior Bycatch Mitigation Scientist, Inter-American Tropical Tuna Commission | Biological analysis |
| Karter Harmon, Fish Biologist, NOAA Fisheries Office of Sustainable Fisheries, HMS Branch | Document review and editing |
| Brian Corrigan, Investigative Support Program Manager, NOAA Fisheries, Office of Law Enforcement, West Coast Division | Document review and editing |
| Greg Busch, Assistant Director, NOAA Fisheries, Office of Law Enforcement, West Coast Division | Document review and editing |

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5. **West Coast Deep-set Longline Outside the Exclusive Economic Zone**

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7. **U.S. West Coast Deep-set Linked Buoy Gear Exempted Fishing Permit Observer Data**

8. **Use of the Entire Hawaii Longline Observer and Logbook Data to Define Typical Annual Effort for Vessels Using Longline-type Gear**

9. **Southwest Fisheries Science Center 2011 Through 2013 Longline Fishing Research Trials**

10. **Shark Survivability Tagging Study in Conjunction with the Proposed Action**

11. **Examples of Current NMFS-Approved Tori Lines for Seabird Avoidance while Fishing under the Exempted Fishing Permit to Fish with Longline-type Gear in the United States West Coast Exclusive Economic Zone**

## Appendix 1. List of Acronyms and Abbreviations

| | |
|---|---|
| AIS | Automatic Identification Systems |
| B | Biomass |
| BSIA | Best Scientific Information Available |
| CCE | California Current Ecosystem |
| CDFW | California Department of Fish and Wildlife |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CNP | Central North Pacific |
| CPUE | Catch Per Unit Effort |
| CV | Coefficient of Variation |
| DGN | Drift Gillnet (*refers to Large Mesh Drift Gillnet*) |
| DNA | Deoxyribonucleic Acid |
| DPS | Distinct Population Segment |
| DSBG | Deep-set Buoy Gear |
| DSLL | Deep-set Longline |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| EFP | Exempted Fishing Permit |
| EIS | Environmental Impact Statement |
| ENP | Eastern North Pacific |
| EO | Executive Order |
| EPO | Eastern Pacific Ocean |
| ESA | Endangered Species Act |
| ESU | Evolutionarily Significant Unit |
| F | Fishing Mortality Rate |
| FMP | Fishery Management Plan |
| FR | Federal Register |
| HMS | Highly Migratory Species |
| HMS FMP | Highly Migratory Species Fishery Management Plan |
| HMSMT | Highly Migratory Species Management Team |
| HR | House of Representatives |
| IATTC | Inter-American Tropical Tuna Commission |
| ISC | International Scientific Committee for Tuna in the North Pacific Ocean |
| ITS | Incidental Take Statement |
| IUU | Illegal, Unreported, and Unregulated |
| LBG | Linked Buoy Gear |
| LCA | Loggerhead Conservation Area |
| LCH | Leatherback Critical Habitat |
| LRP | Limit Reference Point |
| MBTA | Migratory Bird Treaty Act |

| | |
|---|---|
| MFMT | Maximum Fishery Mortality Threshold |
| MHI | Main Hawaiian Islands |
| MMPA | Marine Mammal Protection Act |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| M/SI | Mortality and Serious Injury |
| MSST | Minimum Stock Size Threshold |
| MSY | Maximum Sustainable Yield |
| MUS | Management Unit Species |
| NEPA | National Environmental Policy Act |
| NFG | North Feeding Group |
| NMFS | National Marine Fisheries Service |
| NMS | National Marine Sanctuary |
| NMSA | National Marine Sanctuary Act |
| NOAA | National Oceanic and Atmospheric Administration |
| NOI | Notice of Intent |
| NS | National Standard |
| NWHI | Northwest Hawaiian Islands |
| NWS | National Weather Service |
| ONMS | Office of National Marine Sanctuaries |
| PBR | Potential Biological Removal |
| PCFG | Pacific Coast Feeding Group |
| PDO | Pacific Decadal Oscillation |
| PFMC | Pacific Fishery Management Council |
| PIFSC | Pacific Islands Fishery Science Center |
| PLCA | Pacific Leatherback Conservation Area |
| RFMO | Regional Fisheries Management Organizations |
| SAR | Stock Assessment Report |
| SB | Senate Bill |
| SCB | Southern California Bight |
| SMMP | Swordfish Management and Monitoring Plan |
| SSB | Spawning Stock Biomass |
| SSLL | Shallow-set Longline |
| SWFSC | Southwest Fisheries Science Center |
| TOTAL | Temperature Observations to Avoid Loggerheads |
| UME | Unusual Mortality Event |
| U.S. | United States |
| USFWS | United States Fish and Wildlife Service |
| VMS | Vessel Monitoring System |
| W | West Longitude |
| WCNP | Western and Central North Pacific |
| WCNPO | Western and Central North Pacific Ocean |

| | |
|---|---|
| WCPFC | Western and Central Pacific Fisheries Commission |
| WCPO | Western and Central Pacific Ocean |
| WCR | West Coast Region |
| WFG | Western Feeding Group |
| WNP | Western North Pacific |
| WPFMC | Western Pacific Fishery Management Council |

## Appendix 2. Glossary and Technical Terms

**Biological Opinion:** The written documentation of an Endangered Species Act (ESA) Section 7 consultation.

**Coefficient of Variation (CV):** A measure of precision, or a statistical measure of the dispersion of data points around the mean**.**

**Encounter:** The catch of an animal (i.e., some type of contact with the fishing gear) that does not include a direct mortality (i.e., where the animal is released dead) of the animal.

**Exclusive Economic Zone (EEZ):** The zone established by Presidential Proclamation 5030, dated March 10, 1983, as that area adjacent to the United States which, except where modified to accommodate international boundaries, encompasses all waters from the seaward boundary of each of the coastal states to a line on which each point is 200 nautical miles (370.40 km) from the baseline from which the territorial sea of the United States is measured (Title 3, part 22 CFR).

**Incidental Take:** "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect individuals from a species listed under the ESA. Incidental take is the non-deliberate take of ESA-listed species during the course of a Federal action (e.g., fishing under an FMP).

**Incidental Take Statement (ITS):** The amount of incidental take anticipated under a Proposed Action and analyzed in a biological opinion. It is a requirement under ESA Section 7 consultation regulations.

**Interaction:** Any catch of an animal resulting in any disposition, including being released alive, an indirect mortality (post-encounter mortality), or a direct mortality (i.e., observed dead when hauled-in) of the animal.

**Longline-type:** "Longline-type" gear is an umbrella term for fishing gear that employs either a horizontal mainline or hooks set in a horizontal footprint that exceeds one nm in length and is supported at regular intervals by vertical lines connected to surface floats. Descending from the mainline are branch lines with a baited hook or hooks. This general definition of *longline-type* gear can be applied to many types of gear configurations or fishing practices, which become distinct from one another by functional aspects of the gear (e.g., depth of set, hook type, hook size, bait type), and operational limitations (e.g., mainline length, maximum number of hooks per set, maximum soak times, etc.) or mitigation measures or both. While longline is generally a multi-species gear type, *longline-type* gear may be used to selectively target swordfish, tunas, or other marketable HMS or to target these species as a complex (as is commonly the case when targeting tropical tuna species).

**Mortality or Serious Injury (M/SI):** A standard used for measuring impacts on marine mammals under the Marine Mammal Protection Act (MMPA). Serious injury is defined as an injury likely to result in the mortality of a marine mammal.

**Potential Biological Removal (PBR):** A requirement of the MMPA, it is the estimated number of individuals that can be removed from a marine mammal stock while allowing the stock to maintain or increase its population.

**Section 7 Consultation:** A requirement of section 7(a)(2) of the ESA applicable to all discretionary Federal actions that may affect ESA-listed endangered or threatened species, to ensure that the Proposed Action is not likely to jeopardize listed species.

**Southern California Bight (SCB):** The SCB is a region that includes waters "…south of Pt. Conception, east of a line from Pt. Conception to the western tip of San Miguel Is., to the northwest tip of San Nicholas Is. to the intersection of longitude 118° 00' 00' W., with the southern boundary of the U.S. EEZ" (NMFS 2003).

**Unusual Mortality Event (UME):** A stranding that is unexpected, involves a significant die-off of any marine mammal population, and demands immediate response.

**REFERNENCES**

NMFS. 2003. Final Fishery Management Plan and Environmental Impact Statement for the U.S. West Coast Fisheries for Highly Migratory Species. Pacific Fishery Management Council. August 2003. 794 pages.

# Appendix 3. Hawaii Longline Fishery Observer Data East of 140° West Longitude for 2004 through 2019 Used as a Proxy: Summary, Discussion and Data Analysis

## SUMMARY

This appendix summarizes catch rates by species using Hawaii longline fisheries observer records east of 140° West (W) longitude for the years 2004 through 2019. We use these catch rates to project exempted fishing permit (EFP) catch for a range of effort under the Proposed Action alternatives.

## DISCUSSION

While we include information from the entire Hawaii longline fisheries dataset to define typical annual effort for a longline vessel in a United States longline fishery (in the draft environmental impact statement (EIS) and Appendix 8), we do not present the species catch composition for the entire Hawaii dataset, as the fishing in the western central Pacific Ocean occurred in warmer waters with different species assemblages and catch frequencies than those in the U.S. West Coast exclusive economic zone (EEZ), which is largely dominated by cooler waters due to upwelling within the California Current Ecosystem (Mauzole *et al*. 2020, and Field and Francis 2006). Rather, we stratify the Hawaii longline observer records to consider the species catch composition of sets made east of 140° W, to reduce, to some degree, the otherwise likely bias towards the suite of species and magnitude of interactions in waters in closer proximity to the Hawaiian Islands.

The target species of the Hawaii longline fishery are swordfish (*Xiphias gladius*) and tuna (*Thunnus spp*.), but other species are caught incidentally in this fishery. In terms of the Proposed Action occurring off the U.S. West Coast, species that are actively managed are termed Management Unit Species under the *Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species* (HMS FMP), and are shown in Table A-3-1 (PFMC 2016).

**Table A-3-1.** HMS FMP Management Unit Species.

| Common Name | Scientific Name |
|---|---|
| Striped marlin | *Kajikia audax** |
| Swordfish | *Xiphias gladius* |
| Common thresher shark | *Alopias vulpinus* |
| Shortfin mako shark | *Isurus oxyrinchus* |
| Blue shark | *Prionace glauca* |
| North Pacific albacore | *Thunnus alalunga* |
| Yellowfin tuna | *T. albacares* |
| Bigeye tuna | *T. obesus* |
| Skipjack tuna | *Katsuwonus pelamis* |
| Pacific bluefin tuna | *T. orientalis* |
| Mahi-mahi or Dolphinfish | *Coryphaena hippurus* |

* Previously, striped marlin were included in the genus *Tetrapturus* (Collette et al. 2006).

Below we describe the 2004[1] through 2019 Hawaii longline fisheries observer records east of 140° W in detail. We utilize fishery-dependent data from these records as proxies for identifying impacts of the Proposed Action. Given the similarity in gear, techniques, and volume of observer records, the Hawaii longline fisheries (both deep-set (DSLL) and shallow-set (SSLL) fishery sectors) provide the best potential catch per unit effort (CPUE) rates for considering impacts of the Proposed Action. While we acknowledge that the use of proxy data carries an inherent uncertainty, we regard the proxy datasets as the best scientific information available for the purposes of evaluating the effects of Proposed Action.

The various fish stocks that may be affected by the Proposed Action have been grouped into three categories: *commonly caught management unit species*, *other commonly caught species*, and *uncommonly caught species*. Management unit species of the HMS FMP that have been captured at rates greater than 0.5 animals per 1,000 hooks are considered *commonly caught management unit species*, species other than highly migratory species management unit species that have been captured at rates greater than 0.5 animals per 1,000 hooks are considered *other commonly caught species*, and species that are captured at rates below 0.5 animals per 1,000 hooks are considered *uncommonly caught species*.

The Data Summary section below presents observed catch (number of animals) and CPUE (catch per 1,000 hooks) for *commonly caught management unit species*, *other commonly caught species*, and *uncommonly caught species* in Tables A-3-2 and A-3-4. The number of interactions and CPUE for

[1] Note when the Hawaii SSLL fishery sector re-opened in June of 2004, all trips that followed thereafter either had to be declared as SSLL or DSLL. Data collection for the SSLL fishery sector started in late June 2004 and data collection for the DSLL sector started in early July 2004 (E. Fourney, pers. comm., March 31, 2021). However, there are no data for the DSLL fishery sector for 2004 because no fishing took place east of 140° W that year.

protected species likely to be affected by the Proposed Action are presented in Table A-3-3 and A-3-5 for the SSLL and DSLL fishery sectors, respectively. Given the infrequent capture of *uncommonly caught species* in the Hawaii longline fisheries, none of these species, except for striped marlin, are evaluated further in this draft EIS. Note that there was no recorded catch of any prohibited species as defined under the HMS FMP (Table 4-32 in the draft EIS). Data to derive these catch rates was obtained from NMFS Pacific Islands Regional Office (E. Fourney, pers. comm., March 31, 2020).

**DATA SUMMARY**

**Table A-3-2.** Total observed catch (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) east of 140° W for the Hawaii shallow-set longline fishery, for the years 2004 through 2019. The total number of hooks observed was 3,508,409.

| Species | Total Caught | Number Kept | Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|
| | | | Alive | Dead | |
| ***Commonly Caught Management Unit Species*** | | | | | |
| Swordfish | 38,125 | 34,775 | 1,155 | 2,195 | 10.867 |
| Shark, Blue | 29,676 | 0 | 25,180 | 4,496 | 8.459 |
| Shark, Shortfin Mako | 5,345 | 629 | 3,379 | 1,336 | 1.523 |
| Mahi-mahi or Dolphinfish | 3,914 | 3,221 | 606 | 87 | 1.116 |
| Tuna, Bigeye | 3,878 | 3,322 | 403 | 153 | 1.105 |
| Tuna, Albacore | 2,255 | 1,801 | 220 | 234 | 0.643 |
| ***Other Commonly Caught Species*** | | | | | |
| Lancetfish, Longnose | 6,425 | 0 | 650 | 5,775 | 1.831 |
| Escolar | 2,920 | 1,914 | 614 | 392 | 0.832 |
| Opah | 2,879 | 2,185 | 494 | 200 | 0.821 |
| Stingray, Pelagic | 2,446 | 356 | 1,907 | 183 | 0.697 |
| Oilfish | 1,838 | 138 | 1,354 | 346 | 0.524 |
| ***Uncommonly Caught Species*** | | | | | |
| Pomfret, Brama spp. | 975 | 512 | 224 | 239 | 0.278 |
| Tuna, Yellowfin[1] | 872 | 749 | 91 | 32 | 0.249 |
| Mola, Common[1] | 265 | 1 | 257 | 7 | 0.076 |
| Spearfish, Shortbill | 195 | 53 | 74 | 68 | 0.056 |
| Shark, Unidentified | 179 | 0 | 161 | 15 | 0.051 |
| Marlin, Striped[1] | 165 | 30 | 89 | 46 | 0.047 |
| Bony Fish, Unidentified | 162 | 0 | 150 | 12 | 0.046 |
| Pomfret, Sickle | 133 | 126 | 4 | 3 | 0.038 |
| Shark, Bigeye Thresher | 121 | 6 | 95 | 20 | 0.034 |
| Snake Mackerel | 97 | 3 | 41 | 53 | 0.028 |
| Ribbonfish, Tapertail | 88 | 24 | 20 | 44 | 0.025 |
| Tuna, Skipjack[1] | 71 | 68 | 2 | 1 | 0.020 |
| Shark, Unid. Mako | 42 | 0 | 34 | 8 | 0.012 |
| Shark, Salmon | 28 | 2 | 9 | 17 | 0.008 |
| Shark, Common Thresher | 21 | 3 | 14 | 4 | 0.006 |
| Wahoo | 21 | 21 | 0 | 0 | 0.006 |
| Shark, Unid. Thresher | 20 | 0 | 15 | 5 | 0.006 |

[1] Defined as a Management Unit Species under the under the HMS FMP (Table A-3-1) but caught at an *uncommonly caught species* rate (<0.5 per 1,000 hooks).

**Table A-3-2.** Continued. Total observed catch (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) east of 140° W for the Hawaii shallow-set longline fishery, for the years 2004 through 2019. The total number of hooks observed was 3,508,409.

| Species | Total Caught | Number Kept | Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|
| | | | Alive | Dead | |
| ***Uncommonly Caught Species*** | | | | | |
| Tuna, Unidentified | 20 | 5 | 4 | 11 | 0.006 |
| Marlin, Blue | 18 | 3 | 8 | 7 | 0.005 |
| Shark, Longfin Mako | 14 | 3 | 11 | 0 | 0.004 |
| Pomfret, Dagger | 12 | 1 | 8 | 3 | 0.003 |
| Bony Fish, Other Identified | 10 | 3 | 2 | 5 | 0.003 |
| Billfish, Unidentified | 9 | 0 | 7 | 2 | 0.003 |
| Cigarfishes | 7 | 2 | 3 | 2 | 0.002 |
| Tuna, Bluefin[1] | 6 | 6 | 0 | 0 | 0.002 |
| Shark, Cookie Cutter | 5 | 0 | 2 | 3 | 0.001 |
| Crestfish | 4 | 0 | 2 | 2 | 0.001 |
| Fanfishes | 4 | 0 | 0 | 4 | 0.001 |
| Pomfret, Lustrous | 4 | 3 | 1 | 0 | 0.001 |
| Dogfish, Velvet | 3 | 0 | 2 | 1 | 0.001 |
| Mola, Sharptail | 3 | 0 | 3 | 0 | 0.001 |
| Pomfret, Rough | 3 | 0 | 2 | 1 | 0.001 |
| Yellowtail | 3 | 3 | 0 | 0 | 0.001 |
| Ribbonfish, Scalloped | 2 | 0 | 2 | 0 | 0.001 |
| Mola, Slender | 1 | 0 | 1 | 0 | 0.000[2] |
| Pomfret, Unidentified | 1 | 1 | 0 | 0 | 0.000[2] |
| Shark, Crocodile | 1 | 0 | 1 | 0 | 0.000[2] |
| Shark, Gray Reef | 1 | 0 | 1 | 0 | 0.000[2] |
| Shark, Pelagic Thresher | 1 | 0 | 1 | 0 | 0.000[2] |
| Shark, Tiger | 1 | 0 | 1 | 0 | 0.000[2] |
| Snake Mackerel, Unidentified | 1 | 0 | 0 | 1 | 0.000[2] |

[1] Defined as a Management Unit Species under the under the HMS FMP (Table A-3-1) but caught at an *uncommonly caught species* rate (<0.5 per 1,000 hooks).

[2] Catch per 1,000 hooks rounds to zero; however, one interaction calculates to a rate of 0.0002850 per 1,000 hooks.

**Table A-3-3.** Total observed protected species catch (number of interactions) and catch-per-unit-effort (number of interactions per 1,000 hooks) east of 140° W for the Hawaii shallow-set longline fishery, for the years 2004 through 2019. The total number of hooks observed was 3,508,409.

| Protected Species | Total Caught | Number Kept | Number Returned | | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|---|
| | | | Alive | Dead | Injured | |
| **Fish** | | | | | | |
| Shark, Oceanic Whitetip | 4 | | 3 | 1 | | 0.001 |
| **Seabirds** | | | | | | |
| Albatross, Black-footed | 52 | | | 9 | 43 | 0.015 |
| Albatross, Laysan | 31 | | | 4 | 27 | 0.009 |
| **Marine Mammals** | | | | | | |
| Dolphin, Risso's | 15 | | | 5 | 10 | 0.004 |
| Dolphin, Striped | 3 | | | | 3 | 0.001 |
| Dolphin, Bottlenose | 2 | | | 1 | 1 | 0.001 |
| Dolphin, Short-beaked Common | 1 | | | | 1 | 0.000[1] |
| Beaked Whale, Mesoplodont | 2 | | | | 2 | 0.001 |
| Fur Seal, Guadalupe | 4 + 4 = 8[2] | | | | 4 | 0.002[2] |
| Seal, Northern Elephant | 2 + 2 = 4[2] | | | | 2 | 0.001[2] |
| Seal, Unidentified[3] | 1 | | | | | 0.000[1] |
| **Sea Turtles** | | | | | | |
| Turtle, Loggerhead[4,5] | 39 + 1 = 40 | | | 1 | 40 | 0.011 |
| Turtle, Leatherback[6] | 27 | | | | 27 | 0.008 |
| Turtle, Olive Ridley[6] | 1 | | | | 1 | 0.000[1] |

[1] Catch per 1,000 hooks rounds to zero; however, one interaction calculates to a rate of 0.0002850 per 1,000 hooks.

[2] Unidentified Pinnipeds and Unidentified Sea Lions were categorized as either Guadalupe fur seal or Northern elephant seal using the Wilson Scoring Method as described in the NMFS 2019 SSLL Biological Opinion (NMFS 2019 and J. Lee pers. comm. July 23, 2020). In this case, the Wilson Scoring Method added four individuals to the Guadalupe fur seal species category and two individuals to the Northern elephant seal species category.

[3] One Unidentified Seal was recorded by the observer as lacking ear flaps and also noted as having other seal like characteristics; however, due to the lack of specific data, the unidentified seal was not apportioned to a species category and remains categorized as an "Unidentified Seal" (M. McCracken, pers. comm., August 6, 2020).

[4] One unidentified hardshell sea turtle was confirmed to be a loggerhead sea turtle interaction (J. Lee, pers. comm., July 23, 2020).

[5] Of the 40 loggerhead sea turtles, 39 were released alive (but injured) and only one was released dead.

[6] All leatherback sea turtles and the olive ridley sea turtle were released alive but injured.

**Table A-3-4.** Total observed catch (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) east of 140° W for the Hawaii deep-set longline fishery, for the years 2004[1] through 2019. The total number of hooks observed was 3,741,110.

| Species | Total Caught | Number Kept | Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|
| | | | Alive | Dead | |
| ***Commonly Caught Management Unit Species*** | | | | | |
| Tuna, Bigeye | 20,933 | 19,538 | 1,012 | 383 | 5.595 |
| Mahi-mahi or Dolphinfish | 5,390 | 4,666 | 216 | 508 | 1.441 |
| Shark, Blue | 4,180 | 1 | 3,958 | 221 | 1.117 |
| Tuna, Yellowfin | 2,643 | 2,407 | 132 | 104 | 0.706 |
| ***Other Commonly Caught Species*** | | | | | |
| Lancetfish, Longnose | 18,817 | 21 | 948 | 17,848 | 5.030 |
| Opah | 7,192 | 6,697 | 183 | 312 | 1.922 |
| Snake Mackerel | 6,910 | 336 | 3,565 | 3,009 | 1.847 |
| Pomfret, Sickle | 4,312 | 4,141 | 124 | 47 | 1.153 |
| Escolar | 4,164 | 1,740 | 1,912 | 512 | 1.113 |
| ***Uncommonly Caught Species*** | | | | | |
| Tuna, Skipjack | 1,834 | 1,621 | 2 | 211 | 0.490 |
| Wahoo | 1,818 | 1,721 | 2 | 95 | 0.486 |
| Spearfish, Shortbill | 859 | 645 | 36 | 178 | 0.230 |
| Marlin, Striped[2] | 744 | 431 | 127 | 186 | 0.199 |
| Shark, Shortfin Mako[2] | 655 | 41 | 465 | 149 | 0.175 |
| Pomfret, Dagger | 530 | 22 | 434 | 74 | 0.142 |
| Swordfish[2] | 526 | 322 | 66 | 138 | 0.141 |
| Stingray, Pelagic | 360 | 26 | 300 | 34 | 0.096 |
| Shark, Bigeye Thresher | 280 | 7 | 220 | 53 | 0.075 |
| Tuna, unidentified | 240 | 3 | 20 | 217 | 0.064 |
| Tuna, Albacore[2] | 167 | 164 | 1 | 2 | 0.045 |
| Escolar, Longfin | 134 | 0 | 38 | 96 | 0.036 |
| Marlin, Blue | 89 | 68 | 7 | 14 | 0.024 |
| Pomfret, Brama spp. | 86 | 24 | 36 | 26 | 0.023 |
| Sailfish | 81 | 69 | 2 | 10 | 0.022 |
| Dolphinfish, Pompano | 67 | 42 | 4 | 21 | 0.018 |
| Oilfish | 38 | 7 | 27 | 4 | 0.010 |

[1] There were no data for the DSLL fishery sector for 2004 because no fishing took place east of 140° W that year (E. Fourney, pers. comm., March 31, 2021).

[2] Defined as a Management Unit Species under the under the HMS FMP (Table A-3-1) but caught at an *uncommonly caught species* rate (<0.5 per 1,000 hooks).

**Table A-3-4.** Continued. Total observed catch (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) east of 140° W for the Hawaii deep-set longline fishery years 2004[1] through 2019. The total number of hooks observed was 3,741,110.

| Species | Total Caught | Number Kept | Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|
| | | | Alive | Dead | |
| **Uncommonly Caught Species** | | | | | |
| Pomfret, Rough | 28 | 1 | 24 | 3 | 0.007 |
| Puffer, Pelagic | 27 | 0 | 13 | 14 | 0.007 |
| Mola, Slender | 25 | 1 | 9 | 15 | 0.007 |
| Billfish, unidentified | 23 | 0 | 9 | 14 | 0.006 |
| Shark, Unid. Thresher | 20 | 0 | 14 | 6 | 0.005 |
| Swallowers | 19 | 0 | 3 | 16 | 0.005 |
| Crestfish | 17 | 3 | 8 | 6 | 0.005 |
| Bony Fish, unidentified | 15 | 0 | 9 | 6 | 0.004 |
| Fanfishes | 13 | 0 | 4 | 9 | 0.003 |
| Shark, Unidentified | 13 | 0 | 11 | 2 | 0.003 |
| Remora/Suckerfish | 12 | 0 | 12 | 0 | 0.003 |
| Ribbonfish, Tapertail | 12 | 1 | 7 | 4 | 0.003 |
| Shark, Longfin Mako | 12 | 0 | 9 | 3 | 0.003 |
| Cigarfishes | 11 | 0 | 5 | 6 | 0.003 |
| Scabbardfish, Razorback | 9 | 5 | 1 | 3 | 0.002 |
| Hammerjaw | 9 | 0 | 1 | 8 | 0.002 |
| Pomfret, Unidentified | 7 | 0 | 5 | 2 | 0.002 |
| Gemfish, Black | 6 | 1 | 2 | 3 | 0.002 |
| Mola, Common | 6 | 0 | 6 | 0 | 0.002 |
| Shark, Silky | 6 | 0 | 2 | 4 | 0.002 |
| Bony Fish, other identified | 4 | 0 | 1 | 3 | 0.001 |
| Shark, Unid. Mako | 4 | 0 | 2 | 2 | 0.001 |
| Dogfish, Velvet | 3 | 0 | 2 | 1 | 0.001 |
| Mola, Sharptail | 3 | 0 | 3 | 0 | 0.001 |
| Lancetfish, Shortnose | 3 | 0 | 0 | 3 | 0.001 |
| Bigeye Sand Tiger Shark | 2 | 0 | 2 | 0 | 0.001 |
| Escolar, Roudi's | 2 | 0 | 0 | 2 | 0.001 |
| Shark, Cookie Cutter | 2 | 0 | 2 | 0 | 0.001 |
| Marlin, Black | 1 | 1 | 0 | 0 | 0.000[1] |

[1] There was no data for the DSLL fishery sector for 2004 because no fishing took place east of 140° W that year (E. Fourney, pers. comm., March 31, 2021).

[2] Catch per 1,000 hooks rounds to zero; however, one interaction calculates to a rate of 0.0002673 per 1,000 hooks.

**Table A-3-4.** Continued. Total observed catch (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) east of 140° W for the Hawaii deep-set longline fishery years 2004[1] through 2019. The total number of hooks observed was 3,741,110.

| Species | Total Caught | Number Kept | Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|
| | | | Alive | Dead | |
| ***Uncommonly Caught Species*** | | | | | |
| Mobula (Devil Ray) | 1 | 0 | 1 | 0 | 0.000[2] |
| Pomfret, Lustrous | 1 | 0 | 1 | 0 | 0.000[2] |
| Pomfret, Pacific | 1 | 1 | 0 | 0 | 0.000[2] |
| Puffer, Unidentified | 1 | 0 | 0 | 1 | 0.000[2] |
| Shark, Other Identified | 1 | 0 | 1 | 0 | 0.000[2] |
| Tuna, Kawakawa | 1 | 1 | 0 | 0 | 0.000[2] |
| Ribbonfish, Scalloped | 1 | 0 | 1 | 0 | 0.000[2] |

[1] There was no data for the DSLL fishery sector for 2004 because no fishing took place east of 140° W that year (E. Fourney, pers. comm., March 31, 2021).

[2] Catch per 1,000 hooks rounds to zero; however, one interaction calculates to a rate of 0.0002673 per 1,000 hooks.

**Table A-3-5.** Total observed protected species catch (number of interactions), and catch-per-unit-effort (number of interactions per 1,000 hooks) east of 140° W for the Hawaii deep-set longline fishery years 2004[1] through 2019. The total number of hooks observed was 3,741,110.

| Protected Species | Total Caught | Number Kept | Number Returned | | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|---|
| | | | Alive | Dead | Injured | |
| **Seabirds** | | | | | | |
| Albatross, Black-footed | 9 | 0 | 0 | 9 | 0 | 0.002 |
| **Marine Mammals** | | | | | | |
| Whale, False Killer[2] | 1+1=2 | 0 | 0 | 0 | 2 | 0.001 |
| **Sea Turtles** | | | | | | |
| Turtle, Olive Ridley | 3 | 0 | 0 | 2 | 1 | 0.001 |
| Turtle, Loggerhead | 1 | 0 | 0 | 1 | 0 | 0.000[3] |
| Turtle, Green/Black | 1 | 0 | 0 | 1 | 0 | 0.000[3] |

[1] There was no data for the DSLL fishery sector for 2004 because no fishing took place east of 140° W that year (E. Fourney, pers. comm., March 31, 2021).

[2] The false killer whale category is the sum of one unidentified whale from 2016 plus one identified false killer whale from 2019. The 2016 "unidentified whale, dolphin or porpoise" encounter the observer collected a skin biopsy for deoxyribonucleic acid (or DNA) comparison. When the skin biopsy was analyzed in the lab the animal was identified as a false killer whale (S. J. Arceneaux, pers. comm., March 21, 2018). Given the 2016 encounter with the false killer whale occurred near 138° W longitude the animal was most likely an individual from the Eastern and Central North Pacific pelagic stock (pelagic stock), and not the Main Hawaiian Islands (MHI) stock whose range is restricted to movements and foraging in the waters surrounding the main Hawaiian Islands (Baird et al. 2012). Furthermore, the pelagic stock is not an Endangered Species Act (ESA) listed species whereas the MHI stock is listed as an endangered distinct population segment under the ESA. The false killer whale encountered in 2019 occurred near 136° W longitude; therefore, (similar to the animal encountered in 2016) the animal was most likely an individual from the Eastern and Central North Pacific pelagic stock (pelagic stock), and not the MHI stock.

[3] Catch per 1,000 hooks rounds to zero; however, there was one interaction with a loggerhead sea turtle in 2015 and one interaction with a green sea turtle in 2018 which both calculate to an interaction rate of 0.0002673 per 1,000 hooks.

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# Appendix 4. United States West Coast Drift Gillnet Fishery Observer Data: Summary, Discussion and Data Analysis

## SUMMARY

This appendix summarizes the 2001/2002 through 2019/2020 United States (U.S.) West Coast drift gillnet (DGN) fishery observer dataset. The DGN fishery serves as a proxy for identifying impacts of the Proposed Action. Despite differences in gear type, time-area concentration of effort, and the units used to calculate catch per unit effort (CPUE), the West Coast DGN fishery observer records provide information on the potential suite of *major species*, *minor species* and prohibited species, as well as any protected species likely to interact with fishing gear in the Proposed Action Area (see Section 3 in the draft environmental impact statement (EIS)).

## DISCUSSION

The West Coast DGN fleet targets swordfish, common thresher shark and other marketable species, and operates primarily off the coast of California in the southern reaches of the Proposed Action Area, i.e., off the central and southern coast of California (Figure A-4-1). While the West Coast DGN fishery provides the closest approximation to the spatial scope and target species of the Proposed Action, we do not apply catch or interaction rates from the West Coast DGN dataset to the analysis of alternatives, given differences in gear type (net versus hook-and-line) and therefore the basis for CPUE is catch per 100 sets for DGN versus catch per 1,000 hooks for longline. Nevertheless, the West Coast DGN dataset is used to qualitatively inform opinions about the potential suite of *major species*, *minor species*, prohibited species, and other species likely to interact with fishing gear in the Proposed Action Area. Any species in the *major species* category for the West Coast DGN fishery dataset that was not present in the Hawaii shallow-set nor deep-set longline fisheries data east of 140˚West (W) longitude was added to either the *commonly caught management unit species* or *other commonly caught species* categories for this analysis (see Section 3 of the draft EIS).

While DGN fishery records date back to the 1970s, operational characteristics (e.g., the Pacific Leatherback Conservation Area which was implemented for the West Coast DGN fishery in 2001) have changed considerably over time, to adapt to regulations intended to improve the fishery's performance with respect to environmental protection objectives of U.S. statutes (Urbisci *et al.* 2017). Therefore, we stratify the West Coast DGN observer records from the 2001/2002 fishing season through the 2019/2020 fishing season. This time period is more reflective of applicable management approaches and

considerations for evaluating exempted fishing permits (EFP) to target swordfish and other marketable highly migratory species (HMS) in response to the Council's July 2, 2014 solicitation for EFP proposals (PFMC 2014).

The data summary section below shows observer catch summaries by species and catch rates for *major species* and *minor species* in Table A-4-1. *Major species* are defined as species that have been captured in quantities greater than 10 animals per 100 observed sets and *minor species* captured in quantities less than 10 animals per 100 observed sets. These *minor species* did not involve species for which there are pressing resource conservation concerns, given their infrequent capture in the West Coast DGN fishery, and will not be used to evaluate impacts in the draft EIS.

Table A-4-2 shows protected species interactions rates per 100 observed sets. Rates for protected species interactions ranged from 0.031 to 3.938 (mean = 0.5028) animals per 100 observed sets over the 18-year period of the West Coast DGN dataset (total of 3,225 observed sets). The short-beaked common dolphin and the California sea lion were the only two protected species that displayed high interaction rates (interaction rates higher than 3 interactions per 100 observed sets), whereas all other protected species have interaction rates below 0.750 interactions per 100 observed sets (Table A-4-2). Table A-4-3 shows the number of animals observed caught for prohibited species. Commercial landings are not permitted for prohibited species therefore, they must be released immediately.

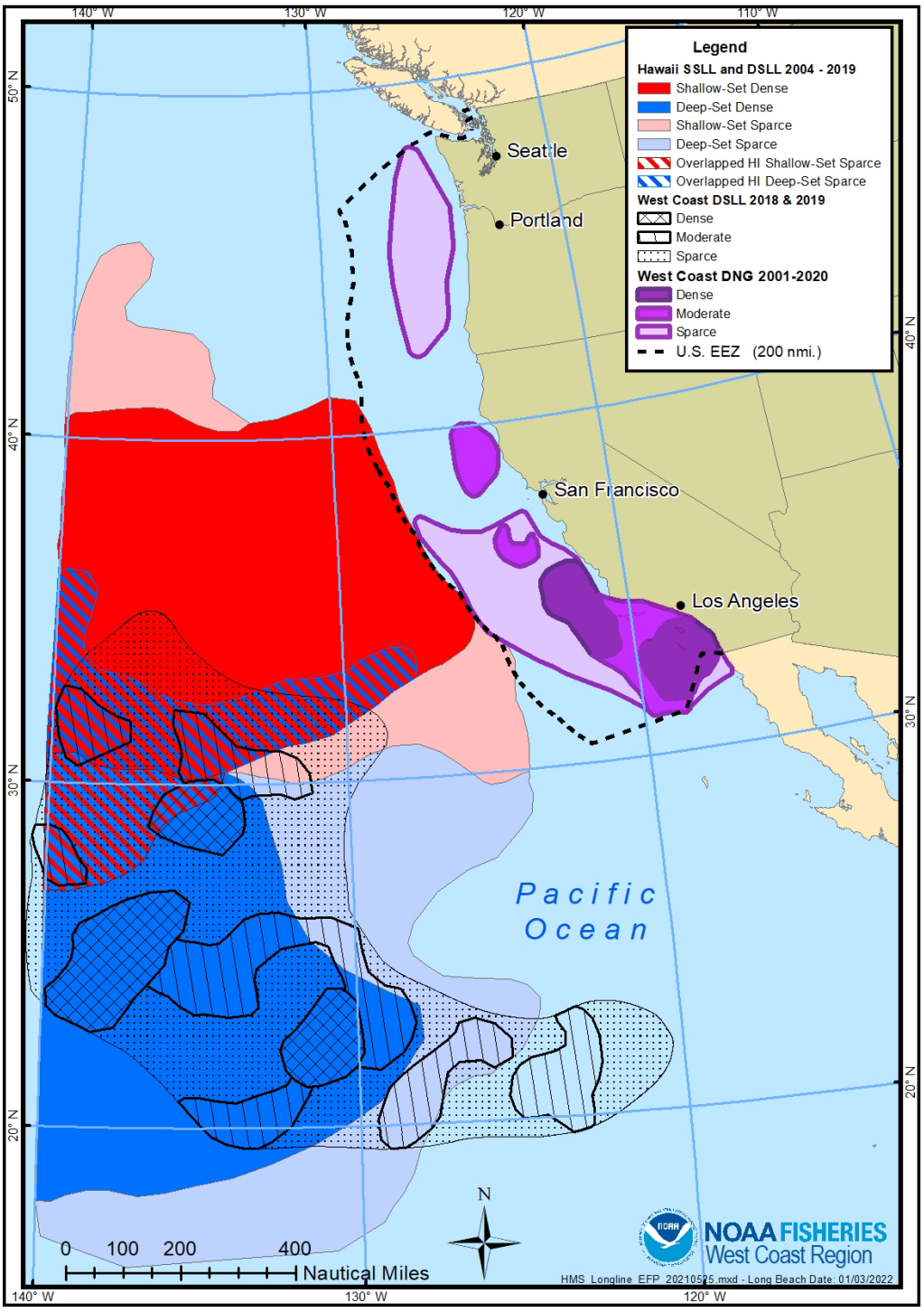


**Figure A-4-1**. Spatial extent of fishing effort by density for fishery datasets used as proxies for the Proposed Action and the U.S. West Coast EEZ (i.e., the Proposed Action Area). Proxy datasets include: the 2004 through 2019 Hawaii longline fisheries dataset east of 140˚ W longitude, the 2001/2002 through 2019/2020 U.S. West Coast drift gillnet fishery observer dataset, and the 2018 and 2019 U.S. West Coast deep-set longline fishery dataset.

## DATA SUMMARY

**Table A-4-1**. *Major species* and *minor species* catch rates per 100 observed sets for the U.S. West Coast drift gillnet fishery for the 2001/2002 through 2019/2020 fishing seasons (PacFIN data extraction, April 29, 2020). Total number of sets was 3,225 sets.

| ***Major Species*** | **DGN Catch per 100 Observed Sets** |
|---|---|
| Common Mola | 775.349 |
| Swordfish[1] | 229.271 |
| Shortfin Mako Shark[1] | 112.341 |
| Blue Shark[1] | 105.116 |
| North Pacific Albacore[1] | 94.729 |
| Skipjack Tuna[1] | 88.682 |
| Common Thresher Shark[1] | 88.031 |
| Opah | 87.721 |
| Pacific Mackerel | 56.465 |
| Pacific Bluefin Tuna[1] | 55.225 |
| Pacific Bonito | 30.202 |
| Bullet Mackerel | 12.744 |
| ***Minor Species*** | **DGN Catch per 100 Observed Sets** |
| Louvar | 9.581 |
| Yellowfin Tuna[1] | 8.992 |
| Bigeye Thresher | 8.403 |
| Pacific Pomfret | 6.760 |
| Pelagic Stingray | 6.233 |
| Scombrid | 3.783 |
| Striped Marlin[1] | 3.752 |
| Unidentified Invertebrate | 3.752 |
| Slender Mola | 3.194 |
| Salmon Shark | 2.171 |
| California Yellowtail | 1.395 |
| Smooth Hammerhead Shark | 1.302 |
| Bat Ray | 1.085 |
| Jack Mackerel | 0.992 |
| Unidentified Fish | 0.837 |
| Remora | 0.713 |
| Pacific Electric Ray | 0.465 |
| Fish Other Identified | 0.403 |
| Pacific Sardine | 0.372 |

[1] Defined as a "management unit species" under the under the *Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species*.

**Table A-4-1**. Continued. *Major species* and *minor species*[1] catch rates per 100 observed sets for the U.S. West Coast drift gillnet fishery for the 2001/2002 through 2019/2020 fishing seasons (PacFIN data extraction, April 29, 2020). Total number of sets was 3,225.

| ***Minor Species*** | **DGN Catch per 100 Observed Sets** |
|---|---|
| Blue Marlin | 0.341 |
| Oilfish | 0.341 |
| Megamouth Shark[2] | 0.217 |
| Mobula | 0.248 |
| Jumbo Squid | 0.186 |
| Pacific Hake | 0.186 |
| Unidentified Billfish | 0.155 |
| Longfin Mako Shark | 0.155 |
| Unidentified Rockfish | 0.124 |
| Escolar | 0.093 |
| Pelagic Thresher Shark | 0.093 |
| Unidentified Ray | 0.093 |
| Basking Shark[2] | 0.279 |
| Oarfish | 0.062 |
| Prickly Shark | 0.062 |
| Sevengill Shark | 0.062 |
| Soupfin Shark | 0.062 |
| Spiny Dogfish | 0.062 |
| Unidentified Mackerel | 0.062 |
| Unidentified Mollusk | 0.062 |
| Unidentified Shark | 0.062 |
| White Seabass | 0.062 |
| California Skate | 0.031 |
| Crestfish | 0.031 |
| King of the Salmon | 0.031 |
| Longnose Lancetfish | 0.031 |
| Pipefish | 0.031 |
| Round Stingray | 0.031 |
| Spider Crab | 0.031 |
| Unidentified Crustacean | 0.031 |
| Unidentified Hammerhead Shark | 0.031 |
| Unidentified Thresher Shark | 0.031 |
| Bay Pipefish | 0.031 |

[2] Prohibited species (see Table A-4-3 for details).

**Table A-4-2**. Observed protected species in the U.S. West Coast drift gillnet fishery by total catch, disposition and catch per 100 sets for the 2001/2002 through 2019/2020 fishing seasons. Total number of sets was 3,225.

| Protected Species | Total Caught | Number Returned | | Catch per 100 Sets |
|---|---|---|---|---|
| | | Alive | Dead | |
| **Marine Mammals** | | | | |
| Dolphin, Short-beaked Common[1] | 127 | 0 | 127 | 3.938 |
| Sea Lion, California | 98 | 1 | 97 | 3.039 |
| Dolphin, Northern Right Whale | 24 | 0 | 24 | 0.744 |
| Dolphin, Long-beaked Common | 14 | 1 | 13 | 0.434 |
| Dolphin, Pacific White-sided | 11 | 0 | 11 | 0.341 |
| Seal, Northern Elephant | 9 | 0 | 9 | 0.279 |
| Dolphin, Risso's | 6 | 0 | 6 | 0.186 |
| Whale, Gray | 3 | 1 | 2 | 0.093 |
| Whale, Short-finned Pilot | 3 | 0 | 3 | 0.093 |
| Whale, Sperm | 2 | 1 | 1 | 0.062 |
| Dolphin, Bottlenose | 1 | 0 | 1 | 0.031 |
| Dolphin, Unidentified | 1 | 0 | 1 | 0.031 |
| Porpoise, Dall's | 1 | 0 | 1 | 0.031 |
| Whale, Humpback[1] | 1 | 1 | 0 | 0.031 |
| Whale, Minke | 1 | 1 | 0 | 0.031 |
| Whale, unidentified | 1 | 1 | 0 | 0.031 |
| **Fish** | | | | |
| Ray, Giant Manta | 1 | 0 | 1 | 0.031 |
| **Birds** | | | | |
| Northern Fulmar | 20 | 19 | 1 | 0.620 |
| Unidentified Auklet | 1 | 0 | 1 | 0.031 |
| Bird, unidentified | 1 | 0 | 1 | 0.031 |
| **Sea Turtles** | | | | |
| Turtle, Leatherback | 2 | 2 | 0 | 0.062 |
| Turtle, Loggerhead[1] | 2 | 2 | 0 | 0.062 |

[1] Note we are aware of additional West Coast DGN interactions with one short-beaked common dolphin and two more confirmed humpback whale interactions (one in the 2020/2021 fishing season released alive with no gear attached and one in the 2021/2022 fishing season released alive with gear attached; C. Villafana, pers. comm., West Coast Region Observer Program Manager, November 30, 2021) as well as a confirmed interaction with one loggerhead sea turtle in the 2022/2023 fishing season (specimen was transported to the Southwest Fishery Science Center for necropsy; A. Rhodes, pers. Comm., West Coast Region, Fishery Policy Analyst, December 19, 2023); however, we did not have access to the data at the time of preparing the draft EIS.

**Table A-4-3**. Observed prohibited species catch in numbers of animals for the U.S. West Coast drift gillnet fishery for the 2001/2002 through 2019/2020 fishing seasons.

| Prohibited Species | Catch in Numbers of Animals |
|---|---|
| Basking Shark | 2 (1 released alive and 1 dead) |
| Great White Shark | None |
| Megamouth Shark | 9 (all released alive) |
| Pacific Halibut | None |
| Pacific Salmon Species | None |

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# Appendix 5. Deep-set Longline Fishery Outside the U.S. West Coast Exclusive Economic Zone: Summary, Discussion and Data Analysis

## SUMMARY

This appendix summarizes catch rates by species for the U.S. West Coast deep-set longline (DSLL) fishery observer records occurring outside the U.S. West Coast exclusive economic zone (EEZ) to derive projected exempted fishing permit (EFP) catch for a range of effort in the Proposed Action alternatives.

## DISCUSSION

A small U.S. West Coast-based pelagic longline fishery has been operating out of southern California ports since 2005. This fishery deploys DSLL gear to target tuna (primarily bigeye tuna, *Thunnus obesus*) on the high seas. Most DSLL fishing activity occurs within this customary fishing area and season (i.e., between November and April within the boundaries of the equator and 35° N. latitude, and between the United States and Mexico EEZs and 140° West (W) longitude) due to availability of target species and operating costs. However, there are no restrictions on the area and time that DSLL fishing is permitted to take place outside of the EEZs and north of the equator, except for an April 1 through May 31 closure within the bounds of the equator, 15° North latitude, 145° W and 180° W longitude. Under existing regulations at 50 CFR 660.712, the fishery is not prohibited from using wire leaders.

For many years, a single vessel participated in this fishery, primarily targeting tuna with some swordfish and other marketable highly migratory species (HMS) taken incidentally. The NMFS West Coast Region (WCR) observer program has consistently observed this fishery since 2005; however, observer catch summaries are only available for 2019 and 2020 as data confidentiality issues arise when less than three vessels participate in a given fishery. The NMFS WCR observer program records show observer coverage was 61.5 percent in 2019 and 35.3 percent in 2020.

Below is a description of the 2019 and 2020 West Coast DSLL fishery observer records described in detail. The fishery-dependent data from this fishery serves as a proxy for identifying impacts of the DSLL portion (Component 2) of the Proposed Action. Given the similarity in gear and techniques, the West Coast DSLL fishery provides potential catch per unit effort (CPUE) rates for considering impacts of the Proposed Action when new species are in the catch and/or CPUE are not available from the Hawaii DSLL fishery dataset east of 140˚ W (Appendix 3). While we acknowledge that the use of proxy data carries an inherent uncertainty, we regard the proxy datasets as the best scientific information available for the purposes of evaluating the effects of Proposed Action.

Off the U.S. West Coast, species that are actively managed are termed Management Unit Species under the *Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species* (HMS FMP; PFMC 2003). These species are listed in Table A-5-1 (PFMC 2016).

**Table A-5-1**. HMS FMP Management Unit Species.

| Common Name | Scientific Name |
|---|---|
| Striped marlin | *Kajikia audax** |
| Swordfish | *Xiphias gladius* |
| Common thresher shark | *Alopias vulpinus* |
| Shortfin mako shark | *Isurus oxyrinchus* |
| Blue shark | *Prionace glauca* |
| North Pacific albacore | *Thunnus alalunga* |
| Yellowfin tuna | *T. albacares* |
| Bigeye tuna | *T. obesus* |
| Skipjack tuna | *Katsuwonus pelamis* |
| Pacific bluefin tuna | *T. orientalis* |
| Mahi-mahi or Dolphinfish | *Coryphaena hippurus* |

* Previously, striped marlin were included in the genus *Tetrapturus* (Collette et al. 2006).

The various species caught by the West Coast DSLL fishery have been grouped into three categories: *commonly caught management unit species*, *other commonly caught species*, and *uncommonly caught species*. Management unit species under the HMS FMP that have been caught at rates greater than 0.5 animals per 1,000 hooks are considered *commonly caught management unit species*, species other than HMS management unit species that have been caught at rates greater than 0.5 animals per 1,000 hooks are considered *other commonly caught species*, and species that are caught at rates less than 0.5 animals per 1,000 hooks are considered *uncommonly caught species*.

The West Coast DSLL fishery observer catch summaries are presented in the data summary section below showing observed catch (number of animals) and CPUE (catch per 1,000 hooks) in Tables A-5-2, and number of interactions and CPUE for protected species likely to be affected by the Proposed Action are presented in Table A-5-3. Data to derive these catch rates was obtained from NMFS WCR Observer Program (C. Villafana, pers. comm., April 14, 2021). Note, there was no recorded catch of any prohibited species as defined in the HMS FMP.

## DATA ANALYSIS

**Table A-5-2**. Total observed catch (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) for the West Coast deep-set longline fishery outside the EEZ for years 2019 and 2020. The total number of hooks observed was 690,785.

| Species | Total Caught | Unknown | Number Kept | Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|---|
| | | | | Alive | Dead | |
| ***Commonly Caught Management Unit Species*** | | | | | | |
| Tuna, Bigeye | 1,736 | 6 | 1,684 | 9 | 37 | 2.513 |
| Tuna, Yellowfin | 737 | 1 | 728 | 0 | 8 | 1.067 |
| Tuna, Albacore | 557 | 0 | 515 | 2 | 39 | 0.806 |
| ***Other Commonly Caught Species*** | | | | | | |
| Opah | 968 | 2 | 960 | 2 | 4 | 1.401 |
| Lancetfish | 645 | 0 | 3 | 17 | 625 | 0.934 |
| Pomfret, Sickle | 494 | 1 | 489 | 4 | | 0.715 |
| Wahoo | 427 | 0 | 415 | 0 | 12 | 0.618 |
| ***Uncommonly Caught Species*** | | | | | | |
| Mahi-mahi or Dolphinfish[1] | 334 | 1 | 309 | 4 | 10 | 0.484 |
| Escolar | 317 | 0 | 131 | 136 | 50 | 0.459 |
| Shark, Blue[1] | 280 | 3 | 7 | 246 | 24 | 0.405 |
| Tuna, Skipjack[1] | 85 | 0 | 81 | 0 | 4 | 0.123 |
| Shark, Shortfin Mako[1] | 56 | 0 | 3 | 44 | 9 | 0.081 |
| Marlin, Striped[1] | 48 | 0 | 3 | 26 | 19 | 0.069 |
| Snake Mackerel | 44 | 1 | 10 | 15 | 18 | 0.064 |
| Oilfish | 25 | 0 | 0 | 19 | 6 | 0.036 |
| Tuna, unidentified | 25 | 0 | 0 | 0 | 25 | 0.036 |
| Swordfish[1] | 22 | 0 | 21 | 1 | 0 | 0.032 |
| Stingray, Pelagic | 20 | 0 | 1 | 18 | 1 | 0.029 |
| Shark, Bigeye Thresher | 13 | 0 | 0 | 13 | 0 | 0.019 |
| Spearfish, Shortbill | 13 | 0 | 0 | 1 | 12 | 0.019 |
| Shark, Unidentified Thresher | 12 | 0 | 0 | 12 | 0 | 0.017 |
| Pomfret, Dagger | 11 | 0 | 0 | 7 | 4 | 0.016 |
| Pomfret, Lustrous | 11 | 0 | 1 | 9 | 1 | 0.016 |
| Shark, Unid. Mako | 10 | 0 | 0 | 9 | 1 | 0.014 |
| Escolar, Longfin | 7 | 0 | 0 | 1 | 6 | 0.010 |
| Shark, Common Thresher[1] | 6 | 0 | 0 | 4 | 2 | 0.009 |

[1] Defined as a Management Unit Species under the under the HMS FMP (Table A-5-1) but caught at an *uncommonly caught species* rate (<0.5 per 1,000 hooks).

**Table A-5-2**. Continued. Total observed catch (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) for the West Coast deep-set longline fishery outside the EEZ for years 2019 and 2020. The total number of hooks observed was 690,785.

| Species | Total Caught | Unknown | Number Kept | Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|---|
| | | | | Alive | Dead | |
| ***Uncommonly Caught Species*** | | | | | | |
| Shark, Unidentified | 4 | 1 | 0 | 3 | 0 | 0.006 |
| Pomfret, Brama spp. | 3 | 0 | 0 | 2 | 1 | 0.004 |
| Scabbardfish, Razorback | 3 | 0 | 1 | 0 | 2 | 0.004 |
| Rainbow Runner | 3 | 0 | 3 | 0 | 0 | 0.004 |
| Fanfish, Pacific | 2 | 0 | 0 | 0 | 2 | 0.003 |
| Sailfish, Pacific | 2 | 0 | 0 | 2 | 0 | 0.003 |
| Ribbonfish, Tapertail | 2 | 0 | 0 | 1 | 1 | 0.003 |
| Shark, Cookie Cutter | 1 | 0 | 0 | 0 | 1 | 0.001 |
| Mola, Common | 1 | 0 | 0 | 1 | 0 | 0.001 |
| Puffer, Pelagic | 1 | 0 | 0 | 1 | 0 | 0.001 |
| Shark, Pelagic Thresher | 1 | 0 | 0 | 1 | 0 | 0.001 |
| Escolar, Roudi's | 1 | 0 | 0 | 1 | 0 | 0.001 |
| Pomfret, Rough | 1 | 0 | 0 | 1 | 0 | 0.001 |

**Table A- 5-3**. Total observed protected species catch (number of interactions) and catch-per-unit-effort (number of interactions per 1,000 hooks) for the West Coast deep-set longline fishery outside the EEZ for years 2019 and 2020[1]. The total number of hooks observed was 690,785.

| Protected Species | Total Caught | Number Kept | Number Returned | | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|---|
| | | | Alive | Dead | Injured | |
| **Birds** | | | | | | |
| Unidentified Shearwater Species[2] | 1 | 0 | 0 | 1 | 0 | 0.001 |
| **Sea Turtles** | | | | | | |
| Turtle, Loggerhead[3] | 1 | 0 | 0 | 0 | 1 | 0.001 |

[1] Note that a single olive ridley sea turtle interaction (dead) also occurred in the West Coast DSLL fishery operating outside the EEZ in 2006. The incidental take of the olive ridley occurred in an area not typically fished by the DSLL fishing gear. The fisherman stated that it was an exploratory fishing trip south of the proposed action area for the fishery and that he would no longer fish in that area (NMFS 2006). We note here, as 2006 data is not included in our analysis as less than three vessels participated in 2006; therefore, data confidentiality issues prohibit its use.

[2] This Unidentified Shearwater Species category did not have interactions with the Hawaii longline fisheries data east of 140˚ W longitude (Appendix 3) but had interactions in this fishery; therefore, Unidentified Shearwater Species are moved to Protected Species most likely to be affected and added to the Species List (Section 3. Methodology in the draft environmental impact statement (EIS)). This catch per 1,000 hooks rate was also used to project interactions for the DSLL component in the draft EIS.

[3] This loggerhead sea turtle was caught in 2019 and released alive but injured.

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# Appendix 6. The 2019 Longline Exempted Fishing Permit Fishing Trials: Summary, Discussion and Data Analysis

## SUMMARY

This appendix summarizes the 2019 three-month longline exempted fishing permit (EFP) fishing trials (2019 Longline EFP) observer dataset to inform the potential suite of *commonly caught management unit species*, *other commonly caught species*, *uncommonly caught species*, prohibited finfish, and protected species likely to interact with the fishing gear in the Proposed Action Area (i.e., inside the U.S. West Coast exclusive economic zone (EEZ)). The 2019 Longline EFP was conducted using the same gear, and operated in the same spatial (i.e., the EEZ) and temporal scope as the Proposed Action. However, due to the very limited duration of the 2019 Longline EFP, this dataset is only used as a proxy until larger and more robust datasets are not available. We acknowledge that the use of this limited proxy data carries an inherent uncertainty.

## DISCUSSION

On April 29, 2019, the National Marine Fisheries Service (NMFS) issued an EFP for two vessels to target swordfish and other highly migratory species using shallow-set longline (SSLL) and deep-set longline (DSLL) gear in the U.S. West Coast EEZ off California and Oregon. The terms and conditions of the EFP required 100 percent observer coverage, mitigation measures to reduce protected species interactions, and limits on interactions with loggerhead and leatherback sea turtles (NMFS 2019). The EFP was signed by the applicants and became valid in June of 2019.

Between September 5 and December 10, 2019, the two EFP vessels undertook eight fishing trips comprising 20 DSLL sets and 59 SSLL sets off California. Although the EFP only operated for three months, the fishermen used 50,136 (93 percent) of the 54,000 hooks allotted for SSLL, and 37,156 (33 percent) of the 125,000 hooks allotted for DSLL. Observer data were collected on 100 percent of the EFP fishing trips. DSLL sets averaged 1,858 hooks per set (range 1,520 to 2,500 hooks) and SSLL sets averaged 850 hooks per set (range 353 to 1,218 hooks). All of the DSLL and SSLL sets took place outside of the no fishing-zone (i.e., no fishing in the Southern California Bight, Leatherback Critical Habitat and shoreside of the 50 nautical mile line; Figure A-6-1) as defined in the terms and conditions of the EFP. Approximately 45 percent of DSLL sets and 90 percent of SSLL sets were performed off northern and central California, with none occurring inside the Monterey Bay National Marine Sanctuary's Davidson Seamount Management Zone. About 30 percent of DSLL sets and about 80 percent of SSLL sets occurred in the Pacific Leatherback Conservation Area (PLCA), which is closed to drift gillnet fishing between August 15 and November 15 each year.

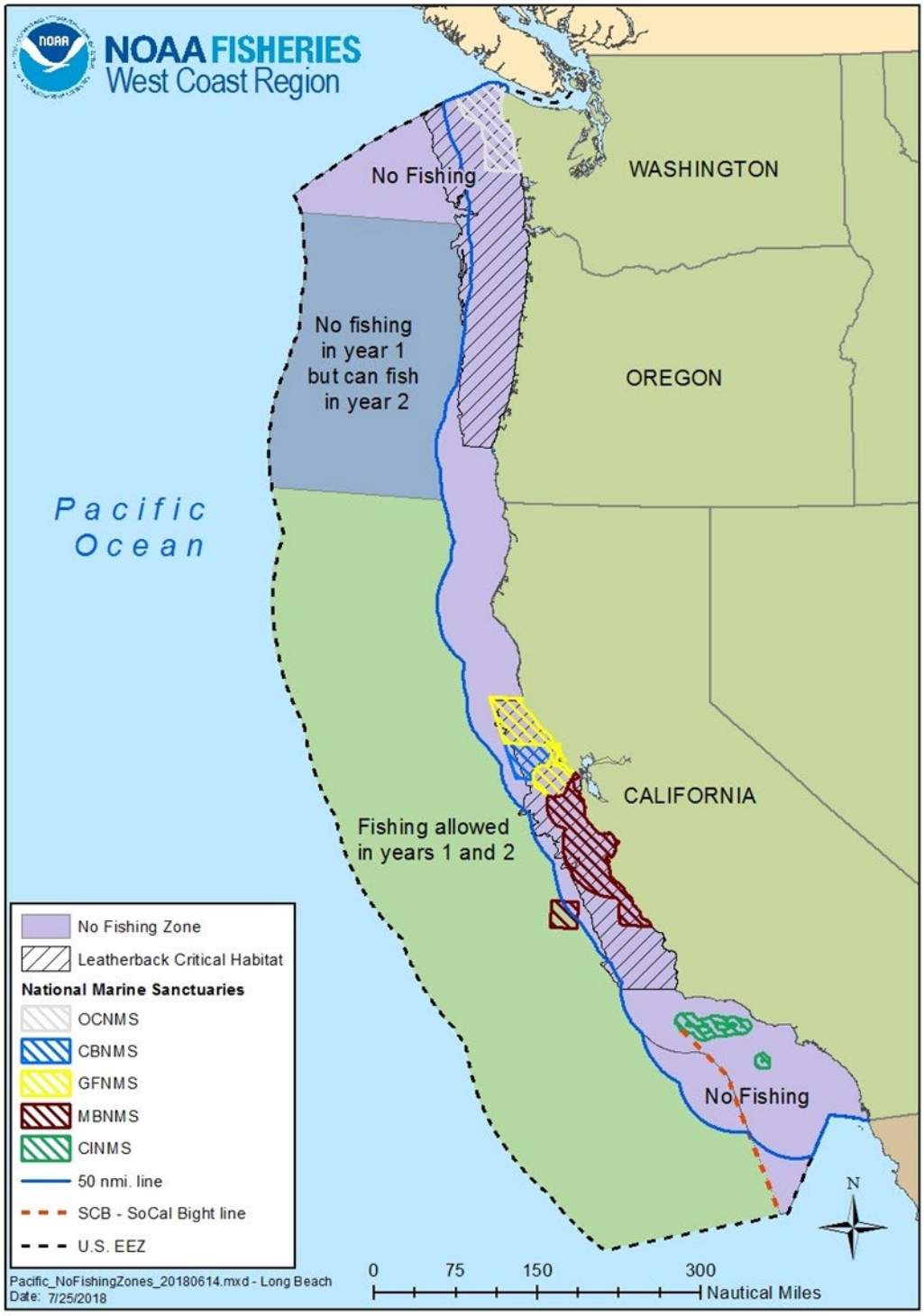


**Figure A-6-1**. Coastwide view of the 2019 Longline EFP no-fishing zone (in purple), including areas shoreside of the 50 nautical mile line, the Leatherback Critical Habitat, the Southern California Bight, and most of the National Marine Sanctuaries (NMS; except for a portion of the Davidson Seamount (red-hatched quadrilateral polygon)) on the U.S. West Coast. The current NMSs on the U.S. West Coast include Olympic Coast NMS (OCNMS), Cordell Bank NMS (CBNMS), Greater Farallones NMS (GFNMS), Monterey Bay NMS (MBNMS) and Channel Islands NMS (CINMS).

Species that are actively managed under the *Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species* are termed Management Unit Species (HMS FMP; PFMC 2003), and are shown in Table A-6-1 (PFMC 2016).

**Table A-6–1**. HMS FMP Management Unit Species.

| Common Name | Scientific Name |
|---|---|
| Striped marlin | *Kajikia audax** |
| Swordfish | *Xiphias gladius* |
| Common thresher shark | *Alopias vulpinus* |
| Shortfin mako shark | *Isurus oxyrinchus* |
| Blue shark | *Prionace glauca* |
| North Pacific albacore | *Thunnus alalunga* |
| Yellowfin tuna | *T. albacares* |
| Bigeye tuna | *T. obesus* |
| Skipjack tuna | *Katsuwonus pelamis* |
| Pacific bluefin tuna | *T. orientalis* |
| Mahi-mahi or Dolphinfish | *Coryphaena hippurus* |

* Previously, striped marlin were included in the genus *Tetrapturus* (Collette et al. 2006).

We group the various fish stocks caught by the 2019 Longline EFP into three categories: *commonly caught management unit species, other commonly caught species* and *uncommonly caught species*. Management unit species of the HMS FMP that have been caught at rates greater than 0.5 animals per 1,000 hooks are considered *commonly caught management unit species*, species other than HMS management unit species that have been caught at rates greater than 0.5 animals per 1,000 hooks are considered *other commonly caught species*, and species that are caught at rates less than 0.5 animals per 1,000 hooks are considered *uncommonly caught species*. The 2019 Longline EFP observer catch summaries are presented in the data summary section below showing observed catch (number of animals) and catch per unit effort (CPUE; catch per 1,000 hooks) for *commonly caught management unit species*, *other commonly caught species*, and *uncommonly caught species* in Tables 6-2 and 6–4. Data to derive these catch rates were obtained from NMFS WCR Observer Program (C. Villafana, pers. comm., March 31, 2020).

Prior to issuance, the 2019 Longline EFP was predicted to result in less than one interaction with species including Guadalupe fur seal, Laysan albatross, ginkgo-toothed beaked whale, beaked whale species, bottlenose dolphin, Risso's dolphin, striped dolphin, short-beaked common dolphin, unidentified sea lions, northern elephant seal, and loggerhead sea turtle; and less than two interactions with leatherback sea turtle and black-footed albatross. The only observed interactions with protected species were two California sea lion interactions (released alive but injured) in the SSLL sector (Table A-6-3).

Although the 2019 Longline EFP only operated for 3 of the 24 months issued, the data collected indicate higher swordfish catch relative to proxy data NMFS used for analyzing these EFPs prior to issuance (i.e., data from the Hawaii longline fishery east of 140° West (W) longitude from 2004 to 2014). For example, DSLL swordfish CPUE (catch per 1,000 hooks) was 1.426 under the 2019 Longline EFP (Table A-6-4) versus 0.141 in the Hawaii DSLL fishery data east of 140˚ W (Appendix 3, Table 3-4). The 2019 Longline EFP SSLL swordfish CPUE was 12.127 (Table A-6-3) versus 10.867 in the Hawaii SSLL fishery data east of 140˚ W (Appendix 3, Table A-3-2). However, the CPUE for blue sharks and shortfin mako sharks was an order of magnitude higher than projected by the Hawaii longline fishery data east of 140˚ W. The 2019 Longline observer records indicate that on DSLL trips approximately 11 percent of blue shark and 26 percent of shortfin mako shark catch were kept, while approximately 87 percent and 72 percent, respectively, were released alive (Table A-6-7). Similarly, on the 2019 Longline EFP SSLL trips, approximately 10 percent of blue shark and 37 percent shortfin mako shark catch were kept while approximately 88 percent and 59 percent, respectively, were released alive.

Notably, swordfish CPUE increased 5 to 7 fold when fishing inside the PLCA. The 2019 Longline EFP SSLL swordfish CPUE was 14.383 fish per 1,000 hooks for sets made inside the PLCA versus 1.879 fish per 1,000 hooks for sets made outside (Table A-6-5). Similarly, the 2019 Longline EFP DSLL swordfish CPUE was 4.180 fish per 1,000 hooks for sets made inside versus 0.773 fish per 1,000 for sets made outside the PLCA (Table A-6-6).

Because resource user groups expressed concerns about the potential for striped marlin interactions during longline EFP activities, the trials set a striped marlin species limit equal to the number of animals expected to be caught during the EFP activities. The limit was 57 animals; however, no striped marlin were caught. Additionally, no other prohibited species were caught. The EFP holders submitted a preliminary report on their 2019 EFP activities at the 2020 June Council meeting (PFMC 2020), per Council Operating Procedure 20 (PFMC 2017).

**DATA SUMMARY**

**Table A-6–2**. Total observed catch (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) for the shallow-set sector of the 2019 Longline EFP. The total number of hooks observed was 50,136.

| Species | Total Caught | Number Kept | Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|
| | | | Alive | Dead | |
| ***Commonly Caught Management Unit Species*** | | | | | |
| Shark, Blue | 4,326 | 424 | 3828 | 74 | 86.285 |
| Shark, Shortfin Mako | 971 | 363 | 570 | 38 | 19.367 |
| Swordfish | 608 | 584 | 21 | 3 | 12.127 |
| Tuna, Albacore | 38 | 34 | 1 | 3 | 0.758 |
| Shark, Common Thresher | 27 | 13 | 9 | 5 | 0.539 |
| ***Other Commonly Caught Species*** | | | | | |
| Ribbonfish, Tapertail | 59 | 6 | 10 | 43 | 1.177 |
| Lancet | 58 | 3 | 23 | 32 | 1.157 |
| Opah | 46 | 40 | 5 | 1 | 0.918 |
| ***Uncommonly Caught Species*** | | | | | |
| Tuna, Bigeye[1] | 18 | 18 | 0 | 0 | 0.359 |
| Oilfish | 10 | 0 | 9 | 1 | 0.199 |
| Stingray, Pelagic | 6 | 0 | 6 | 0 | 0.120 |
| Mola, Common | 4 | 0 | 4 | 0 | 0.080 |
| Pomfret, Pacific | 4 | 4 | 0 | 0 | 0.080 |
| Tuna, Yellowfin[1] | 3 | 3 | 0 | 0 | 0.060 |
| Shark, Bigeye Thresher | 1 | 0 | 1 | 0 | 0.020 |
| Tuna, Bluefin[1] | 1 | 1 | 0 | 0 | 0.020 |
| Escolar | 1 | 0 | 0 | 1 | 0.020 |
| King-Of-The-Salmon | 1 | 0 | 0 | 1 | 0.020 |
| Squid, Red Flying | 1 | 1 | 0 | 0 | 0.020 |
| Triggerfish, Rough | 1 | 0 | 0 | 1 | 0.020 |
| Pomfret, Sickle | 1 | 1 | 0 | 0 | 0.020 |
| Tuna, Skipjack[1] | 1 | 1 | 0 | 0 | 0.020 |
| Shark, Unidentified Thresher | 1 | 0 | 1 | 0 | 0.020 |
| Ribbonfish, Unknown | 1 | 0 | 0 | 1 | 0.020 |
| Dogfish, Velvet | 1 | 1 | 0 | 0 | 0.020 |

[1] Defined as a Management Unit Species under the under the HMS FMP (Table A-6-1) but caught at an *uncommonly caught species* rate (<0.5 per 1,000 hooks).

**Table A-6-3**. Total observed protected species catch (number of interactions) and catch-per-unit-effort (number of interactions per 1,000 hooks) for the shallow-set sector of the 2019 Longline EFP. The total number of hooks observed was 50,136.

| Protected Species | Total Caught | Number Kept | Number Returned | | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|---|
| | | | Alive | Dead | Injured | |
| **Marine Mammals** | | | | | | |
| Sea Lion, California[1,2] | 2 | 0 | 0 | 0 | 2 | 0.040 |

[1] Both California sea lions were released alive but injured.

[2] California sea lions were not caught in the Hawaii longline fisheries data east of 140˚ W; however, there were interactions in the U.S. West Coast drift gillnet (DGN) fishery dataset (Appendix 4) so California sea lions were moved into the SSLL "protected species considered likely to be affected" category for evaluating impacts to protected species. Since catch rates from the U.S. West Coast DGN fishery cannot be applied to longline fisheries, the catch rate from SSLL sector of the 2019 Longline EFP was used as a proxy catch rate in the EIS.

**Table A-6-4**. Total observed catch (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) for the 2019 deep-set Longline EFP. The total number of hooks observed was 37,156.

| Species | Total Caught | Number Kept | Number Returned | | Catch per 1,000 Hooks |
|---|---|---|---|---|---|
| | | | Alive | Dead | |
| ***Commonly Caught Management Unit Species*** | | | | | |
| Shark, Blue | 902 | 101 | 789 | 12 | 24.276 |
| Shark, Shortfin Mako | 62 | 16 | 45 | 1 | 1.669 |
| Swordfish | 53 | 50 | 3 | 0 | 1.426 |
| ***Other Commonly Caught Species*** | | | | | |
| Opah | 99 | 94 | 3 | 2 | 2.664 |
| Ribbonfish, Tapertail | 68 | 0 | 23 | 45 | 1.830 |
| ***Uncommonly Caught Species*** | | | | | |
| Oilfish | 12 | 0 | 12 | 0 | 0.323 |
| Lancetfish | 11 | 0 | 1 | 10 | 0.296 |
| Tuna, Albacore[1] | 6 | 6 | 0 | 0 | 0.161 |
| Shark, Common Thresher[1] | 6 | 5 | 0 | 1 | 0.161 |
| Mola, Common | 4 | 0 | 4 | 0 | 0.108 |
| Escolar | 3 | 3 | 0 | 0 | 0.081 |
| Ribbonfish, Unidentified | 3 | 0 | 1 | 2 | 0.081 |
| Tuna, Bigeye[1] | 2 | 2 | 0 | 0 | 0.054 |
| Pomfret, Brama spp. | 2 | 0 | 0 | 2 | 0.054 |
| Pomfret, Rough | 2 | 0 | 2 | 0 | 0.054 |
| Shark, Unidentified | 2 | 0 | 0 | 2 | 0.054 |
| Shark, Bigeye Thresher | 1 | 1 | 0 | 0 | 0.027 |
| Bullet Mackerel[2] | 1 | 1 | 0 | 0 | 0.027 |
| Shark, Longfin Mako | 1 | 0 | 1 | 0 | 0.027 |
| Pacific Fanfish | 1 | 0 | 0 | 1 | 0.027 |
| Pacific Hake | 1 | 0 | 1 | 0 | 0.027 |
| Ribbonfish, Scalloped | 1 | 0 | 1 | 0 | 0.027 |
| Tuna, Skipjack[1] | 1 | 1 | 0 | 0 | 0.027 |
| Tuna, Yellowfin[1] | 1 | 1 | 0 | 0 | 0.027 |

[1] Defined as a Management Unit Species under the under the HMS FMP (Table A-6-1) but caught at an *uncommonly caught species* rate (<0.05 per 1,000 hooks).

[2] Bullet mackerel were not caught in the Hawaii longline fishery data east of 140˚ W; however, they were categorized as a *major species* in the DGN fishery dataset so were moved into the DSLL *commonly caught species* category for evaluating impacts to fish species. Since catch rates from the DGN fishery cannot be applied to longline fisheries, the catch rate from the DSLL sector of the 2019 Longline EFP was used as a proxy catch rate for bullet mackerel.

**Table A-6-5**. Total observed number of hooks set, total number of swordfish observed caught (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) for the shallow-set sector of the 2019 Longline EFP fishing inside vs. outside the PLCA.

| | Number of Shallow-set Hooks Observed | Total Number of Swordfish Caught | Catch per 1,000 hooks |
|---|---|---|---|
| **Sets Inside the PLCA** | 41,090 | 591 | 14.383 |
| **Sets Outside the PLCA** | 9,046 | 17 | 1.879 |

**Table A-6-6**. Total observed number of hooks set, total number of swordfish observed caught (number of animals) and catch-per-unit-effort (number of animals per 1,000 hooks) for the deep-set sector of the 2019 Longline EFP fishing inside vs. outside the PLCA.

| | Number of Deep-set Hooks Observed | Total Number of Swordfish Caught | Catch per 1,000 hooks |
|---|---|---|---|
| **Sets Inside the PLCA** | 8,852 | 37 | 4.180 |
| **Sets Outside the PLCA** | 20,700 | 16 | 0.773 |

**Table A-6-7.** Summary of the Longline EFP observer data in total number of fish for blue shark, shortfin mako shark and swordfish by DSLL and SSLL; and whether the animals were "kept" for landing or returned (discarded) to the sea. If the animal was returned to the sea, they were given a value of either "returned alive" or "returned dead."

**Shallow-set Longline:**

| Species and Disposition | Number of Fish |
|---|---|
| **Blue Shark Total Number Fish** | **4327** |
| Kept | 424 |
| Returned Alive | 3828 |
| Returned Dead | 74 |
| Unknown (left blank) | 1 |
| **Shortfin Mako Shark Total Number Fish** | **971** |
| Kept | 363 |
| Returned Alive | 570 |
| Returned Dead | 38 |
| **Swordfish Total Number Fish** | **608** |
| Kept | 584 |
| Returned Alive | 21 |
| Returned Dead | 3 |

**Deep-set Longline:**

| Species and Disposition | Number of Fish |
|---|---|
| **Blue Shark Total Number Fish** | **902** |
| Kept | 101 |
| Returned Alive | 789 |
| Returned Dead | 12 |
| **Shortfin Mako Shark Total Number Fish** | **62** |
| Kept | 16 |
| Returned Alive | 45 |
| Returned Dead | 1 |
| **Swordfish Total Number Fish** | **53** |
| Kept | 50 |
| Returned Alive | 3 |
| Returned Dead | 0 |

**REFERENCES**

Collette, B.B., J.R. McDowell, and J.E. Graves. 2006. Phylogeny of Recent Billfishes (*Xiphoidei*). Bulletin of Marine Science. Volume 79, pages 455 to 46.

National Marine Fisheries Service (NMFS). 2019. Longline Exempted Fishing Permit Terms and Condition, June 2020. https://www.fisheries.noaa.gov/west-coast/sustainable-fisheries/highly-migratory-species-exempted-fishing-permits.

Pacific Fishery Management Council (PFMC). 2003. Final Fishery Management Plan and Environmental Impact Statement for the U.S. West Coast Fisheries for Highly Migratory Species. Pacific Fishery Management Council. August 2003. 794 pages.

PFMC. 2016. Fishery Management Plan for the U.S. West Coast Fisheries For Highly Migratory Species. As Amended Through Amendment 3. 104 pages.

PFMC. 2017. Council Operating Procedure 20. Protocol for Consideration of Exempted Fishing Permits for Highly Migratory Species Fisheries. April 11, 2017. 4 pages.

PFMC. 2020. Preliminary Report on the 2019 Swordfish Longline EFP Fishery Presented to NMFS West Coast Region. Drs. Doyle A. Hanan1 and Michael G. Hinton on behalf of Captains David Haworth and John Gibbs. June 2020 Council meeting. Informational Report 11. 45 pages.

Villafana, C. 2020. Lead, West Coast Region Observer Program Manager, National Marine Fisheries Service, Long Beach, California. Personal communication, email to Tonya Wick (Ocean Associates, Inc.) January 15, 2020.

# Appendix 7. United States West Coast Deep-set Linked Buoy Gear Observer Data: Summary, Discussion and Data Summary

## SUMMARY

This appendix summarizes the 2018 through 2020 United States (U.S.) West Coast deep-set linked buoy gear (LBG) exempted fishing permit (EFP) fishing trials (deep-set LBG EFPs) observer dataset. Despite differences in gear type, time-area concentration of effort, and the units used to calculate catch per unit effort (CPUE), the deep-set LBG EFPs observer records provide information of the potential suite of *major species*, *minor species* and prohibited species; as well as any protected species likely to interact with fishing gear in the Proposed Action Area (see Section 3 in the Draft Environmental Impact Statement (EIS)). However, due to the very limited duration of the 2018 through 2020 deep-set LBG EFPs, this dataset is only used as a proxy until larger and more robust datasets are not available.

## DISCUSSION

Between 2018 and 2020, the National Marine Fisheries Service (NMFS) issued EFPs to fish deep-set LBG sets to target swordfish in Federal waters off Southern California, i.e., in southern reaches of the Proposed Action Area (Figure A-7-1). During that time, a total of seven vessels fished over a total of 105 days. Observer data were collected for most EFP fishing days; however, for days not observed logbook data was used to fill-in gaps. Deep-set LBG EFP trips that started fishing in 2018 were observed at 100 percent through 2019, and those starting in 2020 were observed at 100 percent for the first year. After being observed at 100 percent in the first year, EFPs were observed for a minimum of 10 percent in subsequent years.

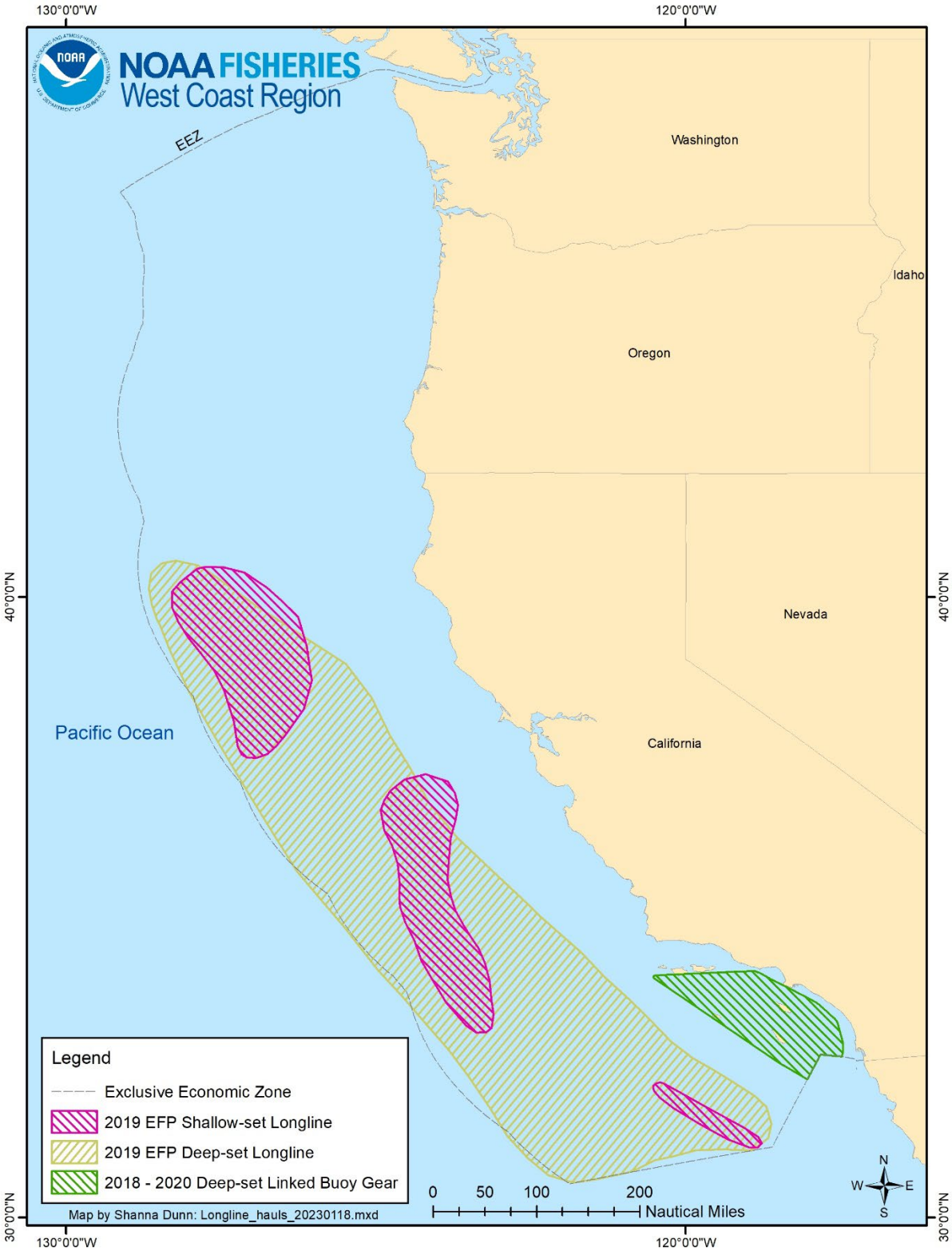


**Figure A-7-1**. Spatial extent of fishing effort for the three-month shallow-set longline and deep-set longline sectors of the 2019 Longline EFP fishing trials (Appendix 6) and the deep-set linked buoy gear EFP fishing trials in the U.S. West Coast EEZ (i.e., the Proposed Action Area).

Deep-set LBG EFP gear consists of a monofilament mainline which extends vertically from a buoy-array (either directly or from a minimum ~15.2 meters (50-foot (ft)) extender) to a weight; then horizontally to a second weight; then vertically to a minimum 50-ft extender attached to a second buoy-array. Up to three gangions with hooks may be connected to each horizontal section of the mainline, all of which must be fished below 90 meters (m; ~295 ft). The pieces may be linked together by the mainline, which is serviceable between each piece of LBG and must be suspended between links below a depth of 50 ft. No more than 10 sections of LBG was deployed at any one time, with no more than 3 hooks per section. Deep-set LBG configuration consists of strike indicator buoys deployed at the surface, a vertical mainline, baited circle hooks at depth, and a weighted sinker to ensure that hooks reach depth rapidly and remain at depth. Deep-set LBG configuration also includes additional sub-surface branch lines connecting the various strike indicator buoys (Figure A-7-2).

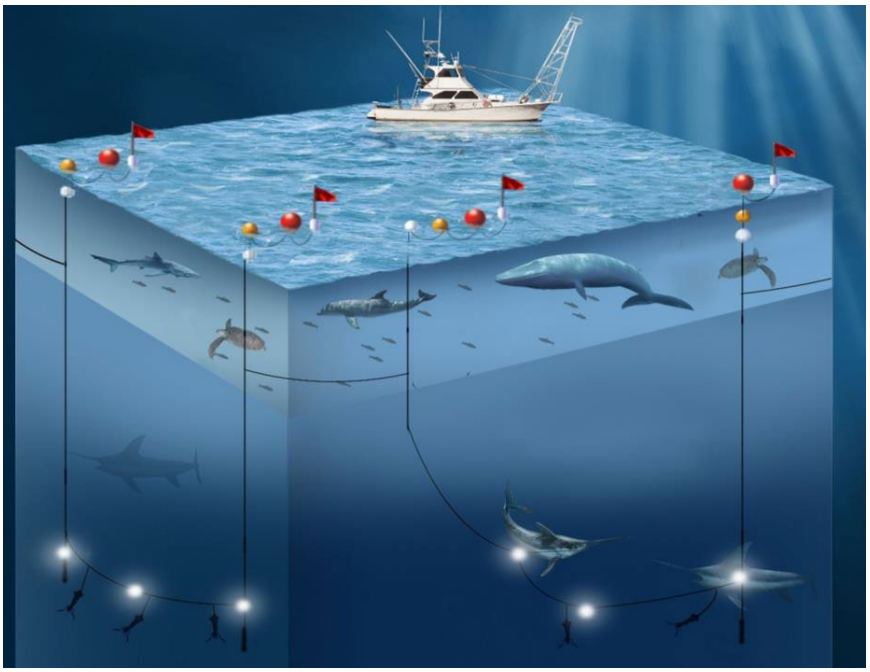

**Figure A-7-2.** Deep-set linked buoy gear configuration, as described by the Pfleger Institute of Environmental Research (PIER; Sepulvida and Aalbers 2019).

The surface buoy flotation and strike detection array consists of a minimum of three buoys (a minimum 45 pounds (lbs) buoyancy non-compressible hard ball, a minimum 6 lbs buoyancy buoy, and a strike detection buoy) with no more than 6 ft of line between adjacent buoys, all connected in-line by a minimum of ⅜ inch diameter line. Use of buoy tether attachments (e.g., non-streamlined gear with loops and/or dangling components) is prohibited. Terminal LBG buoy-arrays must include a locator flag, a radar reflector, and vessel/fisher identification compliant with all current state requirements and regulations. The weights must be a minimum of ~3.6 kg (8 lbs), the lines connecting surface buoys must

be at least ⅜ inch diameter, and the hook size must be a minimum size 16/0 circle hooks with not more than 10 degrees offset. No more than ten pieces, in total, was deployed at one time, with no more than three hooks per piece.

While the deep-set LBG EFP trials provide data targeting swordfish and fished in close proximity to that of the Proposed Action, we do not apply catch or interaction rates from these EFPs given differences in CPUE as the basis for CPUE is catch per days fished for LBG versus catch per 1,000 hooks for longline-type fisheries. Nevertheless, the deep-set LBG dataset is used to qualitatively inform opinions about the potential suite of target, non-target, prohibited finfish, and other species likely to interact with fishing gear in the Proposed Action Area (see Section 3 of the draft EIS).

Species that are actively managed under the *Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species* are termed Management Unit Species (HMS FMP; PFMC 2003), and are shown in Table A-7-1 (PFMC 2016).

**Table A-7–1**. HMS FMP Management Unit Species.

| Common Name | Scientific Name |
|---|---|
| Striped marlin | *Kajikia audax** |
| Swordfish | *Xiphias gladius* |
| Common thresher shark | *Alopias vulpinus* |
| Shortfin mako shark | *Isurus oxyrinchus* |
| Blue shark | *Prionace glauca* |
| North Pacific albacore | *Thunnus alalunga* |
| Yellowfin tuna | *T. albacares* |
| Bigeye tuna | *T. obesus* |
| Skipjack tuna | *Katsuwonus pelamis* |
| Pacific bluefin tuna | *T. orientalis* |
| Mahi-mahi or Dolphinfish | *Coryphaena hippurus* |

* Previously, striped marlin were included in the genus *Tetrapturus* (Collette et al. 2006).

The 2018 through 2020 deep-set LBG data summary section below shows observer and logbook catch summaries by species and catch rates for *major species* and *minor species* in Table A-7-2. Major species are defined as species that have been captured in quantities greater than 1 animal per total days fished and *minor species* captured in quantities less than 1 animal per total days fished. There was no observed catch for prohibited species or protected species during the entire 2018 through 2020 LBG fishing trials. Furthermore, the *minor species* captured during LBG EFP fishing were so infrequent (i.e., less than or equal to 5 fish over 105 days fishing; Table A-7-2) and did not involve species for which there are

pressing resource conservation concerns. Data to derive these catch rates were obtained from NMFS WCR Observer Program.

## DATA SUMMARY

**Table A-7–2**. Total observed catch (number of animals) and catch-per-unit-effort (number of animals per total days fished) by *major species* and *minor species* for the 2018 through 2020 deep-set linked buoy gear EFPs. The total number of days fished was 105 days.

| Species | Total Caught | Catch-per-Unit-Effort |
|---|---|---|
| ***Major Species*** | | |
| Swordfish[1] | 135 | 1.286 |
| ***Minor Species*** | | |
| Tuna, Bluefin[1] | 5 | 0.048 |
| Escolar | 3 | 0.029 |
| Shark, Blue[1] | 2 | 0.019 |
| Shark, Shortfin Mako[1] | 1 | 0.010 |
| Shark, Bigeye Thresher | 1 | 0.010 |
| Shark, Sevengill | 1 | 0.010 |

[1] Defined as a Management Unit Species under the under the HMS FMP (Table A-7-1).

**REFERENCES**

Collette, B.B., J.R. McDowell, and J.E. Graves. 2006. Phylogeny of Recent Billfishes (*Xiphoidei*). Bulletin of Marine Science. Volume 79, pages 455 to 46.

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# Appendix 8. Use of the Entire Hawaii Longline Observer and Logbook Data to Define Typical Annual Effort for Vessels Using Longline-type Gear: Summary, Discussion and Data Analysis

## SUMMARY

The purpose of this appendix is to define typical annual effort for vessels using longline-type gear in a United States (U.S.) fishery, using the entire Hawaii longline observer and logbook datasets from 2004 through 2019 as a proxy for a typical vessel fishing longline-type gear. We calculate typical annual effort for a vessel fishing longline-type gear using average annual observed hooks per set and average annual sets per vessel from the entire Hawaii datasets for the shallow-set longline (SSLL) and deep-set longline (DSLL) fisheries. We then apply the annual average effort for a typical vessel to derive a range of action alternatives by varying levels of annual effort (maximum number of hooks per year) for Components 1 (SSLL) and 2 (DSLL) for the Proposed Action (see Section 2.3 of the draft environmental impact statement (EIS), Action Alternatives Considered in Detail).

## DISCUSSION

Below we describe how the entire Hawaii SSLL and DSLL observer datasets (PacFIN 2020) and logbook reports for 2004 through 2019 (E. Forney, pers. comm. October 20, 2020), were used to define typical effort for a vessel in a U.S. fishery using longline-type gear. Because vessels in the Hawaii longline fleet may fish in both the eastern and western Pacific Ocean, a spatially stratified (i.e., only Hawaii longline data east of 140° West longitude) subset of effort data is not useful for determining the average level of effort for a typical vessel in terms of annual sets per vessel and hooks deployed per set.

## DATA ANALYSIS

We calculate the average (avg.) annual effort for a U.S. vessel fishing longline-type gear using average annual observed hooks per set and average annual sets per vessel, for the entire Hawaii longline dataset, by SSLL and DSLL fishery sectors (Table A-8-1):

***Avg. Annual Effort per Vessel** = **Avg. Annual Observed Hooks per Set** x **Avg. Annual Sets per Vessel***

where the ***Avg. Annual Sets Per Vessel*** is the ***Avg. Annual Number of Sets*** divided by the ***Avg. Annual Number of Active Vessels*** for SSLL and DSLL fishery sectors:

***Avg. Annual Sets Per Vessel = Avg. Annual Number of Sets ÷ Avg. Annual Number of Active Vessels***

Below are the definitions and data sources for each element:

### *Average Annual Effort per Vessel*

The *average annual effort per vessel* is the average number of hooks deployed per year, per vessel, by SSLL and DSLL fishery sectors (Table A-8-1).

**Table A-8-1**. Overall average annual observed hooks per set[1], overall average annual sets per vessel[2,3] and overall average annual effort per vessel[3] for the 2004 through 2019 Hawaii longline fisheries datasets by deep-set longline and shallow-set longline.

| | **Overall Average Annual Observed Hooks Per Set (Number of Hooks)[1]** | **Overall Average Annual Sets Per Vessel (Number of Set)[2,3]** | **Overall Average Annual Effort Per Vessel (Number of Hooks)[3]** |
|---|---|---|---|
| **Shallow-set Longline** | 1,000 (998) | 61 | 61,000 |
| **Deep-set Longline** | 2,400 (2,395) | 138 | 331,200 |

[1] Overall average annual observed hooks per set rounded to hundred with the calculated raw value in parenthesis. Data taken from entire Hawaii longline observer database for years 2004 to 2019; however, SSLL averages do not include years where leatherback (2011) or loggerhead (2006, 2018 and 2019) turtles reached limits (Table A-8-2) and DSLL included all years (Table A-8-3).

[2] Data for the overall average number of sets per year was taken from the entire Hawaii longline observer database for years 2004 to 2019; however, the SSLL averages do not include years where turtles reached limits (Table A-8-2). Additionally, the year 2004 was not a full year of observer data as the Hawaii SSLL fishery did not reopen to fishing until late 2004; therefore, the SSLL data from 2004 was excluded (E. Forney, pers. comm., March 31, 2021).

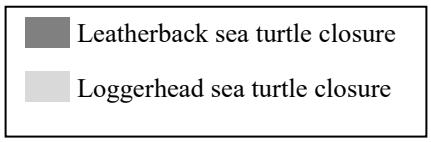
[3] Data for the number of active vessels per year was taken from entire Hawaii longline logbook reports for years 2004 to 2019. However, the reports did not include the number of active vessels for SSLL until 2007 (Table A-8-4) and for DSLL until 2005 as vessels did not need to declare whether they were fishing deep-set or shallow-set until the Hawaii SSLL fishery reopened in late 2004 (Table A-8-5).

### *Average Annual Observed Hooks per Set*

The *average annual observed hooks per set* is the average number of observed hooks per set by SSLL and DSLL (Table A-8-1). For the SSLL component, we used the entire Hawaii SSLL fishery observer dataset for the years 2004 through 2019 to calculate the average annual observed hooks per set, except in years where the SSLL fishery was closed due to leatherback (2011) or loggerhead (2006, 2018 and 2019) sea turtle limits being reached (Table A-8-2). For the DSLL component, we used the entire Hawaii DSLL fishery observer dataset for the years 2004 through 2019 to calculate the average annual hooks per set (Table A-8-3). However, the DSLL observer dataset only represents about 21.2 percent of total sets, as the Hawaii DSLL fishery is not observed at 100 percent (Table A-8-4).

**Table A-8-2.** Average observed number of hooks per set by year and overall average observed number of hooks per set for the entire Hawaii shallow-set longline fishery observer dataset for the years 2004 through 2019[1].

| Year | Average Observed Number of Hooks Per Set |
|---|---|
| 2004[1] | 857 |
| 2005 | 825 |
| 2006[1] | 796 |
| 2007 | 863 |
| 2008 | 915 |
| 2009 | 962 |
| 2010 | 980 |
| 2011[1] | 1,021 |
| 2012 | 1,083 |
| 2013 | 1,117 |
| 2014 | 1,099 |
| 2015 | 1,103 |
| 2016 | 1,095 |
| 2017 | 1,078 |
| 2018[1] | 1,157 |
| 2019[1] | 1,200 |
| **Overall Average 2004-2019[2]** | **998 or ~1,000** |




[1] The entire Hawaii SSLL fishery observer dataset for the years 2004 through 2019 was used for the overall average observed hooks per set except in years where the SSLL fishery was closed due to leatherback (2011; shaded in dark grey) or loggerhead (2006, 2018 and 2019; shaded in light grey) sea turtle limits being reached. Note, the year 2004 was excluded as it was not a full year of observer data because the Hawaii SSLL fishery did not reopen to fishing until late 2004.

[2] The overall average number of hooks is rounded to the nearest hundred.

**Table A-8-3.** Average observed number of hooks per set by year and overall average observed number of hooks per set for the entire Hawaii deep-set longline fishery observer dataset for the years 2004 through 2019.

| Year | Average Observed Number of Hooks Per Set |
|---|---|
| 2004 | 2,387 |
| 2005 | 2,035 |
| 2006 | 2,093 |
| 2007 | 2,178 |
| 2008 | 2,242 |
| 2009 | 2,238 |
| 2010 | 2,285 |
| 2011 | 2,332 |
| 2012 | 2,398 |
| 2013 | 2,428 |
| 2014 | 2,505 |
| 2015 | 2,521 |
| 2016 | 2,547 |
| 2017 | 2,649 |
| 2018 | 2,715 |
| 2019 | 2,760 |
| **Overall Average 2004-2019[1]** | **2,395 or ~2,400** |

[1]The overall average observed number of hooks per set is rounded to the nearest hundred.

**Table A-8-4.** Number of active vessels[1], total sets observed, average sets per vessel, observer coverage percent, expansion factor, average observed sets per vessel and overall average for the entire Hawaii deep-set longline fishery for the years 2004 through 2019.

| Year | Number of Active Vessels[1] | Total Sets Observed[2] | Observer Coverage Percent[1] | Expansion Factor for DSLL (100%/Observer %)[3] | Average Observed Sets Per Vessel | Average Sets Per Vessel[4] |
|---|---|---|---|---|---|---|
| 2004 | NA | 2,088 | 24.6 | 4.0650407 | NA | |
| 2005 | 117 | 4,585 | 26.1 | 3.8314176 | 39 | 150.2 |
| 2006 | 120 | 3,552 | 21.2 | 4.7169811 | 30 | 140.0 |
| 2007 | 129 | 3,559 | 20.1 | 4.9751244 | 28 | 137.3 |
| 2008 | 127 | 3,901 | 21.7 | 4.6082949 | 31 | 141.6 |
| 2009 | 127 | 3,527 | 20.6 | 4.8543689 | 28 | 134.8 |
| 2010 | 122 | 3,585 | 21.1 | 4.7393365 | 29 | 139.3 |
| 2011 | 129 | 3,571 | 20.3 | 4.9261084 | 28 | 136.4 |
| 2012 | 128 | 3,690 | 20.4 | 4.9019608 | 29 | 141.3 |
| 2013 | 135 | 3,829 | 20.4 | 4.9019608 | 28 | 139.0 |
| 2014 | 139 | 3,843 | 20.8 | 4.8076923 | 28 | 132.9 |
| 2015 | 143 | 3,699 | 20.6 | 4.8543689 | 26 | 125.6 |
| 2016 | 142 | 3,888 | 20.1 | 4.9751244 | 27 | 136.2 |
| 2017 | 145 | 3,847 | 20.4 | 4.9019608 | 27 | 130.1 |
| 2018 | 143 | 4,386 | 20.4 | 4.9019608 | 31 | 150.3 |
| 2019 | 150 | 4,615 | 20.5 | 4.8780488 | 31 | 150.1 |
| **Overall Average 2004-2019** | **133** | **3,760** | **21.2** | **4.7399844** | **29** | **138** |

[1] Data for the number of active vessels per year and the observer coverage percent were taken from entire Hawaii longline logbook reports for years 2004 to 2019. Note that the Hawaii longline fishery vessels did not need to declare whether they were fishing deep-set or shallow-set until the Hawaii SSLL fishery reopened in late 2004; therefore, year 2004 was excluded (shaded in gray).

[2] Total sets observed per year was taken from the entire Hawaii longline observer database for years 2004 to 2019.

[3] The expansion factor (100 percent/observed percent) is applied due to less than 100% human observer coverage in the Hawaii DSLL fishery.

[4] Average sets per vessel per year were calculated using the average observed sets per vessel from the entire Hawaii observer dataset multiplied times the expansion factor.

***Average Annual Sets per Vessel***

The *average annual sets per vessel* is the average number of sets per vessel per year (Table A-8-1) and is calculated using the average number of sets per year from the entire Hawaii observer dataset divided by the number of active vessels per year from the entire Hawaii longline fishery logbook data reports.

***Average Annual Number of Sets***

The *average annual number of sets* is the average sets per year by SSLL and DSLL. For the SSLL component, we used the entire Hawaii longline fishery observer dataset for the years 2004 through 2019 to calculate the average annual number of sets, except in years where the SSLL fishery was closed due to leatherback (2011) or loggerhead (2006, 2018 and 2019) sea turtle limits being reached (Table A-8-4). Additionally, the year 2004 was not a full year of observer data as the Hawaii SSLL fishery did not reopen to fishing until late 2004; therefore, we excluded the SSLL data from 2004. For the DSLL component, we used the entire Hawaii longline fishery observer dataset for 2004 through 2019 to calculate the average annual number of sets. However, in order to represent the whole Hawaii DSLL fishery, we multiplied total observed sets per year by an expansion factor (Table A-8-5) because the Hawaii DSLL fishery is not observed at 100 percent.

*Number of Active Vessels per Year*

The number of active vessels per year is the number of vessels that fished in the Hawaii SSLL or DSLL fisheries in each year. For the SSLL component, we used the entire set of Hawaii longline fishery logbook reports for 2004 through 2019; however, the reports did not include the number of active vessels for SSLL until 2007 (Table A-8-5). Additionally, the SSLL fishery was closed in some years due to leatherback (2011) or loggerhead (2006, 2018 and 2019) sea turtle limits being reached (Table A-8-5). For the DSLL component, we used the entire Hawaii longline fishery logbook reports for 2004 through 2019; however, the reports do not include the number of active vessels for DSLL until 2005, as vessels did not need to declare whether they were fishing deep-set or shallow-set until the Hawaii SSLL fishery reopened in late 2004 (Table A-8-4).

We used our calculated average annual effort per vessel to define a range of action alternatives by varying levels of annual effort (maximum number of hooks per year) for Components 1 (SSLL) and 2 (DSLL) of the Proposed Action. We multiplied the maximum annual level of effort in number of hooks for SSLL and DSLL under each alternative by the respective species catch rates to describe expected impacts for each species that may be affected (Section 4 of the draft EIS).

**Table A-8-5**. Number of active vessels[1], total number of sets, average number of sets per vessel and overall average for the entire Hawaii shallow-set longline fishery for the years 2004 through 2019.

| Year | Number of Active Vessels[1] | Total Number of Sets[2] | Average Number of Sets Per Vessel |
|---|---|---|---|
| 2004 | | 135 | |
| 2005 | | 1,646 | |
| 2006 | | 850 | |
| 2007 | 28 | 1,569 | 56 |
| 2008 | 27 | 1,597 | 59 |
| 2009 | 28 | 1,762 | 63 |
| 2010 | 28 | 1,872 | 67 |
| 2011 | 20 | 1,474 | 74 |
| 2012 | 18 | 1,364 | 76 |
| 2013 | 15 | 962 | 64 |
| 2014 | 20 | 1,338 | 67 |
| 2015 | 22 | 1,156 | 53 |
| 2016 | 13 | 727 | 56 |
| 2017 | 20 | 1,005 | 50 |
| 2018 | 11 | 420 | 38 |
| 2019 | 14 | 312 | 22 |
| **Overall Average 2004-2019** | **20** | **1,137** | **61** |

Data not recorded

Closure of fishery due to sea turtle limits being reached

[1] Data for the number of active vessels per year was taken from entire Hawaii longline logbook reports for years 2004 to 2019. However, the reports did not include the number of active vessels for SSLL until 2007; therefore, the SSLL data from 2004 to 2006 was excluded (shaded in dark gray).

[2] Data for the overall number of sets per year was taken from the entire Hawaii longline observer database for years 2004 to 2019; however, year 2004 was excluded as it was not a full year of observer data because the Hawaii SSLL fishery did not reopen to fishing until late 2004. Furthermore, the SSLL overall average number of sets per year per vessel does not include years (2006, 2011, 2018 and 2019) where turtles reached limits (shaded in light gray; Table A-8-2).

For comparison purposes, note that the average hooks set per year for all vessels in the Hawaii SSLL fishery was 1,330,145 hooks (Table A-8-6), and in the Hawaii DSLL fishery was 44,538,364 hooks (Table A-8-7).

**Table A-8-6.** Number of hooks set and overall average number of hooks set for the entire Hawaii shallow-set longline fishery sector for years 2004 through 2019.

| Year | Number of Hooks Set |
|---|---|
| 2004[1] | 115,718 |
| 2005 | 1,358,247 |
| 2006[2] | 676,716 |
| 2007 | 1,353,761 |
| 2008 | 1,460,042 |
| 2009 | 1,694,550 |
| 2010 | 1,835,182 |
| 2011[2] | 1,505,467 |
| 2012 | 1,476,969 |
| 2013 | 1,074,909 |
| 2014 | 1,470,683 |
| 2015 | 1,274,805 |
| 2016 | 796,165 |
| 2017 | 1,083,216 |
| 2018[2] | 486,013 |
| 2019[2] | 374,487 |
| **Overall Average** | **1,330,145** |

[1] The year 2004 data was not used, as the Hawaii SSLL fishery sector did not reopen to fishing until late 2004; therefore, 2004 is not a full year of observer data.

[2] The entire Hawaii SSLL fishery observer dataset for the years 2004 through 2019 was used for the overall average number of hooks set except in years (shaded) where the SSLL fishery was closed due to sea turtle limits being reached (Table A-8-2).

**Table A-8-7**. Number of hooks observed, expansion factor for DSLL and the overall estimated number of hooks set for the entire Hawaii deep-set longline fishery sector for years 2004 through 2019.

| Year | Number of Hooks Observed[1] | Expansion Factor for DSLL (100%/Observer %)[2] | Estimated Number of Hooks Set[3] |
|---|---|---|---|
| **2004[1]** | 4,073,382 | 4.0650407 | 16,558,463 |
| **2005** | 9,328,681 | 3.8314176 | 35,742,073 |
| **2006** | 7,434,798 | 4.7169811 | 35,069,802 |
| **2007** | 7,751,161 | 4.9751244 | 38,562,990 |
| **2008** | 8,747,946 | 4.6082949 | 40,313,115 |
| **2009** | 7,891,695 | 4.8543689 | 38,309,199 |
| **2010** | 8,190,758 | 4.7393365 | 38,818,758 |
| **2011** | 8,328,872 | 4.9261084 | 41,028,926 |
| **2012** | 8,847,913 | 4.9019608 | 43,372,123 |
| **2013** | 9,296,069 | 4.9019608 | 45,568,966 |
| **2014** | 9,626,794 | 4.8076923 | 46,282,663 |
| **2015** | 9,327,007 | 4.8543689 | 45,276,733 |
| **2016** | 9,901,279 | 4.9751244 | 49,260,095 |
| **2017** | 10,190,504 | 4.9019608 | 49,953,451 |
| **2018** | 11,907,869 | 4.9019608 | 58,371,907 |
| **2019** | 12,739,655 | 4.8780488 | 62,144,659 |
| **Overall Average[1] Hooks 2005-2019** | **8,974,024** | **4.7399844** | **44,538,364** |

[1] The overall average number of hooks observed for DSLL was taken from the entire Hawaii SSLL fishery observer dataset for the years 2004 through 2019; however, the Hawaii longline fishery vessels did not need to declare whether they were fishing deep-set or shallow-set until the Hawaii SSLL fishery reopened in late 2004; therefore, year 2004 was excluded (Table A-8-4).

[2] The expansion factor is the percent observer coverage (100 percent/observed percent; Table A-8-4) because the Hawaii DSLL fishery is not observed at 100 percent.

[3] The estimated number of hooks set was derived by multiplying the number of hooks observed times the expansion factor years 2005 to 2019.

## REFERENCES

Forney, E. Fisheries Information Specialist, Sustainable Fisheries Division/Pacific Islands Regional Office. October 20, 2020. Personal communication, e-mail to Tonya Wick (Ocean Associates, Inc.) regarding the logbook data reports for the Hawaii longline fisheries.

Forney, E. Fisheries Information Specialist, Sustainable Fisheries Division/Pacific Islands Regional Office. March 31, 2021. Personal communication, e-mail to Tonya Wick (Ocean Associates, Inc.) regarding the 2004 shallow-set longline fishery reopening.

Pacific Fisheries Information Network (PacFIN). 2020. Eric Forney (Fisheries Information Specialist, Sustainable Fisheries Division/Pacific Islands Regional Office) extracted the entire Hawaii longline datasets on October 1, 2020.

# Appendix 9. Southwest Fisheries Science Center 2011 Through 2013 Longline Fishing Research Trails: Summary and Discussion


## SUMMARY

This appendix provides a brief synopsis of the SWFSC longline fishing trials and reasons for not including the trials as a proxy dataset for analyses in the Proposed Action.


## DISCUSSION

The SWFSC performed DSLL research fishing trials in the U.S. West Coast EEZ from 2011 to 2013 (SWFSC 2014). The goal of this project was to explore potential gear alternatives for targeting swordfish off California, building on previous efforts to reduce turtle bycatch in longline fisheries. The idea was to shift the longline gear to deeper water to capitalize on the difference is daytime depths, as swordfish typically spend the daylight hours in waters deeper than 200 meters, whereas leatherbacks typically remain above 120 meters (SWFSC 2014).

On three cruises from 2011 through 2013, NOAA collaborated with longline fishermen aboard the chartered F/V *Ventura II* off central and southern California to investigate the efficacy of targeting swordfish during the day using a DSLL (PFMC 2014a). During 47 sets, with hook depths of 230 to 247 meters and soak times of 2.7 to 4 hours, 111 marketable fish (including 8 swordfish, 67 opah, and 23 pomfret) and 352 non-marketable fish (including 328 blue sharks and 17 king-of-the-salmon) were caught. Short soak times were used to maximize fish condition for tagging. Two swordfish, five opah and five blue sharks were released with satellite tags and the majority of the remaining blue sharks were tagged with conventional tags and released. This study concluded that it is possible to catch swordfish and other marketable species below turtle habitat with DSLL; however, swordfish catch was low.

Fishing during these trials were probably impacted by anomalous oceanographic conditions; catch for the U.S. West Coast drift gillnet fleet was very low over the same time periods. Efforts to collect additional data under more realistic fishing operations (i.e., fishing in ideal conditions, over longer time periods) would provide a further test of the gear's potential. At the March 2014 Pacific Fishery Management Council meeting, the SWFSC gave a presentation (PFMC 2014b) and a NMFS-SWFSC report (PFMC 2014a) advising that, given the experimental and small-scale nature of this research, data from the trials should not be used to assess fishing techniques other than those employed during the study and that more research is warranted on the subject.

Ultimately, we do not use the SWFSC longline fishing trials performed by the SWFSC in 2011 through 2013 to analyze the Proposed Action, due to differences in fishing practices, the experimental and small-scale nature of this research, and fishing conditions during these trials which may have been impacted by anomalous oceanographic conditions. It should be noted that these fishing trials did not operate under an EFP, but rather were research studies by the SWFSC with the goal of exploring gear alternatives for targeting swordfish off California (PFMC 2014a and PFMC 2014b).

## REFERENCES

PFMC. 2014a. NMFS Report-Alternative Gear Research Update. NOAA Southwest Fisheries Science Center's Deep-set Longline Experiments, Highly Migratory Species. Agenda Item K.5.b NMFS SWFSC Report March 2014. 2 pages.

PFMC. 2014b. NMFS Report-Alternative Gear Research Slide Show. NOAA Southwest Fisheries Science Center's Deep-set Longline Experiments, Highly Migratory Species. Agenda Item K.5.b NMFS SWFSC Report March 2014.

SWFSC. 2014. The SWFSC Director's 2014 Report on Research Regarding Highly Migratory Species (HMS) and Their Fisheries in the North Pacific Ocean. Administrative Report LJ-14-04. May 2014. 43 pages.

## Appendix 10. Shark Survivability Tagging Study in Conjunction with the Proposed Action: Summary and Discussion


### SUMMARY

This appendix describes a shark survivability tagging study that could be performed as an additional mitigation measure that may added to the required terms and conditions for exempted fishing permits (EFP) granted under the Proposed Action.


### DISCUSSION

During the 2019 three-month longline EFP fishing trials that occurred off the U.S. West Coast exclusive economic zone (EEZ), NMFS observers collected promising data. For target and most other species catch per unit effort (CPUE; catch per 1,000 hooks) was similar to projected CPUE using the 2004 through 2014 Hawaii longline fisheries observer datasets east of 140˚ West longitude (Hawaii subset) as proxy. Additionally, the EFP data indicates very few interactions with protected species (i.e., two California sea lions released alive, but injured). However, CPUE for blue sharks and shortfin mako sharks were an order of magnitude higher than projected CPUE using the Hawaii subset data as a proxy for fishing under the 2019 Longline EFP.

The CPUE for the 2019 shallow-set longline (SSLL) EFP was 13 times higher than projected for blue sharks, and 12 times higher than projected for shortfin mako sharks (Table A-10-1). For DSLL, actual CPUE was 26 times higher than projected for blue sharks and 14 times higher than projected for shortfin mako sharks (Table A-10-2). Observer records indicate that on DSLL trips approximately 11 percent of blue shark and 26 percent of shortfin mako shark were kept, while approximately 87 percent and 72 percent, respectively, were released alive. Similarly, on SSLL trips, approximately 10 percent of blue shark and 37 percent of shortfin mako shark were kept, while approximately 88 percent and 59 percent, respectively, were released alive.

**Table A-10-1. Shallow-set longline projected CPUE (catch per 1,000 hooks) versus actual CPUE, and percent kept for blue shark and shortfin mako shark.**

| | Blue Shark | Shortfin Mako Shark |
|---|---|---|
| **Projected CPUE** | 6.365 | 1.496 |
| **Actual CPUE** | 86.305 | 19.367 |
| **Percent Kept** | 10% | 37% |

**Table A-10-2. Deep-set longline projected CPUE (catch per 1,000 hooks) versus actual CPUE, and percent kept for blue shark and shortfin mako shark.**

| | Blue Shark | Shortfin Mako Shark |
|---|---|---|
| **Projected CPUE** | 0.888 | 0.118 |
| **Actual CPUE** | 23.388 | 1.669 |
| **Percent Kept** | 11% | 26% |

Although the blue and shortfin mako shark CPUE was higher than projected, it was foreseeable, as a 1969 United States longline fishing study off central Baja California showed a large number of blue sharks encountered (Kato 1969) even though swordfish catch was promising. The 1969 study reported about 8 swordfish per 1,000 hooks and about 356 blue sharks per 1,000 hooks. Catch rates for the SWFSC fishing trials in 2011 through 2013 also showed high catch rates of blue sharks (Appendix 9). Given the high rates of shark catches off of the North American West Coast, NMFS will be conducting a tagging study to collect information on habitat use and post-release mortality rates of sharks following interactions with the longline-type gear used during the Proposed Action. The study results can aid in ongoing efforts to identify habitat separation to reduce bycatch rates, and can provide insight into post-release survivability, and inform best handling practices to improve survival of bycaught sharks in the West Coast EEZ.

While stock status of blue and shortfin mako sharks are not a management concern at this time, little is known about impacts of fishery interactions on these species in the West Coast EEZ. Given the variability in animal behavior and fishing practices, it is critical to conduct studies in the same region where interactions occur. The Proposed Action provides a unique opportunity to investigate biological characteristics of shark interactions in the West Coast EEZ, and to quantify post-release mortality rates, and identify best handling and release practices.

The shark study would be performed as an optional mitigation measure (see Section 2.4 of the draft environmental impact statement (EIS), measure number 14) that may be added as an optional measure to

the required set of terms and conditions for EFPs granted under the Proposed Action. EFPs that become part of the study would work with the West Coast Region Observer Program (WCROP) to tag 20 blue and 20 mako sharks using satellite linked pop-off archival tags (PAT) during EFP fishing activities in the West Coast EEZ. WCROP observers will be trained to deploy the PATs and record data on hook position, shark condition, and handling and discard data, and other details relevant to each interaction. Blue sharks will be tagged with long-term (180 or 360 days) logging PATs what will provide detailed insight into habitat use in addition to post release survival. This detailed data can feed into the development of EcoCast (a real-time dynamic ocean modeling tool; see Section 2.4 of the draft EIS, measure number 15) and ongoing efforts to reduce bycatch rates through habitat separation. Because data on habitat use for mako sharks is already available for the West Coast EEZ, we can use a cheaper survivorship tag that will reveal the fate of each tagged animal after 60 days.

Despite the ability of U.S. West Coast fishermen to sell blue and shortfin mako shark catch to markets, the CPUEs indicated in the 2019 EFP would supply more than the demand in these markets—at least in the near term, even if they were to continue to develop. Thus, the majority of the catch of these species results in discards. Survivability of shark bycatch is a key issue to address in discerning the success of these EFP trials and determining whether longline fishing activities are scalable within the West Coast EEZ.

The shark tagging study will follow the protocols developed by Dr. Melanie Hutchinson (Hutchinson and Bigelow 2019). Consequently, the results will contribute to a broader study concerning shark interactions with longline gear throughout the Pacific, which currently lacks data for the West Coast EEZ. NMFS has made equipment purchases and is in the process of developing training materials for the study.

## REFERENCES

Hutchinson M. and K. Bigelow. 2019. Quantifying Post Release Mortality Rates of Sharks Incidentally Captured in Pacific Tuna Longline Fisheries and Identifying Handling Practices to Improve Survivorship. Scientific Committee, Fifteenth Regular Session. Pohnpei, Federated States of Micronesia, 12-20 August, 2019. WCPFC-SC15-2019/EB-WP-04 (Rev.01).

Kato, S. 1969. Articles: Longlining for Swordfish in the Eastern Pacific. U.S. Department of the Interior, Fish and Wildlife Service. Sep. No. 837. Pages 30 to 32.

## Appendix 11. Examples of Current NMFS-Approved Tori Lines for Seabird Avoidance while Fishing under an Exempted Fishing Permit to Fish with Longline-type Gear in the United States West Coast Exclusive Economic Zone


### SUMMARY

This appendix provides examples of tori lines currently approved for use by the National Marine Fisheries Service (NMFS) for seabird avoidance in other Pacific Ocean U.S. fisheries. Below are examples of two NMFS-approved tori lines currently in use: (1) the NMFS-approved Hawaii deep-set longline (DSLL) "light" tori line, and (2) one of the NMFS-approved U.S. Pacific Coast groundfish bottom longline tori lines (84 FR 67674, December 11, 2019). These tori lines will be permitted for use while fishing under the Proposed Action (see Section 2 in the draft environmental impact statement (EIS)). NMFS will cover the specifications of "approved" tori line options in the annually mandated Protected Species Workshop (Term and Condition number 2 in Section 2.3 of the draft environmental impact statement (EIS); 50 CFR 660.712(e)).


### DISCUSSION

Seabirds are typically hooked when the fishing line is being deployed off the back of the vessel and while baited hooks are in the air or suspended in surface waters before the gear sinks. The birds dive for the bait, get hooked, and may be dragged underwater and drown. Due to potential seabird interactions with vessels operating under the Proposed Action, exempted fishing permit (EFP) vessels may be required to use a tori line. A tori line (also known as a streamer line, bird scaring line, or bait saver line) is a line that extends from a high point on a vessel (e.g., a mast, pole, or rigging) near the stern of the vessel to a drogue (usually a buoy with a weight, such as a section of chain; NMFS 2019). As the vessel moves forward, the drogue creates tension in the line producing a span of area from the stern where the tori line is aloft. Individual streamers extend to the water to prevent aggressive birds from interacting with hooks. Use of a tori line is consistent with the best scientific information available on methods to reduce seabird interactions during fishing operations.

Tori lines are effective at reducing seabird bycatch in longline operations at rates approaching 100 percent (USFWS 2017; ACAP 2015; PSMFC 2013). Recent studies in the Hawaii DSLL fishery have shown that tori lines are more effective at reducing seabird interactions with baited hooks than the use of blue dyed bait and strategic offal discharge (WPFMC 2021). The results showed 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). Furthermore, the Scientific and Statistical Committee of the Western Pacific Regional Fishery Management Council (WPFMC) supports the replacement of blue-dyed fish bait and strategic offal discard requirements in the Hawaii DSLL fishery with tori lines and best practice training on offal management for seabird bycatch mitigation (WPFMC 2021).

EFP fishermen fishing under the Proposed Action would be required to use NMFS-approved tori lines, except during National Weather Service (NWS) Small Craft Advisories. Currently, tori line options include either the Hawaii "light" tori line in use in the DSLL fishery and currently being tested in the Hawaii shallow-set longline fishery (87 FR 15383, March 17, 2022), or one of the Pacific Coast groundfish bottom longline fishery tori line configurations (84 FR 67674, December 11, 2019). EFP vessels operating under the Proposed Action will be briefed on the construction, use and deployment of different tori line specifications during their participation in the mandatory annual Protected Species Workshop (Section 2.3 of the draft EIS, term and condition number 2; 50 CFR 660.712(e)).

Hawaii "Light" Tori Line Example and Summary Details

The Hawaii "light" tori line design was developed as part of the Tori Line Cooperative Research Project by the WPFMC, NMFS Pacific Islands Fisheries Science Center, NMFS Pacific Islands Regional Office, and Hawaii Longline Association. The design was built specifically for Hawaii DSLL. Figure A-11-1 below shows the tori line basic design and Figure A-11-2 shows a more detailed diagram of the Hawaii "light" tori line. The recommended regulatory specifications of the Hawaii "light" tori line can be found in the WPFMC's Options for a Regulatory Amendment: Modification of Seabird Interaction Mitigation Measures in the Hawaii Deep-set Longline Fishery from the September 2021 meeting (WPFMC 2021).

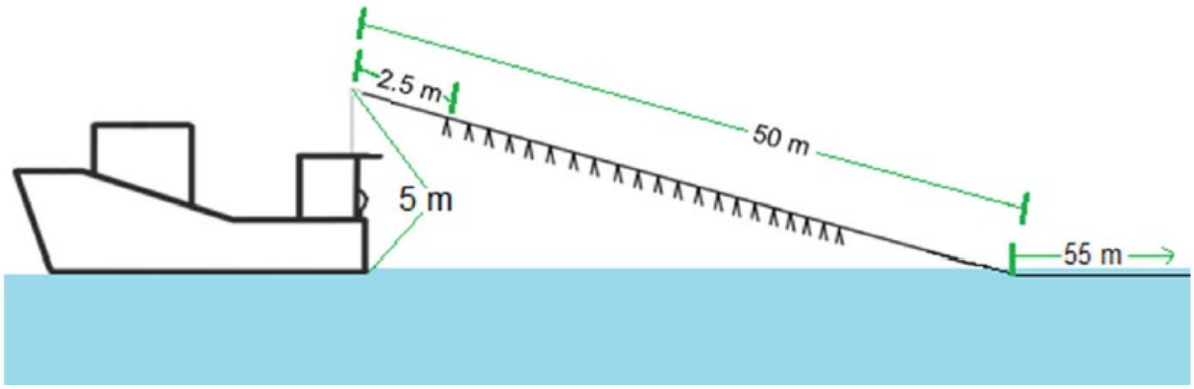



**Figure A-11-1.** Basic diagram of the Hawaii "light" tori line (WPFMC 2021; m=meters).

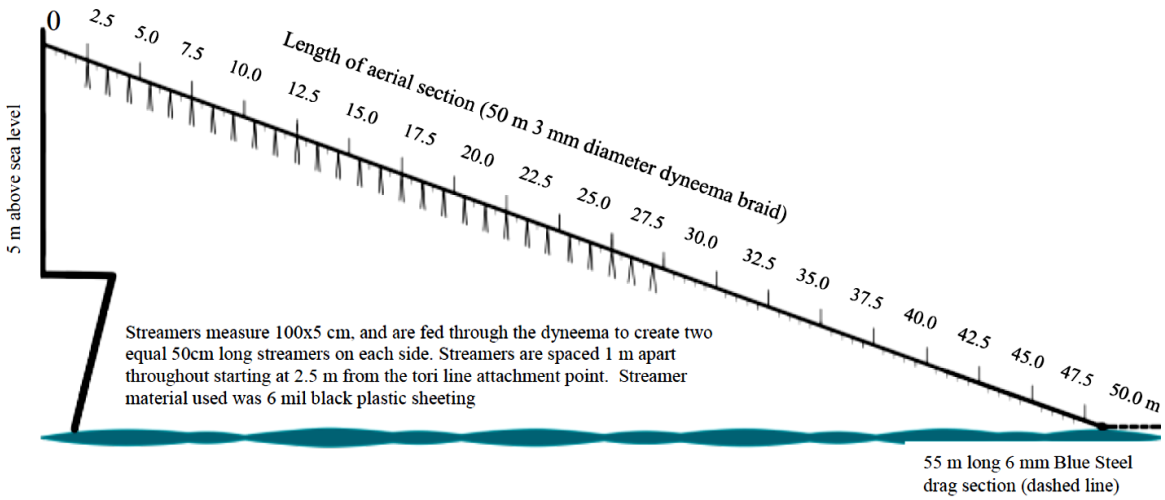



**Figure A-11-2.** Detailed diagram of the Hawaii "light" tori line (WPFMC 2021; cm=centimeters and mm=millimeters).

Pacific Coast Groundfish Fishery Tori Line Example and Summary Details

The Pacific coast groundfish bottom longline fishery requires vessels 26 feet (ft or 7.9 meters (m)) length overall and longer managed under the Pacific Coast Groundfish Fishery Management Plan to use streamer lines while setting gear or to set gear between civil dusk and civil dawn (night set) when fishing in Federal waters north of 36° North latitude (NMFS 2020). The action is necessary to fulfill terms and conditions of a 2017 United States Fish and Wildlife Service Biological Opinion to minimize incidental take of Endangered Species Act-listed short-tailed albatross (*Phoebastria albatrus*). The length of the streamer lines is different depending on the gear type used. Additionally, most boats only need to use one streamer line. The only boats that need to use two streamer lines are those that are over 55 ft using bottom longline gear. Figure A-11-3 shows an example of the tori line configuration for vessels 26 ft or greater with mast, poles and rigging using snap gear. The West Coast groundfish bottom longline-type tori line to be used as a NMFS-approved option for the Proposed Action will depend on the specifications of each EFP vessel. That is, Figure A-11-3 is only one example of tori line use in the Groundfish fishery (NMFS 2020).

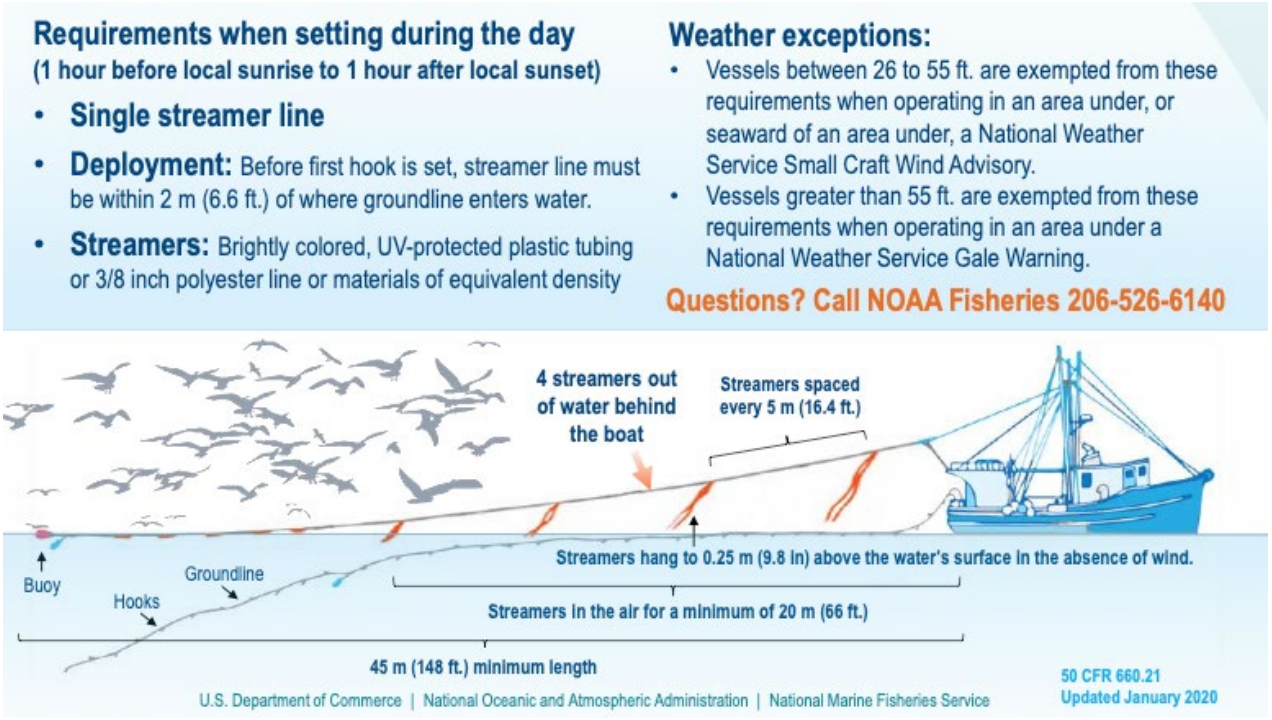



**Figure A-11-3**. An example of the West Coast Seabird Avoidance Measures for vessels 26 feet and greater length overall, with mast, poles or rigging using snap gear (NMFS 2020).

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